

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS
AMERICA, INC., AND SAMSUNG DISPLAY CO., LTD.,
Petitioner,

v.

POLARIS POWERLED TECHNOLOGIES, LLC,
Patent Owner.

Case No. IPR2018-01262
Patent No. 8,223,117

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,223,117
UNDER 35 U.S.C. §§ 311–319 AND 37 C.F.R. § 42.100 *et seq.***

LIST OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 8,223,117 (the “117 patent”)
1002	File History for U.S. Patent No. 8,223,117
1003	U.S. Patent No. 5,554,912 (“Thayer”)
1004	European Patent Office Publication No. 0570037 (“Godwin”)
1005	U.S. Patent No. 6,337,675 (“Toffolo”)
1006	U.S. Patent No. 6,657,663 (“Morris”)
1007	U.S. Patent No. 5,760,760 (“Helms”)
1008	U.S. Patent No. 6,762,741 (“Weindorf”)
1009	Japanese Patent Office Publication No. 1999316566
1010	Certified Translation of Japanese Patent Office Publication No. 1999316566
1011	Japanese Patent Office Publication No. 2001134255 (“Miura”)
1012	Certified Translation of Japanese Patent Office Publication No. 2001134255
1013	U.S. Patent No. 6,947,017 (“Gettemy”)
1014	U.S. Patent No. 5,270,818 (“Ottenstein”)
1015	U.S. Patent No. 4,044,375
1016	U.S. Patent No. 3,928,867
1017	U.S. Patent No. 4,799,768 (“Gahan”)
1018	U.S. Patent No. 6,825,470
1019	U.S. Patent No. 6,255,784
1020	U.S. Patent No. 6,596,981
1021	Brent Robertson, “Controlling a Backlight with the TSL2550 Ambient Light Sensor, Designers Notebook #7,” Texas Advanced Optoelectronic Solutions Inc. (March 3, 2003).
1022	U.S. Provisional Patent Application No. 60/543094
1023	Exhibit A to Polaris’ February 1, 2018 Infringement Contentions in <i>Polaris PowerLED Technologies v. Samsung Electronics America, Inc. et al.</i> , 2:17-cv-00715-JRG (E.D. Tex.)
1024	Exhibit B to Polaris’ February 1, 2018 Infringement Contentions in <i>Polaris PowerLED Technologies v. Samsung Electronics America, Inc. et al.</i> , 2:17-cv-00715-JRG (E.D. Tex.)
1025	Exhibit C to Polaris’ February 1, 2018 Infringement Contentions in <i>Polaris PowerLED Technologies v. Samsung Electronics America, Inc. et al.</i> , 2:17-cv-00715-JRG (E.D. Tex.)

Exhibit	Description
1026	Exhibit D to Polaris’ May 8, 2018 First Amended Infringement Contentions in <i>Polaris PowerLED Technologies v. Samsung Electronics America, Inc. et al.</i> , 2:17-cv-00715-JRG (E.D. Tex.)
1027	U.S. Patent No. 7,468,722 (“the ’722 patent”)
1028	File History for U.S. Patent No. 7,468,722
1029	Declaration of Dr. Philip Hobbs
1030	<i>Curriculum vitae</i> of Dr. Philip Hobbs
1031	<i>Building Electro-Optical Systems: Making It All Work</i> , 1st ed., Philip C. D. Hobbs (2000)
1032	U.S. Patent No. 4,238,727

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I. INTRODUCTION

Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Display Co., Ltd. (“Petitioner”) petitions for *inter partes* review seeking cancellation of claims 1-2, 4-7, 9, 13-16, and 18-20 of U.S. Patent No. 8,223,117 (Ex. 1001, “’117 patent”), assigned to Polaris PowerLED Technologies, LLC (“Patent Owner” or “Polaris”).

The ’117 patent relates generally to “brightness control” of a display screen, and, more specifically, to “fully automatic . . . adjusting [of] display brightness in response to varying ambient lighting conditions in combination with various user preferences.” Ex. 1001, 1:60-64. During prosecution, the applicant emphasized two different aspects of how its brightness control system calculates the brightness of the display. Specifically, the independent claims require not only multiplication of ambient light and user input signals, but also a “dark level bias”—an adjustment made to the brightness of the display to maintain a minimum brightness level in low ambient light.

However, neither multiplying the ambient light level by a user input to determine display screen brightness (the claimed “multiplier”), nor adjusting a display screen’s brightness above a minimum at low ambient light levels (the claimed “dark level bias”) were new in 2003. As for the former feature, both the ’117 patent and its parent patent were originally rejected over prior art cited for

a multiplier feature, causing the applicant to emphasize the specific structure of the “multiplier circuit” in the parent patent, and the “dark level bias” feature during the prosecution of the ’117 patent. As for the latter feature, maintaining a minimum brightness in dark conditions was a well-known feature disclosed by multiple references in the field of automatic brightness control systems.

More generally, systems and methods for automatically adjusting the brightness of a display in response to changes in ambient light levels and user preferences were well known years before the March 28, 2003 priority date asserted by the Patent Owner in the related litigation described in Section II.B below. *See* Ex. 1029, ¶¶ 13-41. Because the ’117 patent claims well-known features that had been disclosed years before 2003 by numerous prior art references, such as the Thayer and Godwin references relied upon in the grounds below, the challenged claims would have been obvious to a skilled artisan.

II. MANDATORY NOTICES (37 C.F.R. § 42.8(A)(1))

A. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

The real parties-in-interest for this Petition are Petitioner, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Display Co., Ltd.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

Patent Owner has asserted the ’117 patent in litigation against the real parties-in-interest in *Polaris PowerLED Technologies, LLC v. Samsung Electronics*

America, Inc., et al., Case No. 2:17-cv-00715-JRG (E.D. Tex.) (“the Litigation”).

C. Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3))

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D. Service Information (37 C.F.R. § 42.8(b)(4))

Service information is provided in the designation of counsel above. A power of attorney is submitted with this Petition. Counsel for Petitioner consents to service of all documents via electronic mail at the email addresses above and at Samsung-Polaris-IPR@cov.com.

