

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APUTURE IMAGING INDUSTRIES CO., LTD.,

Petitioner,

v.

ROTOLIGHT LIMITED,

Patent Owner.

Case No.: IPR2024-01425
U.S. Patent No. 10,197,258

**DECLARATION OF P. MORGAN PATTISON, PhD
IN SUPPORT OF PETITION FOR *INTER PARTES*
REVIEW OF U.S. PATENT NO. 10,197,258**

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I, P. Morgan Pattison, PhD, hereby declare as follows:

I. INTRODUCTION

A. Engagement

1. I have been retained by Aputure Imaging Industries Co., LTD. to offer technical analysis and opinions relating to U.S. Patent No. 10,197,258 (Ex. 1001) (the “’258 Patent”) 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 provide this Declaration to present my opinions on the ’258 Patent and its relation to the prior art.

B. Background and Qualifications

4. I received my B.S. in Electrical Engineering, Electronic Devices and Materials from the University of California, San Diego, in 1996. From there, I worked as a laser test engineer at Cymer Laser in San Diego. During my time there, I tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products.

5. After working at Cymer Laser, I attended the University of California, Santa Barbara and received my M.S. in Electrical Engineering, Electronics and Photonics in 2003 and my Ph.D. Materials Science, Electronic and Photonic Materials in 2006.

6. In early 2006, I started working as a project manager for the U.S. Department of Energy where I managed DOE funded R&D projects in energy efficient LED and OLED based lighting technologies, so called solid state lighting (SSL).

7. In 2007, I founded and am still currently the President of Solid State Lighting Services, Inc. Some of the services we offer include providing technical, strategic, and market expertise in the areas of LEDs, OLEDs, lighting, displays, and optoelectronic materials and devices. We also provide services related to LED and lighting product failure and reliability evaluation. I have worked at Solid State Lighting Services, Inc. for almost 17 years.

8. Further details regarding my qualifications are included in my CV, which is attached hereto as Appendix A and incorporated by reference as if set forth in its entirety herein.

II. UNDERSTANDING OF THE GOVERNING LAW

A. Invalidity by Obviousness

9. I understand that obviousness is analyzed from the perspective of a person of ordinary skill in the art (a “POSITA”) at the time the alleged invention was made. I also understand that a POSITA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

10. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art, and in light of the general knowledge in the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

11. I understand that obviousness can be established by combining or modifying disclosures to the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the

alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

12. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known opinions within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

13. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that in order for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim that was known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged.

14. Finally, I understand that Patent Examiners at the U.S. Patent and Trademark Office (“USPTO”) rely upon certain exemplary rationales in review patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is a list of exemplary rationales relied upon by Patent Examiners at the USPTO:

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of a known technique to improve similar devices (methods, or products) in the same way;
- (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- (E) “Obvious to try”- Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and

- (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

B. Materials Relied on in Forming My Opinions

15. In forming my opinions expressed in this declaration, I have relied on my own knowledge, experience, and expertise, as well as the knowledge of a POSITA in the relevant timeframe. In addition, I have reviewed and relied upon the following list of materials, and any other cited reference, in this declaration:

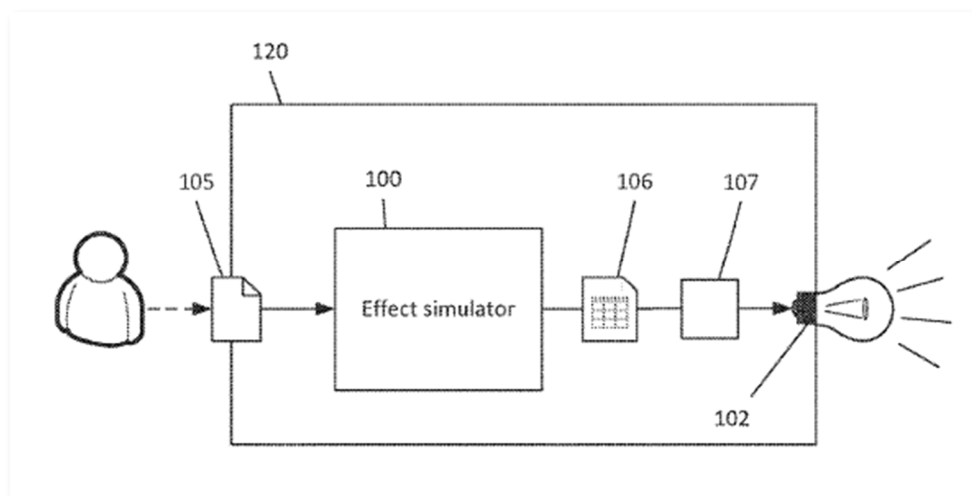
- U.S. Patent No. 10,197,258 (the “’258 Patent”) (EX1001);
- Prosecution History of the ’258 Patent (EX 1002);
- U.S. Patent Application Publication No. 2005/0274626 to Mueller *et al.* (EX1004);
- Installation & User’s Manual for Showline SL PAR 155 ZOOM RGBW LED Luminaire (“Showline”) (EX1005);
- Declaration of Martin Palmer Regarding Showline SL PAR 155 Zoom RGBW LED Luminaire User’s Manual, from *Arnold & Richter Cine Technik GmbH & Co. Betriebs KG v. Rotolight Limited*, No. IPR2021-01497 (P.T.A.B.) (EX1011);
- U.S. Patent No. 8,632,208 to Choong (“Choong”) (EX1012); and

- Declaration of Mike Wood submitted in connection with IPR2021-01497.

III. BACKGROUND OF THE '258 PATENT AND LIGHTING EFFECT TECHNOLOGY

16. Independent Claim 1 of the '258 Patent recites a “lighting system” that includes a “lighting device” and “controller” integrated into a combined unit. The controller is “adapted to control the lighting device to produce a user customizable cinematic lighting special effect selected from a range of different user customizable cinematic lighting special effects.” The controller includes an “input interface,” which enables a user to select an effect, and an “effect simulator,” which calculates a “time varying lighting value,” based on at least one “simulation parameter” (e.g., brightness, color) depending on the selected effect, and outputs the value to a lighting device to simulate the selected effect.

17. Figure 2 of the '258 Patent is a schematic diagram of a lighting system:



EX1001, Figure 2.

18. Figure 2 depicts a single studio lamp device (120) with an effect simulator (100) and a light (102) integrated therein. EX1001, 5:61-63. Figure 2 also depicts:

- an input interface (105), including a control panel for user input of parameters for simulating a lighting effect;
- data (106) used to modulate light 102 such that the desired lighting effect is produced; and
- a lighting data converter 107 to convert data 106 from the lighting effect simulator 100 into a suitable signal for a particular light 102.

Id., 5:57-58, 6:4-8, 8:41-46. Though it is not depicted in Figure 2, the '258 Patent also teaches “[a] microcontroller or other computing unit [that] is integrated into the lamp device 120 for performing calculations.” *Id.*, 6:1-3.

19. Using Figure 2 as a reference, the '258 Patent describes how users can make selections of desired lighting effects on the user interface 105. *Id.*, 6:4-11, 6:47-7:41. Depending on the desired effect, “simulation parameters,” such as “brightness,” “duration,” “colour,” and “frequency,” can be adjusted to customize the effect. *Id.*, 3:48-62, 6:47-7:16, 8:18-25, Fig. 6. These parameters may be random or user-selected and are used by the effect simulator 100 to calculate the data 106,

or “time varying lighting values,” that characterize the effect and are used to produce it on lighting device 102.

20. The effect simulator 100 is the component of the controller that “creates data 106 characterising a lighting effect.” *Id.*, 5:54-58, 7:51-52, 8:41-50. The ’258 Patent describes how before this data is sent to lighting device 102 to output the light simulating effect, it may be converted by lighting data converter 107. *Id.*, 8:41-53. The lighting device 102 then outputs light simulating the desired effect.

21. The ’258 Patent also describes a number of variants that correspond to dependent claims 2-22.

A. ’258 Patent File History

22. The ’258 Patent issued on February 5, 2019, from U.S. Patent Application No. 15/849,819, which is a continuation of U.S. Patent Application No. 15/481,460, and claims priority to U.S. Provisional Patent Application No. 62/319,809, filed April 8, 2016. In an Office Action dated March 28, 2018, the Examiner rejected the original claims under 35 U.S.C. § 112 but made no rejections relating to prior art. The claims were amended to overcome the Examiner’s § 112 rejections, and a Notice of Allowance was sent on September 24, 2018. In the Notice, the Examiner indicated that the prior art fails to teach or 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.” The ’258 Patent issued on February 5, 2019.

B. Entertainment Lighting Effects Systems

23. Starting in the late 1990’s and continuing today, LED technology enabled a dramatic shift in the levels of control achievable with lighting technology. LEDs can emit light at a range of colors, can be integrated with optical down-converters to generate different hues of white light, and can be modulated (turned off and on and dimmed) very rapidly. These capabilities of LED lighting technology enable the generation of innumerable effects by combining lighting colors with their modulation. Colors from the different LEDs can be combined to create different perceived colors and the LEDs can be modulated to generate changes in color over time which can then be used to simulate the light emitted from all sorts of natural and man-made phenomena. The control of the LEDs to achieve these effects boils down to controlling the drive current for the different color LEDs.

24. Many of these effects were not possible with previous lighting technologies since previous lighting technologies have limitations on the colors they can be engineered to emit, and they cannot be modulated as rapidly or as readily as LED technology.

25. The lighting effects described in the '258 Patent have long been used in the film, broadcast, and T.V. industry since before the advent of LEDs. Directors and producers have desired to provide a realistic a lighting arrangement so that the audience is fully drawn into the plot of the movie or program. Warm, dynamic light from a fire or light effects reflected from water help complete the illusion for the viewers.

26. Using LEDs for lighting effects has been commonplace due to their better efficiency, easier controls, and faster response times. LEDs were also available in multiple colors, so colored gels and filters weren't required, and a single LED luminaire could perform many different tasks.

27. Many options, including LED lighting, were available for lighting effects generation in the film industry at the time of the earliest claimed date of the '258 Patent. Luminaires were capable of producing effects and could be controlled either locally, through a control panel on the luminaire, or remotely through a data connection, such as the industry standard DMX-512 control protocol. Multiple luminaires could be connected to coordinate effects, such as showing lightning bursts from different directions or movement of light. All these systems and techniques were in common use at the time of the '258 Patent.

IV. CLAIM CONSTRUCTION AND POSITA DEFINITION

A. Claim Construction

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

29. It is my understanding that claims in an *inter partes* review 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.

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

30. A POSITA in the field of the '258 Patent, as of April 8, 2016, would have had a good working knowledge of electrical engineering and entertainment lighting systems, controls, and effects. They would have gained this through an undergraduate degree in electrical engineering or a comparable field as well as some experience in the field of entertainment lighting systems. 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.

V. CLAIMS 1-22 ARE UNPATENTABLE.

31. When the Examiner allowed the Challenged Claims to issue, the Examiner was not aware of Mueller, Showline, or Choong. Mueller, Showline in view of Mueller, Mueller in view of Choong, and Showline in view of Mueller and

further in view of Choong disclose or teach every limitation of the Challenged Claims. Had the Examiner been aware of these references, the Examiner would have found the Challenged Claims unpatentable.

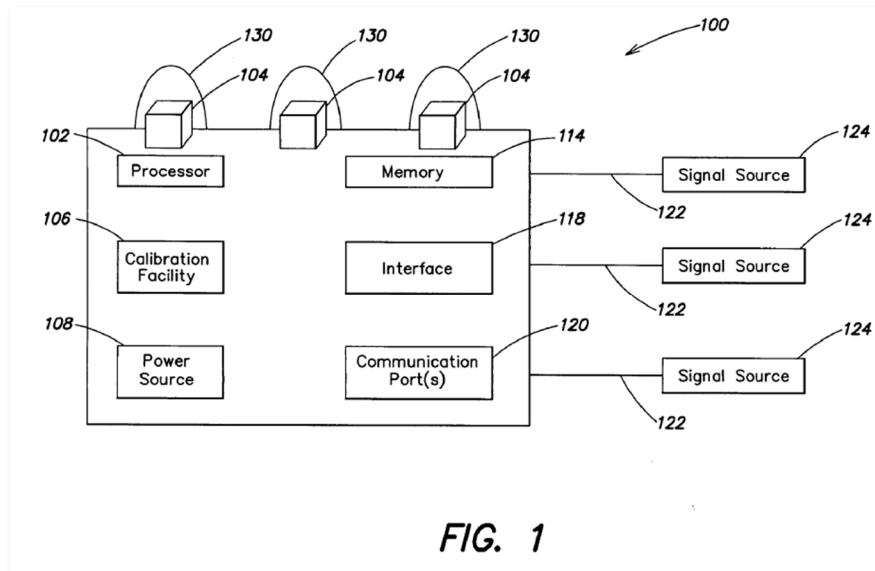
A. Ground 1 – Mueller renders Claims 1-6 and 8-22 obvious.

1. Overview of Mueller

32. U.S. Patent Application Publication 2005/0275626 to Mueller *et al.*, titled “Entertainment Lighting System” was filed on March 2, 2005, and published on December 15, 2005. Mueller is therefore prior art to the ’258 Patent at least under 35 U.S.C. 102(a).

33. Mueller describes the creation and modification of coordinated lighting effects in real time. In doing so, Mueller describes a processor 102 that is configured to output one or more control signals to drive light sources 104 so as to generate various intensities of light from each light source 104. EX1004, [0168]. The processor 102 may be particularly configured (*e.g.*, programmed) to provide control signals to one or more of the light sources 104 so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects. *Id.*, [0170]. Mueller further describes that the processor’s control of one or more of the light sources 104 could be based, at least in part, on user signals provided through an interface 118. *Id.*, [0183]. Such user signals could be user-selectable settings or functions, including, but not limited to, generally controlling the light output of the

lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, and setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182].



Id., Figure 1.

34. In additional embodiments, Mueller teaches a lighting system 200 with components that connect through a network 202. *Id.*, [0165], [0197]. Further, multiple lighting units 100 may be interconnected to form the lighting system 200. *Id.*, [0197]. The lighting system 200 may include multiple controllers joined through the network 202 as well. *Id.*, [0200].

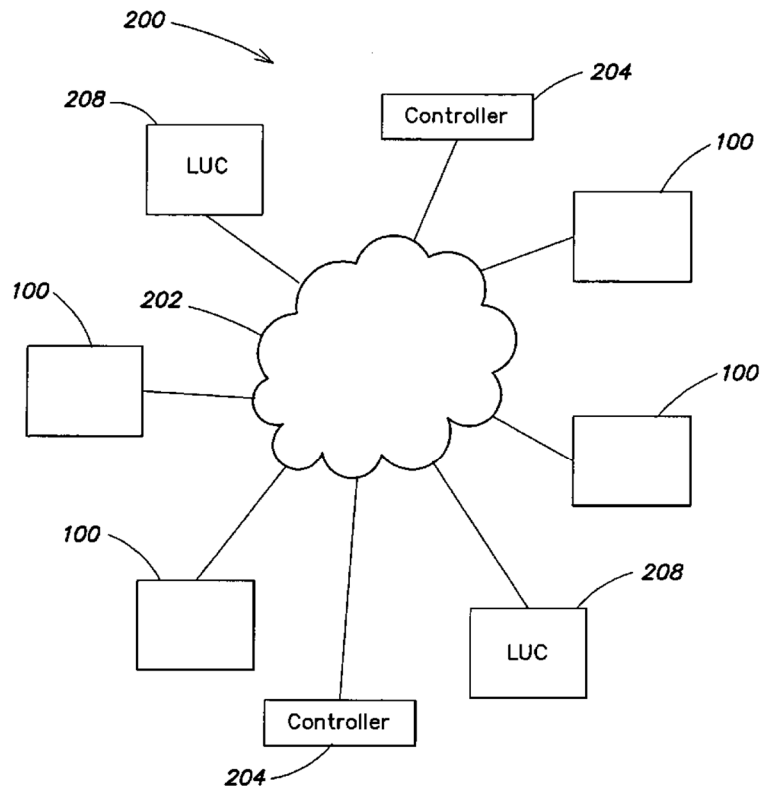


FIG. 2A

Id., Figure 2.

35. Mueller discloses a number of alternative embodiments utilizing the general concepts disclosed therein in a variety of specific devices and settings. A POSITA would understand that the concepts discussed in the context of each of these embodiments are applicable to Mueller's other embodiments. Generally, employing these concepts across Mueller's embodiments would require only the alteration or addition of software code, a concept with which a POSITA would be familiar. A POSITA would thus be motivated, where required, to combine the teachings of Mueller's various embodiments with those of other embodiments.

2. Claim 1

36. It is my opinion that Mueller renders Claim 1 obvious.

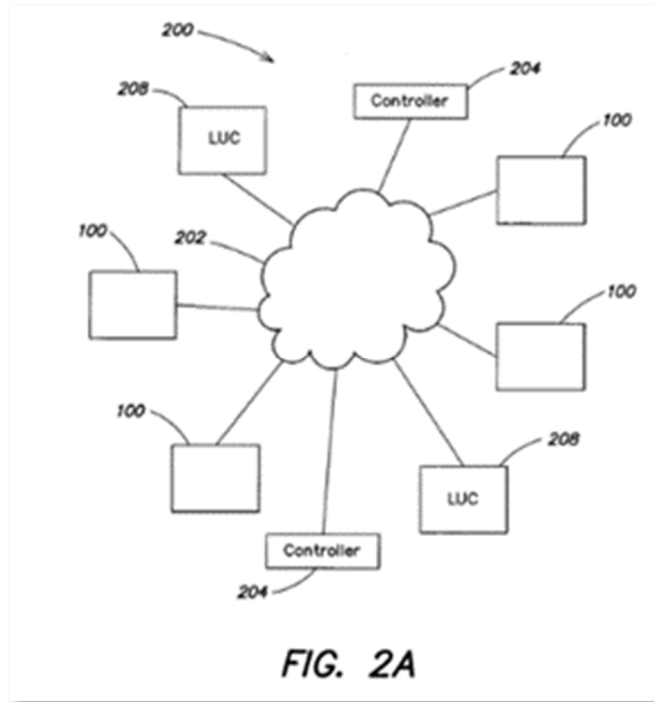
a. Claim Element 1p

37. The preamble of Claim 1, designated Claim Element 1p herein, recites “A lighting system comprising:” EX1001, 11:59.

38. It is my understanding that a patent claim’s preamble does not limit the scope of the claim except in limited circumstances. If the preamble of Claim 1 is not limiting, then it does not impact the validity of Claim 1. For the purposes of this declaration, I assume that the preamble of Claim 1 is limiting and must be considered for the purposes of evaluating the validity of these claims.

39. Regardless, Mueller teaches Claim Element 1p.

40. Specifically, Mueller describes a lighting system, i.e., “a networked lighting system 200.” EX1004, [0197].



Id., Figure 2A.

41. In additional embodiments, the lighting unit 100 is shown and “may serve as a device in a lighting environment.” The lighting unit 100 includes a processor 102, one or more light sources 104, a memory 114, and other components. A POSITA would understand that the combination of these elements would form a system as the term is used in claim 1 of the ’258 patent.

42. Therefore, Mueller teaches Claim Element 1p.

b. Claim Element 1a

43. Claim Element 1a recites “a lighting device; and” EX1001, 11:60.

44. Mueller teaches Claim Element 1a.

45. Specifically, Mueller describes that the lighting system 200 comprises

“a . . . lighting unit[] 100,” which is a lighting device. EX1004, [0197]; *see also id.*, FIG. 2A. “The lighting unit 100 may be employed in a variety of applications including, but not limited to, interior or exterior space illumination in general, direct or indirect illumination of objects or spaces, theatrical or other entertainment-based and/or special effects illumination, decorative illumination, safety-oriented illumination” among other purposes. *Id.*, [0165].

