

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Arnold & Richter Cine Technik GmbH & Co. Betriebs KG,
Petitioner,

v.

Rotolight Limited,
Patent Owner.

Case (to be assigned)
Patent 10,845,044

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,845,044
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.***

Filed on behalf of Petitioner:
Celine Jimenez Crowson (Reg. No. 40,357)
Joseph J. Raffetto (Reg. No. 66,218)
Scott Hughes (Reg. No. 68,385)
HOGAN LOVELLS US LLP
555 13th Street N.W.
Washington, D.C. 20004
Telephone: 202.637.5600
Facsimile: 202.637.5710

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	MANDATORY NOTICES	2
	A. Real Parties-in-Interest.....	2
	B. Related Matters	2
	C. Counsel and Service Information	3
III.	NOTICE OF FEES PAID	3
IV.	CERTIFICATION OF GROUNDS FOR STANDING	3
V.	PRECISE RELIEF REQUESTED	3
VI.	THE '044.....	4
	A. '044 Overview	4
	B. '044 File History	6
VII.	CLAIM CONSTRUCTION AND POSITA DEFINITION.....	7
	A. Claim Construction	7
	B. Definition of a Person of Ordinary Skill in the Art	7
VIII.	ANALYSIS OF GROUNDS FOR UNPATENTABILITY	8
	A. Grounds Based on Astera	8
	1. <u>Ground 1</u> – Astera Anticipates or Renders Obvious Claims 1-19	10
	B. Grounds Based on Edwards	62
	1. <u>Ground 2</u> – Edwards Anticipates or Renders Obvious Claims 1-19.....	63
IX.	CONCLUSION	87
	<u>Appendix A</u>	A-1
	<u>Appendix B</u>	B-1
	<u>Appendix C</u>	C-1

TABLE OF AUTHORITIES

Page(s)

Statutes

35 U.S.C. 282(b)	7
35 U.S.C. § 102(a)(1).....	8
35 U.S.C. § 102(a)(2).....	63

Regulations

37 C.F.R. 42.24(a)(1)(i)	B-1
37 C.F.R. § 42.24(d)	B-1
37 C.F.R. § 42.100(b)	7

I. INTRODUCTION

Petitioner Arnold & Richter Cine Technik GmbH & Co. Betriebs KG (“**ARRI**”) challenges Claims 1-19 of U.S. Patent No. 10,845,044 (“**’044**”). The **’044** claims nothing more than a well-known lighting system allowing users to input, save, recall, and produce a light effect. The system—whether claimed as a method, system, or program—does three basic things: (1) receives and stores a user-input simulation parameter, based on the desired effect (*e.g.*, fire); (2) calculates a “time varying lighting value,” based on the recalled input simulation parameter; and (3) outputs that value to a light to generate the effect.

None of this was new at the time of the alleged invention. Myriad prior art references disclose lighting systems that (a) accepts input commands from users to select parameters and customize a special effect, (b) stores and recalls those parameters from memory, (c) converts those parameters into values to produce the special effect, and (d) produces the effect on the light.

The two primary references discussed herein, together with the Declaration of lighting expert Mike Wood,¹ underscore this. The first is a User Manual for the Astera AX10 Spotmax (“**Astera**”) (Ex. 1003). Astera discloses how the AX10 can, through an interface on the light, a remote, or an app, receive user selections for customizable lighting effects, store those inputs, and then produce the

¹ The Declaration of Mike Wood (the “**Wood Decl.**”) is Exhibit 1006.

customizable lighting effects at a later time. The second reference, Edwards,² is an issued patent that discloses a lighting effects system that recalls saved parameters related to user-selected desired effects, calculates lighting signals based on the recalled parameters, and generates the lighting effect based on the lighting signals using one or more lighting devices.

Edwards was not considered during prosecution of the '044. Astera was submitted prior to issuance of the '044, but it was only provided in an Information Disclosure Statement (“IDS”) after a Notice of Allowance had issued and was never addressed substantively in any Office Action.³

II. MANDATORY NOTICES

A. Real Parties-in-Interest

The real party-in-interest in this proceeding is Arnold & Richter Cine Technik GmbH & Co. Betriebs KG.

B. Related Matters

The '044 is not the subject of any other proceedings. ARRI previously filed *inter partes* review petitions against U.S. Patent Nos. 10,197,257 (IPR2021-01496); 10,197,258 (IPR2021-01497); and 10,203,101 (IPR2021-01498). These related patents claim priority to the '044.

² “Edwards” is U.S. Patent No. 9,743,010 (Ex. 1004).

³ '044 File History, IDS submitted January 14, 2020 (Ex. 1002).

C. Counsel and Service Information

Lead counsel is Joe Raffetto (Reg. 66,218). Backup counsel are Celine Crowson (Reg. 40,357) and Scott Hughes (Reg. 68,385). Service information is as follows:

Post and Hand Delivery	Hogan Lovells US LLP 555 13th Street, N.W. Washington, D.C. 20004
Email	celine.crowson@hoganlovells.com joseph.raffetto@hoganlovells.com scott.hughes@hoganlovells.com
Telephone / Facsimile	202.637.5600 / 202.637.5910

III. NOTICE OF FEES PAID

Fees are submitted herewith. If additional fees are due during the proceeding, the undersigned authorizes the Office to charge them to Deposit Account No. 50-1349.

IV. CERTIFICATION OF GROUNDS FOR STANDING

ARRI certifies the '044 is available for *inter partes* review, and that ARRI is not barred or estopped from requesting this review.

V. PRECISE RELIEF REQUESTED

The relief requested is cancellation of the challenged claims, as follows:

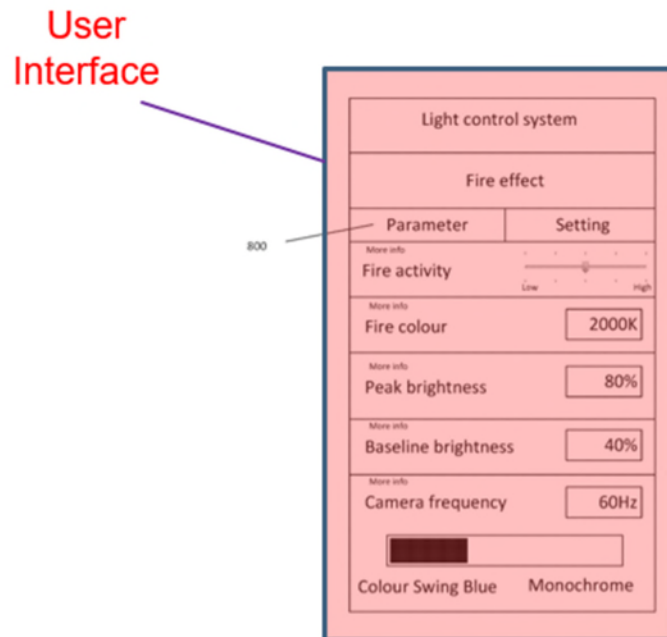
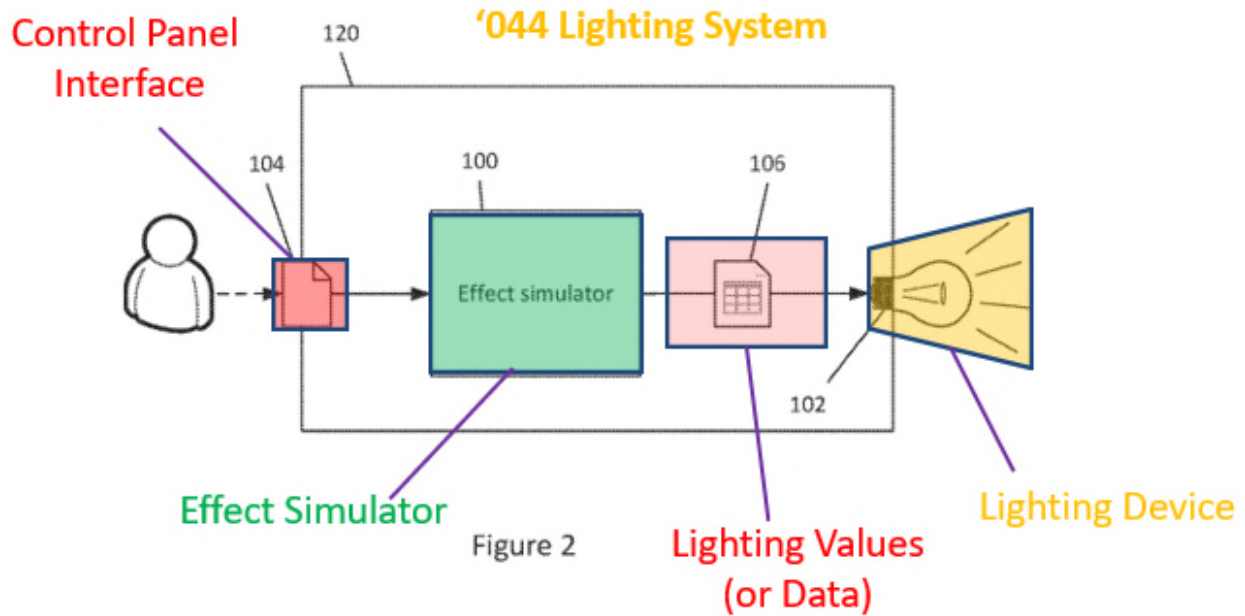
Ground	References	Claims ⁴	Basis
1	Astera	1-11, 12-18, 19	102 / 103
2	Edwards	1-11, 12-18, 19	102 / 103

VI. THE '044

A. '044 Overview

Independent Claims 1, 12, and 19 of '044 recite a method, system, and computer program, respectively, for “controlling a lighting device to produce a range of different user customisable lighting effects.” These claims recite five basic elements. **One, receive** a user input of “at least one user input simulation parameter to customize a lighting effect,” where the input simulation parameter depends on the lighting effect being simulated. **Two, store** the user input simulation parameter in memory. **Three, recall** the user input simulation parameter from the memory. **Four, calculate, using an effect simulator,** a “time varying lighting value” based on the parameter. **Five, output** the “time varying lighting value” to a lighting device, so as to generate the user-selected lighting effect.

⁴ Independent claims in **bold**.



('044, Figs. 2 and 6 (annotated).)

With reference to annotated Figures 2 and 6 above, the '044 describes how users can make selections of desired lighting effects on a control panel interface.

(*Id.*, 5:61-6:8; 8:5-18.) Depending on the desired effect, users may select and adjust “simulation parameters,” such as “brightness,” “duration,” “colour,” and “frequency,” to customize the effect. (*Id.*, 1:52-67; 6:37-7:6; 7:66-8:18; FIG. 6.) These simulation parameters are used by the “effect simulator” to calculate the data 106, or “time varying lighting values,” that characterize the lighting effect, and which are used to produce signals sent to the LEDs to generate the effect. (*Id.*, 5:41-54; 7:19-36; 8:5-39.) Effects (with their parameters) may be “stored” and then “recalled” from memory at a later time. (*Id.*, 9:27-36.)

B. '044 File History

The '044 was filed April 7, 2017 and issued November 24, 2020. It claims priority to U.S. Provisional No. 62/319,809, filed April 8, 2016. During examination, the originally presented claims were rejected for claiming features not shown in the drawings, and on non-statutory double patenting grounds in view of U.S. Patent Application No. 15/820,469 (issued as U.S. Patent No. 10,197,257). Applicant submitted a new claim set, along with amendments to the specification and figures. ('044 File History, August 7, 2018 Response at 2-10.)

A subsequent Final Office Action objected to the amendments as introducing new matter and for failing to comply with the written description requirement. Applicant withdrew the amendments and filed a terminal disclaimer. ('044 File History, July 7, 2019 Response at 2-11.) The '044 was thereafter

allowed. Applicant proceeded to then file an IDS on January 14, 2020 (which included Astera), March 5, 2020, and June 30, 2020. However, no new Office Actions were issued, and nothing in the record indicates that any of the references (including Astera) was substantively considered, much less considered as presented herein.

VII. CLAIM CONSTRUCTION AND POSITA DEFINITION

A. Claim Construction

Claims in an *inter partes* review “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Unless indicated otherwise, all claim terms are given such ordinary and customary meaning.

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

A person of ordinary skill in the art (“**POSITA**”) in the field of the ’044 would have had a good working knowledge of electrical engineering and entertainment lighting systems, controls, and effects. (Wood Decl., ¶ 38.) She would have gained this through an undergraduate Bachelor’s degree in electrical engineering, or a comparable field as well as some experience in the field (*e.g.*, in

entertainment lighting systems). (*Id.*) The more education one has, the less experience needed to attain an ordinary level of skill. (*Id.*) Similarly, more experience in the field may serve as a substitute for formal education. (*Id.*)

VIII. ANALYSIS OF GROUNDS FOR UNPATENTABILITY

A. Grounds Based on Astera

Astera is a user manual for the AX10, a controllable lighting device used in studio filming and entertainment lighting. (Wood Decl., ¶¶ 41-42; Canins Decl.⁵, ¶¶ 2, 5.) Astera is prior art under at least 35 U.S.C. § 102(a)(1). The AX10 was sold to customers beginning in 2014 in Germany, and the first orders from customers in the United States were in March 2015. (Canins Decl., ¶¶ 4-8.) Astera bears a date of May 7, 2015, and was made publicly available, including to distributors and purchasers of the AX10, beginning at least in June of 2015 in the U.S., including via a Quick Start guide in product packaging and via Astera’s website. (*Id.*)

Astera describes operation and use of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (*i.e.*, red, green, blue, amber, and white) LEDs:

⁵ The Declaration of Simon Canins (the “**Canins Decl.**”) is Exhibit 1008.



(Astera, cover (annotated); *see also id.*, 7.)

The AX10 can be controlled by various controllers, including (a) LCD Control Panel (with a “standalone engine”) on the AX10 (“**Control Panel**”), (b) remote control, (c) “AsteraApp” (an app for mobile devices), and (d) CRMX wireless DMX. (*Id.*, 9.)

Control Panel on AX10 Light	Remote Control	App																				
LEGEND <table><tr><td> MENU COLOR BACK TO PREVIOUS MENU </td><td> - SPEED SCROLL DOWN </td><td> + BRIGHT SCROLL UP </td><td> ENTER PROG CHOOSE/ CONFIRM </td></tr><tr><td colspan="4">FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:</td></tr><tr><td>ENTER THE MAIN MENU</td><td>FACTORY RESET</td><td>ENTER THE MAIN MENU</td><td>ENTER THE DMX MENU</td></tr><tr><td colspan="4">HOLD THE ABOVE BUTTON FOR 25SECS TO:</td></tr><tr><td>STANDALONE MENU</td><td>ADJUST SPEED</td><td>ADJUST BRIGHTNESS</td><td>CHANGE PROGRAM</td></tr></table>	MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM	FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:				ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU	HOLD THE ABOVE BUTTON FOR 25SECS TO:				STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM		
MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM																			
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:																						
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU																			
HOLD THE ABOVE BUTTON FOR 25SECS TO:																						
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM																			

(*Id.*, 9, 11, 23.)

The AX10 produces customized lighting effects (*id.*, 23-24, 27-28, 32) run through the Control Panel, infrared remote, AsteraApp, and DMX control. (*Id.*, 21, 28; *see also id.*, 17.) The effects include fire, fast, medium, and slow strobes, color chaser effects, color fades, spiral colors, and rainbow. (*Id.*, 17, 21.) Users can customize these effects by adjusting parameters including speed, crossfade, stroboscope, and brightness:

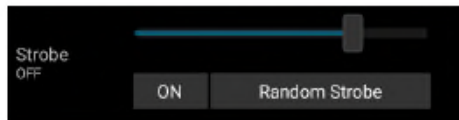
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

(*Id.*, 27; *see also id.* 20, 24-29.)

1. Ground 1 – Astera Anticipates or Renders Obvious Claims 1-19

a. Independent Claim 1

Astera anticipates or renders obvious Claim 1.

Claim 1p: A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:

Astera discloses Claim 1p. (Wood Decl., ¶¶ 51-56.) Astera discloses features and functionality of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (i.e., red, green, blue, amber, and white) LEDs. (Astera, 7.)