III. FEES (37 C.F.R. § 42.103)

The undersigned authorizes the Office to charge \$30,500 (\$15,500 request fee and \$15,000 post-institution fee) to Deposit Account No. 50-0740 for the fees set

forth in 37 C.F.R. § 42.15(a). The undersigned further authorizes payment for any additional fees that might be due in connection with this Petition to be charged to the above-referenced Deposit Account.

IV. REQUIREMENTS FOR INTER PARTES REVIEW UNDER 37 C.F.R. § 42.104

A. Grounds for Standing (37 C.F.R. § 42.104(a))

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the '117 patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the '117 patent on the grounds identified in this petition.

B. Citation of Prior Art

The prior art relied upon is:

Exhibit	Reference	Publication Date	Availability as Prior Art¹
Ex. 1003	U.S. Patent No. 5,554,912 ("Thayer")	September 10, 1996	§§ 102(a), (b), and (e)
Ex. 1004	European Patent Office Publication No. 0050037 ("Godwin")	November 18, 1993	§§ 102(a) and (b)

¹ Because the application for the '117 patent was filed prior to March 16, 2013, the pre-AIA conditions for patentability apply. All references herein to §§ 102 and 103 of the Patent Statute refer to pre-AIA versions.

Ex. 1005	U.S. Patent No. 6,337,675 (“Toffolo”)	January 8, 2002	§§ 102(a), (b), and (e)
Ex. 1006	U.S. Patent No. 6,657,663 (“Morris”)	December 2, 2003	§§ 102(a) and (e)

C. Claims and Statutory Grounds (37 C.F.R. §§ 42.104(b)(1) & (b)(2))

Claims 1-2, 4-7, 9, 13-16, and 18-20 (“the challenged claims”) of the ’117 Patent should be cancelled on the grounds below:

Ground	Claims	Basis
I	1-2, 4-7, 15- 16, 18-19	Under 35 U.S.C. § 103 as obvious over the combination of Thayer and Godwin
II	9, 20	Under 35 U.S.C. § 103 as obvious over the combination of Thayer, Godwin, and Toffolo
III	13, 14	Under 35 U.S.C. § 103 as obvious over the combination of Thayer, Godwin, and Morris

D. Person of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSA”) at the time of the alleged invention of the ’117 Patent would have had at least a Bachelor’s degree in electrical engineering, physics, or optics, and at least 3 years of experience with analog circuit design and optical sensors, as explained by Dr. Philip Hobbs. See Ex. 1029, ¶ 91.

E. Claim Construction (37 C.F.R. § 42.104(b)(3))

A discussion regarding the interpretation of certain claim limitations appears in Section VI.C, below.

F. Unpatentability of the Construed Claims (37 C.F.R. § 42.104(b)(4))

An explanation of how the challenged claims of the '117 Patent are unpatentable is provided in Section VII, below.

G. Supporting Evidence (37 C.F.R. § 42.104(b)(5))

The evidence relied upon to support the challenge and the relevance of the evidence, including identifying specific portions of the evidence that support the challenge, are provided below. An Exhibit List is set forth above.

V. OVERVIEW OF THE TECHNOLOGY

As of March 28, 2003—the earliest priority date asserted by the Patent Owner in the Litigation²—the particular features of the '117 patent's purported invention had been described in numerous references, as described below and in the “Technology Background” section of Dr. Hobbs' declaration. *See* Ex. 1029, ¶¶ 13-56.

A. Automatically Adjusting Display Screen Brightness Based on Ambient Light Detected by a Sensor

Automatic adjustment of the brightness of a display screen based on sensed

² Solely for purposes of this petition, Petitioner does not challenge this date.

ambient light levels had been thoroughly described in prior art patents and publications prior to 2003, as described by Dr. Hobbs in paragraphs 14-22 of his declaration (Ex. 1029). As a 1995 patent explained, “it is obvious that the contents of an LCD can be much more easily viewed in a dark room than a bright one,” Ex. 1007, 1:45-47, and numerous systems and methods had been developed to automatically adjust a screen’s brightness based on the brightness of the environment. In particular, a number of pre-2003 patents and publications (such as Thayer, Godwin, and Toffolo) described automatically adjusting the brightness of display screens in automobiles and other vehicles based on the current ambient light level detected by a sensor, a value that could rapidly change based on the vehicle’s movement. Ex. 1029, ¶¶ 17-21.

B. User Inputs to an Automatic Display Brightness System

Thayer, Godwin, Toffolo, and other pre-2003 automatic brightness systems featured user input devices through which a user could customize the automatic brightness adjustment system to particular preferences, as described in paragraphs 23-34 of the Hobbs declaration (Ex. 1029). One well-known method for customizing the automatic brightness adjustment in such systems was to calculate display brightness by multiplying a user’s input by the sensed level of ambient light, as taught by, e.g., Godwin and a 1993 U.S. Patent to Ottenstein. Ex. 1029, ¶¶ 24-25, 31-34. Both Godwin and Ottenstein explained that this multiplication technique

allowed the user to initially select their desired contrast ratio for the display, then maintain that contrast ratio by linearly scaling the screen brightness to changes in the ambient light level. *Id.*

C. Maintaining Minimum Display Brightness at Negligible Levels of Ambient Light

The pre-2003 automatic display brightness systems described above commonly recognized that conditions of no (or very little) ambient light in the environment required a minimum level of display screen brightness to allow the screen to be visible/readable to a user. *See* Ex. 1029, ¶¶ 35-41. Although reduction of screen brightness as the ambient light level decreases is desirable for the sake of reducing power consumption, it was recognized that such reduction should cease at some minimum ambient light threshold to avoid the screen going entirely dark. *Id.* As the 1995 patent to Helms noted, it was known that display systems would require display brightness to be “set to the minimum level necessary to enable the contents of the display to be perceived,” Ex. 1007, 1:54-57, even if the display was in a pitch-black environment.