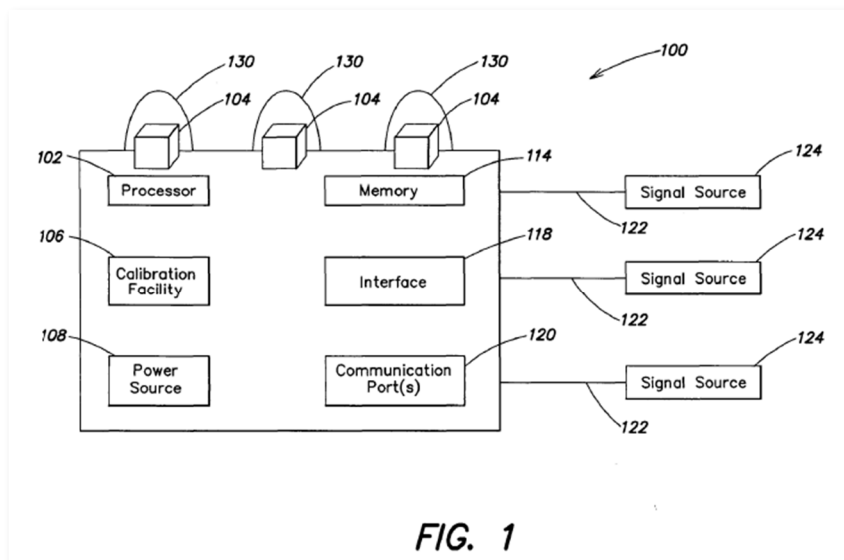
46. Therefore, Mueller teaches Claim Element 1a.

c. Claim Element 1b

47. Claim Element 1b recites “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:” EX1001, 11:61-65.

48. Mueller teaches Claim Element 1b.

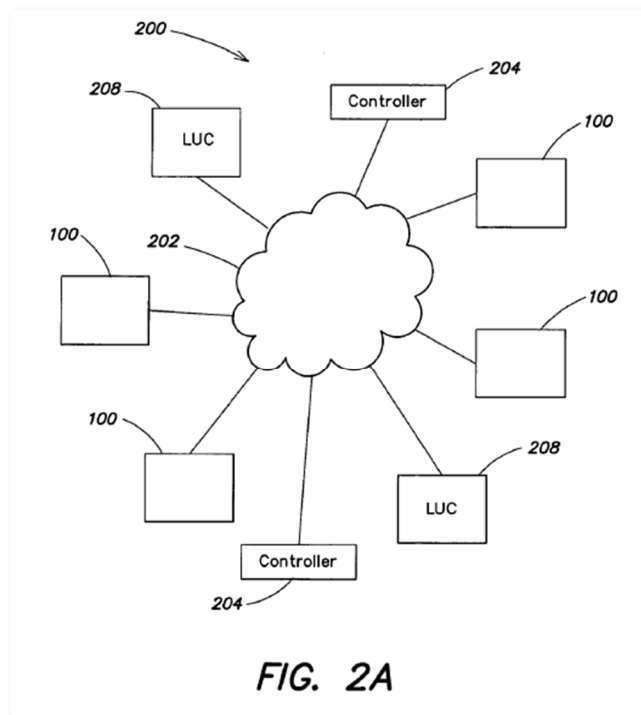
49. In one embodiment, Mueller describes a processor 102 of the lighting unit 100. Processor 102, “controls one or more of the light source 104”. *Id.*, [0183] (“In one implementation, the processor 102 of the lighting unit 100 monitors the interface 118 and ***controls one or more of the light sources 104.***” (emphasis added)).

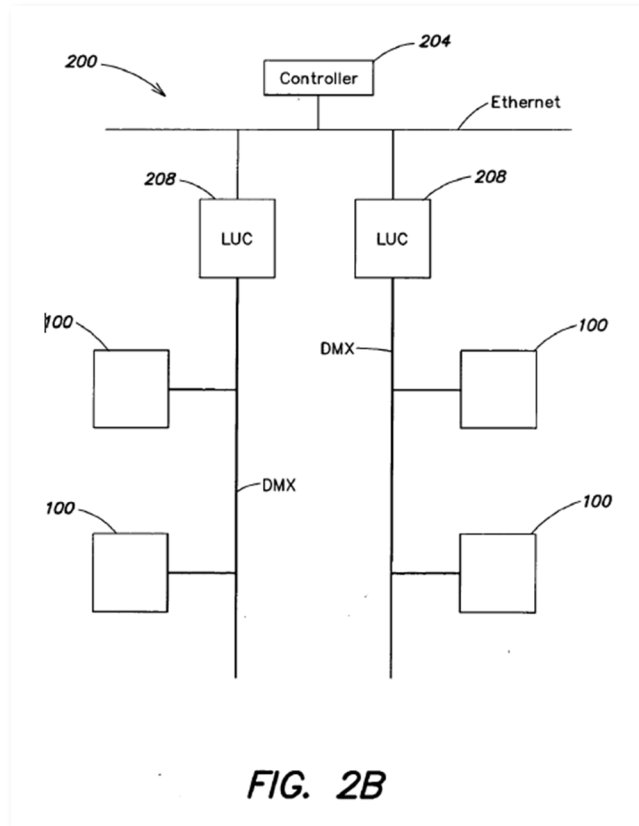


Id., Figure 1. Mueller explains that processor 102 controls lighting unit 100, and individual light sources 104, integrated in that unit. *Id.*, [0182]-[0183]. Mueller further explains that this control is “based at least in part on signals, such as user signals, provided through [an] interface 118[,]” *id.*, [0183], and includes the ability to produce user customizable lightning special effects. Specifically, Mueller describes this control as “generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, [and] changing and/or selecting various parameters of selected lighting effects” *Id.*, [0182].

50. The production of a particular lighting effect selected from a set of “various pre-programmed lighting effects” meets this claim element's requirement of producing an effect “selected from a range of different user customisable cinematic lighting special effects.”

51. In a second embodiment comprising a networked lighting system 200 made up of multiple lighting units 100, Mueller describes lighting unit controller (LUC) 208, which controls lighting unit(s) 100. EX1004, [0199] (“As shown in FIG. 2A, the lighting system 200 may include one or more lighting unit controllers (‘LUCs’) 208, wherein each LUC 208 is responsible for communicating with and generally controlling one or more lighting units 100 coupled to it.”).





Id., Figures 2A, 2B.

52. Mueller explains that LUC 208's control of lightning units 100 includes enabling each lighting unit 100 to produce user customizable lightning effects selected from a range of different user customizable cinematic lighting special effects" onto the end of that sentence. One example Mueller teaches is the generation a "rainbow chase" in response to user input: "The user may provide a simple instruction to the central controller 204 to accomplish this, and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a 'rainbow chase' (appearance of

a propagating rainbow of colors).” *Id.*, [0202]. Other such effects include fires and explosions. *Id.*, [0221].

53. Mueller further explains that such lighting effects produced by lighting unit 100 are user customizable. A user may, for instance, select from a range of different lighting effects, *Id.*, [0215], and “[a]ny of the effects can be specified with parameters, such as frequencies, wavelengths, wave widths, peak-to-peak measurements, velocities, inertia, friction, speed, width, spin, vectors, and the like.” *Id.*, [0225].

54. In the context of either embodiment discussed above, a POSITA would understand from Mueller the lighting effects could include cinematic lighting special effects. Mueller teaches that the lighting systems described therein can be used in connection with an event taking place in an entertainment venue, including “a film studio” or “a video studio”. EX1004, [0034]. Moreover, a POSITA would understand that lighting effects generated by the methods and systems of Mueller, could be used in any of a variety of applications, including cinematography and filmmaking. For a POSITA, applying the lighting effects disclosed in Mueller to such uses would require little experimentation or adaptation.

55. Moreover, a POSITA would understand that the many options of changing parameters “such as frequencies, wavelengths, wave widths, peak-to-peak measurements, velocities, inertia, friction, speed, width, spin, vectors, and the like”

as a selection from a range of “a range of different user customisable cinematic lighting special effects these parameters (i.e., effects) form the “range of different user customisable cinematic lighting special effects”.

56. Therefore, Mueller teaches Claim Element 1b.

d. Claim Element 1c

57. Claim Element 1c recites “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” EX1001, 11:66-12:2.

58. Mueller teaches Claim Element 1c.

59. Mueller explains that lighting unit 100, whether used alone or within lighting system 200, comprises one or more interfaces 118. EX1004 [0182]. Mueller further explains that “the network lighting system 200 may be configured flexibly to include any of the components discussed [in connection with lighting unit 100], such as the signal sources 124, *interfaces 118*, communication ports 120 . . . either as stand alone components, integrated components or shared components.” *Id.*, [0198] (emphasis added)). A POSITA would thus understand that lighting system 200 could include interface 118 either as an integrated component of lighting unit 100 or as a standalone component. As explained above, interface 118 enables a user to select

user-customizable cinematic lighting effects from a range of different effects. *Supra* Claim Element 1b.

60. Mueller also explains that interface 118 receives user input in the form of “any of a number of user-selectable settings or functions (e.g., . . . changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit)” *Id.*, [0182]. Mueller also teaches that the pre-programmed lighting effects can be customized by a user. *Supra* Claim Element 1b. A POSITA would understand that a user can interact with the interface, (e.g., using the external controls) to select one of the previously discussed parameters or “user customizable cinematic lighting special effect.

61. Therefore, Mueller teaches Claim Element 1c.

e. Claim Element 1d

62. Claim Element 1d recites “an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter,” EX1001, 12:3-5.

63. Mueller teaches Claim Element 1d.

64. In the context of a lighting system made up of a single lighting unit 100, Mueller describes a processor 102, which is an effect simulator. EX1004, [0168]-[0170]. Mueller explains that processor 102 is configured to output at least one control signal based on a simulation parameter for each light source 104 so as to

independently control the intensity of light generated by each light source 104. *Id.*, [0168]. Mueller further explains that processor 102 calculates a time varying lighting value: “the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to **generate** a variety of static or **time-varying (dynamic) multi-color** (or multi-color temperature) lighting effects.” *Id.*, [0170] (emphasis added).

65. In the context of networked lighting system 200, Mueller teaches LUC 208, which is an effect simulator. *Id.*, [0199]-[0202]. Specifically, Mueller explains that “when an intended LUC 208 receives such a command, it may then interpret the command so as to generate the appropriate lighting control signal.” *Id.*, [0202]. Based on my understanding, a POSITA would understand that such interpretation of a received command to generate an appropriate lighting control signal comprises one or more calculations.

66. Mueller also explains that both processor 102 and LUC 208 are capable of generating control signals for time-varying lighting effects. EX1004, [0170] (“**[P]rocessor 102** may be particularly configured . . . to **provide control signals** to one or more of the light sources so as to **generate a variety of** static or **time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.**” (emphasis added)); [0215] (“The program may be configured . . . to generate an array of lighting

effects . . . where *the color changes in hue, saturation or intensity over a period of time . . .*”) (emphasis added)).

67. Mueller further explains that the parameters of the lighting effects generated by the lighting devices 100 described therein, regardless of whether they are used alone or in a networked configuration, may be adjusted. *Id.*, [0182] (identifying as “user-selectable settings or functions” “changing and/or selecting various parameters of selected lighting effects.”) A POSITA would understand this disclosure to indicate that the time-varying lighting effects disclosed by Mueller were based, at least in part, on simulation parameters that were either pre-programmed or specified by a user.

68. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0217]–[0218]. Mueller also describes an algorithm for altering the image information. *Id.* “The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information.”

69. In connection with several embodiments, Mueller discusses the use of software, algorithms, and the like to calculate time varying lighting values. *See, e.g.,*

id., [0063], [0064], [0170], [0172], [0178], [0205]-[0207], [0211], [0220], [0302], [0303]. A POSITA would have understood that such software or algorithms would provide processor 102 or LUC 208 with the ability to calculate these dynamic lighting values.

70. A POSITA would have understood that the parameters used to calculate information and are applied to the object with the lighting system could include a time varying value to change the information that is used to apply a lighting effect to an object. It would have been obvious to use this embodiment of Mueller to calculate a time varying value to produce lighting effects using Mueller's lighting system 200 including a lighting unit 100.

71. Therefore, Mueller teaches Claim Element 1d.

f. Claim Element 1e

72. Claim Element 1e recites "said at least one simulation parameter depending on the selected user customisable cinematic lighting special effect being simulated," EX1001, 12:5-7.

73. Mueller teaches Claim Element 1e.

74. Based on my understanding, Mueller teaches the selection of user customizable cinematic lighting effects to be simulated. *See supra* Claim Elements 1a-1c. Mueller also teaches that a user of the systems described therein may customize those cinematic lighting effects by changing one or more simulation

parameters. A POSITA would understand that the simulation parameter(s) for the pre-programmed lighting effects of Mueller, EX1004, [0182], are dependent on the specific pre-programmed lighting effects selected for simulation.

75. A POSITA would understand that presenting simulation parameters unrelated to the lighting effect to be simulated would only create confusion and would limit the available parameters to be adjusted to only those relevant to the selected effect. This is particularly true because Mueller specifically teaches contexts in which adjustable effect parameters are limited to those relevant to a selected effect. *See, e.g., id.*, [0305] (“*a user can select a sparkle effect 5050 from the pull-down menu of the type filed 4058, in which case **the parameters pane 4074 shows parameters appropriate for a sparkle effect.***” (emphasis added).

76. Further, POSITA would understand that selecting specific parameters from the parameters pane 4074 that depend on a specific effect, such as the sparkle effect 5050, could be incorporated with the lighting unit 100 or lighting system 200. For example, Mueller explains that the lighting unit 100 can be incorporated into a light system manager 1650 that includes a light system composer composing a light show to display on the lighting system that includes the lighting unit 100. *See Id.*, [0256]–[0258].

77. Therefore, Mueller teaches Claim Element 1e.

g. Claim Element 1f

78. Claim Element 1f recites “adapted to output said time varying lighting value to said lighting device so as to simulate the selected user customisable cinematic lighting special effect;” EX1001, 12:7-10.

79. Mueller teaches Claim Element 1f.

80. Mueller teaches both processor 102 and LUC 208 outputting a time varying lighting value to lighting unit 100, whether lighting unit 100 is used alone or in a networked system, to simulated the selected user-customizable cinematic lighting special effect. EX1004, [0170].

81. Specifically, Mueller explains that processor 102 “provide[s] control signals to one or more of the light sources so as to generate a variety of static or *time-varying (dynamic)* multi-color (or multi-color temperature) lighting effects.” EX1004, [0170] (emphasis added); *see also supra* Claim Element 1b. Mueller also explains that LUC 208 “is responsible for communicating with and generally controlling one or more lighting units 100[,]” *id.*, EX1004, [0199], by “generat[ing] the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100.” *Id.*, [0202].

82. Accordingly, a POSITA would understand that the processor 102 is an “effects simulator” configured (or adapted) to output the control signals to one or more light sources, which include the time- varying lighting value, to simulate (or

generate) the customizable cinematic lighting special effect. As previously explained, a POSITA would also understand this feature of the lighting unit 100 could be used in the cinema field. Such use would require little to no modification of the discussed systems.

83. Therefore, Mueller teaches Claim Element 1f.

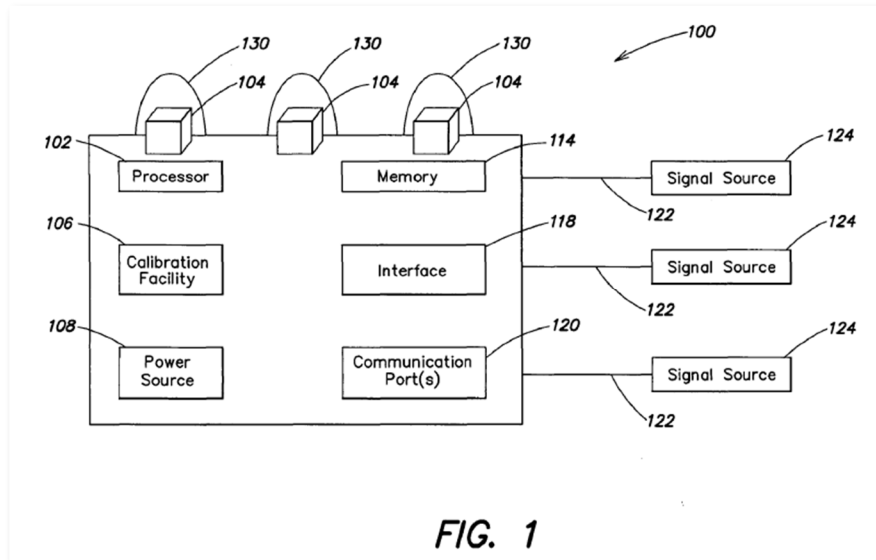
h. Claim Element 1g

84. Claim Element 1g recites “wherein said lighting device and said controller are integrated in a combined unit.” EX1001, 12:11-12.

85. Mueller teaches Claim Element 1g.

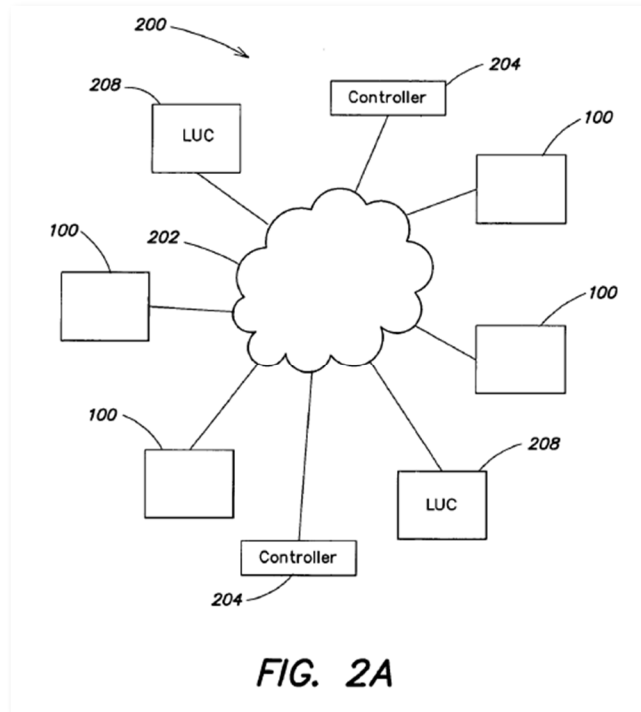
86. In the context of a lighting system comprising only a single lighting unit 100, Mueller describes that the controller (processor 102) and lighting device (lighting unit 100) are integrated in a combined unit: lighting unit 100. EX1004, [0168] (the lighting unit 100 also may include a processor 102).

87. In addition, Mueller teaches the lighting unit 100 includes “one or more light sources 104” and a “processor that is configured to output one or more control signals to drive the light sources 104.” A POSITA would thus understand that the lighting unit 100 is an integrated combined unit as shown in FIG. 1.



Id., Figure 1.

88. In the context of a networked lighting system 200, though LUC is depicted as residing outside lighting unit 100, Mueller explains that the components described therein and depicted in Figure 2A, such as “lighting units 100 may be coupled to a given LUC 208 in a variety of different configurations including serial connections, parallel connections, networked connections, and combinations thereof.” *Id.*, [0199].



Id., Figure 2A. The '258 Patent contemplates a system comprising such connections as being a combined unit. *See, e.g.*, EX1001, 11:44-47 (“[I]t should be appreciated that the effect simulator 100 or the computing device 130 may be separate from any light 102, and connectable to lights 102, by either a wired or wireless connection.”)

89. Moreover, Mueller makes clear that such systems can be designed with flexibility regarding the placement of the various components disclosed therein: “the networked lighting system 200 may be configured flexibly to include any of the components discussed above, . . . either as standalone components, integrated components or shared components.” *Id.*, [0198]; *see also id.*, [0062] (“A given lighting unit may have any one of a variety of mounting arrangements for the light source(s), enclosure/housing arrangements and shapes, and/or electrical and

mechanical connection configurations.”). Given these disclosures, a POSITA would understand that LUC(s) 208 could be specifically located in any of various components comprising a lighting system and could elect to include LUC(s) 208 within a combined unit with lighting unit 100 for any of a variety of reasons, including but not limited to portability, cost savings, durability, and ease of use.

90. Therefore, Mueller teaches Claim Element 1g.

3. Claim 2

91. Claim 2 recites “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.” EX1001, 12:13-16.

92. It is my opinion that Mueller renders Claim 2 obvious.

93. Mueller explains that the interface 118 is “provided to facilitate any of a number of user-selectable settings or functions.” EX1004, [0182]. Mueller further explains that interface 118 enables users to customize lighting special effects by “changing and/or selecting various parameters of selected lighting effects.” *Id.*, (“The lighting unit 100 may include one or more *interfaces 118 that are provided to facilitate any of a number of user-selectable settings or functions* (e.g., . . . changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit [and] *changing and/or selecting various parameters* of selected lighting effects” (emphasis added).) *Id.*

94. Further, The interface 118 presents controls such as, switches, dials, buttons or the like. The interface is used to facilitate a number of user-selectable settings or functions such as changing and/or selecting various pre-programmed lighting effects or various parameters of selected lighting effects to be generated by the lighting unit. *Id.*, [0182].

4. Claim 3

95. Claim 3 recites “The lighting system according to claim 1, wherein the lighting device comprises at least one LED.” EX1001, 12:17-18.

96. It is my opinion that Mueller renders Claims 3 obvious.

97. Mueller explains that “the lighting unit 100 may include one or more light sources 104, wherein one or more of the light sources may be an LED-based light source that includes one or more light emitting diodes (LEDs).” EX1004, [0167]. Mueller further explains that such LEDs can be multiple different colors. *Id.* (“In one aspect of this embodiment, any two or more of the light sources 104 may be adapted to generate radiation of different colors (e.g. red, green, and blue, respectively).”) *Id.* Further, the light sources are adapted to generate radiation of essentially white light. *Id.*

98. Accordingly, a POSITA would understand that an LED based light source that produces red, green, and blue light, *see Id.*, [0167], to be a RGB LED or an RGB+W since the light sources 104 also produce essentially white light.