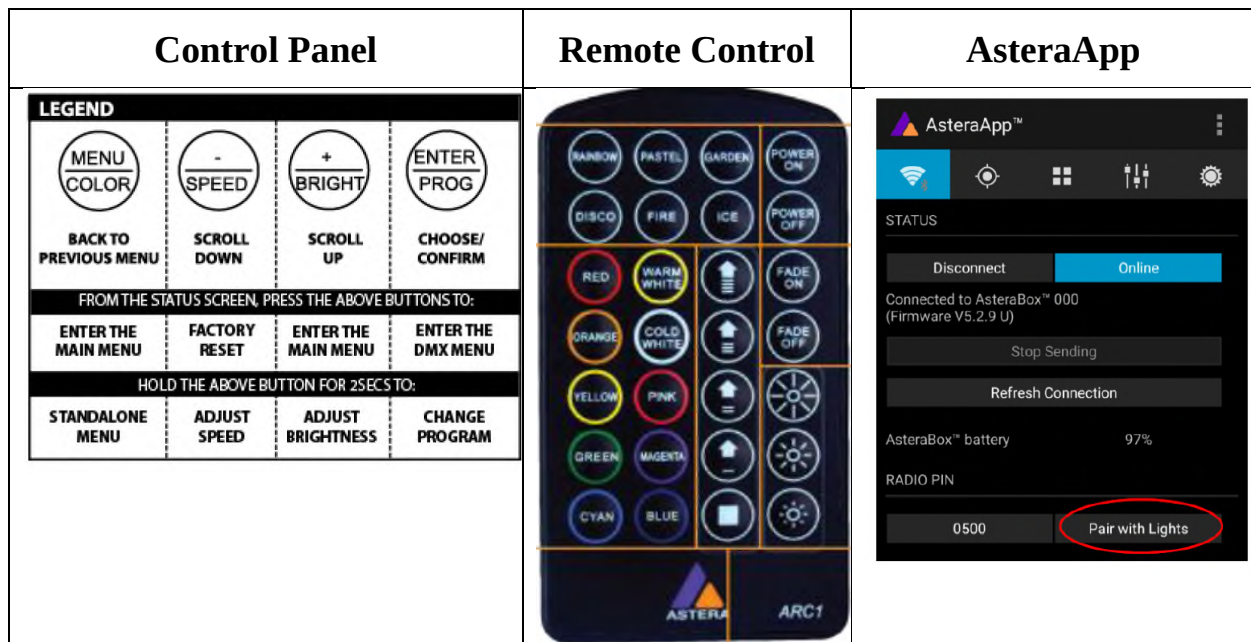


4 SPECIFICATION

LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emittance*:	10,350lx (at 2m; White 4000K)
CRI*:	up to 92

(Id., cover (annotated), 7 (annotated).)

The AX10 can be controlled via various controllers, including the Control Panel and AsteraApp. (Id., 9.)



(*Id.*, 9, 11, 23.)

The AX10 can produce different “user customizable lighting effects.” (Wood Decl., ¶¶ 53-56.) “Effect modes” offer “a comprehensive control of the built in standalone engine,” to implement “predefined programs” for effects including fire, strobe, static colors, color fades, rainbow, spiral colors. (Astera, 17, 21.)

Name	Pattern
ONE COLOR STATIC	A static color is displayed on the whole virtual light.
TWO COLOR STATIC	The virtual light is split into two halves and two colors are displayed.
THREE COLOR STATIC	The virtual light is split into three parts and three colors are displayed.
FOUR COLOR STATIC	The virtual light is split into four parts and four colors are displayed.
ONE COLOR FADE	For all FADE programs, the whole color palette of four colors is used. Those colors are faded in and out one by one. Here, the whole virtual light shows the same color.
TWO COLOR FADE	The virtual light is split and shows two colors at a time.
THREE COLOR FADE	The virtual light is split and shows three colors at a time.
FOUR COLOR FADE	The virtual light is split and shows four colors at a time.
SIMPLE RUNNING	A running light; the background and the running pixels color can be set.
DOUBLE RUNNING	Two pixels are running in opposite direction.
TWO COL RUNNING	The two pixels are of different color even.
FLAG RUNNING	A three color flag is running over the background color.
DOUBLE FLAG RUNNING	Two flags are running over background in opposite direction.
SPIRAL 4 COLORS	The color is changed pixel by pixel. All four colors are used one after the other.
SPIRAL 2 COLORS	The color changes between color 1 and 2 from the outside to the inside, pixel by pixel.
RAINBOW	A rainbow effect is displayed.
FIRE	The fire effect is a random flicker between two colors, background and flickering color.

(*Id.*, 21.)

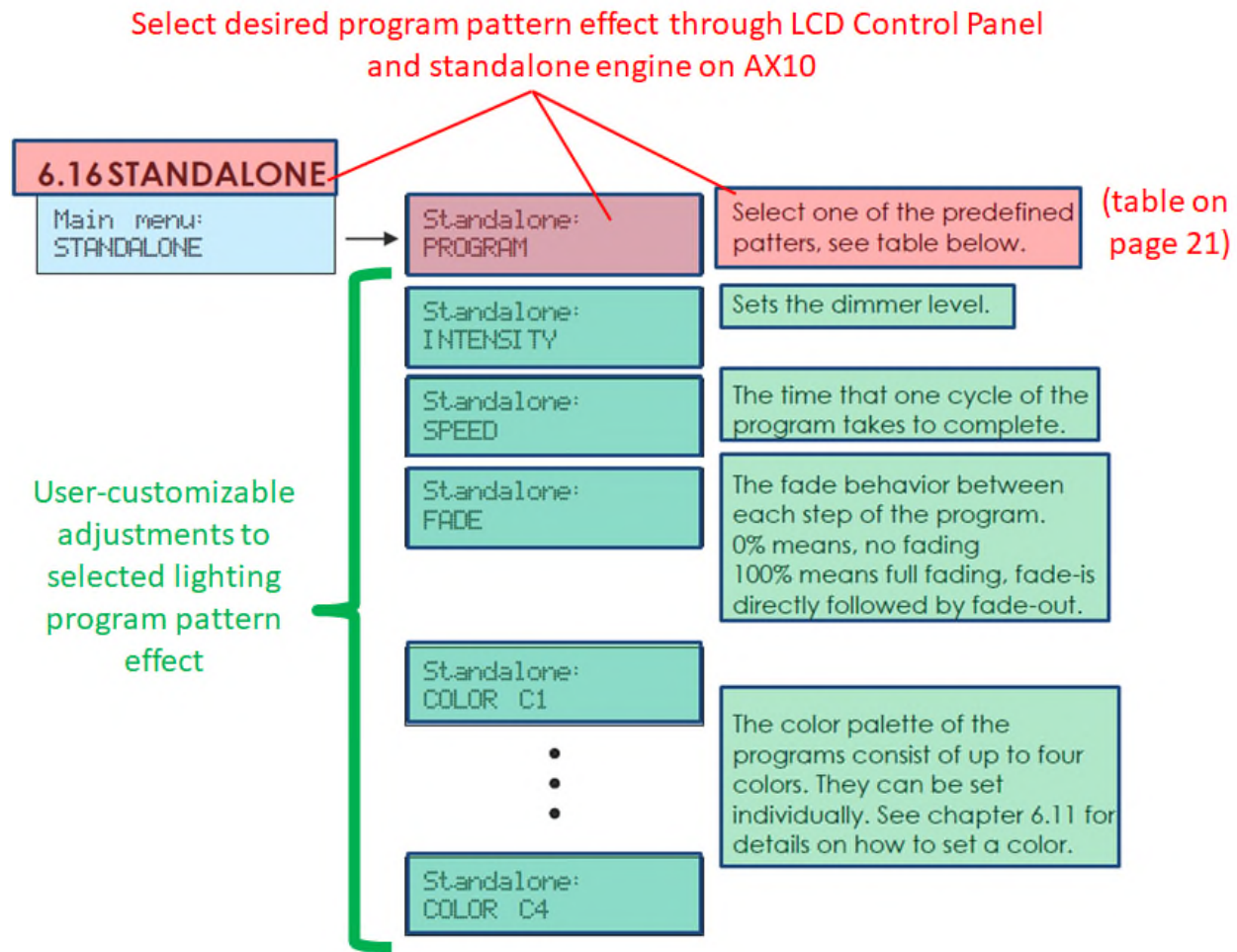
Users can customize these effects. (*Id.*, 8, 11, 13, 20, 24-29.) The Control Panel allows users to “select” an effect and modify it by adjusting: (i) intensity to set a dimmer level; (ii) speed to change the time to complete one cycle; (iii) fade time between program steps; and (iv) color. (*Id.*, 20.)

6.6 CONTROL PANEL

User-customizable adjustments to selected lighting program pattern effect

LEGEND			
 BACK TO PREVIOUS MENU	 SCROLL DOWN	 SCROLL UP	 CHOOSE/CONFIRM
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:			
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU
HOLD THE ABOVE BUTTON FOR 2SEC TO:			
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM

Select desired program pattern



(*Id.*, 11, 20 (annotated).)

Similarly, users can select and customize effects including “running lights,” “fire,” “rainbow,” “chaser effects” and “stroboscope” through AsteraApp. (*Id.*, 27-28.)

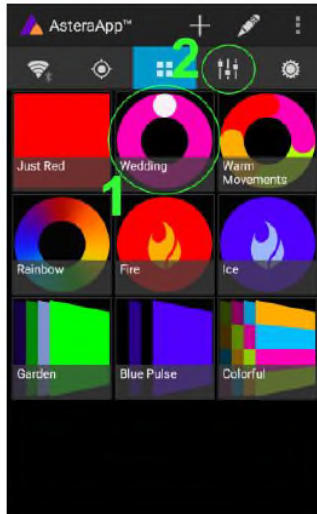
7.7 LIST OF EFFECTS

The effects' patterns are pre-defined and cannot be modified by the user. They are pre-programmed inside of each light. Still they can be parameterized. These effects are:

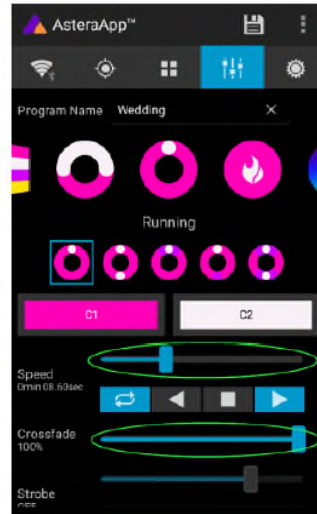
	Several variations of running lights are available.
	The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.
	The rainbow effect shows a color change through all colors. Only its speed can be adjusted.
	Chaser effects provide an efficient means to create dancefloor lighting. The static chaser exchanges the color of the lights according to the tapped-in beat. The colors are randomly chosen. The effect can be adjusted to show up to 4 different colors at a time.
	The Moving Chasers overlay the static chaser by a second movement of the four displayed colors over the available positions of a Flow-Set. This gets mostly interesting of the Moving Strobe is chosen. Then, only some of the positions strobe and they are moving. So the strobe effect moves over the Flow-Set.

(*Id.*, 28 (annotated).) Selected effects can then be customized by adjusting parameters including: (i) “speed” for “the effect to complete one cycle,” (ii) “crossfade” between steps, (iii) “speed” of a “stroboscope” effect, (iv) “brightness,” and (v) “color”:

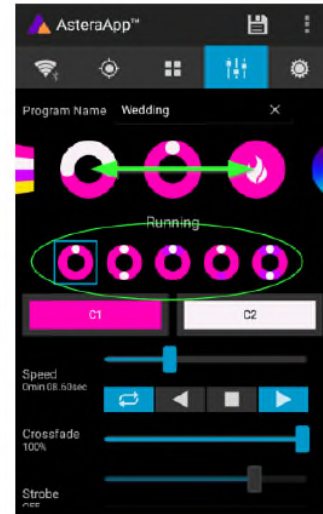
7.6 CHANGING THE EFFECT



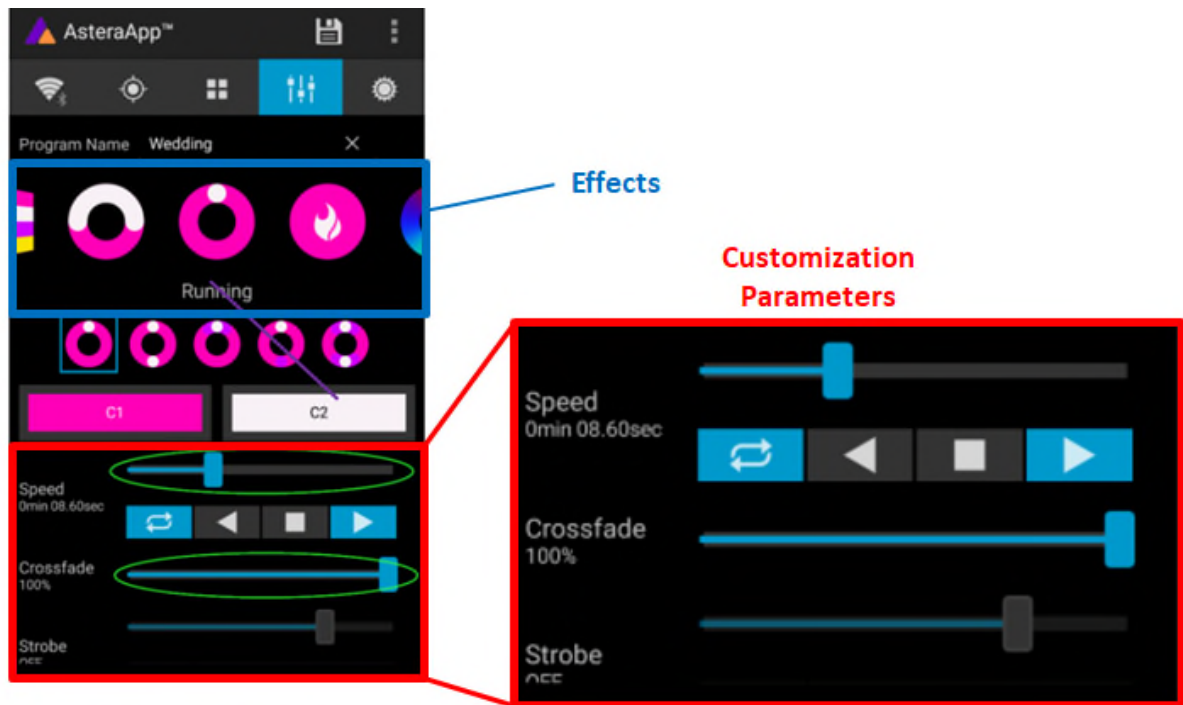
On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.



Set 'Crossfade' to 0% and 'Speed' to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.

(Id., 27 (annotated).)

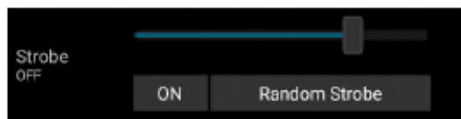
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

(*Id.*, 27.)

Claim 1a: *receiving user input of at least one user input simulation parameter to customise a lighting effect;*

Astera discloses Claim 1a. (Wood Decl., ¶¶ 57-60.) The AX10 receives user inputs through multiple user interfaces:



(Astera, 9, 11, 23.) Users can select desired effects and input parameters through interfaces on the Control Panel or AsteraApp. (*Id.*, 8, 11, 13, 20, 24-29.)