Accordingly, many pre-2003 publications, including Thayer and Toffolo, disclosed the need to set a minimum brightness regardless of ambient light level. *See* Ex. 1029, ¶¶ 35-41. For example, Thayer disclosed a “minimum brightness” limit under which the display screen could not fall below even when the level of ambient light dropped to zero. Ex. 1003, Fig. 3. Ottenstein recognized that using

its multiplication technique at low ambient light levels would require the contrast to “grow[] without limit,” and therefore disclosed that the “sensed ambient brightness level should be limited” to a minimum of 10%. Ex. 1014, 3:65-4:4.

VI. SUMMARY OF THE '117 PATENT

A. Overview of the '117 Patent

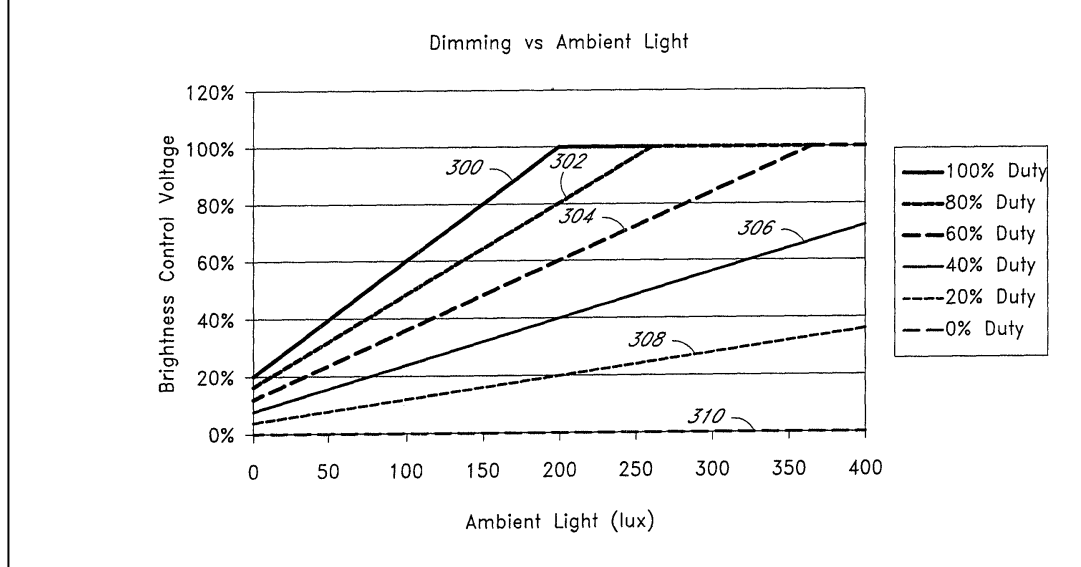
The '117 patent (Ex. 1001) is entitled “Method and Apparatus to Control Display Brightness With Ambient Light Correction.” Ex. 1001, (54). It claims priority to provisional patent application No. 60/543,094, filed February 9, 2004. Ex. 1001, (60). Dr. Hobbs provides an overview of the '117 patent in paragraphs 57-69 of his declaration (Ex. 1029).

The '117 patent explains that its claimed systems and methods are directed to “adjusting display brightness in response to varying ambient lighting conditions in combination with various user preferences,” Ex. 1001, 1:60-64, and can be used in “portable electronic devices, automotive displays, electronic dashboards, television, and the like,” Ex. 1001, 4:62-66.

1. Varying Ambient Lighting Conditions in Combination with Various User Preferences

Fig. 3 of the '117 patent is a graph illustrating how the brightness control system varies the brightness of the display by multiplying a value indicative of a sensed ambient light by a user input, Ex. 1001, 5:44-51:

FIG. 3



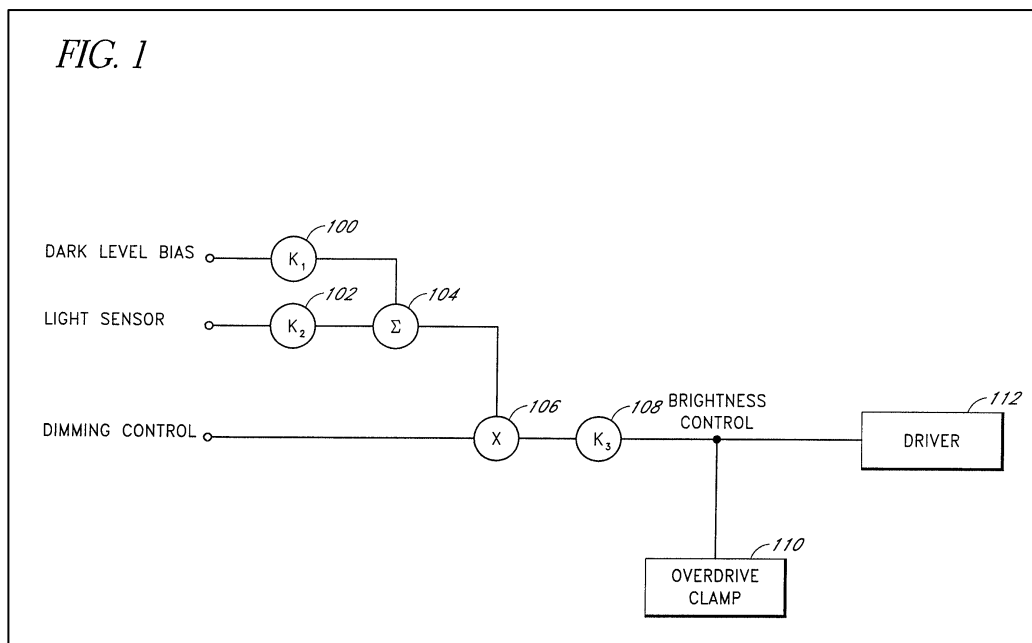
“Ambient light levels are indicated in units of lux (or lumens/square meter)” on the x-axis, and the “brightness control signal levels” used to control the brightness of the display are indicated on the y-axis “as a percentage” of the “full-scale” maximum brightness of the display. Ex. 1001, 5:46-51. Graphs 300-310 illustrate how the brightness of the display increases as the level of ambient light increases (or how the brightness decreases as the level of ambient light decreases), with the “rate of increase (or decrease) depend[ing] on the user setting.” Ex. 1001, 6:1-7. As the provisional application explains, this user setting represents the contrast ratio desired by the user. Ex. 1022, A-2.