99. Given the above disclosures, a POSITA would have understood the benefits of incorporating RGB or RGB+W LED's as light sources 104 since the light sources are disclosed as LEDs, because otherwise, white light could not be generated.

5. Claim 4

100. Claim 4 recites “The lighting system according to claim 3, wherein the lighting device comprises multiple different coloured LEDs.” EX1001, 12:19-20.

101. It is my opinion that Mueller renders Claims 4 obvious.

102. Mueller explains that “the lighting unit 100 may include one or more light sources 104, wherein one or more of the light sources may be an LED-based light source that includes one or more light emitting diodes (LEDs).” EX1004, [0167]. Mueller further explains that such LEDs can be multiple different colors. *Id.* (“In one aspect of this embodiment, any two or more of the light sources 104 may be adapted to generate radiation of different colors (e.g., red, green, and blue, respectively).”) *Id.* Further, the light sources are adapted to generate radiation of essentially white light. *Id.*

103. Accordingly, a POSITA would understand that an LED based light source that produces red, green and blue light, *see Id.*, [0167], to be a RGB LED or an RGB+W since the light sources 104 also produce essentially white light.

104. Given the above disclosures, a POSITA would have understood the

benefits of incorporating RGB or RGB+W LED's as light sources 104 since the light sources are disclosed as LEDs, because otherwise, white light could not be generated.

6. Claim 5

105. Claim 5 recites “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.” EX1001, 12:21-23.

106. It is my opinion that Mueller renders Claims 5 obvious.

107. Mueller explains that “the lighting unit 100 may include one or more light sources 104, wherein one or more of the light sources may be an LED-based light source that includes one or more light emitting diodes (LEDs).” EX1004, [0167]. Mueller further explains that such LEDs can be multiple different colors. *Id.* (“In one aspect of this embodiment, any two or more of the light sources 104 may be adapted to generate radiation of different colors (e.g., red, green, and blue, respectively).”) *Id.* Further, the light sources are adapted to generate radiation of essentially white light. *Id.*

108. Accordingly, a POSITA would understand that an LED based light source that produces red, green and blue light, *see Id.*, [0167], to be a RGB LED or an RGB+W since the light sources 104 also produce essentially white light.

109. Given the above disclosures, a POSITA would have understood the benefits of incorporating RGB or RGB+W LED's as light sources 104 since the light sources are disclosed as LEDs, because otherwise, white light could not be generated.

7. Claim 6

110. Claim 6 recites “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.” EX1001, 12:24-27.

111. It is my opinion that Mueller renders Claim 6 obvious.

112. Mueller teaches that the controller controls the colour or colour temperature of such LEDs. *Id.*, [0170] (“the lighting unit 100 may be particularly arranged such that the ***processor-controlled*** variable intensity light generated by two or more of the light sources 104 combines to ***produce a mixed colored light (including essentially white light having a variety of color temperatures)***” (emphasis added)); *see also id.*, [0171] (“the lighting unit 100 may include ***a wide variety of colors of LEDs*** in various combinations, including two or more of red, green, and blue LEDs to ***produce a color mix, as well as one or more other LEDs to create varying colors and color temperatures of white light.***” (emphasis added)).

113. Mueller further teaches that processor 102's controlling of color or color temperature, depends on a user input via interface 118, as the production of

mixed color/mixed color temperature of light is in response to selection “desirable spectrums of lighting conditions.” *Id.*, [0171]; *see also id.*, [0182] (describing the use of interface 118 to “chang[e] and/or select[] various parameters of selected lighting effects . . .”).

114. Based on these disclosures, Mueller clearly teaches a controller (the processor 102) adapted to control the colour or colour temperature of said LEDs (lighting unit 104) in dependence on a user input received via the input interface (interface 118).

8. Claim 8

115. Claim 8 recites “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.” EX1001, 12:31-33.

116. It is my opinion that Mueller renders Claim 8 obvious.

117. Mueller teaches that lighting unit 100 “may be constructed and arranged to produce a wide range of variable color radiation . . . including essentially white light having a variety of color temperatures. EX1004, [0170]. Mueller teaches a number of color temperatures within the range of 2800-7000 Kelvin. *Id.*, [0060] “The color temperature of white light generally falls within a range of from approximately 700 degrees K . . . to over 10,000 degrees K.”), [0061] (“[A] conventional incandescent bulb has a color temperature of approximately 2848

degrees K[and] early morning daylight has a color temperature of approximately 3,000 degrees K . . .”).

9. Claim 9

118. Claim 9 recites “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.” EX1001, 12:34-37.

119. Mueller renders Claim 9 obvious.

120. Mueller teaches that processor 102 of lighting unit 100 controls the intensity (that is, “brightness”) of light generated by each light source 104 included in lighting unit 100. EX1004, [0168]. As explained above, Mueller teaches that this control can be implemented via user input to processor 102 through interface 118. *See supra* Claim Element 1c.

10. Claim 10

121. Claim 10 recites “The lighting system according to claim 1, wherein the simulation parameter comprises at least one of a colour and a colour temperature.” EX1001, 12:38-40.

122. It is my opinion that Mueller renders Claim 10 obvious.

123. Mueller explains that a simulation parameter to be used with lighting unit 100 can comprises a color. Specifically, Mueller teaches that the processor 102 of lighting unit 100 “may be particularly configured (e.g., programmed) to provide

control signals to one or more of the light sources so as to generate a variety of stator or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” EX1004, [0170].

124. In the context of a networked lighting system comprising multiple lighting units 100, Mueller describes the manner in which a user can “generate a color changing effect that various colors from one lighting unit 100 to another lighting unit 100 and across a number of lighting units 100 in such a way as to generate the appearance of a propagating rainbow of colors (“rainbow chase”)” *Id.*, [0202]. Mueller explains that commands may be sent to each lighting unit 100 that “contain timing, intensity, hue, saturation or other relevant information, for example.” *Id.*

11. Claim 11

125. Claim 11 recites

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.

EX1001, 12:41-47.

126. It is my opinion that Mueller renders Claim 11 obvious.

127. Mueller discloses that user customizable lighting effect can be programmed to simulate a number of different effects, including explosions, flashes,

and the like. For example, Mueller describes that “designer can program the *fire or explosion effect* on a computer”. EX1004, [0221] (emphasis added). In another example, Mueller describes that “the program may be configured, for example to generate an array of lighting effects such as. . . *flashing effects. . . a flare streaking across a room. . . [and] a plume from an explosion*”. *Id.*, [0215] (emphasis added).

128. Based on my understanding, a POSITA would understand that the fire or explosion effects that are programmed by generating corresponding control signals could be produced as an effect using the lighting unit 100 and its associated components. Accordingly, the lighting unit 100 could be easily programmed without difficulty to produce any of the listed effects in Claim 11.

12. Claim 12

129. Claim 12 recites “The lighting system according to claim 1, wherein the controller is adapted to store said at least one simulation parameter in memory.” EX1001, 12:48-50.

130. It is my opinion that Mueller renders Claim 12 obvious.

131. Mueller describes, associated with the processor disclosed therein, “one or more storage media generically referred to . . . as ‘memory[.]’” EX1004, [0064]. “[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” *Id.* Mueller describes such functions as including, “generally controlling the

light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting *various parameters of selected lighting effects*, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

132. Mueller further provides that

[t]he lighting unit 100 also may include a *memory* 114 to *store* various information. For example, the memory 114 may be employed to *store one or more lighting programs* for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation

Id. (emphasis added).

133. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: “the lighting control interface allows for the storage and downloading of new functions and new parameter settings.” EX1004, [0380] (emphasis added).

134. Mueller also teaches recalling the stored simulation parameter being recalled for execution: “[t]he memory 114 may be employed to store one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources.” EX1004, [0172].

135. A POSITA would understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for “user modification and implementation” of lighting effects. EX1004, [0380].

13. Claim 13

136. Claim 13 recites “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.” EX1001, 12:51-54.

137. It is my opinion that Mueller renders Claim 13 obvious.

138. As explained above, Mueller’s LUC 208 is adapted to control one or more lighting device by outputting a time varying light value to those lighting devices to simulate a selected user customizable cinematic lighting special effect. *See supra* Claim Element 1f. Mueller further teaches that each LUC 208 “is responsible for communicating with and generally controlling **one or more** lighting units 100 coupled to it.” EX1004, [0199].

139. Further, Mueller teaches that the lighting system 200 connects to many lighting units 100 to form the networked lighting system. The described LUCs 208 can be used to generally control one or more lighting units 100. A POSITA would

understand, and it would have been obvious to allow a user to use controls, such as interface 118, to select one or more of the lighting units 100.

140. In additional embodiments, the lighting devices are also described as essentially lights. *See*, EX1001, Col 5:54–56. The light 102 or lighting device are the same or similar to the lighting sources 104. The processor 102 outputs “one or more control signals to drive the light sources 104.” EX1004, [0168]. Further, “the processor 102 of the lighting unit 100 monitors the interface 118 and controls one or more of the light sources 104 based at least in part on signals, such as user signals, provided through the interface 118.” *Id.*, [0183]. Thus, the processor 102 (controller) controls the lighting sources 104 (lighting devices) depending on user input to the interface 118 (the selected user customizable cinematic lighting special effect).

141. In addition, a POSITA would understand that a similar process of an interface 118 could be included with one of the LUCs 208 to control one or more lighting units 100.

14. Claim 14

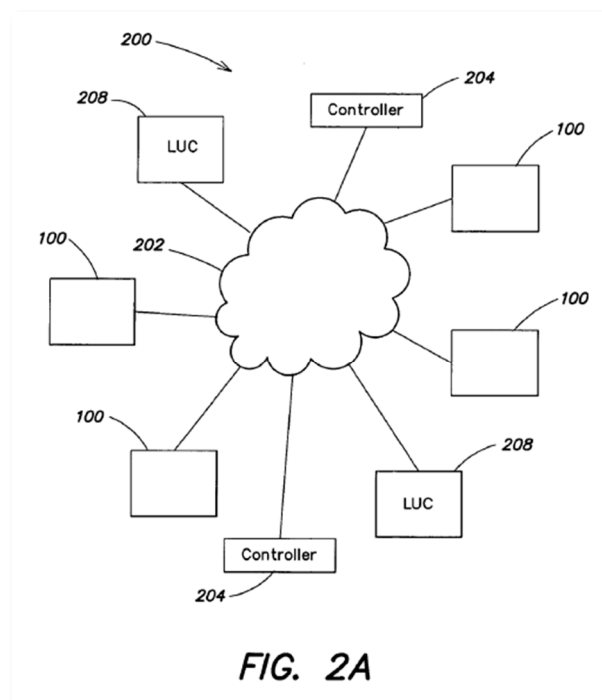
142. Claim 14 recites “The lighting system according to claim 1, further comprising a further lighting device, said further lighting device being separate from said controller.” EX1001, 12:55-57.

143. It is my opinion that Mueller renders Claim 14 obvious.

144. As explained above, Mueller teaches that the lighting systems disclosed

therein, whether a single lighting unit 100 operating on its own or a networked system of multiple lighting units 100, can be designed with flexibility regarding the placement of the various components disclosed therein. *See supra* Claim Element 1g. Mueller explains that the lighting system 200 comprises “a number of lighting units 100”. EX1004, [0197]; *see also id.*, Figure 2A (showing multiple lighting units 100).

145. As shown below in Figure 2A, additional lighting unit(s) 100 are separated from LUC 208 and processor 102 of the first lighting unit 100.



Id., Figure 2A.

146. A POSITA would understand that a lighting unit 100 or lighting source 104 could be included and controlled by another lighting unit 100 or the LUC 204,

the lighting unit 100 or lighting source 104 being separate from the LUC 204 since they are connected over a network.

15. Claim 15

147. Claim 15 recites “The lighting system according to claim 14, wherein the controller comprises a wireless communication interface adapted for wireless communication with said further lighting device.” EX1001, 12:58-61.

148. It is my opinion that Mueller renders Claim 15 obvious.

149. Mueller teaches “communication ports 120” as part of lighting unit 100, which are interfaces for communication with other lighting devices. EX1004, [0190] (“the lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a variety of other devices . . . the communication port 120 may include an interface for any suitable wireless communications”).

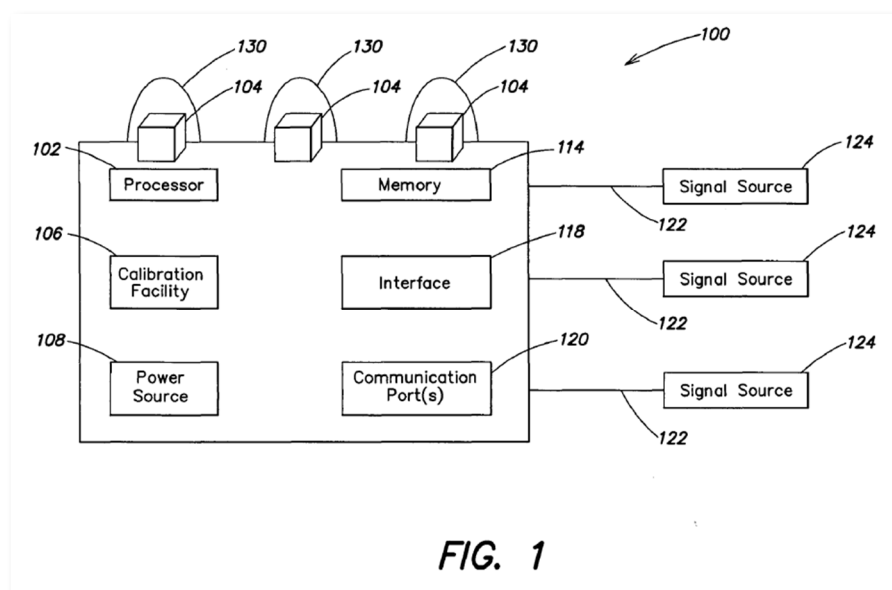


FIG. 1

Id., Figure 1.

150. Mueller teaches that the communication port 120 can be integrated into a controller (either processor 102 or LUC 208), as it explains that “any of the components discussed above, such as the signal sources 124, interfaces 118, communication ports 120, and other components . . . either as stand alone components, integrated components or shared components” can be flexibly configured to be included with processor 102. *Id.*, [0198]. A POSITA would have understood that the communication ports 120 could be integrated with any of the controllers disclosed by Mueller.

16. Claim 16

151. Claim 16 recites “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.” EX1001, 12:62-65.

152. It is my opinion that Mueller renders Claim 16 obvious.

153. Mueller teaches a number of lighting effects that simulate a moving light source, including a “rainbow chase” effect involving “a color changing effect that various colors from one lighting unit 100 to another lighting unit 100, or across a number of the lighting units 100 in such a way as to generate the appearance of a propagating rainbow of colors, explosions, turbulence, fire, missiles, shape motion,

tinkerbelle-like shapes, lights moving in a room, “and many others.” EX1004, [0202], [0225].

154. A POSITA would have understood, in the context of a networked lighting system 200, that the way in which these effects could be generated using multiple light sources would be to offset and/or overlap the output of the various light sources. In view of the disclosures of Mueller, a POSITA would not have found this to be a surprising or difficult task to undertake. In addition, it would have been obvious to include the production of effects by lighting system 200 to the lighting unit 100 since lighting unit includes similar capabilities and the processor 102 could be programmed to control the lighting sources 104 to output the moving light source effect, e.g., the rainbow chase.

17. Claim 17

155. Claim 17 recites “The lighting system according to claim 1, wherein the controller is separable from the lighting device.” EX1001, 12:66-67.

156. It is my opinion that Mueller renders Claim 17 obvious.

157. As explained above, Mueller makes clear that the lighting systems disclosed therein may be designed with flexibility in mind. *See supra* Claim Element 1g; *see also* EX1004, [0198], [0062]. Mueller further identifies a variety of different configurations under which LUC 208 and the lighting device 100 are connected, for example, serial connections, parallel connections, networked connections and

combinations thereof. *Id.*, at [0199]. Mueller further teaches that the connection between LUC 208 and the lighting unit 100 could be via a variety of different communication media and protocols. *Id.* Mueller also specifically contemplates that “one or more devices coupled to a network may serve as a controller for one or more other devices coupled to the network (e.g., in a master/slave relationship).” *Id.*, [0066].

158. Given these disclosures, a POSITA would be motivated to adopt flexible connections between the LUC 208 and lighting unit 100, that they can be integrated as a combined unit, while being separable and connected together via a cable. A POSITA would understand that Mueller teaches such flexibility and that such a flexible arrangement might be desired for any of a number of reasons, including adaptability (for instance, having the controller integrated into lighting unit 100 for portability, but separable to permit use in situations where remote control of lighting unit 100 is desired), ease of use, and cost.

18. Claim 18

159. Claim 18 recites “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.” EX1001, 13:1-4.

160. It is my opinion that Mueller renders Claim 18 obvious.

161. Mueller teaches an input interface in the form of interface 118. EX1004, [0182]. Mueller further provides that “[t]he interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” *Id.*

162. Mueller further explains that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

19. Claim 19

163. Claim 19 recites “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.” EX1001, 13:5-8.

164. It is my opinion that Mueller renders Claim 19 obvious.

165. A POSITA would understand that a converter in lighting system 200 such as processor 102 or LUC 208, would convert lighting data, such as brightness or color data, such as the data shown the configuration file 500 of Figure 5, into lighting signal. *Id.*, [0214] (“With all of the light systems 102 in predetermined positions, as identified in the configuration file 500,” the representation of the

lighting effect “can be played in the room by the light system and or another system such as a sound system”).)

502 504 508 510 512 514 518 520

LIGHT SYSTEM	TIME	POSITION	LIT POSITION	COLOR RANGE	INTENSITY	OTHER SYS.	POSITION
LS001	T1	(1,3,7)	POLY001	0-16000	0-100		
LS001	T2	(1,3,7)	POLY001	0-16000			
LS001	T3	(1,3,7)	POLY002	0-16000			
LS002	T1	(0,0,0)	POLY003	0-16000			
LS002	T2	(0,0,0)	POLY004	0-16000			
LS002	T3	(0,0,0)	POLY005	0-16000			
LS00N	TN						

500

FIG. 5

Id., Figure 5. Indeed, a POSITA would understand that such conversion would be necessary for lighting system 200 to operate by making lighting data in to control signals transmitted to each lighting unit 100.

166. The convertor is described as converting data into a suitable signal for a particular light. EX1001, 8:41–46. As a described example of this feature, “for a light emitting diode (LED) array lighting the data conversion occurs at an LED lamp control logic that produces and supplies a separate pulse-width-modulation output for each LED colour to an LED drive circuit.” EX1001, 8:46–50. The processor 102 is described in Mueller as producing control signals such as pulse width modulated

signals. The processor 102 may control other dedicated circuitry which in turn controls the light sources 104. The processor 102 inherently includes a convertor to output signals to the lighting sources 104. A POSITA would understand that the processor 102 includes the convertor or controls other circuitry that is the convertor for converting data into signals that go to the lighting source 104 (lighting devices) as output.

167. Moreover, a POSITA would understand measured brightness or color data would exist as an electrical signal, and perhaps, as stored computer memory data. The measured electrical signal or computer data would be required to be translated back into a signal with specific electrical properties or LED drive condition (applied current) that is suitable to the specific color LED or LEDs that are putting out light. LEDs have specific drive requirements and, typically, an LED driver chip or processor is used to convert desired intensity levels into usable drive signals or applied currents usable by the LEDs.

20. Claim 20

168. Claim 20 recites “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.” EX1001, 13:9-12.

169. It is my opinion that Mueller renders Claim 20 obvious.

170. Mueller explains that the systems described therein can be used in a

variety of contexts and locations, including “a film studio, [and] a video studio.” EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

171. Further, little to no changes would need to be made to the lighting unit 100 or the lighting system 200 in order to use them for videography, broadcast, cinematography, studio filming, and/or location filming.

21. Claim 21

172. Claim 21 recites “The lighting system according to claim 12, wherein the controller is adapted to recall said stored at least one simulation parameter from said memory.” EX1001, 13:13-15.

173. It is my opinion that Mueller renders Claim 21 obvious.

174. Mueller describes, associated with the processor disclosed therein, “one or more storage media generically referred to . . . as ‘memory[.]’” EX1004, [0064]. “[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” *Id.* Mueller describes such functions as including, “generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or

selecting *various parameters of selected lighting effects*, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

175. Mueller further provides that

[t]he lighting unit 100 also may include a *memory* 114 to *store* various information. For example, the memory 114 may be employed to *store one or more lighting programs* for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation

Id. (emphasis added).

176. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: “the lighting control interface allows for the storage and downloading of new functions and new parameter settings.” EX1004, [0380] (emphasis added).

177. Mueller also teaches recalling the stored simulation parameter being recalled for execution: “[t]he memory 114 may be employed to store one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources.” EX1004, [0172].

178. A POSITA would understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for “user modification and implementation” of lighting effects. EX1004, [0380].