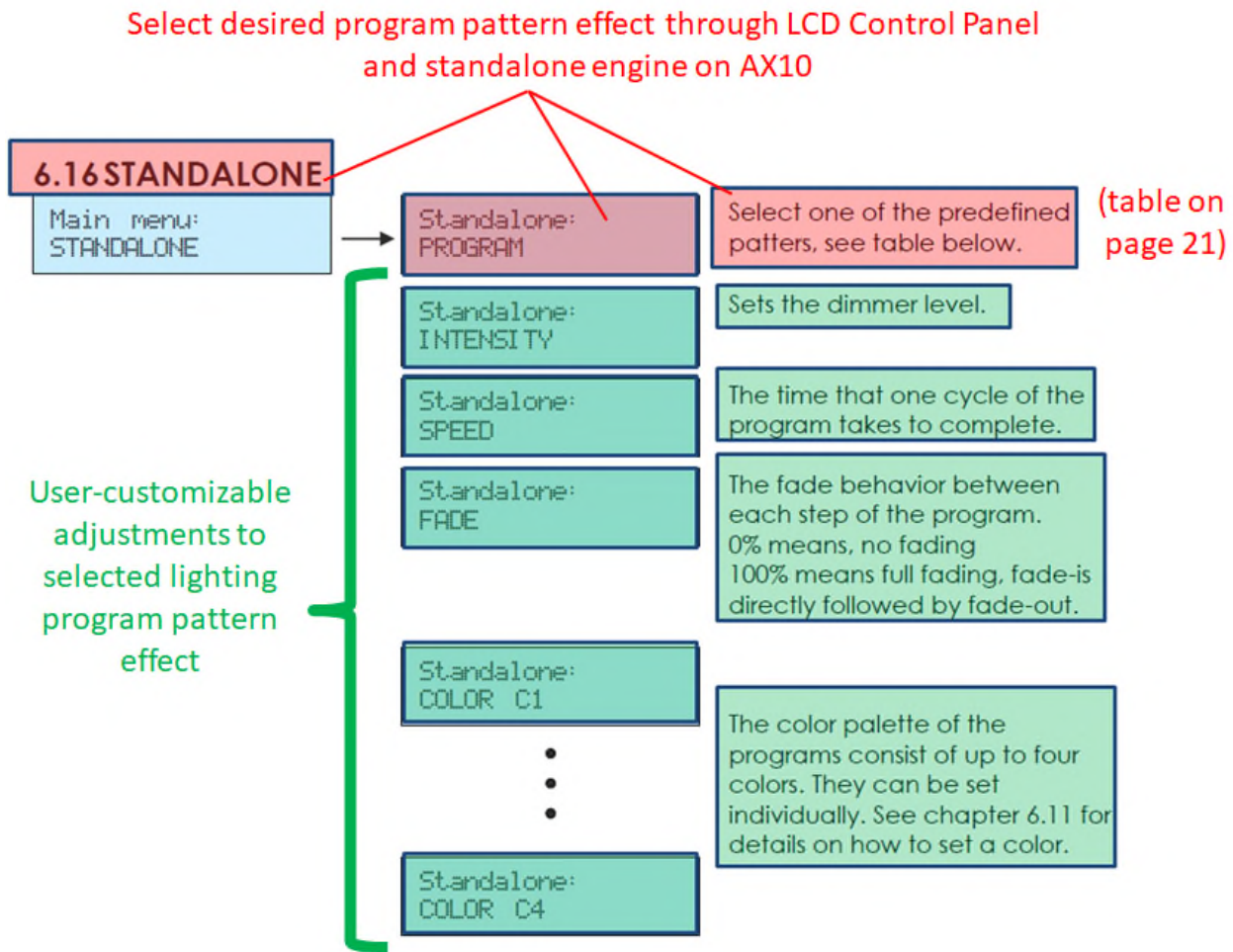
The Control Panel includes an LCD interface that “receives” user selections of a lighting program (*e.g.*, those listed on page 21) and parameters of: (i) intensity; (ii) speed of a cycle of the program; (iii) fade time between steps; and (iv) color selections. (*Id.*, 20.)

6.6 CONTROL PANEL

User-customizable
adjustments to
selected lighting
program pattern
effect

LEGEND			
 BACK TO PREVIOUS MENU	 SCROLL DOWN	 SCROLL UP	 CHOOSE/ CONFIRM
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:			
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU
HOLD THE ABOVE BUTTON FOR 2SEC TO:			
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM

Select desired
program pattern

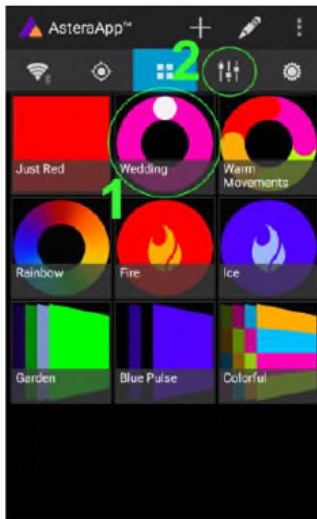


(*Id.*, 11, 20 (annotated).) These selections are received by the Control Panel, which then adjusts the effect accordingly. (Wood Decl., ¶¶ 57-58.) *See also supra* Claim 1p.

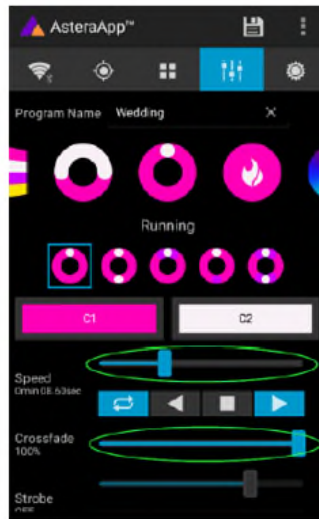
Similarly, with AsteraApp, programs of effects, such as “wedding,” may be selected and “highly customized.” (*Id.*, 27.) In particular, different “effects” may be selected from a main screen, and the user can then “enter the editor” where the user is provided options to customize parameters of the effect. (*Id.*) Any user

inputs of adjustments to the effect parameters are received by AsteraApp through the user interface. (*Id.*)

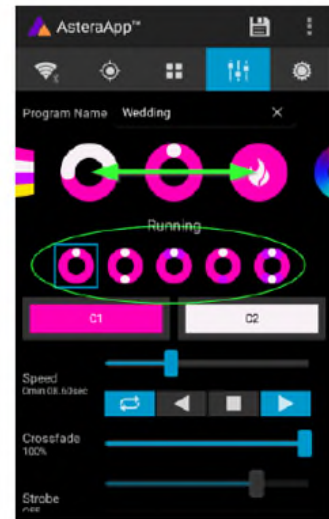
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

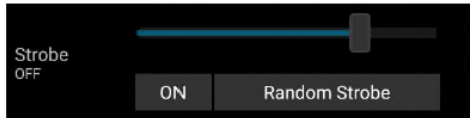
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

(*Id.*, 27.)

In addition, Astera discloses that pre-defined effect patterns, such as “fire,” “fading colors,” and “rainbow,” may be selected, with the user then being able to adjust parameters of the effect that are received by AsteraApp. (*Id.*, 28.) For example, if a “fire” effect is selected as part of a program, the user can adjust at least the “background” and “flickering” colors, and if a “rainbow” effect is included, then the “speed” can be adjusted. (*Id.*) Finally, for all effects, Astera discloses a “master brightness” control that can adjust the brightness of any lights that would run an effect. (*Id.*, 31.)

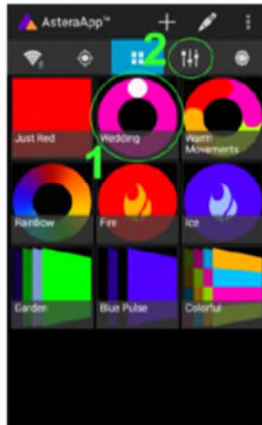
Claim 1b: storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;

Astera discloses Claim 1b. (Wood Decl., ¶¶ 61-67.) In Astera, the simulation parameter depends on the user-selected pre-programmed light effect (*e.g.*, fire, rainbow, chaser), as customized by any desired random strobing, speed, brightness, or color parameters. *See supra* Claim 1a. The speed, fade, color, stroboscope, and brightness selectable menu options are based on the user-selected effect, and are presented as parameters for adjusting the particular selected effect. (Astera, 20-21, 24-28.) For example, when “rainbow” is selected a “speed” parameter can be generated, and when “fire” is selected parameters to generate the “random flicker” and set the background and flickering effect colors are generated. (*Id.*, 28.)

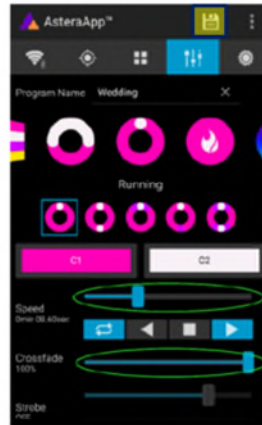
The effects and user adjustments made to them may also be “saved back to the main screen by pressing the save button.” (Astera, 27.) Users may select an effect (like “fire” or “wedding”) and modify it by changing simulation parameters (like “colors,” “speed,” “stroboscope,” and “brightness”). (*Id.*; *see also id.*, 25.) When the user is done, she can click the disk icon in AsteraApp, saving the modified effect parameters. (*Id.*, 27.)⁶

⁶ Moreover, Astera discloses that a user’s adjustments for “Anti-Flicker” are preserved, or saved, once entered into AsteraApp. (*Id.*, 32.) By “preserving” the

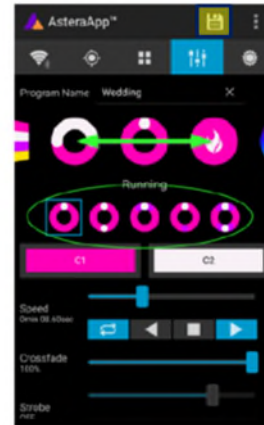
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

(*Id.*, 27 (annotated).)

Once saved to the main screen, these stored effects (with their modified parameters) can later be recalled and played. (*Id.*, 10, 24, 30; *see also infra* Claim 1c.) Saving within AsteraApp (a program stored in memory) therefore saves to a “memory,” as saving within the main menu must save to a memory so that the saved effect can later be recalled and replayed. (Wood Decl., ¶¶ 62-65.)

Anti-Flicker adjustments, these settings are also saved and recalled when the lamps are powered back on. (Wood Decl., ¶ 62.)

Similarly, when operating the AX10 through the Control Panel on the lighting device, a POSITA would understand that any user selected effects and adjusted parameters are “saved” to a memory within the AX10. (Wood Decl., ¶¶ 66-67.) From the Control Panel, users can make Standalone mode selections of programs (*i.e.*, effects) and parameter adjustments. (Astera, 11, 14, 17, 20-21; *see also supra* Claim 1a.) For example, a user can select a program, and then adjust and set an “intensity” parameter for the program. (Astera, 20). After setting the intensity, a user can also adjust “speed,” and then “fade” parameters of the same program. (*Id.*) Each of these parameter selections must be stored in memory; otherwise, a user would not be able to change one parameter and then make another selection to change a different parameter prior to finalizing the effect and outputting it from the light. (Wood Decl., ¶ 66.)

Further, the Control Panel provides an option for users to “reset” the settings of the device, including “resetting” the Standalone settings set for any particular user-customized effect and program. (Astera, 12, 22.) That the Standalone settings, which include the selected effect and any adjusted parameters (*id.*, 12 (“reset all user settings to default”), 20-22) can be “reset” to default values indicates those parameters must be stored in memory on the device. (Wood Decl., ¶ 67.) That is, the user selected parameter settings are stored and saved until they are changed or reset to default. (*Id.*)

Claim 1c: recalling from said memory said at least one stored user input simulation parameter;

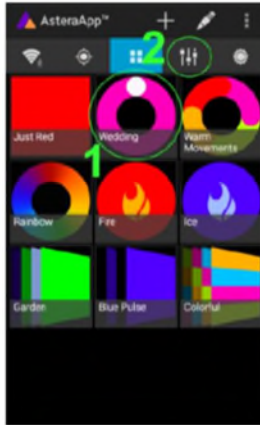
Astera discloses Claim 1c. (Wood Decl., ¶¶ 68-71.) The stored user input parameters (*see supra* Claim 1b) are recalled from memory prior to, and during, the output of desired effects from the AX10.⁷ (Wood Decl., ¶¶ 68-71.)

In AsteraApp, stored effects (with their modified parameters) can be recalled, with lighting values calculated based on the recalled effect and parameters so the effect can be played later. (Astera, 24, 27, 30.) For example adjusted program effects such as “Wedding” may be “saved back to the main screen,” from which they can later be recalled, played, or further adjusted. (*Id.*,

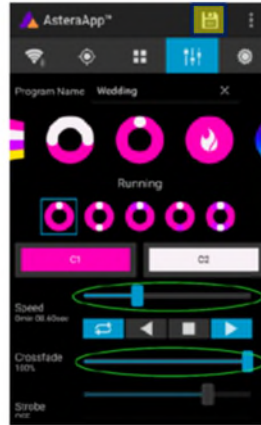
⁷ The '044 contains a single reference to storing and recalling parameters, stating “[i]t should be appreciated that due to the nature of the light 102, the effects may be customised by a user, for example, the frequency/speed, peak/minimum brightness or colour/colour temperature may be dynamically changed, and/or made to vary over time in a customised manner. ***Such user input simulation parameters may be stored in memory 220 and recalled from the memory 220 at a later time.*** The effects may be triggered on cue (for example from a director) by sending a signal over a wired remote trigger or wireless device.” ('044, 9:27-36.)

27.) The saved programs of “effects” are represented by “tiles” on a main screen where they can be selected and recalled. (*Id.*, 30.)

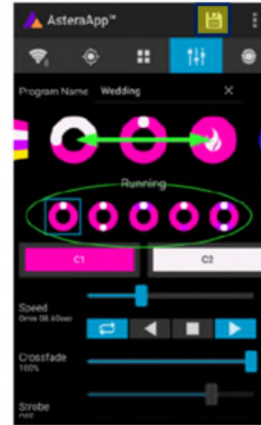
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



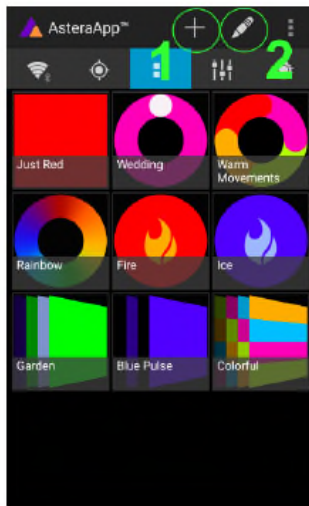
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

(*Id.*, 27.)

7.9 THE MAIN SCREEN

Here each program is represented by a tile. Those tiles can be edited and freely positioned. Several pages of files are available.



To move or delete a tile, press the pen icon (2). A popup will show the available actions. To add a new program tile, press the "+" icon (1).



While adding a tile, either a default "Static Red" or the currently running program can be selected. Additionally, special function tiles are available.

(*Id.*, 30.)

Again, the stored effects and adjusted parameters are saved to a memory (*see infra* Claim 1b), and when they are recalled they are recalled from this same memory.

(Wood Decl., ¶ 70.)

Similarly, in Standalone mode implemented through the Control Panel, saved user parameter settings are “recalled” for the AX10 to “replay” and “display” the customized effect programs with the lights. (*Astera*, 10, 17, 20-21; *see also id.*, 7 (indicating the AX10 may be “operating under a previous setting.”))

Claim 1d: calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter;

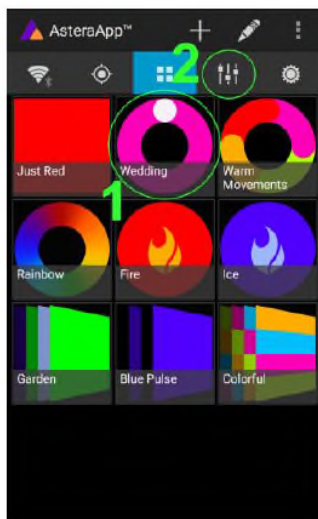
Astera discloses Claim 1d. (Wood Decl., ¶¶ 72-75.) The Control Panel and AsteraApp include effect simulators to calculate time varying lighting values for generating special effects based on recalled simulation parameters. (Astera, 9-11, 13, 17, 21, 24.)

The Control Panel allows users to “select” from predefined effects, and then adjust parameters including intensity (to set a brightness level), speed (to change the time to complete one cycle), fade time, and color. (*Id.*, 20.) As noted above, these effects with adjusted parameters are stored and recalled from the AX10 (via the Control Panel) in order for the user to make selections and adjustments and play the desired effect. (*See supra* Claims 1b-1c.) The Control Panel creates data characterizing the adjusted lighting effect based on the recalled effect settings, in the form of values and settings for the LEDs to “display these effects properly with [the] light.” (*Id.*, 12, 17, 20-21; *see also* Wood Decl., ¶ 73.) The “standalone engine” then causes the LEDs to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” (*Id.*, 24; *see also id.*, 10, 17.) For effect patterns, the values vary with time to change the output of the LEDs, creating the effect. (*Id.*, *see also* Wood Decl., ¶ 73.)