2. “Dark Level Bias”

The “brightness control signal near zero lux” in Fig. 3 above indicates the

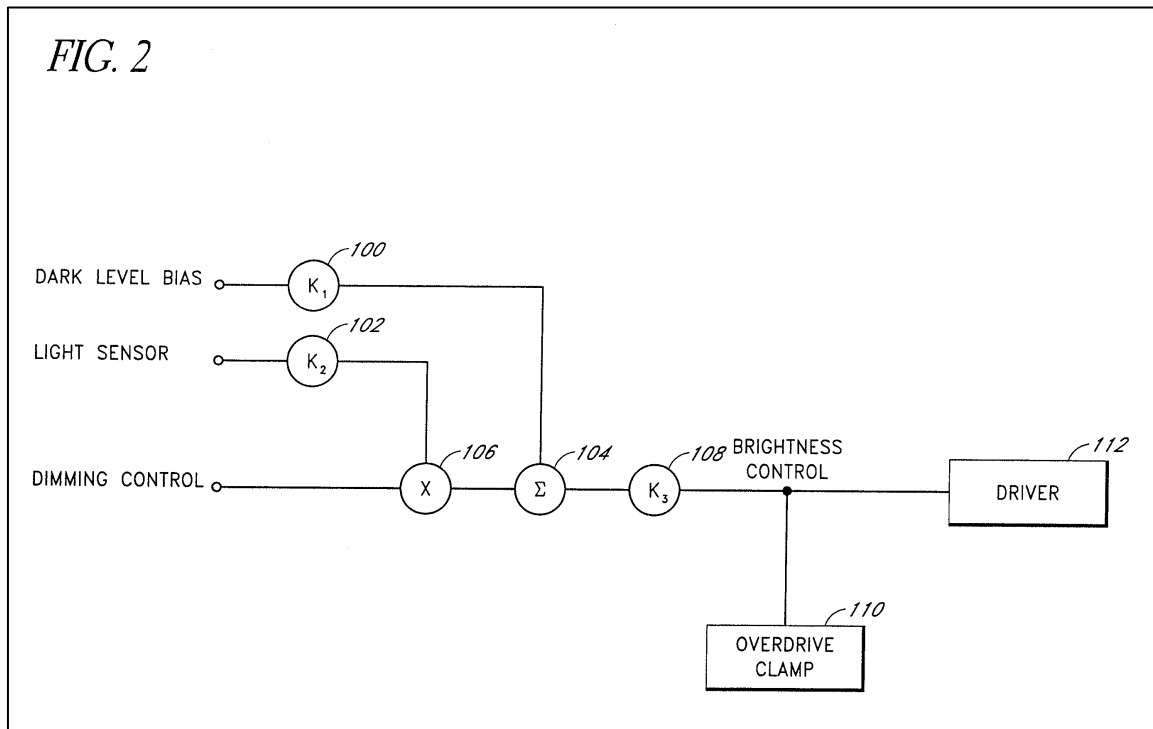
“dark bias level”—the brightness of the screen when the level of ambient light is near-zero. Ex. 1001, 6:10-12. In the embodiment of Fig. 3, which is depicted in Fig. 1, the magnitude of the dark bias level (or dark level bias) “also depends on the user setting,” Ex. 1001, 5:44-45, 6:10-12.

The '117 patent provides two exemplary embodiments of how the ambient light sensor output, user input, and dark level bias interact to calculate the brightness of the display screen. Fig. 1 illustrates a first embodiment in which the “dark level bias” 100 value is summed with the output from the ambient light sensor 102 at summing circuit 104, and that sum is then multiplied by the “user input” at “multiplier circuit” 106 to produce a “brightness control signal,” Ex. 1001, 4:45-59:



Another embodiment is illustrated by Fig. 2, in which the output from the

ambient light sensor 102 is first multiplied by the user input value at multiplier circuit 106, and the dark level bias 100 is *then* added to the product of the user input and light sensor output at summing circuit 104, Ex. 1001, 5:15-24:



This second embodiment “provides a predefined level of brightness in substantially total ambient darkness” that is “independent of the user input,” Ex. 1001, 5:30-42—because the dark level bias is added only after the user input and the light sensor output have been multiplied, Ex. 1029, ¶ 64. By contrast, in the embodiment of Fig. 1 (which results in a graph as depicted in Fig. 3, Ex. 1001, 5:44-46), the “level of brightness in substantially total ambient darkness” is dependent on user input because the sum of the dark level bias value is multiplied by user input, Ex. 1001, 4:45-59, resulting in different brightness levels (depending

on user input) at an ambient light level of 0 lux, as depicted in Fig. 3 above, Ex. 1001, 6:9-11.

Independent claim 1 of the '117 patent recites (emphases added):

*A **brightness control circuit** with selective ambient light correction comprising:*

***a first input configured to receive a user signal** indicative of a user selectable brightness setting;*

***a light sensor configured to sense ambient light** and to output a sensing signal indicative of the ambient light level*

***a multiplier** configured to selectively generate a combined signal based on both the user signal and the sensing signal; and*

***a dark level bias** configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.*

B. Prosecution History

The '117 patent is a continuation of U.S. Patent No. 7,468,722 ("the '722 patent"). The '722 patent was originally filed on December 27, 2004 with 21 pending claims. During prosecution, the examiner rejected all twenty-one of these

originally pending claims (including dependent claim 2, which recited “a dark level bias circuit configured to maintain the brightness control signal above a predetermined level when the ambient light level decreases to approximately zero”) as either anticipated or obvious over various prior art references. Ex. 1028, 429-440. The claims of the ’722 patent were ultimately allowed after the applicant amended the claims to recite a detailed description of the physical structure of the claimed “multiplier circuit.” Ex. 1028, 35-43, 54-68.

In the continuation application that resulted in the ’117 patent, filed December 12, 2007, the independent claims lacked the detailed description of the “multiplier” that had resulted in allowance of the ’722 patent, but included the “dark level bias” element that had been present in dependent claim 2 of the ’722 patent. Ex. 1002, 114-118.