22. Claim 22

179. Claim 22 recites “The lighting system according to claim 14, wherein said controller is adapted to control said further lighting device in dependence on the selected user customizable cinematic lighting special effect.” EX1001, 13:16-19.

180. It is my opinion that Mueller renders Claim 22 obvious.

181. Mueller explains that, in a networked lighting system 200, each lighting unit 100 can be controlled by a single input:

In this example, the user may provide a simple instruction to the central controller 204 to accomplish [a rainbow chase effect], and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a “rainbow chase.” The command may contain timing, intensity, hue, saturation or other relevant information, for example. When an intended LUC 208 receives such a command, it may then interpret the command so as to generate the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100 that it controls

EX1004, [0202]. Thus, one input can control an original lighting unit 100 as well as further lighting units as required by Claim 22.

182. In addition, “[t]he lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a variety of other devices.” Mueller continues “one or more communication ports 120 may facilitate coupling multiple lighting units together as a networked lighting system, in which at least some of the lighting units are addressable (e.g., have particular identifiers or addresses) and are responsive to particular data transported across the network.” Accordingly, a POSITA would have understood the processor 102 could connect and control a further lighting unit 100 or lighting source 104 on a separate unit through this connection.

B. Ground 1a – Mueller in view of Choong renders Claim 7 obvious.

183. Claim 7 recites “The lighting system of claim 3, wherein the lighting device comprises at least one ‘warm’ and at least one ‘cool’ white LED.” EX1001, 12:28-30. It is my opinion that Mueller in view of Choong renders Claim 7 obvious.

184. Though Mueller teaches the use of multiple LEDs across a spectrum of colors and color temperatures, *see supra* Ground 1, Claims 3-5, it does not explicitly disclose a lighting device with at least one “warm” white LED and at least one “cool” white LED. A POSITA would have understood the utility of an LED arrangement including a “warm” white LED and a “cool” white LED to enable the production of a broad spectrum of color temperatures of white light. It would thus have been

obvious for a POSITA to employ such an arrangement within the lighting unit 100 of Mueller.

185. That the benefits of such an arrangement were well known is demonstrated by Choong, which is in the same field of art as Mueller. Specifically, Choong, which was based on a patent application filed in 2008, discloses a “methodology of creating lighting of white colour with the intended [correlated colour temperature (‘CCT’)] to ease the user to control CCT of white lighting sources when the lighting source contains a plurality of collo white LEDs (not shown), white LEDs (108), warm white LEDs (102) and amber LEDs (100).” EX1012, 2:58-62. To incorporate this sort of LED arrangement, with a cool white LED and a warm white LED, would have been obvious to a POSITA seeking to provide a user with the ability to use the lighting unit 100 of Mueller to produce white light across a broad spectrum of color temperatures.

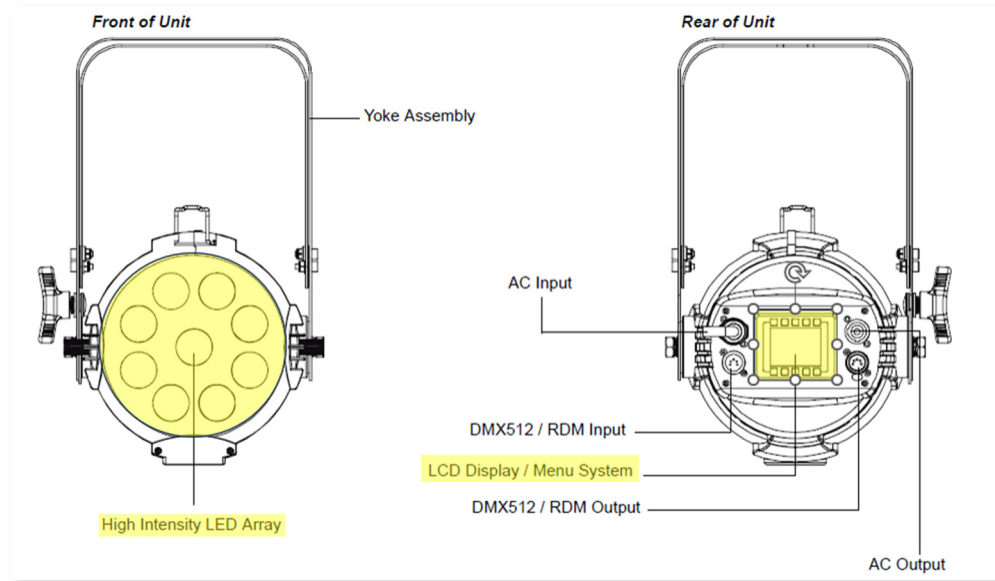
C. Ground 2 – Showline in view of Mueller renders Claims 1-6 and 8-22 obvious.

1. Overview of Showline

186. Showline describes an LED luminaire called the SL PAR 155 ZOOM RGBW LED Luminaire (“SL PAR”) used in entertainment, cinematography, and studio lighting systems. EX1011, ¶7. Showline bears a date of December 10, 2013, and was made publicly available, including to distributors and purchasers of the SL PAR at least as of December, 2013, including via a Quick Start guide included in

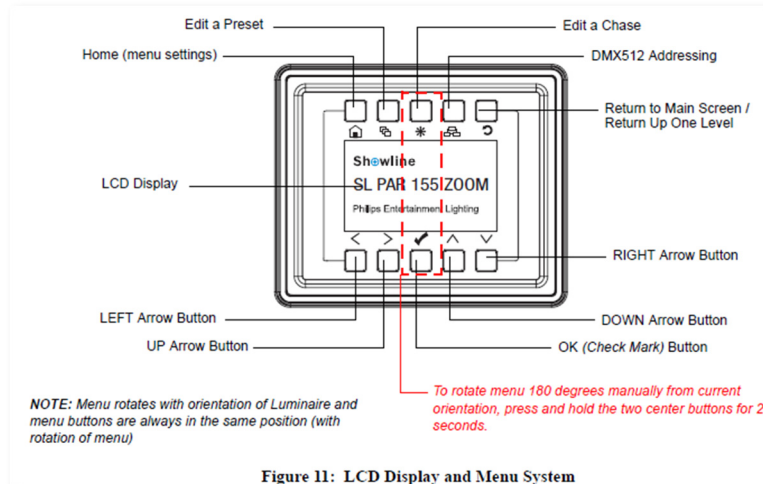
the product packaging and via Vari-Lite's (then Philips) website. *Id.*, ¶¶6-10.

187. Showline describes the SL PAR luminaire, which has (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 unit's rear.



EX1005, Figure 2 (annotated).

188. The integrated LCD Display and Menu System “provides local control” for features and functionality of the RGBW LED array. *Id.*, 14. The LCD Display and Menu System includes a user interface, with buttons allowing a user to navigate, access, and select menu settings. *Id.*, 14-15.



EX1005, Figure 11. The LCD Display and Menu System allows users to select and customize desired lighting effects, such as “presets” and “chases.” *Id.*, 15-17. Selected and customized presets and chases are then run on the luminaire. *Id.*

2. Motivation to Combine

189. A POSITA would be motivated to apply the teaching of Mueller into the system described by Showline, as they both describes lighting systems comprising multiple LEDs, with a central controller controlling all such LEDs. Showline, which is an installation and user manual, EX1005, Cover, provides a great deal of information concerning the operation of the SL PAR luminaires and instructions on how to use the luminaires to create a variety of lighting effects. *Id. passim.* As an installation and user manual, however, Showline does not provide specific detail regarding the design or manufacture of the SL PAR luminaires themselves or the internal workings of the luminaires. A POSITA interested in designing equipment such as the SL PAR luminaire and systems employing such

equipment would thus look to other references disclosing such technical information, including Mueller.

190. A POSITA would therefore be motivated to apply the teaching of Mueller to those of Showline in order to produce a lighting unit that includes components of Mueller, such as the processor 102, to simulate the disclosed effects in a cinema environment. In addition, the described elements within the ‘258 patent claims were known in the art as shown by Showline and Mueller, and combining the references yields predictable results since the lighting effects produced by the Showline device could easily be changed or modified to include the describe features of Mueller. The resulting combination would have been predictable at the time of filing for the ‘258 patent.

3. Claim 1

191. It is my opinion that Showline in view of Mueller renders Claim 1 obvious.

a. Claim Element 1p

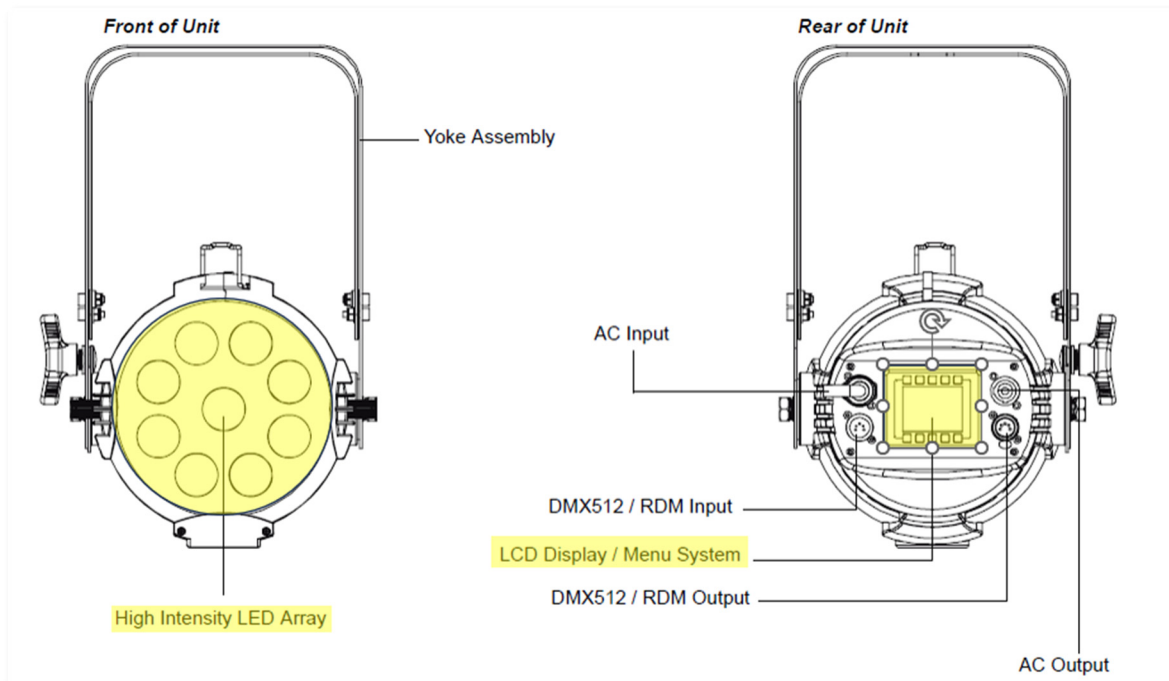
192. The preamble of Claim 1, designated Claim Element 1p herein, recites “A lighting system comprising:” EX1001, 11:59.

193. If the preamble of Claim 1 is not limiting, then it does not impact the validity of Claim 1. For the purposes of this declaration, I assume that the preamble of Claim 1 is limiting and must be considered for the purposes of evaluating the

validity of these claims.

194. Regardless, Showline teaches Claim Element 1p.

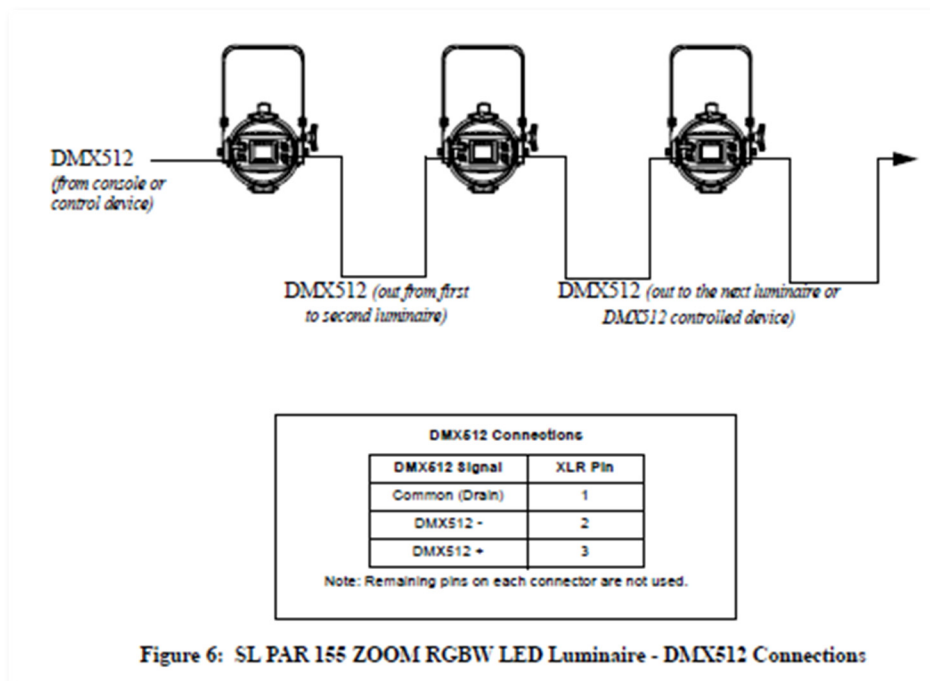
195. Showline teaches the SL PAR, a luminaire unit having a “high intensity LED array” on the front of the unit. EX1005, 6, 42. SL PAR offers a plurality of lighting effects, including presets, effects/chases, and strobe/timing, controlled through a “Display and Menu System” on the unit’s back. *Id.*, 14. The SL PAR luminaire is thus a lighting system.



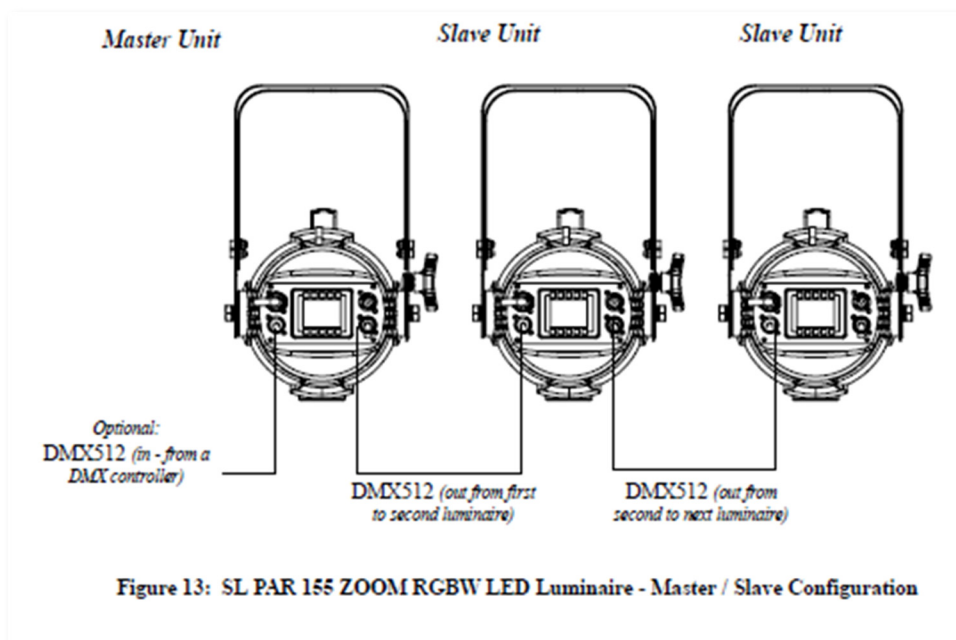
EX1005, Figure 2 (annotated).

196. Showline also teaches multiple embodiments in which multiple SL PAR luminaires can be connected in a networked lighting system, including by networking the multiple SL PAR units using DMX512 networking or through a

“Master / Slave” operational mode. EX1005, 10, 23.



Id., Figure 6.



Id., Figure 13.

197. Therefore, Showline teaches Claim Element 1p.

b. Claim Element 1a

198. Claim Element 1a recites “a lighting device; and” EX1001, 11:60.

199. Showline teaches Claim Element 1a.

200. The SL PAR units include a “high intensity LED array.” EX1005, 6. The LED array in each SL PAR unit is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets.” *Id.*, 42. These LEDs, individually and as an array, are “lighting devices” that provide illumination when running lighting effects, like presets or chases. *Id.*, 14-17.



Id., front cover.

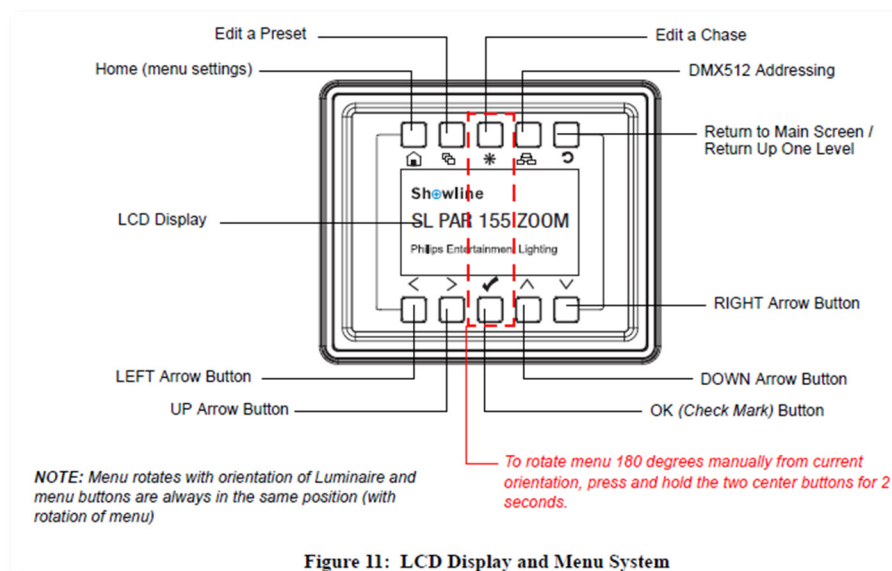
201. Therefore, Showline teaches Claim Element 1a.

c. Claim Element 1b

202. Claim Element 1b recites “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:” EX1001, 11:61-65.

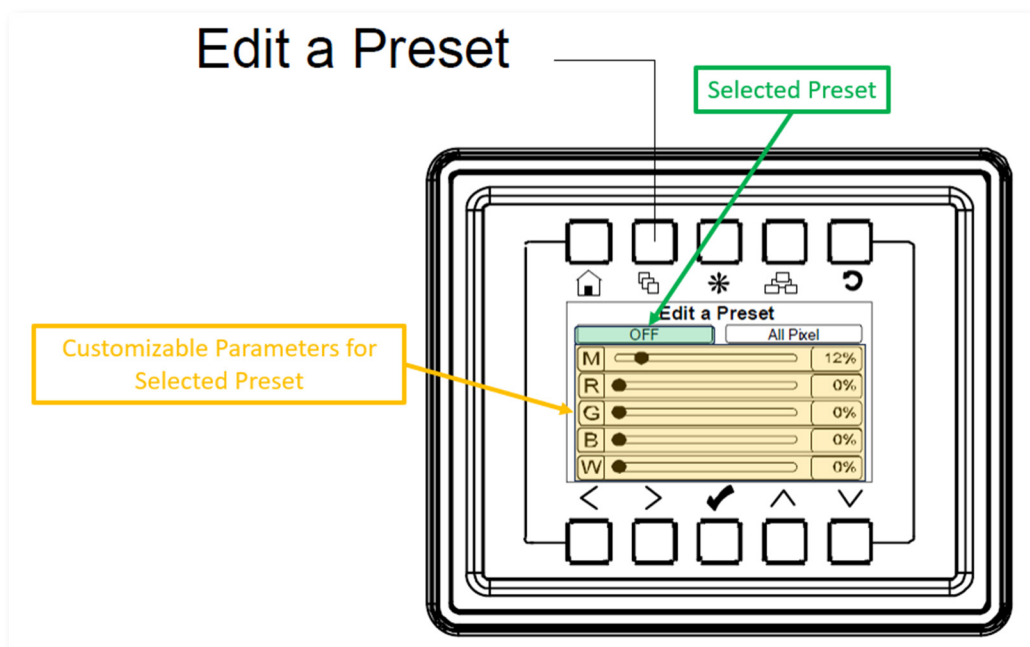
203. Showline in view of Mueller teaches Claim Element 1b.

204. The SL PAR includes an “LCD Display and Menu System” that provides “local control for accessing” fixture settings—namely, that controls the SL PAR and its LEDs. EX1005, 10, 14. The LCD Display and Menu System receives inputs from an interface, and then recalls the appropriate settings for the LED array to produce customizable cinematic effects, including editable presets and eight editable “chases.” *Id.*, 15-16.



Id., Figure 11.

205. Presets may be customized through an “Edit a Preset” menu that allows users to adjust the master intensity (“M”), as well as color values (“RGBW”) for the particular preset. *Id.*, 15. The LCD Display and Menu System produces lighting value settings for the LEDs, based on the selected preset and parameter adjustments. *Id.*, 15-16.