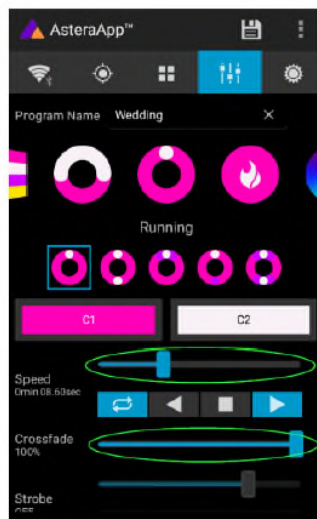
Similarly, in AsteraApp, users can select from different lighting effects, such as “fire,” “chasers,” “rainbow” and “stroboscope.” (Astera, 23-24, 27-28; *see supra*

Astera, Claim 1p.) Selected effects can then “be highly customized,” to adjust parameters including: (i) “speed” of how long it will to complete one cycle, (ii) “crossfade” between steps, (iii) random “stroboscope” speed, and (iv) “brightness.” (*Id.*, 27.) Users can also select and customize colors for effects “with a customizable color pallette,” and certain effects, like “fire effect,” allow a user to “adjust” the colors making up the effect. (*Id.*, 24, 28.)

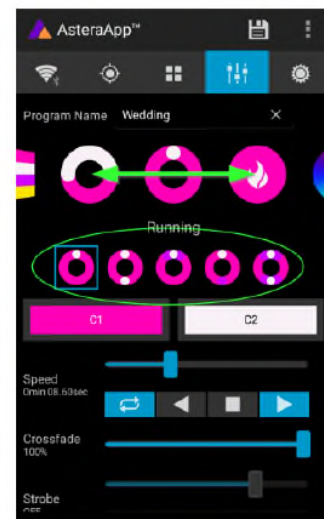
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

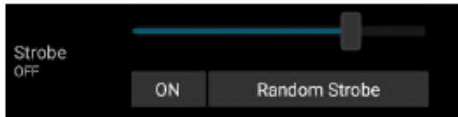
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

(*Id.*, 27.)

These selections may be saved and recalled for later use, such that the recalled parameters are used to calculate the time varying lighting value. (Aster, 10, 24, 30; *see also* Wood Decl. ¶ 75.) For example, after recalling saved effects, AsteraApp calculates time varying lighting values, including brightness and color information, for these user-customized effects. (Aster, 23-29; *see also* Wood Decl., ¶¶ 72-75.) AsteraApp can “send complex effects” to the lights, and can be “used to adjust the lights remotely” by sending controls (which are lighting values). (Aster, 23; *see also* Wood Decl., ¶ 75.) Thus, based on recalled user

parameters, “effects can be created and can be sent to the light by the built in UHF receiver,” where the effects are “triggered” and replayed at each light. (Astera, 23.)

Claim 1e: *outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.*

Astera discloses Claim 1e. (Wood Decl., ¶¶ 76-79.) Both the Control Panel and AsteraApp output time-varying lighting values for the AX10 to “display these [selected] effects properly with [its] light.” (Astera, 21.)

The Control Panel “Main Menu” allows users to select “STANDALONE” mode, where the Control Panel will “set the parameters of the standalone engine” in the AX10. (*Id.*, 12, 17.) In “STANDALONE,” the Control Panel allows users to select a desired effect program and adjust parameters of intensity, speed, fade, and color. (*Id.*, 20-21.) *See also supra* Claim 1a. When a user then wants the lights to play the effect, the “standalone engine” outputs the lighting values to the LEDs to cause them to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” (*Id.*, 24; *see also id.*, 10, 17.) For effect patterns, the output values vary with time to change the output of the LEDs, creating the effect. (*Id.*, *see also* Wood Decl., ¶ 77.)

With AsteraApp, users can select from different effects (*e.g.*, fire, chasers, rainbow) and customize them (*e.g.*, adjust speed, crossfade, stroboscope, brightness). *See supra* Claim 1a. When a user wants to play an effect, the calculated lighting values for that effect are output from AsteraApp to the AX10

lighting device. (*Id.*, 24 (. “With the AsteraApp these effects can be created and be ***sent to the light by the built in UHF receiver,***” where they are received by the standalone engine in the AX10.”) (emphasis added); *see also id.*, 10, 17.) That is, AsteraApp outputs the lighting values representing the adjusted effect to the AX10 light. (Wood Decl., ¶¶ 78-79.) When the lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” (Astera, 24.)

b. Independent Claims 12 and 19

For this Petition, there are no substantive differences between Claim 1 and Claims 12 and 19, and Astera anticipates and renders obvious claims 12 and 19 for the same reasons as Claim 1. *See supra* Claim 1. (*See also* Wood Decl., ¶¶ 80-84.)

A matching of each limitation in Claim 1 to the corresponding limitation in Claims 12 and 19 is as follows, with differences shown in red:

Claim 1	Claim 12	Claim 19
A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:	A system adapted to control at least one lighting device to produce a range of different user customisable lighting effects, the system comprising:	A computer program product comprising software code for controlling a lighting device to produce a range of different user customisable lighting effects the computer program product is adapted to perform, when executed, the steps of:

Claim 1	Claim 12	Claim 19
receiving user input of at least one user input simulation parameter to customise a lighting effect;	an input interface adapted to receive user input of at least one user input simulation parameter to customise a lighting effect;	receiving user input of at least one user input simulation parameter to customise a lighting effect;
storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;	a memory adapted to store said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated; and	storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;
recalling from said memory said at least one stored user input simulation parameter;	an effect simulator adapted to: recall from said memory said at least one stored user input simulation parameter; and	recalling from said memory said at least one stored user input simulation parameter;
calculating, using an effect simulator , a time varying lighting value based on said recalled simulation parameter; and	calculate a time varying lighting value based on said recalled simulation parameter;	calculating, using an effect simulator , a time varying lighting value based on said recalled simulation parameter; and
outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.	wherein the effect simulator is adapted to output said calculated time varying lighting value to the at least one lighting device thereby to simulate a lighting effect.	outputting to said lighting device said time varying lighting value thereby to simulate a lighting effect.

The only differences are that while Claim 1 is directed to a “method” for controlling a lighting device, Claim 12 is directed to a “system” implementing this

same method and Claim 19 is directed to a “computer program” performing the same method. Thus, Astera discloses each limitation in Claims 12 and 19 for the same reasons discussed above with respect to the corresponding limitation in Claim 1.

With respect to Claim 12, Astera discloses that the method of claim 1 is implemented on a system that includes the AX10 lighting device as controlled by either the Control Panel on the device itself in Standalone mode, or through connection with the AsteraApp. *See supra* Claim 1.

Moreover, as discussed in Claim 1, Astera expressly discloses the method can be performed by a “software program” as in claim 19. The Control Panel and AsteraApp are computer programs and perform their functions based on software code. (Wood Decl., ¶ 84.) AsteraApp is a mobile application, in the form of code, that is downloaded and run on a mobile device. (*Id.*) The Control Panel is implemented through software-based programming in the AX10 itself. (*Id.*) The AX10 includes “firmware version 5.2.20.” (Astera, 2, 12, 22.) A POSITA would understand that firmware is software programmed into a read-only memory, and that this firmware implements the programming and control of the AX10. (Wood Decl., ¶ 84.)

c. Dependent Claim 2

Claim 2: *The method according to claim 1, wherein said user customisable simulation parameter is stored locally.*

Astera anticipates or renders obvious Claim 2. (Wood Decl., ¶¶ 85-87.) *See also supra* Claims 1b and 1c.

The user-selectable lighting effects, and user adjustments made to those effects, may be locally “saved back to the main screen by pressing the save button” within the app. (Astera, 27.) Saving locally within AsteraApp saves the effect and parameters on a “local” memory on the device running the app. (Wood Decl., ¶¶ 85-86.)

Similarly, when operating in “Standalone” and controlled by the local Control Panel, where “[t]he light can no longer be controlled by any wireless signal” (Astera, 11), the user customized programs and parameters are saved locally in the AX10 itself. *See Supra* Claims 1b-1c. A POSITA would recognize that the standalone engine implementing “Standalone” mode would use a local memory in order to execute stored lighting commands. (Wood Decl. ¶ 87)

d. Dependent Claim 3

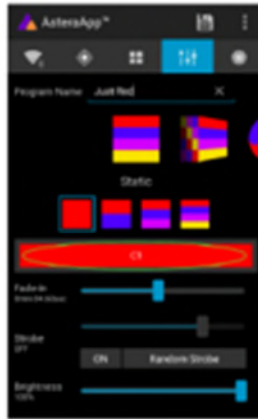
Claim 3: *The method according to claim 1, wherein the simulation parameter comprises a colour or colour temperature.*

Astera anticipates Claim 3. (Wood Decl., ¶¶ 88-90.) In “Standalone,” users can choose “**color**” parameters to set a “color palette” of a selected program. (Astera, 20, 24.) Similarly, in AsteraApp, users can set color parameters for lighting effects. (*Id.*, 24, 27-28.)

7.3 CHANGE THE COLOR



On the AsteraApp™ main screen, press "Just Red".



Once in the editor, press "C1".



Now the lights color can be changed.

(*Id.*, 24 (annotated); see also *id.*, 25-27.)

Astera also discloses that “**color temperature**” can be selected by choosing a static color from a list of predefined color options, including colors based on temperature. (*Id.*, 14.)

6.11.1 Predefined Colors

Color	Red	Green	Blue
RED	255	0	0
ORANGE	255	107	0
YELLOW	255	160	18
GREEN	0	255	0
CYAN	0	255	224
BLUE	0	0	255
VIOLET	127	84	255
PINK	255	53	119
BLACK	0	0	0
2700K	255	166	70
3200K	255	178	89
4000K	255	193	115
5500K	255	211	150
6500K	255	219	167

(*Id.* (annotated).) Moreover, colors can be selected and edited to set “AsteraRGB values” for a particular “color temperature.” (*Id.*, 8.)

e. Dependent Claim 4

Claim 4: *The method according to claim 1, wherein the simulation parameter is related to at least one of: an effect frequency; an effect speed; a colour; a colour temperature; a trigger; a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal (peak) brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation time period.*

Astera anticipates Claim 4. (Wood Decl., ¶¶ 91-98.) Users can select from various lighting effects from the Control Panel or AsteraApp. (Astera, 17, 20-21, 23-24, 27-28.) Users may adjust the “color” of an effect, as well as select settings related to “color temperature.” *See supra* Claim 3. Users can also adjust the “intensity,” or “brightness,” and “speed” parameters of each effect. (*Id.*, 20, 27.) And, in the “Anti-Flicker” settings, a “frequency” parameter “can be freely adjusted.” (Astera, 32.) Accordingly, Astera expressly discloses parameters related to “frequency,” “a brightness,” “speed,” “color,” and “color temperature,” as these may be adjusted. (Wood Decl., ¶ 91.)

Moreover, Astera discloses simulation parameters related to a rate of increase or decrease of brightness, and the brightness fluctuation period, as the time for an effect to complete a cycle is adjusted through the speed parameter. (Astera, 17, 20, 27-28.) Completing the same effect, such as a one, two, or three

color fade, in a shorter time cycle changes how quickly brightness or color fluctuates to complete the effect. (Wood Decl., ¶¶ 92-93.)

In addition, “stroboscope” can be adjusted in speed, thereby changing the brightness fluctuation period of flashes in the effect. (Astera, 27.) And, rate of color change and color fluctuation period parameters can be adjusted in the “chaser effect” and “rainbow effect” that change colors, as the “speed” of both can be adjusted. (*Id.*, 27-28.) Changing the speed changes the rate of color change and color fluctuation period. (Wood Decl., ¶ 94.)

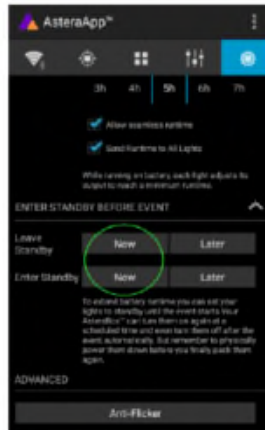
Astera also discloses parameters related to a “trigger,” as users can manually select when to start the effect by selecting “now” or setting a particular “later” time in “standby” settings. (Astera, 34.) The “standby is intended to be used between setup and event... [A]ll lights may be switched to standby mode and woken up later when the event starts.” (*Id.*)

7.14 ENTER AND LEAVE STANDBY

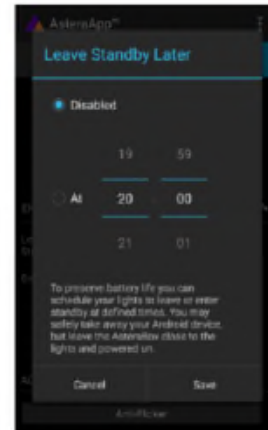
The standby is intended to be used between setup and event (see chapter 3.2.1 **Error! Reference source not found.**). After setup is completed, all lights may be switched to standby mode and woken up later when the event starts. This ensures that no battery runtime is wasted. This can be either done manually or automated.



Press the small arrow to open the standby menu.



By pressing the "Now" buttons, standby can be switched on or off for all currently targeted lights.

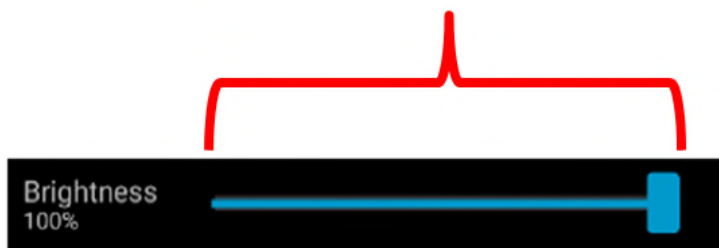


Any of the "Later" buttons will require a time to be set. The standby will be scheduled to the specified time.

(Id., 34.)

Additionally, AsteraApp has a slider such that “[e]ach effect can be adjusted in brightness.” (Id., 27.) Accordingly, the user-selected simulation parameter can be a maximum brightness, with the slider setting possible maximum brightness percentage.

Adjustable brightness maximum level



Each effect can be adjusted in brightness as well.

(*Id.*, 27 (annotated).) The Control Panel allows for the same brightness adjustment.

(*Id.*, 11.) Because a “background” color can be set, this is related to a “minimum brightness” that is at least the background color brightness. (*Id.*, 21, 27-28.)

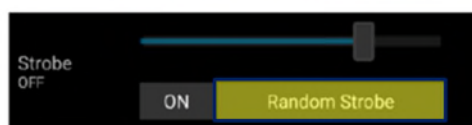
f. Dependent Claim 5

Claim 5: The method according to claim 1, wherein the lighting effect comprises a short time-period (e.g. stroboscopic) lighting effect with a user adjustable minimum pulse width.

Astera anticipates Claim 5. (Wood Decl., ¶¶ 99-103.) Astera discloses both a “stroboscope” effect and the ability to create a short-time alteration between pulses of lights with a color fade or “chaser” effect, each customizable for minimum pulse width. (Astera, 27-28.)

With respect to the “stroboscope effect,” this can be “enabled and seamlessly adjusted in speed.” (*Id.*, 27.) The stroboscopic effect is an effect of flashes with a short-time period between flashes. (Wood Decl., ¶ 100.)

AN EFFECT CAN BE HIGHLY CUSTOMIZED:

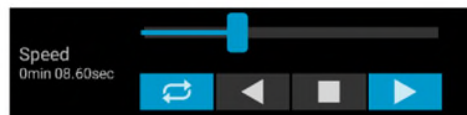


Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.

(*Id.*, 27 (annotated).) By enabling a user to adjust speed of the strobe, Astera allows users to adjust minimum pulse width. (Wood Decl., ¶¶ 100-01.) For example, a slower strobe would have a longer duration, and thus a longer pulse width, and

adjustments to increase the speed of the strobe would result in the duration and thus pulse width becoming smaller. (*Id.*) Moreover, Astera provides that a user can select from “three random stroboscope options are available: slow, medium and fast.” (Astera, 27.) By selecting between these speeds, a user again can adjust minimum pulse width, as a random slow stroboscope effect would have a greater pulse width than a random fast stroboscope effect that comprises more flashes. (Wood Decl., ¶ 101.)

Further, Astera describes that both the Control Panel and AsteraApp provide for control of “crossfade” between steps in an effect program, and “speed” of how “long it will take for the effect to complete one cycle.” (Astera, 17, 20, 27-28.)



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.

(*Id.*, 27 (annotated).)