The examiner rejected nearly all of the pending claims (except for pending claims 30-31, directed to the structural implementation of the “multiplier”) as anticipated or obvious over various prior art references. Ex. 1002, 56-69. The applicant amended each independent claim to recite that the dark level bias adjusted the brightness control signal so that it would be “maintained above a minimum level when the ambient light level decreases to approximately zero.” Ex. 1002, 30-42. The applicant argued that the applied prior art did not “disclose, teach or suggest the use of [such] a dark level bias,” which the applicant characterized as “ensur[ing] a

predefined (or minimum) brightness in total ambient darkness.” *Id.* Following this amendment, and despite previously rejecting over the prior art dependent claim 2 of the parent application (which, as noted above, recited “a dark level bias circuit configured to maintain the brightness control signal above a predetermined level when the ambient light level decreases to approximately zero”), the examiner allowed the claims without further comment. Ex. 1002, 17-21.

C. Claim Construction

In an IPR, the Board construes claim terms in an unexpired patent according to their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b).³ Further discussion regarding the meaning of certain claim limitations in light of Patent Owner’s arguments in the Litigation appears below.

1. **“a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal” (claim 1) / “selectively multiplying the input signal with a sense signal to generate a combined signal” (claim 15) / “means for multiplying the input signal with the sense signal to generate a combined signal” (claim 19)**

The ’117 patent states: “In one embodiment, software algorithm can be used

³ Petitioner is aware of the USPTO’s May 9, 2018 Notice of Proposed Rulemaking, which proposes to replace the BRI standard with the standard of *Phillips v. AWH Corp.* 415 F.3d 1303 (Fed. Cir. 2005). Petitioner believes the claim constructions offered herein would not change even if *Phillips* were applied.

to multiply the light sensor output with the user selectable brightness control. In another embodiment, analog or mixed-signal circuits can be used to perform the multiplication.” Ex. 1001, 2:7-10; *see also id.*, 5:37-38. The ’117 patent also discloses a “multiplier circuit 106,” relevant to claim 19’s “means for multiplying.” *Id.* at Figs. 1, 2. In the Litigation, Patent Owner has asserted that these limitations are met by “software” that “generate[s] a combined signal . . . based on both the user signal and the sensing signal.” *See* Ex. 1023, 30-31, 48, 52; Ex. 1024, 16-17, 27-28, 31-32; Ex. 1025, 26-27, 44-45, 51; Ex. 1026, 8-11, 22, 26-27.

For the purposes of this IPR, and without conceding its applicability in the Litigation, Petitioner adopts Patent Owner’s construction for these terms—namely, that they encompass hardware or software for generating a combined signal from both a user input and a sensing signal.⁴ *Cf. Toyota Motor Corp. v. Blitzsafe Texas, LLC*, Institution Decision, IPR2016-00422, 26 (PTAB July 6, 2016). While Petitioner retains the right in the Litigation to argue that Patent Owner’s construction is incorrect and/or these terms are indefinite, the Board need not evaluate those arguments because these terms are not in controversy for purposes of this IPR. *Id.*

⁴ Petitioner reserves the right in the Litigation to challenge the extent to which this term (and the five terms that follow) satisfies the requirements of 35 U.S.C. § 112, and to argue that this term is subject to treatment under 35 U.S.C. § 112, ¶ 6.

at 11 (“[O]nly terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy.”).

2. “a dark level bias configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero” (claim 1) / “adjusting the combined signal with a dark level bias to generate a brightness control signal for controlling brightness of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero” (claim 15) / “means for adjusting the combined signal with a dark level bias to generate a brightness control signal that is maintained above a minimum level when the ambient light level decreases to approximately zero” (claim 19)

In the Litigation, Patent Owner has asserted that these terms in claims 1, 15, and 19 are met by “a software variable” that “is used to control the brightness control signal such that the brightness control signal is maintained above a predefined brightness” “[w]hen the ambient light level decreases to approximately zero.” Ex. 1023, 37, 48, 52-53; Ex. 1024, 17-19, 28, 32; Ex. 1025, 27-30, 45, 51-52; Ex. 1026, 11-13, 22, 27. Patent Owner has also stated that “the dark level bias may be a variable or set of variables input into a minimum function to generate a brightness control signal.” Ex. 1023, 37.

For the purposes of this IPR, and without conceding its applicability in the Litigation, Petitioner adopts Patent Owner’s construction of these terms—namely, that they encompass software for adjusting the combined signal in order to maintain

brightness above a predetermined level when the ambient light level decreases to approximately zero. For the “means for adjusting the combined signal . . .” element of claim 19, Petitioner notes that the ’117 patent discloses a “dark level bias circuit” that “maintains the brightness control signal above a predetermined level when the ambient light level decreases to approximately zero . . . [which] ensures a predefined (or minimum) brightness in total ambient darkness.” Ex. 1001 at 2:57-61.

3. “an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range” (claim 6)

In the Litigation, Polaris has asserted that the “overdrive clamp circuit is implemented in software” that adjusts the “brightness control signal to limit its amplitude to a predefined range” “above a certain minimum value and is also below a certain value. For example, the overdrive clamp circuit may be implemented in a software function that accepts a variable associated with the combined signal, a minimum, and a maximum and adjusts the variable such that it is between the minimum and maximum.” Ex. 1023, 40-41; Ex. 1024, 22-23; Ex. 1025, 36-38; Ex. 1026, 16-18.

For the purposes of this IPR, and without conceding its applicability in the Litigation, Petitioner adopts Patent Owner’s construction—namely, that it encompasses software for limiting the amplitude of the display brightness to a predetermined range.

4. “means for receiving an input signal indicative of a user selectable brightness setting” (claim 19)

Petitioner notes that the '117 patent discloses the “dimming control input” of Figures 1 and 2 as structures corresponding to this means element. Ex. 1029, ¶ 105.

5. “means for sensing ambient light to generate a sense signal indicative of the ambient light level” (claim 19)

In the Litigation, Patent Owner has asserted that that this term is met by an “ambient light sensor” which “measures ambient light and outputs a sensing signal indicative of the ambient light level.” Ex. 1023, 51; Ex. 1024, 30-31; Ex. 1025, 50-51; Ex. 1026, 25-26.