Id., 15 (annotated).

206. Similarly, all chases may be customized through “adjustable parameters” that allow users to customize “the master intensity, speed, and fade values.” *Id.*, 16. The editable chases may further be customized to create desired lighting effects by editing existing steps or adding new steps to a chase, with a user selecting parameters and using the buttons to make adjustments. *Id.* The LCD

Display and Menu System produces lighting value settings for the LEDs, based on these user selections and parameter adjustments. *Id.*, 16-17, Table 3.

207. Presets and chase effects can be further customized through a “Strobe / Timing Menu” in the LCD Display and Menu System. EX1005, 17. The “Strobe / Timing Menu” allows user to select from additional adjustable parameters, which are “instantly applied to any active Preset, Color Filter, or chase.” *Id.*, 17. That is, if the luminaire is actively outputting lighting effects from the LED array, adjusting these parameters instantly causes the LCD Display and Menu System to adjust the light output to match the new parameter values. Table 4 summarizes these parameters:

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.

EX1004, Table 4.

208. While Showline provides significant detail regarding the operation of the SL PAR and detailed instructions on the SL PAR’s use, it provides little detail regarding the internal components of the SL PAR and the relationships of those components that enable the LCD Display and Menu System to control the functioning of the SL PAR. A POSITA would understand that, in order to provide

the functionality described in Showline, the LCD Display and Menu System would necessarily comprise, or be in a functional relationship with, a processor or similar controller. A POSITA interested in designing equipment such as the SL PAR and networked systems including such luminaires would thus look to other references disclosing such technical information, including Mueller.

209. As explained above, Mueller teaches a number of controllers adapted to control a lighting device to produce a user-customizable cinematic lighting special effect selected from a range of different user-customizable cinematic lighting special effects, including processor 102 and LUC 208. *See supra* Ground 1, Claim Element 1b. A POSITA would recognize the benefits of incorporating Mueller’s processor 102 or LUC 208 in connection with the design of a lighting system as disclosed by Showline.

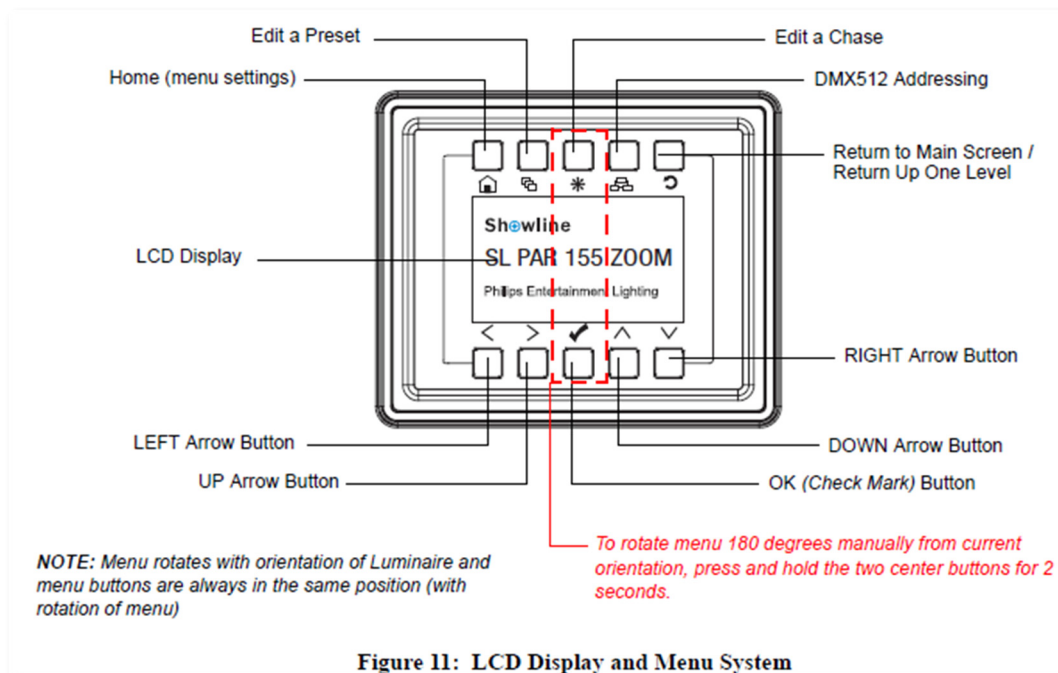
210. Therefore, Showline in view of Mueller teaches Claim Element 1b.

d. Claim Element 1c

211. Claim Element 1c recites “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” EX1001, 11:66-12:2.

212. Showline teaches Claim Element 1c.

213. The SL PAR's LCD Display and Menu System (or controller) includes a user interface that receives user inputs through selectable buttons allowing a user to navigate the menus and make selections. EX1005, 14-15. The LCD Display and Menu System interface (shown below) allows a user to select customizable lighting special effects, including "Presets" and "chases." *Id.*, 15-16. The selectable chase effects include "10 factory defined chases and eight user adjustable chases." *Id.*, 14-15.



Id., Figure 11.

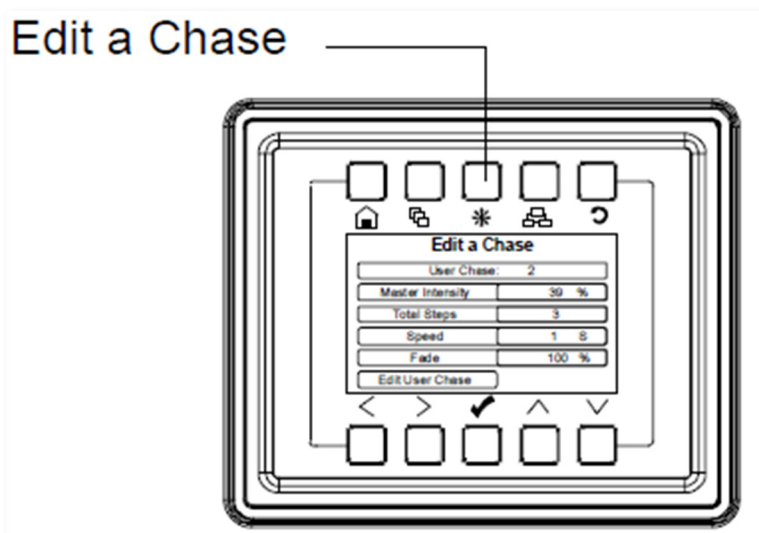
214. Further, the LCD Display and Menu System interface allows users to customize the available effects on the SL PAR. Selected presets can be customized in the "Edit a Preset" menu to customize the intensity and color values for those

presets. *Id.*, 15-16. Selected chase effects can be customized by selecting adjustable parameters through the menus on the interface, 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., Table 3.

215. The “Eight User chases can be further customized to create different effects on the fixture.” *Id.*, 17. When a user selects to “Edit a Chase” to further customize the chase lighting effect, an “Edit User Chase window will be displayed.



Id., 17.

216. Additionally, a “Strobe / Timing menu” provides an interface for users to make additional 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.*, 17. These adjustable strobing/timing parameters, selectable through the user interface menu, include (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.*, 17. These adjustable strobe/timing parameters are summarized 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.

Id., Table 4.

217. Therefore, Showline teaches Claim Element 1c.

e. Claim Element 1d

218. Claim Element 1d recites “an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter,” EX1001, 12:3-5.

219. Showline in view of Mueller teaches Claim Element 1d.

220. The SL PAR’s LCD Display and Menu System includes an “effect simulator,” as the interactive LCD Display and Menu System adjusts and stores data

in the form of “values of the luminaire’s LED settings” for the presets and chases. EX1005, 15-17; *see also supra* Claim Elements 1b-1c. These LED setting values are time-varying lighting values that characterize the desired effect and are provided to the LEDs to produce the proper light output over time, e.g., the customized effect selected by the user.

221. When 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 to match the adjustments. *Id.* In particular, the data values for the LED settings the LCD Display and Menu System sets (calculates) for each preset and chase are 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.

EX1005, Tables 3-4 (annotated). As seen in Tables 3-4, the data values for the LED settings calculated and set by the LCD Display and Menu System are based on adjustable simulation parameters, including “intensity” (or brightness), “speed,” “fade,” “duration,” “strobe rate,” and “color timing.” *Id.*

222. While Showline provides significant detail regarding the operation of the SL PAR and detailed instructions on the SL PAR’s use, it provides little detail regarding the internal components of the SL PAR and the relationships of those components that enable the LCD Display and Menu system to calculate a time varying lighting value based on a simulation parameter. A POSITA would understand that, in order to provide the functionality described in Showline, the LCD Display and Menu system would necessarily comprise, or be in a functional relationship with, an effect simulator akin to processor 102 and LUC 208 of Mueller. A POSITA interested in designing equipment such as the SL PAR and networked systems including such luminaires would thus look to other references disclosing such technical information, including Mueller.

223. As explained above, Mueller teaches a number of effect simulators adapted to calculate a time-varying lighting value based on one or more simulation parameters. *See supra* Ground 1, Claim Element 1d. A POSITA would recognize the benefits of incorporating Mueller’s processor 102 or LUC 208 in connection with the design of a lighting system as disclosed by Showline.

224. For example, incorporating the processor 102 or the LUC 208 would enable the device of Showline to produce the desired time varying effects of Mueller. The processor 102 could have been incorporated into the Showline device with little or no effort since both are related to lighting devices and use similar components and cause the Showline device to produce time-varying multi-color lighting effects. *See* EX1004, [0170].

225. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0217]-[0218]. Mueller also describes an algorithm for altering the image information. *Id.* “The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . . or perform another calculation on the information.”

226. A POSITA would have understood that the parameters used to calculate information and are applied to the object with the lighting system could include a time varying value to change the information that is used to apply a lighting effect to an object. It would have been obvious to use this embodiment of Mueller to calculate a time varying value to produce lighting effects using Mueller’s lighting system 200 including a lighting unit 100.

227. Therefore, Showline in view of Mueller teaches Claim Element 1d.

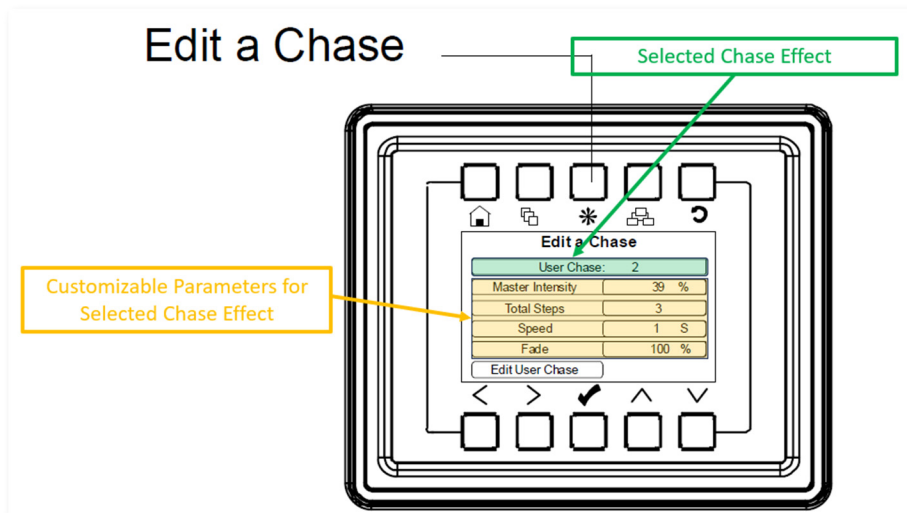
f. Claim Element 1e

228. Claim Element 1e recites “said at least one simulation parameter depending on the selected user customisable cinematic lighting special effect being simulated,” EX1001, 12:5-7.

229. Showline teaches Claim Element 1e.

230. Showline teaches that the “simulation parameters” a user may adjust depend on the selected preset or chase effect a user wants to edit and run on the SL PAR. *See supra* Claim Elements 1b-1d. As discussed, users are presented with options to adjust certain parameters of presets and chases after selecting a particular preset or chase. EX1005, 15-17. For example, with respect to presets, a user first selects a preset to edit by using buttons to “scroll through” available presets. *Id.*, 15. After selecting a preset to edit, a user may then “scroll through the parameters” for that preset, and use “left and right arrow buttons to make adjustments.” *Id.* Thus, the parameters adjusted depend on the effect being edited.

231. As another example, with respect to editable chases, a user first selects a particular chase to edit and is provided a menu allowing a user to make adjustments to parameters for that particular chase:



EX1005, 17 (annotated). As with presets, 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.* Again, the adjusted parameters are particular to the chase being edited.

232. Finally, the “strobe/timing” parameters shown in Table 4 of Showline can be assigned to an “active Preset, Color filter, or chase.” EX1005, 17. Thus, those parameters too depend on the particular preset, color filter, or chase that is active.

233. Therefore, Showline teaches Claim Element 1e.

g. Claim Element 1f

234. Claim Element 1f recites “adapted to output said time varying lighting value to said lighting device so as to simulate the selected user customisable cinematic lighting special effect;” EX1001, 12:7-10.

235. Showline in view of Mueller teaches Claim Element 1f.

236. The interactive LCD Display Menu System allows a user to “recall” (or play) an edited preset or chase effect from the main menu, with the corresponding “stored values of the luminaire’s LED settings” for that preset or chase being sent to the LEDs so the effect can be “run” or implemented by the LED array. *See supra* Claim Elements 1b-1d. That is, when a preset or chase is recalled and run, the lighting values for that 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 effect is implemented. EX1005, 15-17.

237. In addition, “strobe/timing” values are “instantly applied to any active Preset, Color filter, or chase.” EX1005, 17. Thus, the LCD Display and Menu System instantly calculates and sends new LED setting values to implement particular strobe/timing adjustments with respect to the lighting effect being run. *Id.* For example, adjustments to the “Color Timing” parameter are output to the LEDs to adjust “the time used to change color values when running a chase.” EX1005, 17.

238. As explained above, a POSITA would be motivated to incorporate Mueller’s processor 102 or LUC 208 into the SL PAR’s LCD Display and Menu System to enable the functionality disclosed by Showline. *See supra* Claim Element 1d. As further explained above, Mueller’s processor 102 and LUC 208 are adapted

to output time-varying lighting values so as to simulate a selected user-customizable cinematic lighting special effect. *See supra* Ground 1, Claim Element 1f.

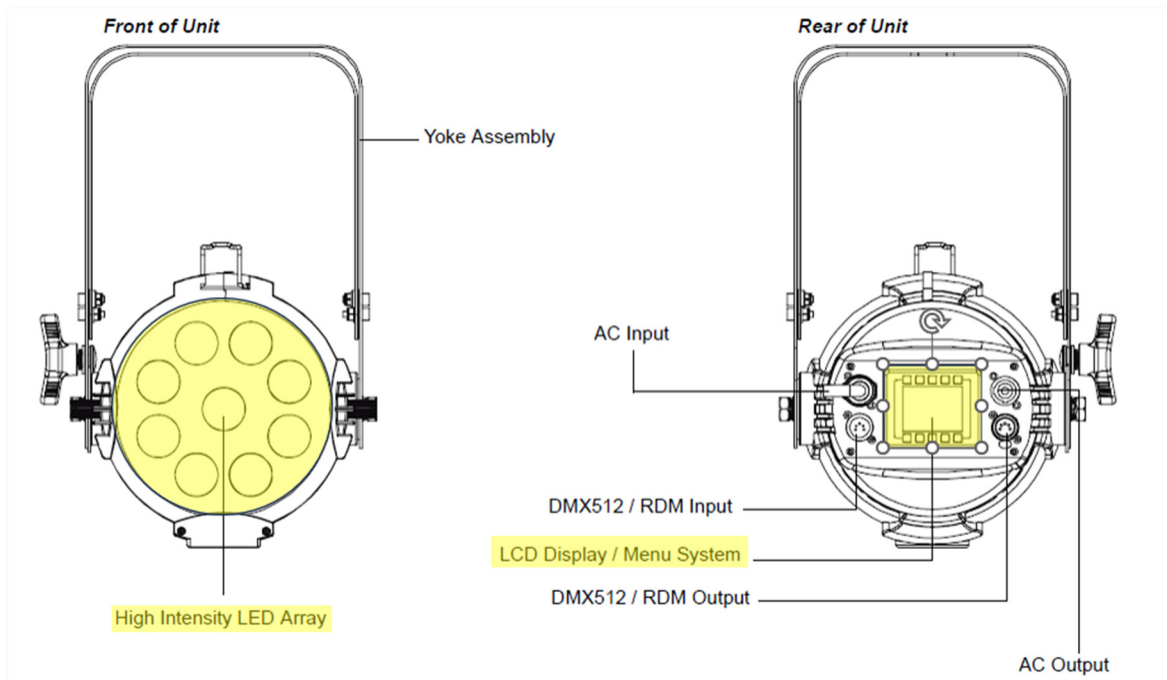
239. Therefore, Showline in view of Mueller teaches Claim Element 1f.

h. Claim Element 1g

240. Claim Element 1g recites “wherein said lighting device and said controller are integrated in a combined unit.” EX1001, 12:11-12.

241. Showline teaches Claim Element 1g.

242. The LED array of SL PAR is located on the front of the unit, and the LCD Display and Menu System (which provides “local control” of the unit) is located on the rear of the same unit:



EX1005, Figure 2 (annotated). Thus, Showline Manual teaches that the lighting device (*e.g.*, LEDs) and controller (*e.g.*, LCD Display and Menu System) are integrated into a single SL PAR unit.

243. Therefore, Showline in view of Mueller teaches Claim 1f.

4. Claim 2

244. Claim 2 recites “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.” EX1001, 12:13-16.

245. It is my opinion that Showline in view of Mueller renders Claim 2 obvious.

246. The user interface of the LCD Display and Menu System enables a user to select and edit presets and chases, and to add strobe/timing adjustments to any preset or chase, to create desired effects. *See supra* Claim Element 1c. Menu options allowing a user to edit presets and chases to customize the selected effects are shown in Figure 11:

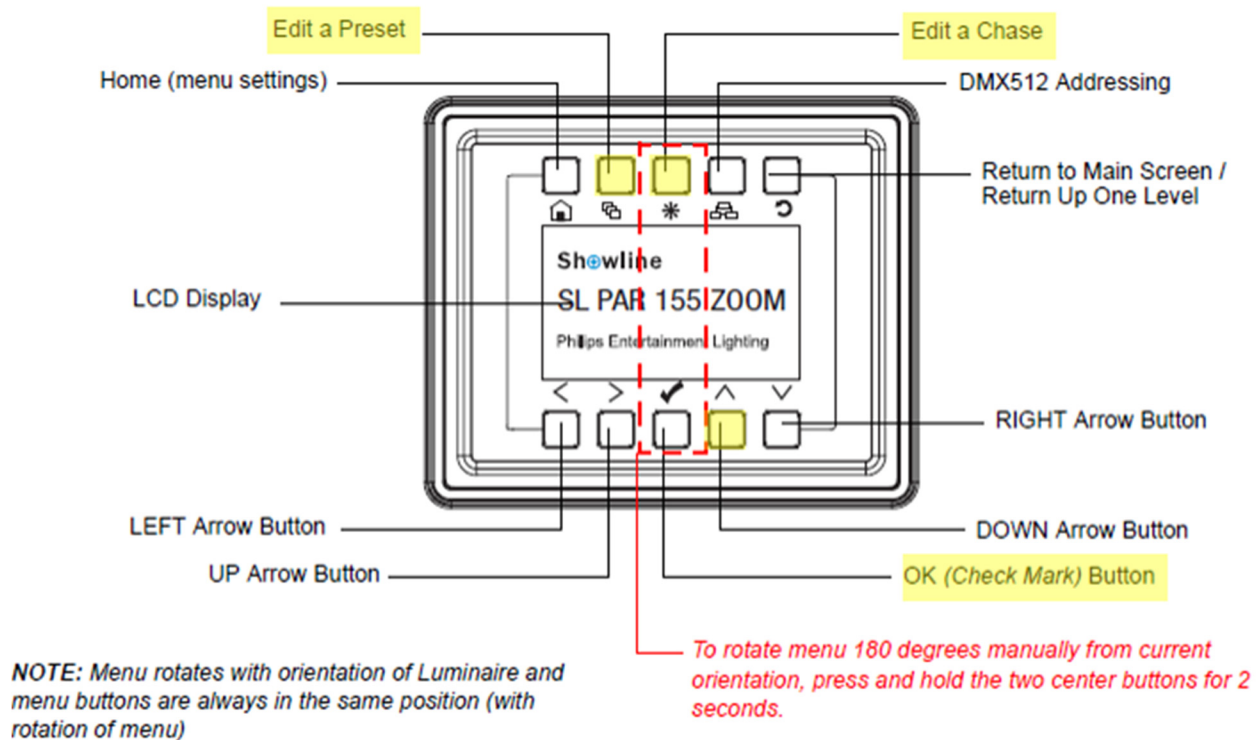
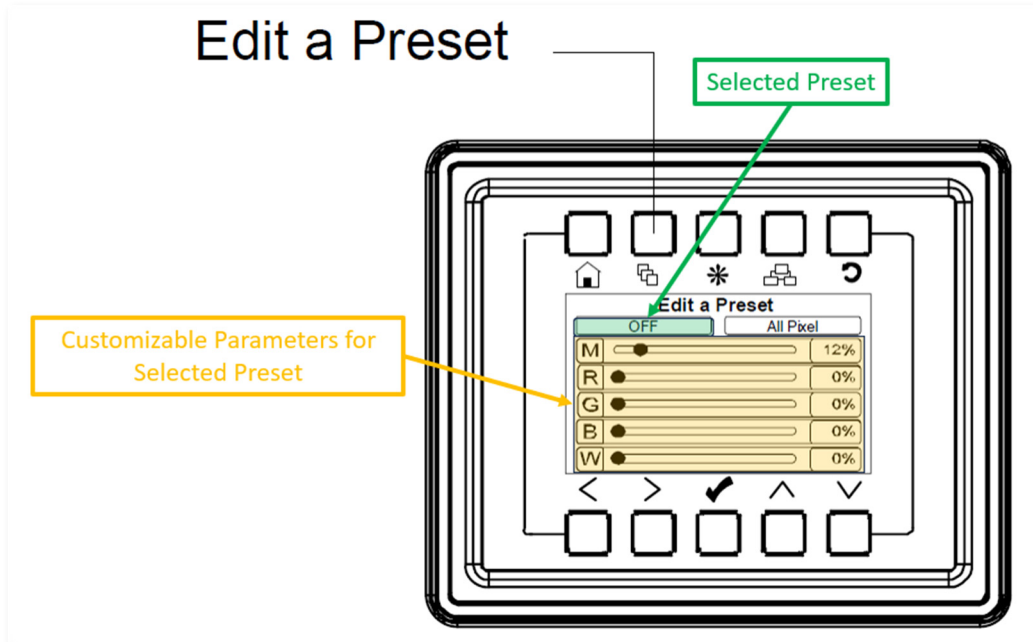


Figure 11: LCD Display and Menu System

EX1005, Figure 11 (annotated).