Using this, a user may select a simple program of, for example, “one color fade,” creating a cycle which involves one color fading from maximum brightness to 0% brightness in one step, or a simple “chaser effect” of alternating between two colors. (*Id.*, 17, 20, 27-28.) By adjusting the speed of how long it takes the light to

complete this cycle of fading down to 0% brightness, the user will adjust the pulse width of the light. (Wood Decl., ¶ 103.) Setting the speed to complete the effect cycle of fading down to 0% brightness in five seconds, for example, will create a longer duration pulse than setting a speed for the same effect to fade down to 0% brightness in one second. (*Id.*) Thus, by creating effects with a light pulse, and adjusting fade of the light and speed of the cycle in which the light fades, Astera teaches a user can create short-time period lighting effects with adjustable pulse width. (Astera, 17, 20, 27-28; *see also* Wood Decl., ¶ 103)

g. Dependent Claim 6

Claim 6: *The method according to claim 1, wherein the user customisable simulation parameter comprises a parameter indicative of a group consisting of: a camera recording frequency; a camera shutter speed; and a camera frame rate.*

Astera discloses Claim 6. (Wood Decl., ¶¶ 104-107.) Astera discloses compensating for “flicker” by calculating lighting values based on user input parameters indicative of at least camera frame rate. (Astera, 32.) Specifically, users can select an “Anti-Flicker” option to compensate for unwanted “flicker” that would otherwise be produced if the PWM refresh frequency of the light did not fit the camera’s frame rate. (*Id.*, *see also* (Wood Decl., ¶ 104.)

7.12 ANTI-FLICKER

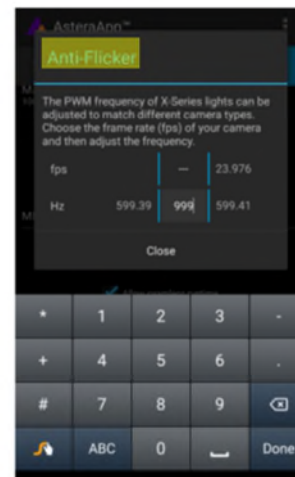
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



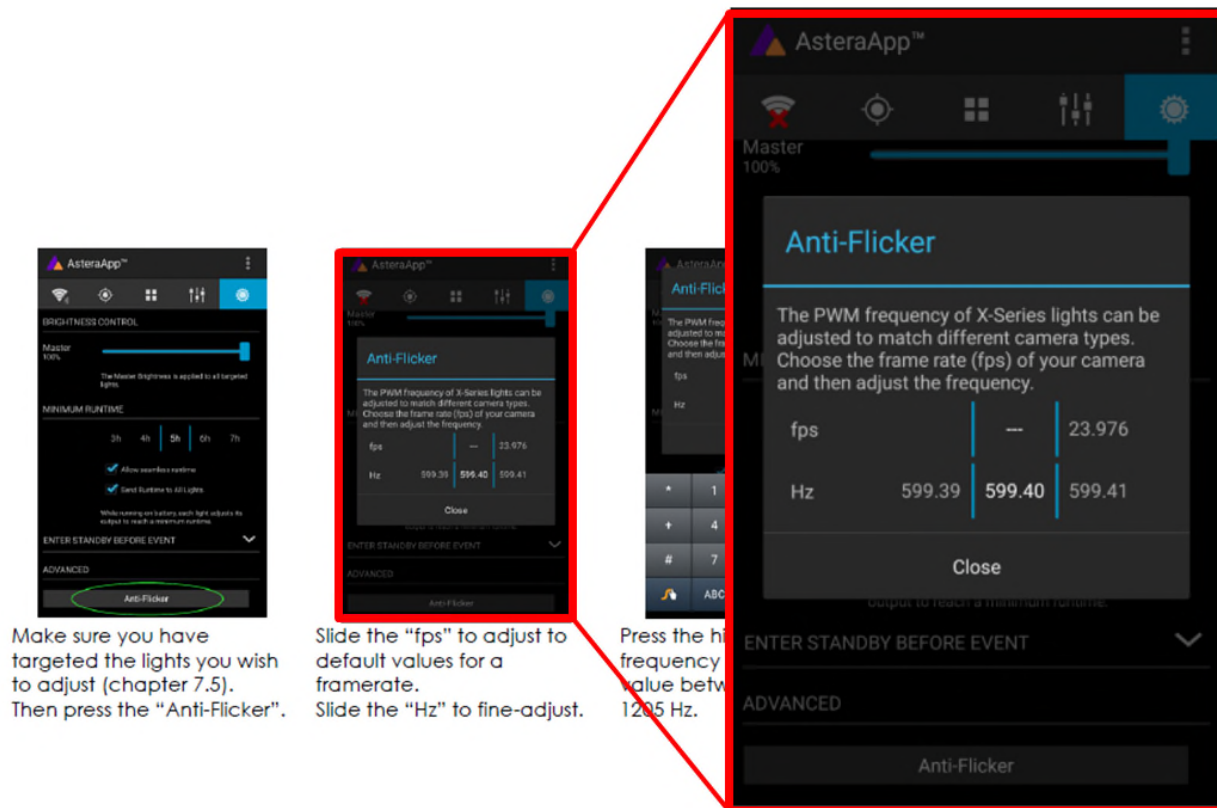
Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.

(Astera, 32 (annotated).)

In the Anti-Flicker menu, users may input and adjust a value for the “frame rate (fps)” of a camera, with AsteraApp suggesting default PWM refresh values for that particular frame rate. (*Id.*, 32) The Anti-Flicker menu also gives users the option to “slide the ‘Hz’ to fine-adjust,” allowing users to refine the PWM refresh frequency to compensate for the particular frame rate of the camera. (*Id.*)



(Astera, 32 (annotated).) Through the Anti-Flicker menu, “the [PWM refresh] frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera’s frame rates.” (*Id.*)

h. Dependent Claim 7

Claim 7: *The method according to claim 1, wherein the lighting 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.*

Astera discloses Claim 7. (Wood Decl., ¶¶ 108-110.) The AX10 can produce many lighting effects, including a “fire effect” which mimics fire flickering:

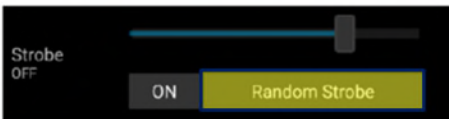


The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.

(Aster, 28; *see also id.*, 21.)

Moreover, a “stroboscope effect” (producing a strobe of flashes) can be added to selected effects:

AN EFFECT CAN BE HIGHLY CUSTOMIZED:



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.

(*Id.*, 27 (annotated); *see also id.*, 17.)

Further, a POSITA would understand from Aster that the AX10 would produce other claimed effects (such as a candle, lightning, welding, sparking, paparazzi flashes, fireworks, a flickering neon sign, a scan, and a police light), based on the effects it offers and its ability to generate various colors, alternate between colors, and add strobing/flashing. (*Id.*, 17, 21, 27-28; *see also* Wood Decl., ¶ 110.) For example, flashing blue and red lights simulates police lights, and irregularly-timed stroboscope flash effects create the impression of lightning, paparazzi flashes, welding, and spark/short circuit effects. (*Id.*)

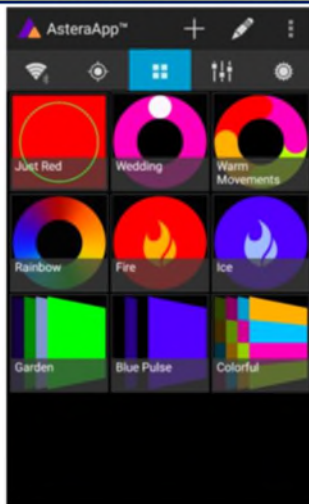
i. Dependent Claim 8

Claim 8: *The method according to claim 1, wherein the lighting value comprises brightness and/or colour data.*

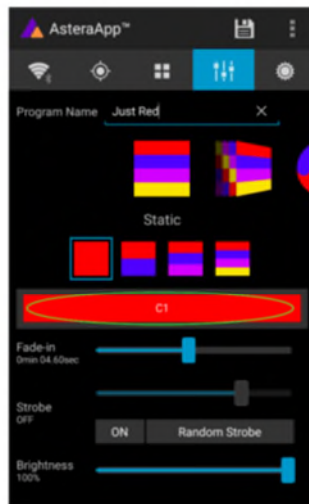
Astera anticipates Claim 8. (Wood Decl., ¶¶ 111-112.) Users can select from different lighting effects (*e.g.*, fire, chasers, rainbow) and then customize those effects (*e.g.*, adjust speed, color, crossfade, stroboscope, brightness). *See supra* Claims 1d, 9. Again, based on these user-selected, customized effects, the AX10 system calculates time varying lighting values including brightness and color information to run the desired effects. (Astera., 17, 20-21, 23-29, 32; *see also* Wood Decl., ¶¶ 111-112.)

For example, “fire” is a random flickering between a “background color and the color of the flickering effect,” both of which colors can be adjusted. (*Id.*) Moreover, users can adjust brightness and color for selected effects. (*Id.*, 20, 24-28.)

7.3 CHANGE THE COLOR



On the AsteraApp™ main screen, press "Just Red".



Once in the editor, press "C1".



Now the lights color can be changed.

(*Id.*, 24 (annotated); *see also id.* (stating that effect patterns can be “played with a customizable color palette.”).) When these effects are run, the brightness and color parameters are included in the lighting values sent to the LEDs so that they properly output the desired effect. (Wood Decl., ¶ 112.)



Each effect can be adjusted in brightness as well.

(*Id.*, 27 (annotated).)

j. Dependent Claim 9

Claim 9: *The method according to claim 1, further comprising converting at least one of brightness and colour data into a lighting signal and outputting the lighting signal to the lighting device.*

Astera anticipates Claim 9. (Wood Decl., ¶¶ 113-115.) *See supra* Claims 1e, 3, 4, and 8. Users can use the Control Panel or AsteraApp to select from different

lighting effects (*e.g.*, fire, chasers, rainbow) and then customize those effects (*e.g.*, adjust speed, color, crossfade, stroboscope, brightness). *See supra* Claims 1p-1d. Again, based on these user-selected, customized effects, the AX10 system calculates time varying lighting values including brightness and color information to run the desired effects. (Astera., 17, 20-21, 23-29, 32; *see also* Wood Decl., ¶ 113.)

The Control Panel includes a “converter” in “Standalone” mode that converts⁸ the selected effects and parameters into values that are sent to the standalone engine that outputs signals to the LEDs. (Astera, 12, 17; *see also* (Wood Decl., ¶ 114.) In particular, the Control Panel offers “comprehensive control of the built in standalone engine,” which converts the brightness and color data into control signals that it outputs to the LEDs to produce the light for the effect. (Astera, 17; *see also* Wood Decl., ¶ 114.)

⁸ The '044 generically describes how before lighting data is sent to the lighting device 102, to output light simulating the effect, it may be converted by a “converter,” which converts the data into a signal suitable for the particular light elements being controlled. ('044, 8:27-39 (“lighting data converter may convert the data 106 from the lighting effect simulator 100 into a **suitable signal** for a particular light 102.” (emphasis added).)

AsteraApp similarly includes a “converter” that converts data relating to user-selected brightness and color parameters for the lighting effects into signals that can be sent to the AX10. As noted above, the data values for color and brightness of an effect can be input in AsteraApp, which converts these values into signals representing the effect that can “be *sent to the light by the built in UHF receiver*,” where they are received by the standalone engine in the AX10 (Astera, 24, 27-28 (emphasis added); *see also id.*, 10, 17.) That is, AsteraApp converts the brightness and color data for an effect into lighting values representing the effect created in AsteraApp, and outputs these lighting values to the AX10. (Wood Decl., ¶ 115.) When the lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” (Astera, 24.)

k. Dependent Claims 10, 16, 18

Claim 10: *The method according to claim 1, wherein the controlling is for a lighting system for videography, broadcast, cinematography, studio filming and/or location filming.*

Claim 16: *The system according to claim 12, wherein the at least one lighting device comprises a lighting device for videography, broadcast, cinematography, studio filming and/or location filming.*

Claim 18: *A lighting device according to claim 17, wherein the at least one lighting device is used for videography, broadcast, cinematography, studio filming and/or location filming.*

Astera anticipates Claims 10, 16, and 18. (Wood Decl., ¶¶ 116-120.) The AX10 can produce many lighting effects (such as “fire,” “rainbow,” “stroboscope,”

and “chase effects”). *See supra* Claim 1p. These effects can be used for “videography, broadcasting, cinematography, studio filming, and location filming.” (Wood Decl., ¶ 116.) As was well-known to a POSITA, Astera manufactures luminaires for film, TV, and theatrical use. (Canins Decl. ¶¶ 2-5 (noting AX10 is one of Astera’s “production lighting products” and that it was shown at a “Prolight and Sound Exhibition”); Wood Decl., ¶ 117.) Further, as was also well-known, the AX10 was designed and sold for such uses. (Canins Decl. ¶¶ 2-5; Wood Decl., ¶ 117.)

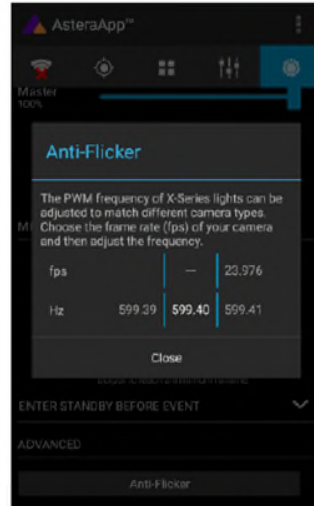
Moreover, Astera ***expressly*** teaches the AX10 produces effects captured by video cameras (used in videography, broadcasting, cinematography, and studio/location filming). (Wood Decl., ¶ 118.) The AX10 has an “Anti-Flicker” adjustment, so the light settings will “fit different ***camera’s frame rates.***” (Astera, 32.)

7.12 ANTI-FLICKER

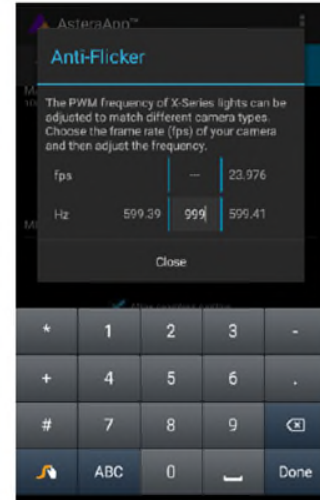
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



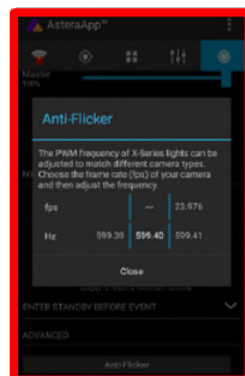
Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



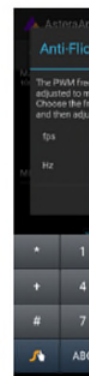
Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.



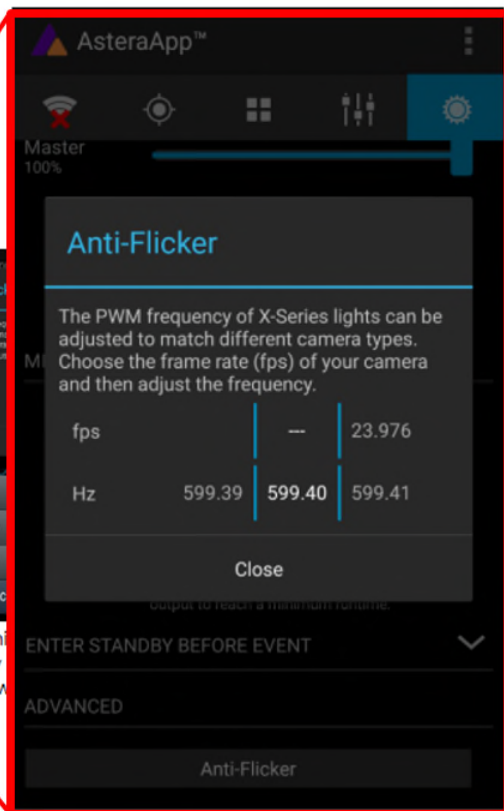
Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.



(*Id.*, 32 (annotated).) Fitting lights to a camera’s frame rates indicates the lighting effects are intended to be captured on video camera (as opposed to a still camera), as the “flicker” avoided is an unwanted artefact that would otherwise appear on captured video. (Wood Decl., ¶¶ 118-119.)