For the purposes of this IPR, and without conceding its applicability in the Litigation, Petitioner adopts Patent Owner’s construction of this term—namely, that it encompasses an ambient light sensor which measures ambient light and outputs a sensing signal indicative of the ambient light level. Petitioner also notes that the '117 patent discloses a “light sensor” in Figures 1 and 2 as structures corresponding to this means element. Ex. 1029, ¶ 109.

6. “means for selectively operating in a manual mode or an auto mode” (claim 20)

In the Litigation, Patent Owner has asserted that this term is met by software for “selectively operating in a manual mode” (in which the light sensor is disabled) “or an auto mode” (in which the light sensor is enabled) “depending on selection by a user.” Ex. 1023, 53; Ex. 1024, 32-33; Ex. 1025, 53-54; Ex. 1026, 28.

For the purposes of this IPR, and without conceding its applicability in the Litigation, Petitioner adopts Patent Owner's construction of this term in the Litigation—namely, that it encompasses any software for selectively operating in a manual mode in which the light sensor is disabled or in an auto mode in which the light sensor is enabled.

VII. A REASONABLE LIKELIHOOD EXISTS THAT PETITIONER WILL PREVAIL WITH RESPECT TO AT LEAST ONE CLAIM

The framework for the analysis for determining obviousness is set forth in the well-known factors outlined in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Petitioner analyzes these *Graham* factors below. The claimed subject matter of the '117 Patent is disclosed and taught in the prior art, as explained below. None of the prior art references or arguments in Grounds I-III were considered by the examiner during prosecution. The Declaration of Dr. Hobbs (Ex. 1029) was also not before the examiner. Accordingly, Grounds I-III do not present the same or substantially the same prior art or arguments as were previously presented to the PTO. 35 U.S.C. § 325(d). Because there is a reasonable likelihood that Petitioner will prevail with respect to at least one claim, Petitioner respectfully requests that the Board institute trial as to all challenges raised in the petition,⁵ and find all

⁵ Pursuant to the Board's April 26, 2018 *Guidance on the Impact of SAS on AIA Trial Proceedings*.

challenged claims unpatentable.

A. Prior Art

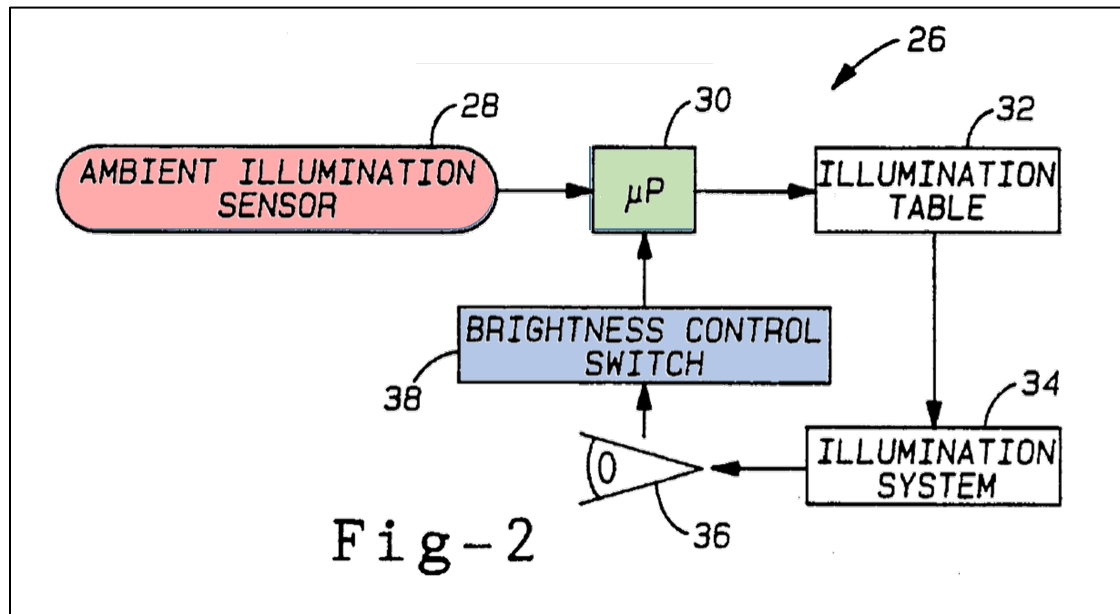
1. Thayer (Ex. 1003)

Thayer is a U.S. Patent titled “Adaptive Instrument Display Brightness Control System” that issued on September 10, 1996, and thus is prior art under 35 U.S.C. § 102(b). Thayer was not cited or considered during the prosecution of the ’117 patent. The listed assignee is Delco Electronics Corporation, Ex. 1003, [73].

Dr. Hobbs provides an overview of Thayer in paragraphs 70-81 of his declaration (Ex. 1029). Similar to the ’117 patent, which recognized the need to “adjust[] the brightness level” of a display “to compensate for changes in ambient lighting,” Ex. 1001, 1:19-22, Thayer discloses an “adaptive instrument display brightness control system that automatically controls the instrument display brightness of a vehicle based on a vehicle operator’s changes to the display brightness and particular ambient light conditions,” Ex. 1003, Abstract. As with the claimed invention of the ’117 patent, Thayer discloses a brightness control system that automatically adapts the brightness of a display screen based on a combination of a signal from an ambient light sensor and a signal input by a user. Thayer also discloses maintaining a minimum display brightness level at low (or zero) levels of ambient light.