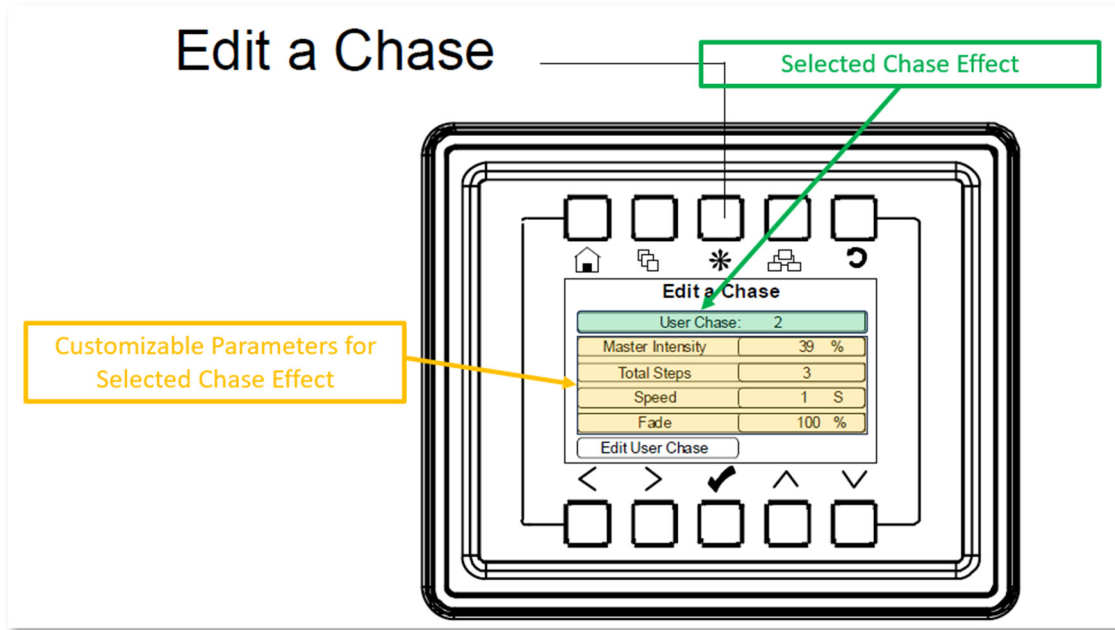
247. As discussed with respect to Claim Elements 1b-1c, the LCD Display and Menu System buttons allows users to navigate and make selections to adjust parameters of lighting values for editable presets and chases, including intensity, duration, timing and colors. *Id.*, 15-17, Tables 3-4. In particular, by using the up, down, left, and right arrow buttons on the LCD Display and Menu System, users can edit presets to adjust selected parameters, edits chases to adjust selected parameters, and assign and adjust strobe and timing parameters to any preset or effect. *Id.*, 15-17. For example, preset color parameters can be edited by changing “RGBW” (*i.e.*,

red, green, blue and white) or “HISC” (*i.e.*, hue intensity, saturation, and color) parameters. *Id.*, 15.



Id. (annotated).

248. Similarly, the LCD Display and Menu System provides user interface menus for a user to select and customize chase effects, including intensity, speed, fade and colors. *Id.*, 16-17.



Id., 17 (annotated).

249. Therefore, Showline in view of Mueller renders Claim 2 obvious.

5. Claim 3

250. Claim 3 recites “The lighting system according to claim 1, wherein the lighting device comprises at least one LED.” EX1001, 12:17-18.

251. It is my opinion that Showline in view of Mueller renders Claim 3 obvious.

252. The SL PAR is an “RGBW LED” luminaire:



EX1005, front cover. Moreover, the SL PAR includes an array of nine RGBW (*i.e.*, multiple different colored) LEDs. *Id.*, 42 (SL PAR is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets); *see also id.*, 15, 17, 21, 28-29 (referencing control of red, green, blue, and white LEDs).

6. Claim 4

253. Claim 4 recites “The lighting system according to claim 3, wherein the lighting device comprises multiple different coloured LEDs.” EX1001, 12:19-20.

254. It is my opinion that Showline in view of Mueller renders Claims 4 obvious.

255. The SL PAR is an “RGBW LED” luminaire:



EX1005, front cover. Moreover, the SL PAR includes an array of nine RGBW (*i.e.*, multiple different colored red (R), green (G), blue (B), and white (W)) LEDs. *Id.*, 42 (SL PAR is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets); *see also id.*, 15, 17, 21, 28-29 (referencing control of red, green, blue, and white LEDs).

7. Claim 5

256. Claim 5 recites “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.” EX1001, 12:21-23.

257. It is my opinion that Showline in view of Mueller renders Claims 5 obvious.

258. The SL PAR is an “RGBW LED” luminaire:



EX1005, front cover. Moreover, the SL PAR includes an array of nine RGBW (*i.e.*, multiple different colored) LEDs. *Id.*, 42 (SL PAR is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets); *see also id.*, 15, 17, 21, 28-29 (referencing control of red, green, blue, and white LEDs).

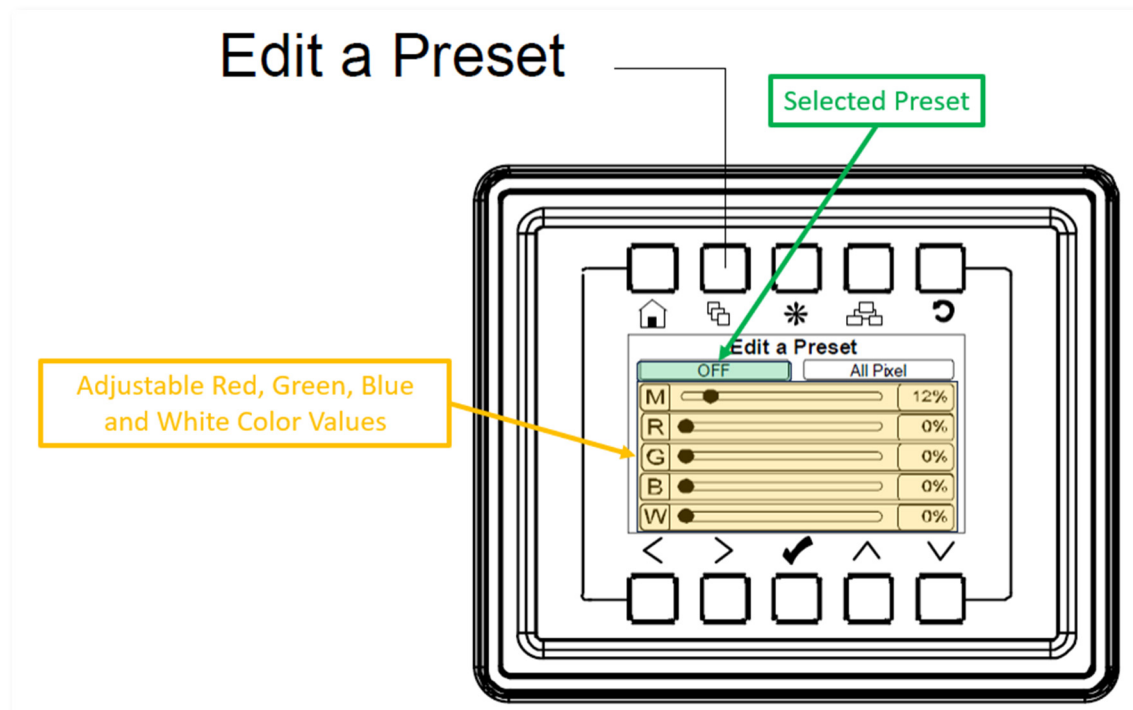
8. Claim 6

259. Claim 6 recites “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.” EX1001, 12:24-27.

260. It is my opinion that Showline in view of Mueller renders Claim 6 obvious.

261. Showline teaches that the color of the SL PAR’s LEDs can be controlled based on user inputs in, for example, the “Edit a Preset,” “Edit a Chase,” and “Strobe / Timing” menus provided on the LCD Display and Menu System. EX1005, 15-17.

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



Id. (annotated).

263. In the “Edit a Chase” menu, users can select “presets or color filters” to apply to each step in the chase. *Id.*, 17. 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 further teaches that the “Edit a Chase” menu allows adjustments to “RGBW” (*i.e.*, red, green, blue and white) or “HISC” (*i.e.*, hue, intensity, saturation, and color) parameters to change the color. EX1005, 17.

264. In the “Strobe/Timing” menu, selected changes to “Color Timing” are implemented by the LCD Display and Menu System to control timing changes between different colors in a chase effect. *Id.* That is, when a chase effect includes

multiple colors, the “Strobe/Timing” menu controls the timing of changes between these different colors.

265. Showline also teaches that, in addition to color adjustments discussed above, “color temperature” is also adjustable. *Id.* In particular, the “Color Temperature” is “user adjustable” between “2700 – 6500K.” EX1005, 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.; see also *id.*, 25 (describing color presets included “White” values at temperatures between 2700K and 10000K), 30 (describing correlated color temperature (CCT) control through DMX settings when in the HSIC mode on the LCD Display and Menu System.) DMX is a common control protocol standard created by and for the entertainment lighting industry.

266. A POSITA would understand from Showline that user adjustment of color temperature would be done through the LCD Display and Menu System. *Id.* The LCD Display and Menu System is described as providing “local control” of the fixture settings. EX1005, 14. A POSITA would recognize that a user-adjustable color temperature would be one of these fixture settings. Moreover, as indicated on pages 15 and 17 of the Showline, the LCD Display and Menu System can access RGBW and HSIC parameters based on DMX maps. EX1005, 15, 17. Showline, 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.*, 30. As Showline indicates that these DMX control settings can be made available to the user through the LCD Display and Menu System, a POSITA would understand that the LCD Display and Menu System can implement these color temperature adjustments.

267. Further, a POSITA would understand the processor 102 of Mueller could be incorporated to control the lights of Showline based on the input received by Showline’s display. The processor 102 could easily be incorporated as the controller.

9. Claim 8

268. Claim 8 recites “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.” EX1001, 12:31-33.

269. It is my opinion that Showline in view of Mueller renders Claim 8 obvious.

270. Showline Manual teaches the “color temperature” of the LED array is “user adjustable” and operates 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)

EX1005, 42. Showline Manual further teaches that, in other modes, color presets which may be implemented by the SL PAR include “White 10000K,” “White 8000K,” “White 6500K,” “White 5600K,” “White 5000K,” “White 4500K,” “White 4000K,” “White 3200K,” “White 3000K,” and “White 2700K.” *Id.*, 25, 30. Thus, the SL PAR is operable to produce light at a color temperature in the claimed range.

10. Claim 9

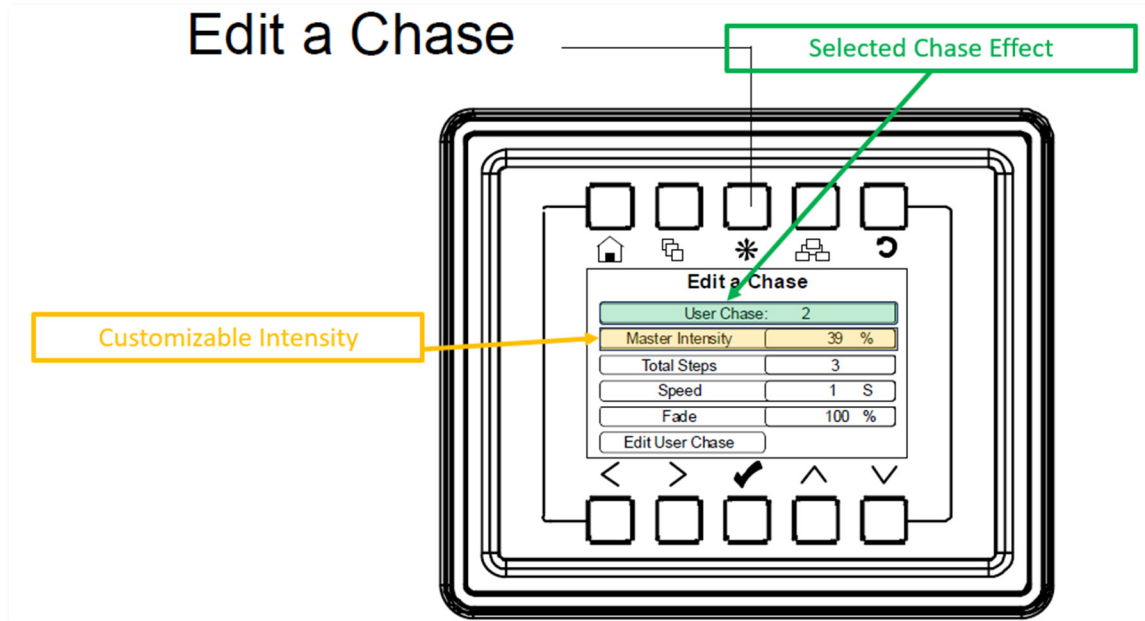
271. Claim 9 recites “The lighting system according to claim 3, wherein the controller is adapted to control the brightness of said LEDs in dependence on a user input received via the input interface.” EX1001, 12:34-37.

272. It is my opinion that Showline in view of Mueller renders Claim 9 obvious.

273. The LCD 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. *See supra* Claim elements 1b-1d. For example, Showline indicates 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. EX1005, 16, Table 3. In addition, through the “Edit a Chase” and

“Strobe/Timing” menus, users can adjust the “master intensity” of the LED output.

Id., 16-17.



Id., 17 (annotated).

11. Claim 10

274. Claim 10 recites “The lighting system according to claim 1, wherein the simulation parameter comprises at least one of a colour and a colour temperature.” EX1001, 12:38-40.

275. It is my opinion that Showline in view of Mueller renders Claim 10 obvious.

276. Showline teaches that the adjustable parameters include selections of color filters and user adjustable color temperature. A user can change the color and

color temperature of the LED elements by changing color and temperature control parameters, including for chase effects. *See supra* Claims 6, 8.

277. Further, A POSITA would understand that Mueller’s processor 102 can receive the input changing the color or color temperature as a simulation parameter for outputting to the lights.

12. Claim 11

278. Claim 11 recites

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.

EX1001, 12:41-47.

279. It is my opinion that Showline in view of Mueller renders Claim 11 obvious.

280. Showline teaches that the user-selected, customizable effects can include at least “flashes (strobe).” EX1005, 16-17. Specifically, chase effects can include “strobe mode and rate settings,” and “the time each strobe flash remains ON” in a chase effect can be adjusted based on user selections. *Id.*, 17, Table 4; *see also id.*, 28-29.

281. Further, a POSITA would understand from Showline that the editable chases, which can include various colors, flashing, and strobing, would produce

other of the claimed effects, such as effects that mimic at least a police light, lightning, paparazzi flashes, welding, sparking, a fire or candle, and neon signs. For example, a chase with flashes or strobes of varying color, duration and intensity would produce light that simulates lightning, paparazzi flashes, and welding and spark/short circuit effects, and a chase flashing alternating blue and red lights would produce light that simulates a police car light. *Id.*

282. Mueller teaches that user customizable lighting effect can be programmed to simulate a number of different effects, including explosions, flashes etc. For example, Mueller describes that “designer can program the *fire or explosion effect* on a computer”. EX1004, [0221] (emphasis added). In another example, Mueller describes that “the program may be configured, for example to generate an array of lighting effects such as. . . *flashing effects*. . . *a flare streaking across a room*. . . *a plume from an explosion*”. *Id.*, [0215] (emphasis added).

283. Based on my understanding, a POSITA would understand that the fire or explosion effects that are programmed by generating corresponding control signals could be produced as an effect using the lighting unit 100 and its associated components. Accordingly, the lighting unit could be easily programmed with difficulty to produce any of the listed effects in Claim 11.

284. A POSITA would understand that Showline’s various colors, flashing, and strobing could be used to accomplish the described effects of Mueller. Further,

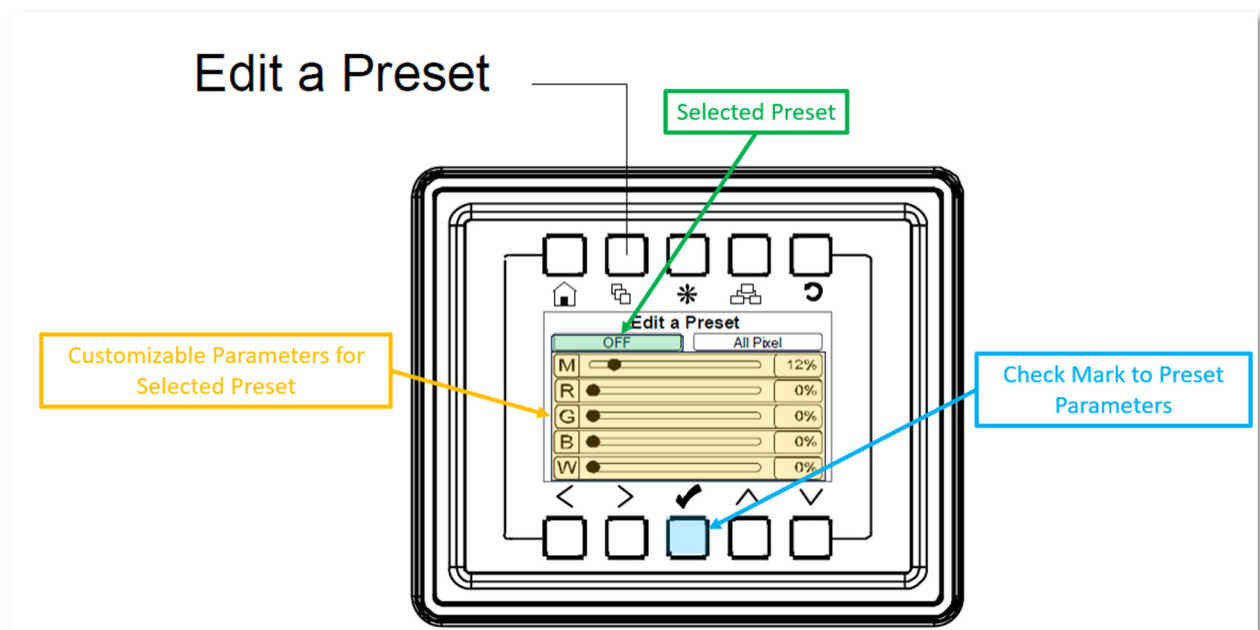
the processor 102 of Mueller could implement the described effects of Mueller using the LEDs of Showline in the cinema industry.

13. Claim 12

285. Claim 12 recites “The lighting system according to claim 1, wherein the controller is adapted to store said at least one simulation parameter in memory.” EX1001, 12:48-50.

286. It is my opinion that Showline in view of Mueller renders Claim 12 obvious.

287. A user may edit presets using the SL PAR’s LCD Display and Menu System, and once all values are adjusted as desired, pressing a “Check Mark” button saves the preset (with its parameters). EX1005, 15-16.