Further, a POSITA would understand references to DMX control in Astera (*see, e.g.*, Astera, 9-10) indicate the AX10 was developed for TV, cinematography, and studio filming, as DMX is a common communication standard created by and for the entertainment lighting industry. (Wood Decl., ¶ 120.)

I. Dependent Claims 11 and 13

Claim 11: *The method according to claim 1, further comprising controlling at least one further lighting device.*

Claim 13: *The system according to claim 12, wherein the system is adapted to control at least one further lighting device.*

Astera anticipates Claims 11 and 13. (Wood Decl., ¶¶ 121-124.) The AX10 is comprised of nine “RGBAW” LEDs. (Astera, 7.) The Control Panel and AsteraApp (*e.g.*, controllers) control this plurality of nine LED “lighting devices.” *See supra* Claims 1p-1e.

In addition, when AX10 lights are controlled by AsteraApp, the “[l]ights can be grouped into sets,” so that a user-created effect “can stretch over up to 32 lights.” (Astera, 10; *see also id.*, 23.)

6.4 CONTROL BY THE ASTERAAPP™

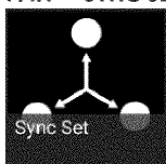
Your light has a built in standalone engine. It can display static colors or replay a number of predefined effect patterns with a customizable color palette.

With the AsteraApp™ these effects can be created and be sent to the light by the built in UHF receiver. The effects are just triggered and then each light replays it autonomously until it receives a new effect.

Lights can be grouped into sets. This way they can be controlled separately and also effects can stretch over up to 32 lights.

(Id., 10 (annotated).) For example, lights can be grouped together such that all lights in the same “Sync-Set” play the same effect simultaneously, based on control signals from AsteraApp:

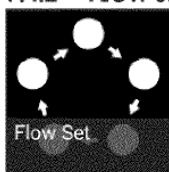
7.4.1 SYNC SET



All lights that are assigned to a Sync-Set can be controlled together. They will do exactly the same.

(Id., 25.) Alternatively, multiple lights can be given positions in a “Flow-Set” and “controlled together”:

7.4.2 FLOW SET



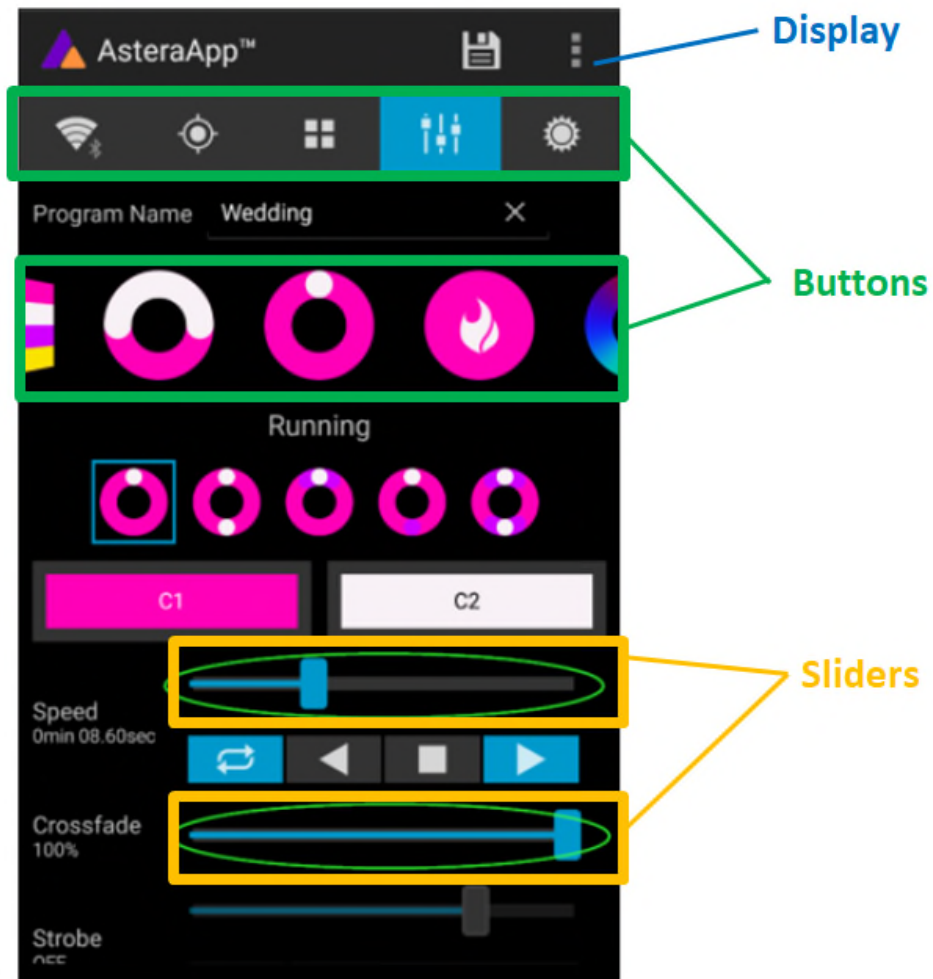
By using a Flow-Set, lights can also be controlled together. But additionally, they are assigned to positions inside the Flow-Set and so form a virtual light with several pixels. All effects, like a running light, are stretched over this virtual light.

(Id., 26.)

m. Dependent Claim 14

Claim 14: *The system according to claim 12, further comprising an input interface and wherein the input interface comprises at least one of: a wireless communication interface; a dial; a slider; a display and buttons.*

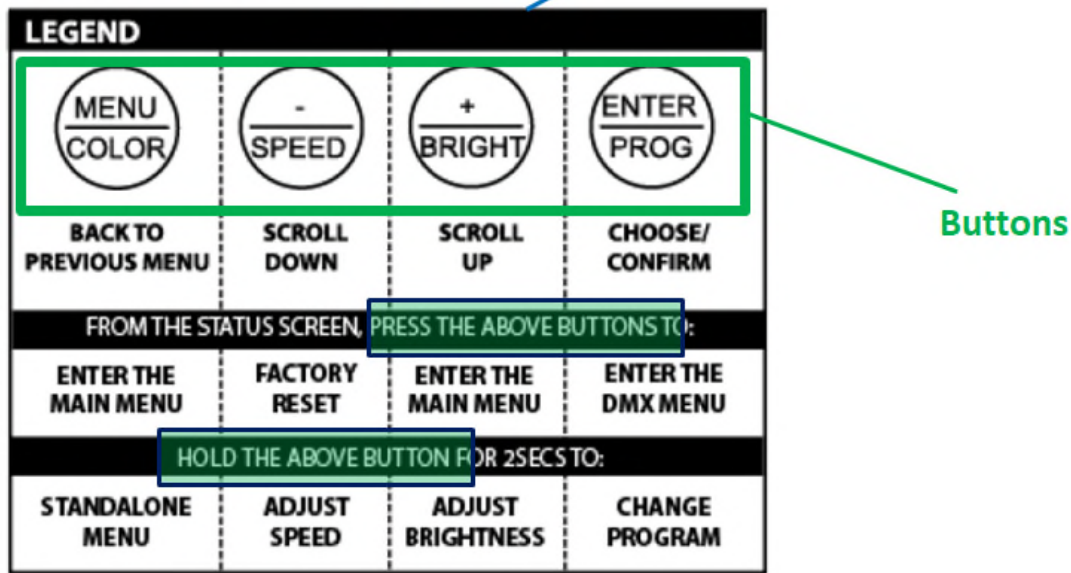
Astera anticipates Claim 14. (Wood Decl., ¶¶ 125-126.) The AX10 has multiple user interfaces to receive inputs, including Control Panel and AsteraApp. *See supra* Claim 1a. AsteraApp comprises a wireless interface (Astera, 24), as well a display, sliders, and buttons:



(*Id.*, 27 (annotated).)

The Control Panel on the AX10 includes an interface having a display and buttons:

6.6 CONTROL PANEL



(*Id.*, 11 (annotated).)

a. Dependent Claim 15

Claim 15: *The system according to claim 12, wherein said at least one lighting device is integrated in a combined unit.*

Astera anticipates and renders obvious Claim 15. (Wood Decl., ¶¶ 127-129.)

The AX10 includes LED lights. (Astera, 7.) The AX10 “can be controlled in several ways,” including a Control Panel user interface, memory, and standalone engine on the AX10 itself. (*Id.*, 9, 20; *see also supra* Claim 1.) More specifically, the AX10 “has a built in ***standalone engine***. It can display static colors or replay a number of predefined effect patterns with a customizable color palette.” (Astera, 10 ((emphasis added).) Additionally, using the Control Panel, a user can “adjust

speed,” “adjust brightness,” and select a new lighting effect program (“change program”), among other things:

LCD Control Panel on AX10

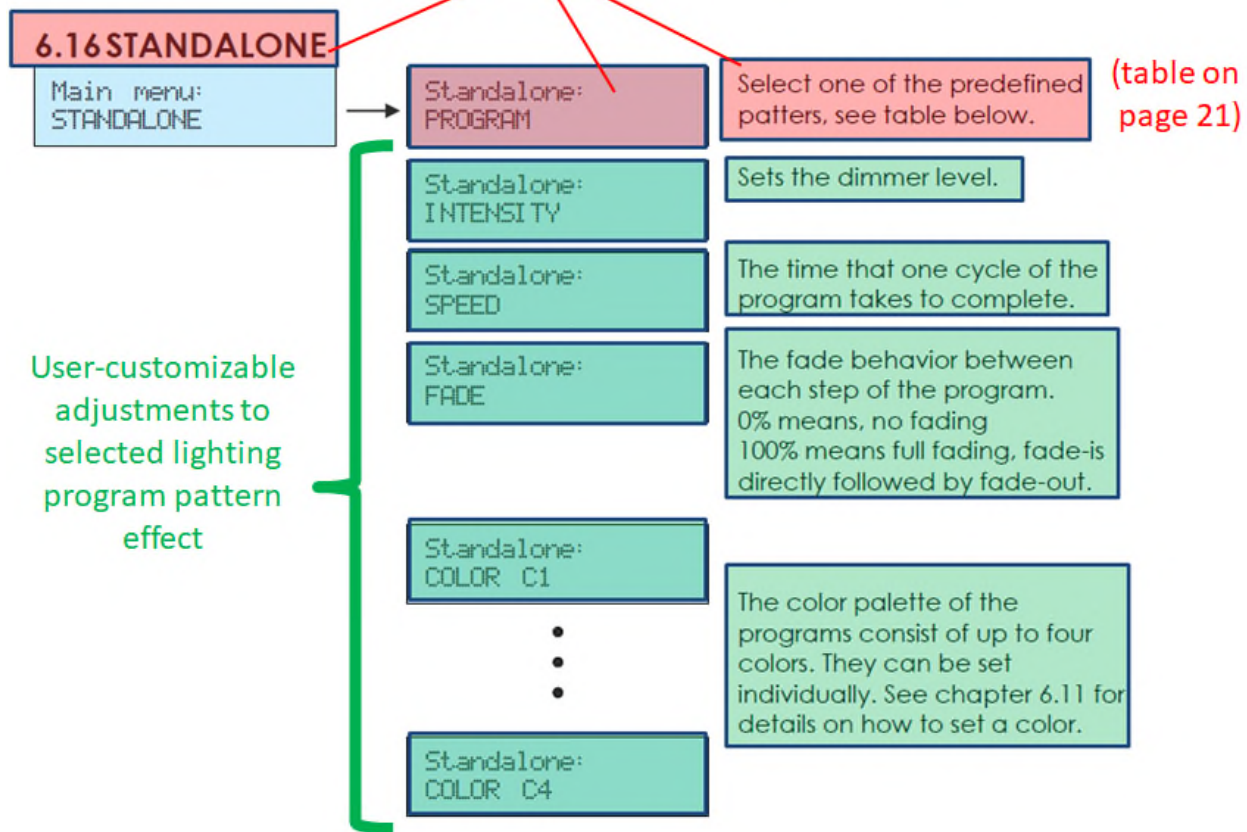
6.6 CONTROL PANEL

User-customizable
adjustments to
selected lighting
program pattern
effect

LEGEND			
 BACK TO PREVIOUS MENU	 SCROLL DOWN	 SCROLL UP	 CHOOSE/ CONFIRM
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:			
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU
HOLD THE ABOVE BUTTON FOR 2SECS TO:			
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM

Select desired
program pattern

Select desired program pattern effect through LCD Control Panel
and standalone engine on AX10



(*Id.*, 11, 20 (annotated).) Thus, the AX10 LED lights, together with the Control Panel, memory (*see supra* Claims 1b-1c), and standalone engine, are “integrated in a combined unit.”

Further, it would have been obvious to a POSITA to provide the AsteraApp interfaces and functionality, including selecting effect programs, editing parameters, and saving and recalling effects to a main screen directly on the Control Panel. (Wood Decl., ¶¶ 128-129.) A POSITA would have recognized that, as explained in Astera, the Control Panel and AsteraApp are two ways of

controlling the same AX10 light. (Astera, 9.) Astera expressly discloses a user can make many of the same selections and adjustments, such as selecting effects and modifying speed, intensity, and fade of those effects. (*Id.*, 11, 17, 20-21, 27-28.) A POSITA would have recognized that providing the AsteraApp interfaces and functionality on the Control Panel of the AX10 itself would allow for expanded options and functionality through controls on the device itself, such as allowing saving and editing programs as icons on a main screen or making “Anti-Flicker” adjustments. (Wood Decl., ¶¶ 128-129.) Thus, modifying the Control Panel to include the interfaces and functionality of AsteraApp would have been trivial, simply including a different type of touch screen interface to make selections and save adjustments, in the same way the Control Panel LCD menu already allows certain selections and adjustments. (*Id.*) Such modification would yield a predictable result, as only the source of the instructions (coming from the Control Panel rather than a remote AsteraApp) would change; the content and result of those instructions as implemented by the standalone engine would not. (*Id.*)

A POSITA would have been motivated to add AsteraApp functionality to the interface on the AX10, given the need for ease of transport and to minimize need for additional equipment and controllers when filming. (*Id.*, ¶ 129.) Including AsteraApp functionality would allow a user operating the device with the Control Panel, rather than through a smartphone, to make necessary adjustments during

operation without having to use additional controllers. (*Id.*) Moreover, adding AsteraApp features to the Control Panel would allow different users to operate the same light and make necessary adjustments and selections, including recalling previously edited effect programs, without each separate user having to download and use AsteraApp. (*Id.*)

a. Dependent Claim 17

Claim 17: *The system according to claim 12, wherein the at least one lighting device comprises at least one light emitting diode.*

Astera anticipates Claim 15. (Wood Decl., ¶ 130.) The AX10 includes “9 x 15W RGBAW Philips LEDs [*i.e.*, light emitting diodes].” (Astera, 7.)

4 SPECIFICATION

LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emittance*:	10.350lx (at 2m; White 4000K)

(*Id.*, 7 (annotated).)

B. Grounds Based on Edwards

Edwards discloses a system and method for producing lighting visual effects for capture with digital cameras, including synchronizing LED light fixtures to digital camera shutters so no unwanted artifacts are captured. (Edwards, Abstract.) The system controls the LEDs so that, for example, “simple visual effects such as a simulated camera flash, lighting pattern or gun flash” are created. (*Id.*, Abstract.)

Edwards was filed as Application No. 15/061,893 on March 4, 2016, and issued as U.S. Patent No. 9,743,010 on August 22, 2017. Edwards claims priority to Provisional Application No. 62/128,392, filed March 4, 2015, and Provisional Application No. 62/264,673, filed December 8, 2015. Edwards is prior art under at least 35 U.S.C. § 102(a)(2).

Edwards discloses that its lighting system can produce lighting effects, such as lightning, a camera flash, strobing, street light flicker, fire, and a candle. (Edwards, 3:18-28, 11:38-12:1.) The lighting system includes “LED light fixtures” and a “lighting controller.” (*Id.*, 5:18-51, 6:49-62.) The lighting controller “can be included inside each individual LED light fixture” or in “an external third system which links all the lights together and coordinates the commands.” (*Id.*, 6:57-62; *see also id.*, 7:20-8:1.) A user can set and adjust parameters for these lighting effects to set up schemes, and the light fixtures include “digital control and memory that allows each of them to store, recall and replay the schemes setup by the cinematographer.” (*Id.*, 7:20-8:1.)