Just as the ’117 patent claims a “brightness control circuit,” Thayer discloses

the components of a “system 26 that adapts instrument display brightness to a vehicle operator’s preference,” Ex. 1003, 3:53-55, illustrated in Thayer’s annotated Fig. 2:

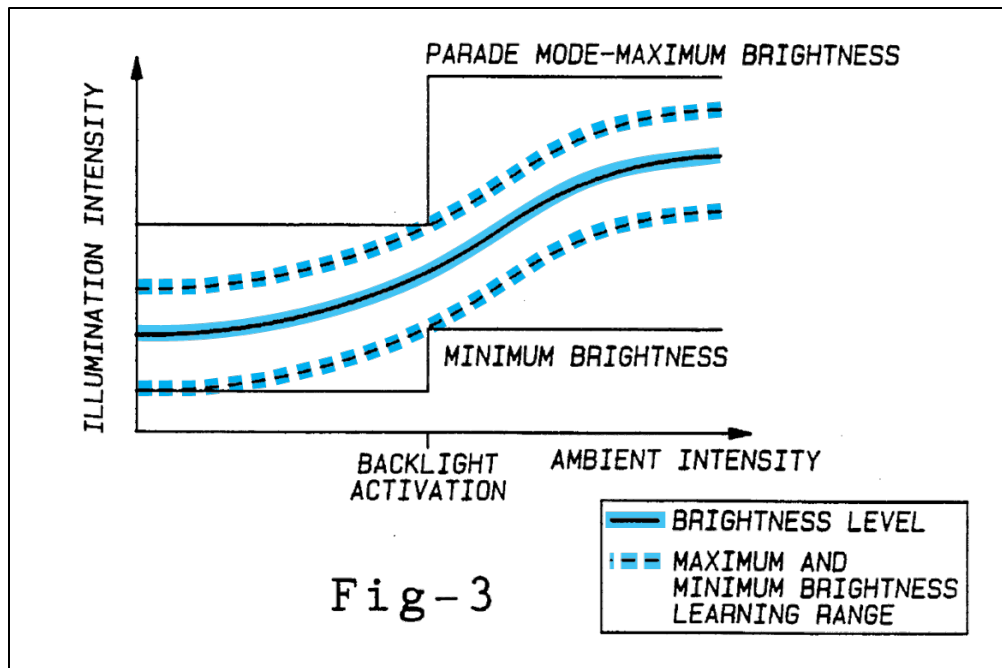


The '117 patent’s claims recite that the “brightness control circuit” is made up of: a) “a first input configured to receive a user signal”; b) “a light sensor configured to sense ambient light”; and c) “a multiplier configured to selectively generate a combined signal.” Fig. 2 of Thayer similarly depicts: a) “an instrument display brightness control switch 38” which can be adjusted by “a vehicle operator 36,” Ex. 1003, 4:17-20 (blue above); b) an “ambient illumination sensor 28 that measures the ambient light intensity,” Ex. 1003, 3:60-62 (red above); and c) a “microprocessor 30” which calculates a brightness level for the display screen “based on the ambient intensity from the sensor 28 and the setting of the switch 38” by the vehicle operator,

Ex. 1003, 4:25-31 (green above).

Thayer uses an “illumination table 32” to correlate measured values from the ambient sensor to display brightness levels. Ex. 1003, 4:2-8. This table is a “look-up table . . . in memory within the microprocessor 30” that “includes a series of data points, where each such data point represents a range of ambient light intensity signals from the sensor 28 and corresponding output illumination value.” Ex. 1003, 4:2-8. The “appropriate look-up value” from the table is “sent to an illumination system 34 that controls the illumination of the instrument display panel 10,” Ex. 1003, 4:12-14, which can be, for example, “backlighting” or “liquid crystal displays (LCDs),” Ex. 1003, 2:23-26, 3:55-60.

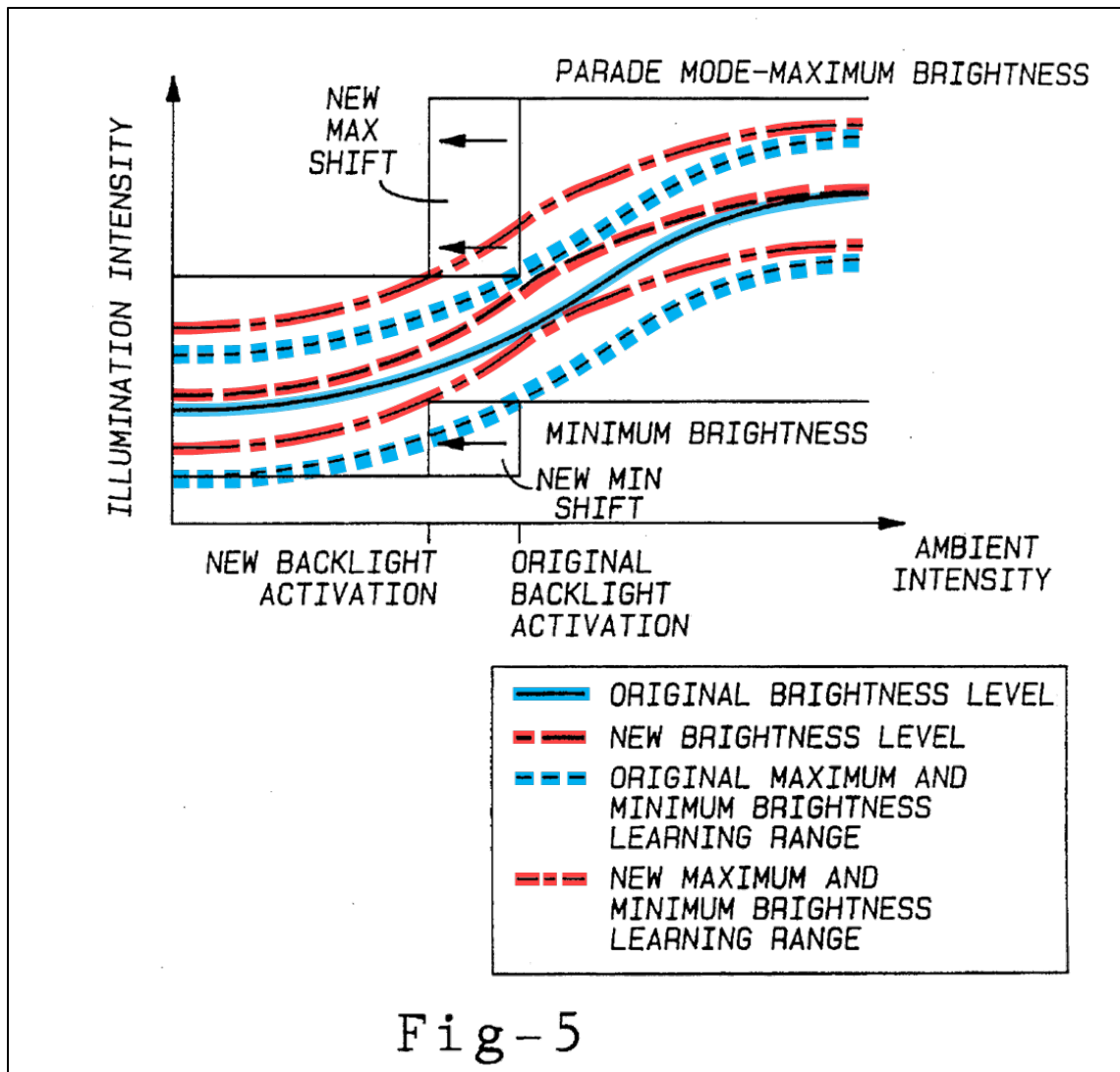
Thayer’s brightness control system “is originally calibrated to a particular brightness of a range of ambient light intensities.” Ex. 1003, 2:54-56. An example of the originally calibrated brightness levels over a range of ambient light intensities is displayed in annotated Fig. 3 (specifically, the solid line representing the “BRIGHTNESS LEVEL” curve, highlighted in blue, below):