Id., 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.*, 15-16. Saved presets can then be “recalled via the menu.” *Id.*, 16.

288. Users can also adjust parameters for any chase, including the ten factory defined chases and the eight user editable chases. *Id.*, 16. Again, users can use buttons on the LCD Display and Menu System to select parameters, and then press a “Check button” to save when done. *Id.* These parameterized chases can be “recalled” through the menu system. *Id.* Similarly, a user can “edit and save” the user-editable chases in the “Edit a Chase” menu, and when all editing steps are done, a user pushes a “Return to Main Menu” button and the “user chase is now saved and can be recalled.” *Id.*, 17.

289. A POSITA would understand from Showline that the adjusted values and parameters selected by the user would be “saved” in and “recalled” from a memory in the SL PAR unit.

14. Claim 13

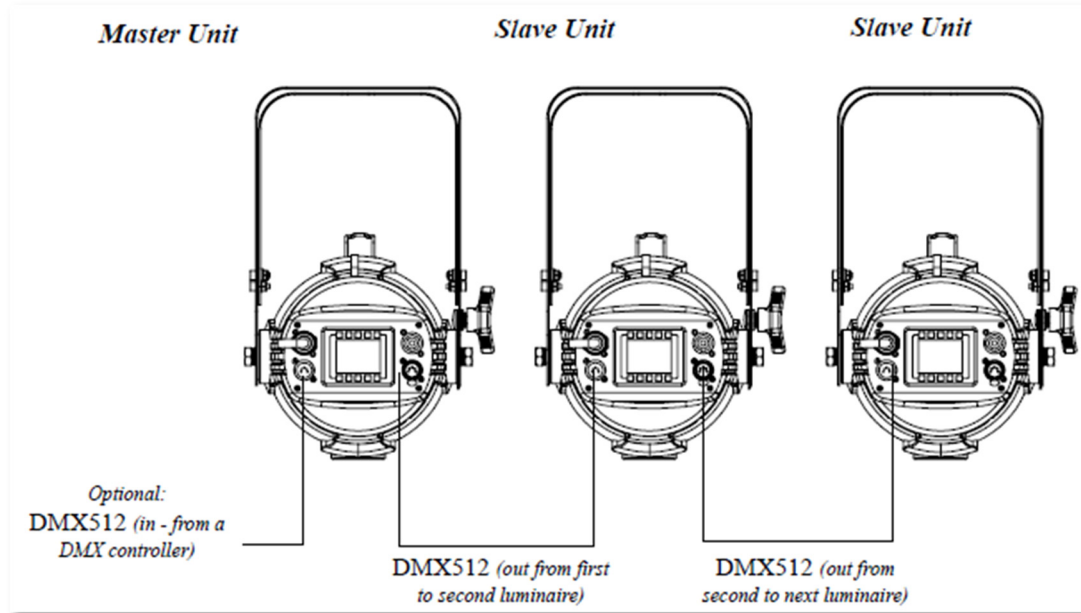
290. Claim 13 recites “The lighting system according to claim 1, wherein the controller is adapted to control a plurality of lighting devices in dependence on the selected user customisable cinematic lighting special effect.” EX1001, 12:51-54.

291. It is my opinion that Showline in view of Mueller renders Claim 13 obvious.

292. Each LED in the SL PAR array of nine LEDs is itself a lighting device. *See supra* Claim element 1a. Further, the LCD Display and Menu System controls this plurality of nine LED “lighting devices” in the SL PAR. *See supra* Claim elements 1b-1f.

293. In addition, the LCD Display and Menu System in one SL PAR can act as a “Master” controller, to control a plurality of “Slave” SL PARs. EX1005, 23. In particular, “[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.” *Id.*

294. In the “Master/Slave” mode, user-selected “presets and chases” 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.* Thus, the plurality of “slave” units is controlled by the “master” unit, based on the user-selected, edited, and adjusted chase effects that are recalled to run on the master.



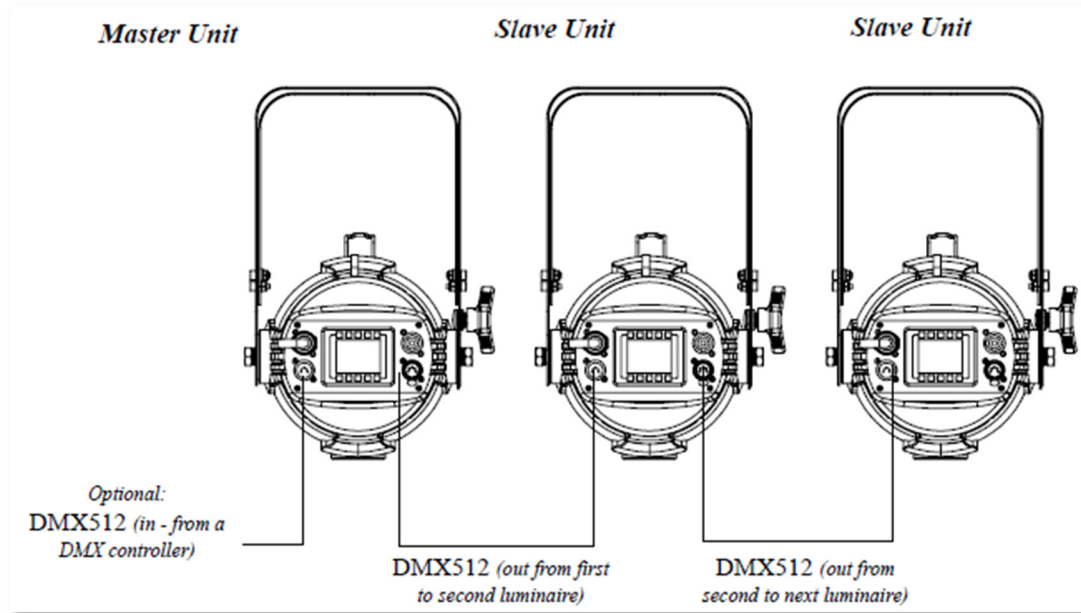
EX1005, Figure 13; *see also id.*, 10.

15. Claim 14

295. Claim 14 recites “The lighting system according to claim 1, further comprising a further lighting device, said further lighting device being separate from said controller.” EX1001, 12:55-57.

296. It is my opinion that Showline in view of Mueller renders Claim 14 obvious.

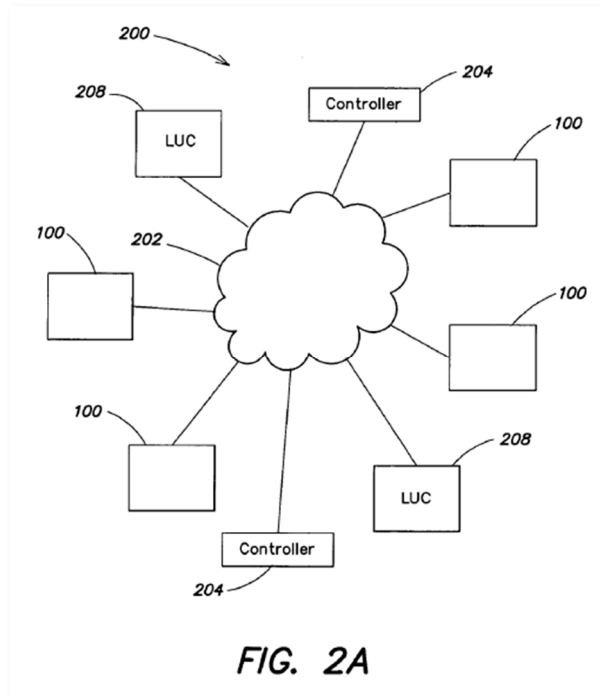
297. In the “Master/Slave” mode, the “slave unit” SL PARs, with their LED arrays, are controlled by and separate from the “master unit” SL PAR (and its LCD Display and Menu System). *See supra* Claim 13.



EX1005, Figure 13; *see also id.*, 10.

298. In addition, Mueller teaches that the lighting systems disclosed therein, whether a single lighting unit 100 operating on its own or a networked system of multiple lighting units 100, can be designed with flexibility regarding the placement of the various components disclosed therein. *See supra* Claim Element 1g. Mueller explains that the lighting system 200 comprises “a number of lighting units 100”. EX1004, [0197]; *see also id.*, Figure 2A (showing multiple lighting units 100).

299. As shown below in Figure 2A, additional lighting unit(s) 100 are separated from LUC 208 and processor 102 of the first lighting unit 100.



Id., Figure 2A.

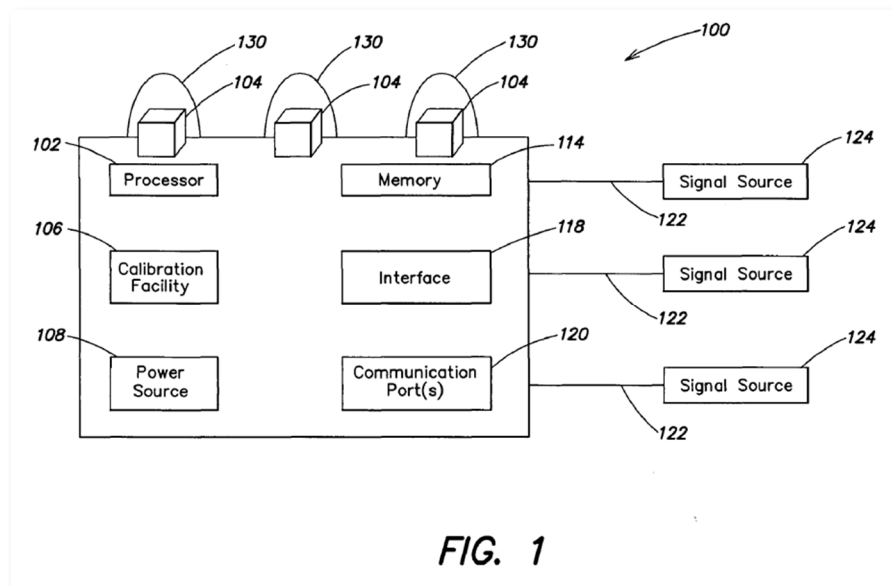
300. A POSITA would understand that a lighting unit 100 or lighting source 104 could be included and controlled by another lighting unit 100 or the LUC 204, the lighting unit 100 or lighting source 104 being separate from the LUC 204 since they are connected over a network.

16. Claim 15

301. Claim 15 recites “The lighting system according to claim 14, wherein the controller comprises a wireless communication interface adapted for wireless communication with said further lighting device.” EX1001, 12:58-61.

302. It is my opinion that Showline in view of Mueller renders Claim 15 obvious.

303. Mueller teaches “communication ports 120” as part of lighting unit 100, which are interfaces for communication with other lighting devices. EX1004, [0190] (“the lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a variety of other devices . . . the communication port 120 may include an interface for any suitable wireless communications”).



Id., Figure 1.

304. Mueller teaches that the communication port 120 can be integrated into a controller (either processor 102 or LUC 208), as it explains that “any of the components discussed above, such as the signal sources 124, interfaces 118, communication ports 120, and other components . . . either as stand alone components, integrated components or shared components” can be flexibly configured to be included with processor 102. *Id.*, [0198]. A POSITA would have

understood that the communication ports 120 could be integrated with any of the controllers disclosed by Mueller.

305. Further, as explained above, a POSITA would be motivated to incorporate a controller disclosed by Mueller, such as processor 102 or LUC 208, into the LCD Display and Menu System of the SL PAR or to associate such a controller with the LCD Display and Menu System of the SL PAR. *See supra* Claim Element 1b. Also as explained above, Mueller teaches that such controllers can comprise a wireless communication interface adapted for wireless communication between a first lighting device and a further lighting device. *See supra* Ground 1, Claim 15.

17. Claim 16

306. Claim 16 recites “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.” EX1001, 12:62-65.

307. It is my opinion that Showline in view of Mueller renders Claim 16 obvious.

308. The LCD Display and Menu System controls the plurality of LEDs in the array of nine LEDs. *See supra* Claim elements 1b-1e. The LCD Display and

Menu System can at least offset or overlap the flashing of these LEDs to simulate a moving light source.

309. For example, in creating and producing chase effects, the LCD Display and Menu can set, for example, a number of different steps in a chase, along with intensity and fade values for each step. EX1005, 16-17. Changing the intensity and fade values for the LEDs in implementing these chases simulates a moving light source, with the LED outputs overlapping to create the light with the appropriate fading. *Id.* 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 (such as a flare shot off into the distance).

310. In addition, in the “Master/Slave” mode, the slave units “mimic the master unit’s operation in all cases.” EX1005, 24. User-selected “presets and chases” made through the LCD Display and Menu System “recalled on the master will automatically play on the slaves without having to program the slaves.” *Id.* Thus, the master unit’s LCD Display and Menu System is adapted to at least overlap the output of the LED arrays in the master and slave units when running chase effects, simulating a moving light source when steps of the chase effect as implemented across the SL PAR units include, for example, all lights brightening at the same time to mimic an approaching train light.

311. Mueller teaches a number of lighting effects that simulate a moving light source, including a “rainbow chase” effect involving “a color changing effect that various colors from one lighting unit 100 to another lighting unit 100, or across a number of the lighting units 100 in such a way as to generate the appearance of a propagating rainbow of colors, explosions, turbulence, fire, missiles, shape motion, tinkerbelle-like shapes, lights moving in a room, “and many others.” EX1004, [0202], [0225].

312. A POSITA would have understood, in the context of a networked lighting system 200, that the way in which these effects could be generated using multiple light sources would be to offset and/or overlap the output of the various light sources. In view of the disclosures of Mueller, a POSITA would not have found this to be a surprising or difficult task to undertake. In addition, it would have been obvious to include the production of effects by lighting system 200 to the lighting unit 100 since lighting unit includes similar capabilities and the processor 102 could be programmed to control the lighting sources 104 to output the moving light source effect, e.g., the rainbow chase. Showline’s LCD display can be implemented with Mueller’s processor 102 to cause Showline to implement the above mentioned effects.

18. Claim 17

313. Claim 17 recites “The lighting system according to claim 1, wherein the controller is separable from the lighting device.” EX1001, 12:66-67.

314. It is my opinion that Showline in view of Mueller renders Claim 17 obvious.

315. Showline explains that, in addition to being able to control the SL PAR via the LCD Display and Menu System, a separable DMX512 control source may be used to provide the same controls. EX1005, 9-10, 19-20. The manual states, for example, that “Presets 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*.” EX1005, 15-17 (emphasis added).) The DMX512 control source is physically attached to the unit through a DMX “cable” connector, connecting the DMX512 control source and SL PAR unit. *Id.*, 10. This DMX512 controller can be disconnected from the SL PAR (including its LED array) and is therefore separable.

316. As explained above, Mueller makes clear that the lighting systems disclosed therein may be designed with flexibility in mind. *See supra* Claim Element 1g; *see also* EX1004, [0198], [0062]. Mueller further identifies a variety of different configurations under which LUC 208 and the lighting device 100 are connected, for

example, serial connections, parallel connections, networked connections and combinations thereof. *Id.*, at [0199]. Mueller further teaches that the connection between LUC 208 and the lighting device 100 could be via a variety of different communication media and protocols. *Id.* Mueller also specifically contemplates that “one or more devices coupled to a network may serve as a controller for one or more other devices coupled to the network (e.g., in a master/slave relationship).” *Id.*, [0066].

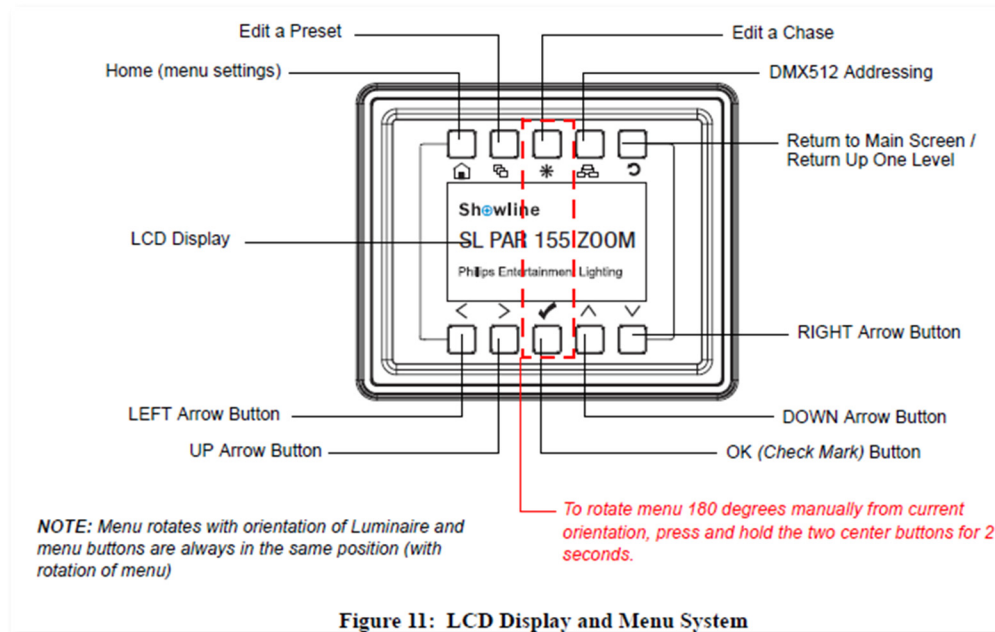
317. A POSITA would understand that the separable DMX15 control source can include the processor 102 (controller) since Mueller is flexibly designed. The result of a separable controller would be predictable and allow the controller to be stored separately, work with other units, or other benefits that would motivate a POSITA to include the processor 102 in a separable unit.

19. Claim 18

318. Claim 18 recites “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.” EX1001, 13:1-4.

319. It is my opinion that Showline in view of Mueller renders Claim 18 obvious.

320. The LCD Display and Menu System includes, for example, an LCD “display” with selectable menu “buttons.” *See Supra* Claim element 1c.



EX1004, Figure 11.

321. Mueller teaches an input interface in the form of interface 118. EX1004, [0182]. Mueller further provides that “[t]he interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” *Id.*

322. Mueller further explains that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

20. Claim 19

323. Claim 19 recites “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.” EX1001, 13:5-8.

324. It is my opinion that Showline in view of Mueller renders Claim 19 obvious.

325. The “converter” ensures the signals are of the proper type to be input into the LEDs or other light elements. The convertor is described as converting data into a suitable signal for a particular light. EX1001, 8:41–46. As a described example of this feature, “for a light emitting diode (LED) array lighting the data conversion occurs at an LED lamp control logic that produces and supplies a separate pulse-width-modulation output for each LED colour to an LED drive circuit.” EX1001, 8:46–50. The processor 102 is described in Mueller as producing control signals such as pulse width modulated signals. The processor 102 may control other dedicated circuitry which in turn controls the light sources 104. The processor 102 inherently includes a convertor to output signals to the lighting sources 104. A POSITA would understand that the processor 102 includes the convertor or controls other circuitry that is the convertor for converting data into signals that go to the lighting source 104 (lighting devices) as output.

326. A POSITA would understand that a converter in lighting system 200 such as processor 102 or LUC 208, would convert lighting data, such as brightness or color data, such as the data shown the configuration file 500 of Figure 5, into lighting signal. *Id.*, [0214] (“With all of the light systems 102 in predetermined positions, as identified in the configuration file 500,” the representation of the lighting effect “can be played in the room by the light system and or another system such as a sound system”).)

502 LIGHT SYSTEM	504 TIME	508 POSITION	510 LIT POSITION	512 COLOR RANGE	514 INTENSITY	518 OTHER SYS.	520 POSITION
LS001	T1	(1,3,7)	POLY001	0-16000	0-100		
LS001	T2	(1,3,7)	POLY001	0-16000			
LS001	T3	(1,3,7)	POLY002	0-16000			
LS002	T1	(0,0,0)	POLY003	0-16000			
LS002	T2	(0,0,0)	POLY004	0-16000			
LS002	T3	(0,0,0)	POLY005	0-16000			
LS00N	TN						

FIG. 5

Id., Figure 5. Indeed, a POSITA would understand that such conversion would be necessary for lighting system 200 to operate by making lighting data in to control signals transmitted to each lighting unit 100.

327. Further, a POSITA would understand from Showline that the SL PAR includes the claimed “converter.” The LEDs in the SL PAR are “15 Watt High Power LED Chipsets.” EX1005, 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. In particular, the color and intensity (brightness) values for the presets and chases, *see supra* Claim element 1d and Claim 6, are converted by LED driver circuitry in the SL PAR to lighting signals sent to the LED chipsets to cause the LEDs thereon to output the appropriate light.

328. In addition, each of the LEDs inherently require a “convertor” to receive the appropriate signal, such as a pulse modulated signal. A POSITA, would understand, the processor 102 of Mueller could connect with the LED Chipsets of Showline to provide the correct signals depending on the type of light and cause the associated effects.