1. **Ground 2 – Edwards Anticipates or Renders Obvious Claims 1-19**

a. **Independent Claim 1**

Edwards anticipates and renders obvious Claim 1.

Claim 1p: A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:

Edwards discloses Claim 1p. (Wood Decl., ¶ 135.) Edwards discloses a method and system for producing different user-customizable lighting special effects, including “a simulated camera flash, lighting pattern or gun flash.” (Edwards, 3:18-28; *see also id.*, Abstract, 11:21-53 (describing how Edwards’ system can produce adjustable lighting effects that can be “dimmed and increased in brightness real time,” including lightning, camera flashes, gun shots, car lights, flashing signs, street lights, or fire, candle, or lantern light).) Edwards additionally discloses how a user can set up and customize “lighting schemes” that include desired lighting effects, with users being able to adjust the “light levels, and the color controls,” among other parameters, for the lights. (*Id.* 7:20-31; *see also id.*, 6:51-7:2, 7:32-9:6.)

Claim 1a: receiving user input of at least one user input simulation parameter to customise a lighting effect;

Edwards discloses Claim 1a. (Wood Decl., ¶¶ 136-137.) Edwards’ system for generating lighting effects receives user inputs of simulation parameters to customize those effects. (Edwards, Abstract, 1:44-49, 3:18-28, 11:19-12:1.) Edwards discloses that user input parameters such as light levels, color, color temperature, and dimming, are received at a control panel on the light or a DMX board. (*Id.*, 7:22-31 (“Using either the control panel on each light or using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the light levels, and

color controls for each ‘active light’ source on the set. Some lights will support setting of color temperature as well as dimming.”); *see also id.*, 10:60-11:32 (describing a DMX control board); 15:46-16:43 (stating that “lighting control can be done at the fixture level or thru a centralized lighting control system”).) These user inputs are then also received at the controllers in the lights or DMX control board, as commands to control or adjust the lights. (*Id.*, *see also* Wood Decl., ¶¶ 136-137.)

Moreover, the “lighting controller” receives (a) “commands that control the lights” (*e.g.*, to produce an effect on the light) and (b) a “sync signal” related to camera parameters it uses to coordinate initiation of outputting the effects from LEDs. (Edwards, 3:13-28; 5:18-23.) Again, the lighting controller that receives user input parameters “can be included inside each individual LED light fixture,” or it can be “an external third system which links all the lights together and coordinates the commands.” (*Id.*, 6:51-62; *see also id.*, 5:19-31; 7:20-8:1; 10:59-66; 15:46-16:36.)

Claim 1b: storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;

Edwards discloses Claim 1b. (Wood Decl., ¶¶ 138-141.) Edwards discloses that the simulation parameters are used to customize effects included in “lighting schemes,” and these parameters depend on the lighting effect or scheme being

simulated. *See supra* Claim 1a; *see also, e.g.*, Edwards 7:20-31 (“Using either the control panel on each light or using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the light levels, and color controls for each ‘active light’ source on the set. Some lights will support setting of color temperature as well as dimming.”).

That is, each light setting parameter depends on the type of lighting scheme and effect the user wants to create, and the user would adjust the color or brightness levels to create the desired effect. (Wood Decl. ¶ 139.) For example, Edwards discloses “lightning, camera flash, or gun shot” effects where the parameters include a sequence of pulses “at different brightness levels.” (Edwards, 11:39-43.) As another example, if a user selects a lighting scheme that will include a fire, candle, or lantern light effect, then the parameters include “subtle, randomly changing level of light.” (*Id.*, 11:50-53.) Edwards also discloses that the setting of the color temperature parameters depends on the desired effect to be simulated, noting that lighting “setup can be changed in color temperature such that one scheme is harsher cool white is used for the purpose of having a more aggressive a darker feeling. The next scheme can be a warm light scheme with completely different feeling.” (*Id.*, 6:63-7:2.)

After the user inputs the parameters to set up the lights with the correct settings for the desired schemes, Edwards discloses that a “STORE” command can be issued so that “[m]ultiple schemes can be stored, preferably digitally, each featuring different light levels, color controls and other settings per active LED light. ... Each light would have **memory storage** for all digital settings corresponding to each scheme.” (*Id.*, 7:20-40 (emphasis added).) In addition, as part of these schemes, camera settings, including “gamma, ISO, color settings, shutter speed, resolutions, etc., ... could be stored and recalled for use in each scheme.” (*Id.*, 7:45-53; *see also id.*, 5:48-52; 6:35-39 (noting that lighting settings can be downloaded to memory inside each light); 6:51-62 (“multiple lights are networked together with **digital control and memory that allows each of them to store, recall and replay the schemes setup by the cinematographer.**” (emphasis added))); 8:62-62-66 (indicating there is a memory setting provided for pulse width parameter inputs).)

Thus, in Edwards, users input simulation parameter settings to customize lighting effects used in lighting schemes, and these settings (*e.g.*, color, color temperature, light level, dimming, camera settings) are then saved in a memory at least in each light. (Wood Decl. ¶¶ 138-141.)

Claim 1c: recalling from said memory said at least one stored user input simulation parameter;

Edwards discloses Claim 1c. (Wood Decl., ¶ 142.) As explained above, Edwards discloses that user input simulation parameter settings are stored in memory. *See supra* Claim 1b. Edwards further discloses that these stored lighting parameter settings are “recalled” from memory so that selected lighting effects and schemes can be replayed by the lights. (Edwards, 6:51-62 (“multiple lights are networked together with digital control and **memory** that allows each of them to **store, recall and replay the schemes setup by the cinematographer.**”); 7:20-65 (noting that after the values for the light parameter and camera settings that make up each lighting scheme are stored in the memory by the STORE command, the controllers for the lights will then “**recall the stored values** for each of these schemes” following a “RECORD” command.)) (emphasis added).)

Claim 1d: calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter;

Edwards discloses Claim 1d. (Wood Decl., ¶¶ 143-144.) Edwards discloses a “lighting controller” (effect simulator) that receives (a) “commands that control the lights” (*e.g.*, to produce an effect on the light) and (b) a “sync signal” for when the lights should turn on/off. (Edwards, 5:18-23.) As noted above, the lighting controller “can be included inside each individual LED light fixture,” or it can be “an external third system which links all the lights together and coordinates the commands.” (*Id.*, 6:57-62; *see also id.*, 5:19-31; 7:20-8:1; 10:59-66; 15:46-16:36.)

Upon issuance of a “RECORD” command, the lighting controllers “recall the stored values” for the desired lighting schemes from memory and “replay them in order, sequentially in sync with [a] sync signal.” (*Id.*, 7:54-8:1.) In particular, if a user selects stored schemes “1, 3, 5, for example,” the “lights would prepare to replay scheme 1, then 3 then 5 in sequence throughout the filming.” (*Id.*) In replaying selected schemes, the lighting controllers recall the parameters for the selected schemes and calculate the necessary lighting commands sent to the LED lights such that the lights produce the proper lighting for each scheme. (*Id.*, see also Wood Decl., ¶ 144.) The lighting commands sent by the lighting controllers to the LEDs are time varying lighting values, as they reflect the “different light levels, color controls and other settings per active LED light” for each scheme. (Edwards, 7:20-65.)

Claim 1e: *outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.*

Edwards discloses Claim 1e. (Wood Decl., ¶¶ 145-147.) The commands from the lighting controller are output to the LED lights, causing to produce effects such as “a simulated camera flash, lighting pattern or gun flash.” (Edwards, 3:18-28; see also *id.*, Abstract, 5:24-29; 11:33-53 (describing how the lighting controller can output commands comprising time-varying lighting values to produce lighting effects, including lightning, camera flashes, gun shots, car lights, flashing signs, street lights, or fire, candle, or lantern light).)

Moreover, by using “synchronized lighting[,] the controller may in addition read a system time stamp and play a lighting ‘scrip’ or series of commands. This allows special effects and lighting timing to be replayed perfectly, synchronized across different takes.” (*Id.*, 5:38-42.) That is, the lighting controller outputs commands comprising time-varying lighting values to the LEDs to implement the cinematographer’s desired lighting schemes and special effects. *See supra* Claims 1a-1d.

For example, Edwards discloses that “[a]ll lights would wait for the rising edge of the sync signal to trigger turning on each scheme frame. At the falling edge the lights would all turn off. At the next rising edge all lights would turn on the next sequential scheme. Each active light in the network or [] system will therefore recall the stored values for each of these schemes and replay them in order, sequentially in sync with the sync signal. When filming starts the sync signal will initialize the record sequence and all lighting will continue to sequentially replay each scheme until the sync signal stops, indicating the filming has stopped, ” (*Id.*, 7:54-8:1; *see also id.*, 16:13-36.)

b. Independent Claims 12 and 19

For this Petition, there are no substantive differences between Claim 1 and Claims 12 and 19 (*see supra*, Astera Claims 12 and 19), and Edwards and renders obvious anticipates claims 12 and 19 for the same reasons as Claim 1. *See supra*

Claim 1. (*See also* Wood Decl., ¶¶ 148-152.) Moreover, as discussed above in Claim 1, Edwards expressly discloses that the method for controlling the lights to produce lighting effects can be performed by a lighting “system” and through execution of a “software program.”

With respect to Claim 12, Edwards discloses that the method of claim 1 is implemented on a system that includes LED lighting fixtures as controlled by either a control panel and controller on the LED fixture itself, or through a DMX control board. *See supra* Claim 1.

With respect to Claim 19, Edwards makes clear that a controller in the lighting system implements a software program as recited in Claim 19. Edwards discloses that the method “comprises **programming** the intensity value of each of the light fixtures prior to the changing step,” and that “there is preferably a **memory** that stores all DMX commands **to be executed** and an input synchronization signal with the lighting controller that synchronizes all lighting transitions with the camera frame capture.” (*Id.*, 1:52-54, 5:48-52 (emphasis added).) In addition, “[f]or film and studio applications... multiple lights are networked together with digital control and **memory that allows each of them to store, recall and replay** the schemes setup by the cinematographer. ... The multi-scheme control systems can be included inside each individual LED light fixture or they can be networked to an external third system which links all the lights

together and coordinates the commands. The control system for each light preferably includes support of multiple commands to control each light and schemes.” (*Id.*, 6:51-62 (emphasis added).) Thus, Edwards’s system uses a “software program” to perform the claimed method, in that commands (*e.g.*, for a user-customized lighting effect) are programmed into memory, with a program on the lighting controller subsequently executing those commands, and replaying the effect, in a controlled fashion to capture desired lighting schemes. (Wood Decl., ¶ 152.)

c. Dependent Claim 2

Claim 2: *The method according to claim 1, wherein said user customisable simulation parameter is stored locally.*

Edwards anticipates Claim 2. (Wood Decl., ¶ 153.) *See also supra* Claims 1b and 1c. Edwards discloses that a user can select and set various lighting settings and schemes, such as for a customizable lighting effect, that are saved to memories in all lights on the network. (Edwards, 6:51-55, 7:20-50.) Edwards describes a light scheme where “multiple lights are networked together with digital control and memory that allows **each of them to store, recall and replay the schemes** setup by the cinematographer.” (*Id.*, 6:51-55 (emphasis added); *see also id.* 7:20-65.) Thus, the user-input parameter setting for each scheme can be stored and recalled on local memories in each of the lights. (*Id.*)

d. Dependent Claim 3

Claim 3: *The method according to claim 1, wherein the simulation parameter comprises a colour or colour temperature.*

Edwards anticipates Claim 3. (Wood Decl., ¶ 154.) Edwards discloses that “[u]sing either the control panel on each light or using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the light levels, and **color** controls for each ‘active light’ source on the set. Some lights will support setting of **color temperature** as well as dimming.” (Edwards, 7:22-31 (emphasis added); *see also id.*, 6:63-7:1 (noting that the user input “lighting setup can be changed in color temperature”).)

e. Dependent Claim 4

Claim 4: *The method according to claim 1, wherein the simulation parameter is related to at least one of: an effect frequency; an effect speed; a colour; a colour temperature; a trigger; a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal (peak) brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation time period.*

Edwards anticipates Claim 4. *See supra* Claim 3. (Wood Decl., ¶¶ 155-157.) Edwards discloses that the simulation parameter is related to at least color, color temperature, trigger (synchronization signal), and brightness and local maximal/minimal brightness (light level and dimming controlling the percentage of light coming out of each fixture). (Edwards, 7:20-31 (“Using either the control panel on each light or using DMX commands, the cinematographer adjusts each

light until he/she has the desired settings on all lights for the ‘lighting scheme’.

This includes the **light levels**, and **color** controls for each ‘active light’ source on the set. Some lights will support setting of **color temperature** as well as **dimming**.

Other lights may support **full color** (like RGB). The most critical and common setting is **dimming which controls the percentage of light coming out of the fixture.**” (emphasis added); 5:22-44 (a “**sync signal** ... is preferably fed into the lighting controller that synchronizes lighting commands. ... Instead of changing the lights asynchronously, the controller preferably holds the commands until the next vertical frame sync pulse.” (emphasis added).)

Moreover, Edwards discloses that its lighting system can produce lighting effects, such as lightning, a camera flash, strobing, street light flicker, fire, and a candle. (Edwards, 3:18-28, 11:38-12:1.) These example effects include at least parameters related to color, trigger, a rate of increase of brightness, a rate of decrease of brightness, a brightness, a local maximal (peak) brightness, a local minimal brightness, and a brightness fluctuation period. (Wood Decl. ¶¶ 155-157.) For example, the “fire, candle and lantern light” effect includes parameters to provide “a subtle, randomly changing level of light.” (Edwards, 11:50-53.) A subtle, randomly changing level of light requires parameters related to brightness, color of the fire or flame, local maximum and minimum brightness (the maximum and minimum of the randomly changed levels of the light), rate of

increase/decrease of brightness and change of color (the time associated with the random changes between different random light levels), and brightness/color fluctuation periods (the time associated with the random changes to the levels of the light during the effect). (Wood Decl. ¶¶ 155-157.)

f. Dependent Claim 5

Claim 5: *The method according to claim 1, wherein the lighting effect comprises a short time-period (e.g. stroboscopic) lighting effect with a user adjustable minimum pulse width.*

Edwards anticipates Claim 5. (Wood Decl., ¶¶ 158-159.) Edwards discloses short time-period lighting effects, such as lightning, camera flashes, or gun shots, including “a ***single frame strobe*** or a ***strobe lasting for multiple frames.***”

(Edwards, 11:39-43 (emphasis added); *see also id.*, 3:21-25.) The user can adjust the minimum pulse width, which is the duration the pulse lasts, of these short time-period lighting effects, in that she can choose whether the effect has a pulse width of a “single frame” or has a pulse width “lasting for multiple frames.” (*Id.*, *see also* Wood Decl., ¶ 158.)

Edwards further discloses a “Pulse Width” mode in which users may adjust “pulse width” settings, providing the “advantage that it can be used for strobing action capture.” (Edwards, 8:62-9:6.) Such strobing is a short time-period lighting effect. (*Id.*; *see also* Wood Decl., ¶ 159.) Moreover, Edwards states that with such

effect, “the light only stay[s] on for the length of the pulse width setting.”

(Edwards, 8:62-9:6; *see also* Wood Decl., ¶ 159.)

g. Dependent Claim 6

Claim 6: *The method according to claim 1, wherein the user customisable simulation parameter comprises a parameter indicative of a group consisting of: a camera recording frequency; a camera shutter speed; and a camera frame rate.*

Edwards anticipates Claim 6. (Wood Decl., ¶¶ 160-165.) Edwards discloses allowing a user to input parameters indicative of at least camera shutter speed and frame rate, in the form a camera synchronization signal and camera settings. (Edwards, Abstract, 1:44-49, 3:18-28, 7:45-50; 11:19-12:1.) Edwards’ lighting controller, based on a user choosing to feed the camera sync signal to the controller, “preferably holds the commands until the next vertical ***frame sync pulse***,” so that the “lighting transitions for each frame are preferably timed to occur during the ***closed shutter period*** prior to the frame being captured by the ***camera***. In this way ***lighting is stable throughout the frame*** and there are preferably no asynchronous lighting events that can impact the image capture.” (*Id.*, 5:18-31 (emphasis added).) By providing an input to synchronize lighting changes to the times when the camera shutter is closed, and making all transitions between captured camera frames as described above, parameters of at least camera shutter speed and frame rate are accounted for in activating the LEDs. (Wood Decl., ¶ 160.)

Edwards further specifies that the “**synchronization of changes in lighting to the camera shutter** for videos and motion pictures ... enables all lighting transitions to be done **between frames** making the resulting frame image capture clean and **free from artifacts that occur when lighting changes occur in the middle of a frame.**” (Edwards, 1:25-30 (emphasis added).) “[T]he active **lighting is synchronized to the camera shutter**, so a special effect such as a gun shot flash can be synchronized with the exact time pulse when the camera shutter is open. This ensures the lighting event is captured cleanly on camera in that specific frame.” (*Id.*, 4:47-54 (emphasis added); *see also id.*, 3:18-28; 7:54-8:1; 11:33-12:1; 14:60-66; 15:46-17:10.)

In addition, Edwards discloses that camera settings, including shutter speed, may be input and stored as part of commands sent to lighting devices, and recalled when implementing a lighting scheme. (*Id.*, 7:33-8:1 (stating that camera settings, including “gamma, ISO, color settings, shutter speed, resolutions, etc., ... could be stored and recalled for use in each scheme.”); *see also id.*, 15:13-16:5.)

Moreover, Edwards discloses controlling the lights to avoid “the lighting chang[ing] mid frame [that] can cause artifacts and ruin the lighting setup” (*id.*, 8:37-40), through a “combination” of, for example, the following:

1. Sync signal: A smart sync signal can turn on the lighting scheme with a rising edge and turn it off with a falling edge. This is preferably carefully timed with frame capture

on the camera to make sure the lighting and frame capture are cleanly synchronized.

2. Shutter angle: Motion picture cameras were developed for film that was advanced between each frame. Shutter angle refers to the amount of time used by the camera to advance the film between frame captures. The original camera angle was 180 degrees which equals 50% shutter closed and 50% shutter open. The shutter angle creates a cinematic “look” and is critical to making films that look like “movies”. Digital cameras have preserved this concept of shutter angle. There is a “shutter off” time in between each frame capture. This shutter off time needs to be indicated as part of the sync signal. In this solution the SYNC signal triggers the onset of the “shutter off time”. This gives the lighting time to change schemes before the frame capture occurs.

3. Pulse Width: In this mode a scheme memory setting is provided to the active lighting for “pulse width”. In this mode the light only stay on for the length of the pulse width setting. This would likely be a rising or falling edge trigger that fires once per frame. This method has the added advantage that it can be used for strobing action capture and also can be used to reduce the total exposure time. This is an alternate way of dimming—using frame sync'd pulse width verses reduced light levels for the full frame. A 50% pulse width time duration is equal to a 50% reduction in light level for 100% of the frame.

(Id., 8:40-9:6.)

h. Dependent Claim 7

Claim 7: The method according to claim 1, wherein the lighting 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.

Edwards anticipates Claim 7. (Wood Decl., ¶¶ 166-167.) Edwards' lighting system can produce a plurality of effects including fire, lightning, flickering sign, muzzle (gunshot) flash, paparazzi (camera) flashes, and strobe flashes. (Edwards, 7:20-30; *see also id.*, 11:33-53.) In particular, Edwards discloses creating effects of "[l]ightning, camera flash or Gun Shot" as a "single frame strobe or a strobe lasting for multiple frames." (Edwards, 11:39-43; *see also id.*, 3:21-25 (disclosing "effects such as a simulated camera flash, lighting pattern or gun flash.")) Edwards further discloses that lighting effects for a "night" scene, such as a "car driving by, flashing sign in window, [or] street light flicker," can be generated by "controlling on or more lights [to give] the effect of light moving or changing intensity or distance." (*Id.*, 11:44-49.) Edwards also discloses that a "fire, candle, [or] lantern light" can be simulated through a "subtle, randomly changing level of light." (*Id.*, 11:50-53.)

i. Dependent Claim 8

Claim 8: *The method according to claim 1, wherein the lighting value comprises brightness and/or colour data.*

Edwards anticipates Claim 8. (Wood Decl., ¶¶ 168-170.) As discussed above, Edwards discloses calculating and outputting commands including lighting values to LEDs that represent lighting schemes and effects based on user parameters. *See supra* Claims 1d-1e, 9. These lighting values, which represent the user-customized lighting effects and schemes, including brightness and color data

because the inputs themselves comprise settings for brightness and color values for the LED lights. (Edwards, 7:20-36; 1:44-2:2, 6:63-7:2, 11:19-32; *see also* Wood Decl., ¶ 168.)

In particular, Edwards discloses that “[u]sing either the control panel on each light or using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the **light levels, and color controls** for each ‘active light’ source on the set. Some lights will support setting of **color temperature as well as dimming**. Other lights may support full color (like RGB). The most critical and common setting is **dimming which controls the percentage of light coming out of the fixture.**”

(Edwards, 7:20-36 (emphasis added); *see also id.*, 1:44-2:2, 6:63-7:2, 11:19-32.)

These light settings (which include brightness and color information) are then “stored,” and upon issuance of a “RECORD” command, Edwards’ lighting controllers “recall the stored values” for the desired lighting schemes from memory and “replay them in order, sequentially in sync with [a] sync signal. When filming starts the sync signal will initialize the record sequence and all lighting will continue to sequentially replay each scheme until the sync signal stops, indicating the filming has stopped.” (*Id.*, 7:54-8:1; *see also id.*, 5:18-52.) When the lighting controller controls the lights to “replay” the stored and recalled lighting schemes, it

sends the lighting values that include the brightness and color data representing the user-customized schemes. (Wood Decl., ¶ 170.)

j. Dependent Claim 9

Claim 9: *The method according to claim 1, further comprising converting at least one of brightness and colour data into a lighting signal and outputting the lighting signal to the lighting device.*

Edwards anticipates Claim 9. (Wood Decl., ¶¶ 171-176.) Edwards discloses that “[u]sing either the control panel on each light or using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the ***light levels, and color controls*** for each ‘active light’ source on the set. Some lights will support setting of ***color temperature as well as dimming***. Other lights may support full color (like RGB). The most critical and common setting is ***dimming which controls the percentage of light coming out of the fixture.***” (Edwards, 7:20-36 (emphasis added); see also *id.*, 1:44-2:2, 6:63-7:2, 11:19-32.)

These light settings (which include brightness and color information) are then “stored,” and can be recalled and played on the lights in sync with the sync signal. (*Id.*, 7:31-8:1.) The lighting controller holds commands to control the lights “until the next vertical frame sync pulse,” so that any “lighting transitions” (or time-varying changes in the lighting values) for each frame are timed to “occur

during the closed shutter period prior to the frame being captured by the camera.”
(*Id.*, 5:24-29.)

Edwards’ lighting controller “converts”⁹ the lighting commands it receives, which include the color and brightness information, into “digital controls” (or lighting signals) for the LEDs, which controls it “holds” before sending to the LEDs based on the sync signal. (*Id.*, 4:10-39, 5:18-52, 6:31-62, 7:32-42; *see also* Wood Decl., ¶¶ 173-176.) Edwards discloses that LEDs are used in the lighting system “because they can be changed using digital controls in nanoseconds, far higher than the frame rate of video capture.” (Edwards, 6:49-51.) The digital controls provided to the LEDs result from a converter that changes the commands into these digital control signals. (Wood Decl., ¶ 176.) In the lighting system, “multiple lights are networked together with digital control and memory that allows each of them to store, recall and replay the schemes setup by the

⁹ The ’044 generically describes how before lighting data is sent to the lighting device 102, to output light simulating the effect, it may be converted by a “converter,” which converts the data into a signal suitable for the particular light elements being controlled. (’044, 8:27-39 (“lighting data converter may convert the data 106 from the lighting effect simulator 100 into a **suitable signal** for a particular light 102.” (emphasis added).)

cinematographer. ... The multi-scheme control systems can be included inside each individual LED light fixture or they can be networked to an external third system which links all the lights together and coordinates the commands. The control system for each light preferably includes support of multiple commands to control each light and schemes.” (Edwards, 6:51-62.)

k. Dependent Claims 10, 16, and 18

Claim 10: *The method according to claim 1, wherein the controlling is for a lighting system for videography, broadcast, cinematography, studio filming and/or location filming.*

Claim 16: *The system according to claim 12, wherein the at least one lighting device comprises a lighting device for videography, broadcast, cinematography, studio filming and/or location filming.*

Claim 18: *A lighting device according to claim 17, wherein the at least one lighting device is used for videography, broadcast, cinematography, studio filming and/or location filming.*

Edwards anticipates Claims 10, 16, and 18. (Wood Decl., ¶ 177.) Edwards discloses that “[t]he present invention is related to synchronization of changes in lighting to the camera shutter for ***videos and motion pictures.***” (Edwards, 1:25-27 (emphasis added).) Edwards also notes that “[u]sing either the control panel on each light or using DMX commands, the ***cinematographer*** adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the light levels, and color controls for each ‘active light’ source on the set.” (*Id.* 7:22-27 (emphasis added); *see also, id.*, 1:44-49, 2:66-3:19, 6:51-55.) Thus, the

lights in the lighting system are for at least one of videography, broadcast, cinematography, studio filming, and location filming. (Wood Decl., ¶ 177.)

I. Dependent Claims 11 and 13

Claim 11: *The method according to claim 1, further comprising controlling at least one further lighting device.*

Claim 13: *The system according to claim 12, wherein the system is adapted to control at least one further lighting device.*

Edwards anticipates Claims 11 and 13. (Wood Decl., ¶ 178.) Edwards' lighting controller can be used to control multiple lights networked together. (Edwards, 1:44-49, 6:51-62.) Specifically, "[t]he present invention is a method for making a digital video, the method comprising synchronizing **one or more** light emitting diode (LED) light fixtures to the shutters of one or more digital cameras, and changing an intensity of the one or more lights while the shutter on each of the one or more cameras is closed." (*Id.*, 1:44-49 (emphasis added).) "For film and studio applications in this invention[,] multiple lights are networked together with digital control and memory that allows each of them to store, recall and replay the schemes setup by the cinematographer. LED lights will preferably be exclusively used as the active lights under a network controlled system. The multi-scheme control systems can be included inside each individual LED light fixture or they can be networked to an external third system which links all the lights together and coordinates the commands." (*Id.*, 6:51-62.)

m. Dependent Claim 14

Claim 14: *The system according to claim 12, further comprising an input interface and wherein the input interface comprises at least one of: a wireless communication interface; a dial; a slider; a display and buttons.*

Edwards anticipates and renders obvious Claim 14. (Wood Decl., ¶¶ 179-183.) Edwards discloses a controller that “can be included inside each individual LED light fixture” or as “an external third system which links all the lights together and coordinates the commands.” (Edwards, 6:57-62; *see also id.*, 5:19-31; 7:20-8:1; 10:59-66; 15:46-16:36.)

With respect to the controller included in the light fixture, Edwards discloses that a user can setup desired lighting schemes using a “control panel on each light.” (*Id.*, 7:20-31.) A POSITA would understand such a control panel to include at least one of buttons, dials, or sliders for a user to make selections, as well as a display for the user to make the adjustments and set the desired effects. (Wood Decl., ¶ 180.) Otherwise, the user would be unable to make selections. (*Id.*)

With respect to using an external controller, Edwards discloses a user can set up schemes and make adjustments to lights using a standard DMX board. (Edwards, 7:22-27 (“using DMX commands, the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’” This includes the light levels, and color controls for each ‘active light’ source on the set.”); *see also id.*, 4:23-27, 11:21-30, 13:65-14:5, 14:36-41, 16:36-40.)

Edwards describes that “[t]he industry standard for adjusting lights is DMX control boards. The present invention can utilize DMX addressing and command standards to support VALT. A standard DMX control board can be used to control the individual lights and setup for each VALT track in the same way it is used today.” (Edwards, 16:36-40.) Edwards further discloses that a “VALT DMX console or control panel may be structured to comprise push button VALT commands, and organize lighting controls by VALT track.” (*Id.*, 17:66-18:2.)

A standard DMX control board or panel is a device allowing users to access and adjust effects and parameters of multiple lights, individually or together, and store and recall lighting presets, patterns, chases, and sequences. (Wood Decl., ¶¶ 182-183.) A POSITA would understand that a DMX control board or panel, as in Edwards, would have buttons or a keypad (to select the lights to be controlled), a display (to show selections and lighting state), and user controls such as sliders, faders, and knobs (to adjust parameters of selected lights). (*Id.*)

n. Dependent Claim 15

Claim 15: *The system according to claim 12, wherein said at least one lighting device is integrated in a combined unit.*

Edwards anticipates Claim 15. (Wood Decl., ¶ 184.) Edwards discloses that its “lighting controller” can be “included inside each individual LED light fixture.” (Edwards, 6:57-62.) This control system “includes support of multiple commands to control each light and schemes.” (*Id.*) Edwards further discloses that “[u]sing the

control panel on each light..., the cinematographer adjusts each light until he/she has the desired settings on all lights for the ‘lighting scheme.’ This includes the light levels, and color controls for each ‘active light’ source on the set.” (*Id.*, 7:22-27.) Thus, the control panel, lighting controller (which includes the effect simulator, *see supra* Claims 1d-1e, 12), memory in the lighting fixture (*see supra* Claims 1b-1c), and LED lighting device can all be integrated into one combined LED lighting unit. (Wood Decl., ¶ 184.)

o. Dependent Claim 17

Claim 17: *The system according to claim 12, wherein the at least one lighting device comprises at least one light emitting diode.*

Astera anticipates Claim 15. (Wood Decl., ¶ 185.) Edwards’s lighting system includes light emitting diodes (or LEDs). (Edwards, Abstract; *see also, id.*, 1:44-49, 2:66-3:19, 4:32-35, 6:49-56.) Edwards describes “synchronizing one or more light emitting diode (LED) light fixtures to the shutters of one or more digital cameras.” (*Id.*, 1:44-49.) Moreover, “[a]ll ‘active lights’ on the set preferably comprise digital LED lights” (*Id.*, 4:32-35; *see also id.*, 6:55-56 (“LED lights will preferably be exclusively used ...”).)

IX. CONCLUSION

ARRI respectfully requests that a Trial be instituted. Claims 1-19 should be cancelled. ARRI respectfully submits that each of the presented Grounds are separate and distinct.

Dated: October 25, 2021

Respectfully submitted,

/s/ Joseph J. Raffetto

Celine Jimenez Crowson (Reg. No. 40,357)

Joseph J. Raffetto (Reg. No. 66,218)

Scott Hughes (Reg. 68,385)

HOGAN LOVELLS US LLP

555 13th Street N.W.

Washington, D.C. 20004

Telephone: 202.637.5600

Facsimile: 202.637.5910

*Counsel for Petitioner Arnold & Richter Cine
Technik GmbH & Co. Betriebs KG*

APPENDIX A

Table of Exhibits

Exhibit No.	Description
1001	U.S. Patent No. 10,845,044 (<i>Challenged Patent</i>)
1002	File History for the '044 Patent
1003	The Astera Manual
1004	U.S. Patent No. 9,743,010 (Edwards)
1005	American National Standard E1.11 – 2008 (2013), Entertainment Technology USITT DMX512-A, Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories, ANSI (2017)
1006	Declaration of Mr. Michael Wood
1007	Curriculum Vitae of Mr. Michael Wood
1008	Declaration of Mr. Simon Canins

APPENDIX B

Certificate of Word Count

I certify that, in accordance with 37 C.F.R. § 42.24(d), the word count for the foregoing Petition totals 13,708. This is less than the permitted total under 37 C.F.R. 42.24(a)(1)(i).

/s/ Joseph J. Raffetto

Joseph J. Raffetto (Reg. No. 66,218)

*One of the attorneys for Petitioner Arnold &
Richter Cine Technik GmbH & Co. Betriebs KG*

APPENDIX C

Certificate of Service

I certify that on October 25, 2021, a copy of this Petition and supporting document were served on Patent Owner via Federal Express at the following address:

PRTSI Inc.
232 NW 42nd Ter
Plantation FL 33317

/s/ Joseph J. Raffetto
Joseph J. Raffetto (Reg. No. 66,218)
One of the attorneys for Petitioner
Arnold & Richter Cine Technik GmbH & Co.
Betriebs KG