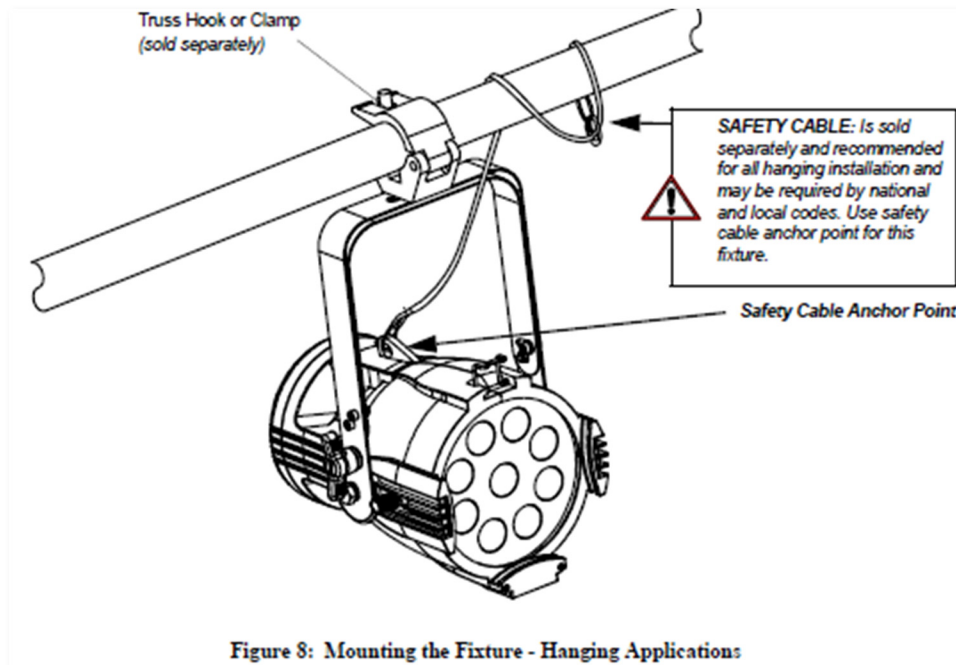
21. Claim 20

329. Claim 20 recites “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.” EX1001, 13:9-12.

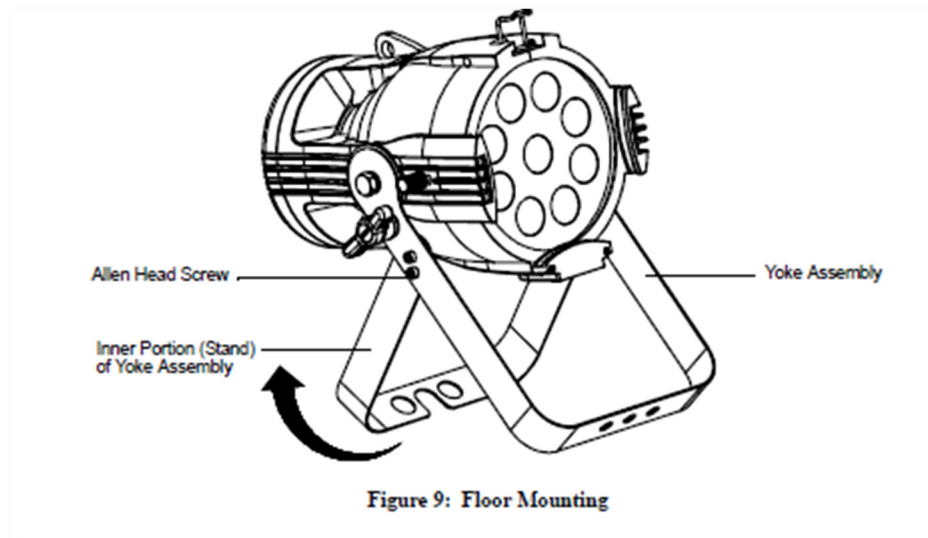
330. It is my opinion that Showline in view of Mueller renders Claim 20 obvious.

331. A POSITA would have known, and understood from Showline, that the SL PAR could be used for at least of videography, broadcast, cinematography, studio filming, and location filming. As was well known in the art to a POSITA, Showline is a brand name of Vari-Lite, a company that manufactured luminaires for film, TV, and theatrical use. Further, as was also well known, the SL PAR was designed and sold for such end uses. EX1011, ¶7 (noting that the SL PAR 155 is often used in “entertainment lighting and to provide special lighting effects in video and studio filming environments.”).

332. Showline Manual also teaches mounting SL PAR units to trusses or in hanging applications, such as would be done in studio filming applications, and further teaches that SL PAR units may be mounted to the floor. EX1005, 11-12.



Id., Figure 8.



Id., Figure 9. A POSITA would recognize the truss and floor mounting configurations shown are typical configurations for mounting such luminaires in videography, broadcast, cinematography, studio filming, and location filming settings. Indeed, these truss and floor mounting configuration are expected lighting

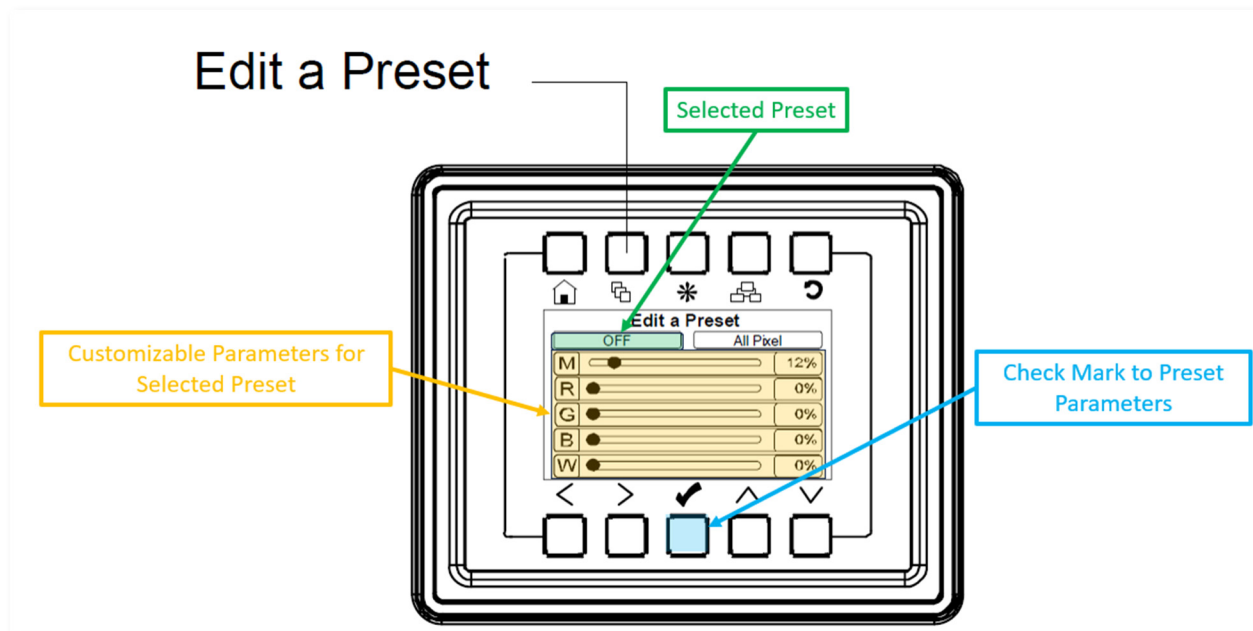
set ups for studio filming applications, where a studio stage is illuminated with various luminaires mounted to trusses above the stage, and also from luminaires mounted to the floor that provide light illuminating scenes from below. *Id.* Further, a POSITA would understand the references to the DMX512 control protocol in Showline Manual, *see, e.g.*, EX1005, 14, 24-39, indicate the SL PAR was for use in TV, cinematography, and studio filming, as this is a common communication standard created by and for the entertainment lighting industry.

22. Claim 21

333. Claim 21 recites “The lighting system according to claim 12, wherein the controller is adapted to recall said stored at least one simulation parameter from said memory.” EX1001, 13:13-15.

334. It is my opinion that Showline in view of Mueller renders Claim 21 obvious.

335. A user may edit presets using the SL PAR’s LCD Display and Menu System, and once all values are adjusted as desired, pressing a “Check Mark” button saves the preset (with its parameters). EX1005, 15-16.



Id., 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.*, 15-16. Saved presets can then be “recalled via the menu.” *Id.*, 16.

336. Users can also adjust parameters for any chase, including the ten factory defined chases and the eight user editable chases. *Id.*, 16. Again, users can use buttons on the LCD Display and Menu System to select parameters, and then press a “Check button” to save when done. *Id.* These parameterized chases can be “recalled” through the menu system. *Id.* Similarly, a user can “edit and save” the user-editable chases in the “Edit a Chase” menu, and when all editing steps are done, a user pushes a “Return to Main Menu” button and the “user chase is now saved and can be recalled.” *Id.*, 17.

337. A POSITA would understand from Showline that the adjusted values and parameters selected by the user would be “saved” in and “recalled” from a memory in the SL PAR unit.

23. Claim 22

338. Claim 22 recites “The lighting system according to claim 14, wherein said controller is adapted to control said further lighting device in dependence on the selected user customizable cinematic lighting special effect.” EX1001, 13:16-19.

339. It is my opinion that Showline in view of Mueller renders Claim 22 obvious.

340. Mueller explains that, in a networked lighting system 200, each lighting unit 100 can be controlled by a single input:

In this example, the user may provide a simple instruction to the central controller 204 to accomplish [a rainbow chase effect], and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a “rainbow chase.” The command may contain timing, intensity, hue, saturation or other relevant information, for example. When an intended LUC 208 receives such a command, it may then interpret the command so as to generate the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100 that it controls

EX1004, [0202]. Thus, one input can control an original lighting unit 100 as well as further lighting units as required by Claim 22.

341. In addition, “[t]he lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a

variety of other devices.” Mueller continues “one or more communication ports 120 may facilitate coupling multiple lighting units together as a networked lighting system, in which at least some of the lighting units are addressable (e.g., have particular identifiers or addresses) and are responsive to particular data transported across the network.” Accordingly, a POSITA would have understood the processor 102 could connect and control a further lighting unit 100 or lighting source 104 on a separate unit through this connection.

342. Further, Showline teaches that, in the “Master/Slave” mode, the LCD Display and Menu System in the “master unit” controls the LED arrays in the “slave” units, based on the user-selected effects recalled (or played) on the master unit. Stated differently, an effect selected on the “master unit” via its LCD Display and Menu System is run (or played) on the “slave” units. *See supra* Claim 14.

343. A POSITA would understand that the flexibility of Mueller to use the lighting system 200 or the “master/slave” mode of Showline can be used to control multiple lighting units. The processor 102 or LUC 208 of Mueller integrated into a Showline device could thus be used to control multiple Showline devices.

344. Therefore, Showline in view of Mueller renders Claim 22 obvious.

D. Ground 2a – Showline in view of Mueller and further in view of Choong renders Claim 7 obvious.

[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.

345. Claim 7 recites “The lighting system of claim 3, wherein the lighting device comprises at least one ‘warm’ and at least one ‘cool’ white LED.” EX1001, 12:28-30.

346. It is my opinion that Showline in view of Mueller and further in view of Choong renders Claim 7 obvious.

347. Though Showline teaches the use of multiple LEDs across a spectrum of colors and color temperatures, *see supra* Ground 2, Claims 3-5, it does not explicitly disclose a lighting device with at least one “warm” white LED and at least one “cool” white LED. A POSITA would have understood the utility of an LED arrangement including a “warm” white LED and a “cool” white LED to enable the production of a broad spectrum of color temperatures of white light. It would thus have been obvious for a POSITA to employ such an arrangement within a devices such as the SL PAR.

348. That the benefits of such an arrangement were well known is demonstrated by Choong, which is within the same field of art as Showline and Mueller. Specifically, Choong, which was based on a patent application filed in 2008, discloses a “methodology of creating lighting of white colour with the

intended [correlated colour temperature (‘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).” EX1012, 2:58-62. To incorporate this sort of LED arrangement, with a cool white LED and a warm white LED would have been obvious to a POSITA seeking to provide a user with the ability to use a lighting device like SL PAR to produce white light across a broad spectrum of color temperatures.

CERTIFICATION

I reserve the right to supplement my opinions as appropriate if the Patent Owner alleges or offers any purported evidence of any secondary considerations of non-obviousness.

I hereby 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 knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 16th day of September, 2024

Respectfully submitted,



APPENDIX A

P. Morgan Pattison
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Experience

Solid State Lighting Services, Inc. **November 2007 - Present**
Founder/President- Provide technical, strategic, and market expertise in the areas of LEDs, OLEDs, Lighting, Solid State Lighting (SSL), displays, and optoelectronic materials and devices. LED device, lighting, and materials product development. Horticultural lighting research and strategy. Light pollution measurement, evaluation, and mitigation. LED and lighting product failure and reliability evaluation. Manage research on human and animal physiological responses to light. Scout and evaluate new technologies for investment.

U.S. Department of Energy **January 2006 – November 2007**
National Energy Technology Laboratory, Morgantown WV
Project Manager- Managed DOE funded R&D projects in SSL including LED and OLED lighting technologies. Managed solicitation and selection of new funded R&D projects. Identified priority areas of research necessary for advancement of SSL efficiency, performance, and price.

University of California, Santa Barbara **September 2000 – January 2006**
Graduate Student Researcher- Doctoral thesis research under Professor Shuji Nakamura (Nobel Prize in Physics 2014) on GaN based micro-cavity light emitting diodes. Research included: epitaxial structure design and growth by MOCVD, semiconductor process development, materials characterization, and electro-optical device characterization. Additional areas of research included UV LEDs, vertical cavity surface emitting laser (VCSEL), and edge emitting laser diodes.

Cymer Laser, San Diego **November 1996 – May 2000**
Laser Test Engineer- Tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products. Testing included optical characterization and full system troubleshooting. Test development of new electrical and optical test methodologies to improve test cycle, Labview automation of test procedures, and development of test documentation.

Education

Ph.D. Materials Science, Electronic and Photonic Materials
University of California, Santa Barbara, 2006
Thesis: *Fabrication and Characterization of Gallium Nitride Based Micro-Cavity LEDs*
M.S. Electrical Engineering, Electronics and Photonics
University of California, Santa Barbara, 2003
B.S. Electrical Engineering, Electronic Devices and Materials
University of California, San Diego, 1996

Expertise

Optoelectronic materials and devices, lighting, LED, OLED, UV-LEDs, Germicidal UV application, R&D and technology evaluation, μ LED-LED-OLED-Quantum Dot display technology, medical lighting, SSL product evaluation and selection, LED lighting product development, R&D Management, technology roadmapping, technical meeting moderation, technical writing, IP evaluation, trial expert witness, lighting color evaluation and selection, advanced lighting performance evaluation, Energy Star LED lighting testing, photometric characterization and testing, R&D Management, Federal R&D funding processes, R&D Proposal review and evaluation, ESCO contracts and performance measurement & verification (M&V), horticultural lighting, wildlife responses to light, human physiological responses to light

Accreditations, Affiliations, and Professional Societies

Fellow - Illuminating Engineering Society (IES)

Chair – Outdoor Nighttime Environments (ONE) Committee

Voting Member – IES Horticultural Lighting Committee

Oregon State University, Civil and Construction Engineering, Courtesy Faculty

Lighting Certified (LC) by National Council on Qualifications for Lighting Professionals

Member - International Society of Horticultural Scientists (ISHS)

Member – International Dark-Sky Association (IDA)

Member – International Society for Optics and Photonics (SPIE)

Member – American Society of Agricultural and Biological Engineers (ASABE)

Project Management Professional (PMP) *Lapsed*, Project Management Institute (2006)

U.S. Government Contracting Officer's Representative (COR) (2006)

Leadership

Senior Technical and Strategic Advisor to DOE SSL R&D Program

Lead writer of DOE SSL R&D Opportunities, R&D Plan, and Multi-Year Program Plan

Technical content supervisor of annual DOE SSL R&D Workshops

Manage organization of DOE SSL topical R&D meetings on: LED devices and materials, OLEDs, luminaire integration, roadway lighting, germicidal ultraviolet (UV) LEDs, human physiological responses to light, domesticated and wild animal responses to light, roadway and area lighting, and horticultural lighting

New business creation/development – *Action Spectrum*, *Ultra-Yield Solutions*, *Guidance LED*, *Zuli*, *Canvas*, *Intellilight/Next*, *SSLS, Inc.*, *Diel Lighting Science*, *Blue Laser Fusion*

Scientific Advisory Board member to *GLASE (Greenhouse Lighting and System Engineering)*, NYSERDA funded controlled environment agriculture R&D program

Technical Advisory Committee of Resource Innovation Institute

Advisory Board Member of *Phosphor Global Summit* annual meeting

Advisor to *Cyclotron Road* – Clean Technology Incubator at Lawrence Berkeley National Lab

Project sponsor for Senior Design Course at UCSB (2011-2012)

1. Design and development of spectro-goniophotometer
2. Design and development of smartphone light controller (co-founder and original board member of resulting company renamed *Zuli*)

Designed, fabricated, and characterized world's first gallium nitride microcavity LED

Fabricated and characterized world's first gallium nitride semipolar LED

Publications

Minimizing Ecological Impacts of Marine Energy Lighting. Reilly, C. E., Larson, J., Amerson, A. M., Staines, G. J., Haxel, J. H., & Pattison, P. M. (2022). *Journal of Marine Science and Engineering*, 10(3), 354.

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A Review of Human Physiological Responses to Light: Implications for the Development of Integrative Lighting Solutions. Vetter, C, Pattison, PM, Houser, K, Herf, M, Phillips, AJK, Wright, KP, Skene, DJ, Brainard, GC, Boivin, DB, Glickman, G. (2021) *Leukos*

DOE 2020 LED Manufacturing Supply Chain. Lee, K, Nubbe, V, Rego, B, Hansen, M, Pattison, M. *U.S. DOE Lighting R&D Program*. July 2021.

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First-moment analysis of polarized light emission from InGaN/GaN light-emitting diodes prepared on semipolar planes. Masui, H., Baker, T. J., Sharma, R., Pattison, P. M., Iza, M., Zhong, H., Nakamura, S., & DenBaars, S. P. (2006). *Japanese journal of applied physics*, 45(9L), L904.

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Presentations

U.S. Fish & Wildlife Service Light Pollution & Bird Collisions expert panel, Workshop on Disorder in Semiconductor Physics and Devices 2024, University of Cincinnati IRIS 2023 Working Group, IES Raleigh Section “Horticultural Lighting – A Growing Opportunity”, IES Street and Area Lighting Conference 2022, National Park Service Science and Technology – Skyglow Measurements at Channel Islands National Park 2022, UCSB Nitride Seminar 2022, International SSL Alliance 2021 General Assembly, The Limits of Food Production – Vertical Farming 2021, Horticonn 2020, U.C. Davis Energy and Efficiency Institute, California Energy Administration, 2020 DOE Lighting R&D Workshop, Charleston Catholic High School STEM Seminar, East Tennessee State University Physics and Astronomy Seminar, IES Rocky Mountain Section – CU Boulder, 2019 DOE SSL R&D Workshop, Harvard ES-173 Guest Lecture, U.S. DOE Building Technologies Office Brown Bag Seminar, U.C. Santa Barbara Nitrides Seminar 2018, Phosphor Global Summit 2018, West Virginia State University – Biology Seminar, East Tennessee State University Entrepreneur Club 2018, IES Aviation

Lighting Committee Meeting 2017 (Best Technical Paper), ICCEA Panama 2017, NCERA 101 Controlled Environment Agriculture meeting, DOE SSL R&D Workshop 2017, The College of New Jersey Physics Colloquium, DOE SSL R&D Workshop 2017, NREL 2016, Harvard University Engineering Seminar, LightSym 2016, DOE SSL R&D Workshop 2016, DOE SSL Technology development Workshop 2015, DOE SSL R&D Workshop 2015, IDTechX Internet of Things Applications, Phosphor Global Summit 2014, International Conference on Nitride Semiconductors 2013, IES Illuminate Philadelphia 2012, Strategies in Light 2012, Energy Efficiency Expo 2011, Tennessee Association of Physical Plant Administrators 2011, East Tennessee State University Faculty Development Sustainability Seminar 2011, LED Discovery 2010, Think Tomorrow Today 2008, International Conference on Nitride Semiconductors 2005, International Symposium on Blue Lasers and Light Emitting Diodes 2004, Fall Materials Research Society 2001.

Patents

Technique for growth and fabrication of semipolar (Ga, Al, In, B) N thin films, heterostructures, and devices. #9793435, #9231376, #8686466, #7846757, #10529892

Lighting unit having lighting strips with lighting elements and a remote luminescent material. #8491165

Lighting unit with heat dissipating chimney #8360607

Lighting unit with indirect light source #8684566 B2

System for monitor and control of equipment. #9432210

Semiconductor light emitting device #8227820, #8643036

Etching technique for the fabrication of thin (Al, In, Ga) N layers. #7795146

Semiconductor micro-cavity light emitting diode. Application # 11/510,240 (abandoned), WO2007025122