Thayer states that “[t]he horizontal axis of the graph shows the ambient light intensity increasing towards the right, and the vertical axis of the graph shows the instrument display illumination intensity increasing in a vertical direction.” Ex. 1003, 4:45-48.

Thayer explains that an operator can “adapt the system to other brightness levels depending on that operator’s preference.” Ex. 1003, 5:8-11. The dotted user lines illustrate the minimum and maximum limits of the user’s adjustments to the originally calibrated brightness curve, Ex. 1003, 5:11-14, which Thayer refers to as the “learning range,” Ex. 1003, 6:16-22. If the user attempts to make a change “outside of the learning range . . . the system 26 will then move the instrument display intensity to either the maximum or minimum intensity values” of the learning range. Ex. 1003, 6:31-35.

Fig. 5 of Thayer illustrates how the originally calibrated brightness curve can be changed by user input. Ex. 1029, ¶ 78. The originally calibrated brightness curve (solid blue, below) with a first minimum brightness at a level of zero ambient light intensity, is contrasted with a user-adjusted brightness curve (middle red curve, below) with a different, higher minimum brightness at zero ambient light intensity. Ex. 1029, ¶ 78. This change in the display's brightness curve (including to the minimum brightness at zero ambient light) results from "the vehicle operator 36 [making] adaptations to the instrument display brightness that increases the brightness over the entire range of ambient light intensities," Ex. 1003, 7:18-37:



As illustrated above, “[w]hen the center brightness line gets adapted to a new value” by the operator, “the learning range is also adjusted, as shown.” Ex. 1003, 7:27-29. Thayer also discloses an absolute minimum brightness level for the display, illustrated by the horizontal “MINIMUM BRIGHTNESS” line in both Figs. 3 and 5, which represents the “minimum instrument intensity for any given light intensity that can be set” using switch 38, Ex. 1003, 4:58-60. This “MINIMUM BRIGHTNESS” line thus provides a minimum brightness for the

display, regardless of user changes to the brightness curve (as shown in Figs. 3 and 5, the “learning range” does not allow a user to adjust the minimum brightness below the “MINIMUM BRIGHTNESS” line’s limit). Ex. 1029, ¶ 80.

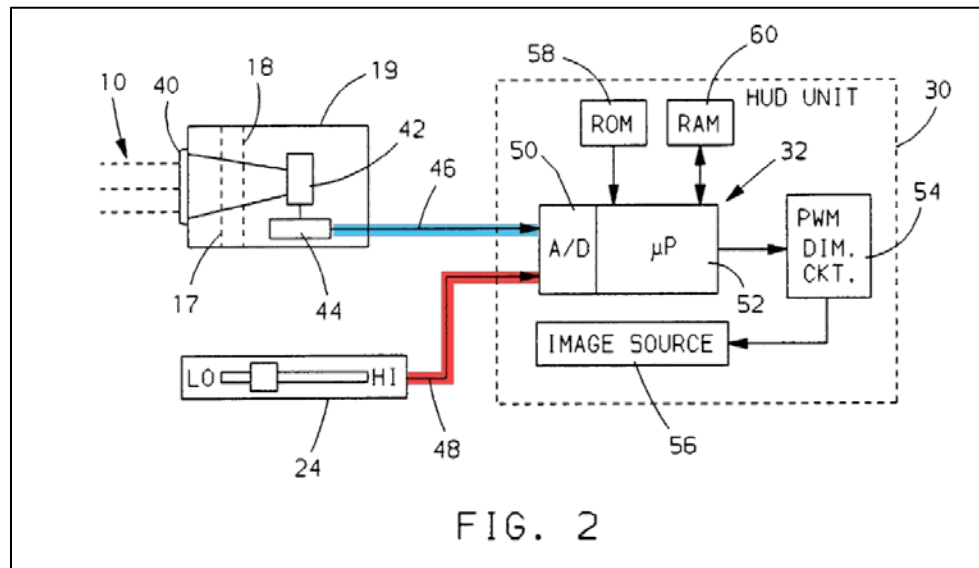
2. Godwin (Ex. 1004)

Godwin is a European Patent Office publication titled “Head-up display system” that was published on November 18, 1993, and thus is prior art under 35 U.S.C. § 102(b). Godwin was not cited or considered during prosecution of the ’117 patent. The listed applicant of Godwin is Delco Electronics Corporation, Ex. 1004, cover, the same assignee as listed for Thayer, Ex. 1003, [73]. Dr. Hobbs provides an overview of Godwin in paragraphs 82-87 of his declaration (Ex. 1029). As with Thayer and the claimed invention of the ’117 patent, Godwin is directed to a system for automatically adjusting display brightness based on the combination of an ambient light level and a user input. Additionally, Godwin, like the ’117 patent, discloses allowing the user to input a desired contrast ratio and then multiplying that user input with the level of ambient light to calculate the brightness level of the display screen. Ex. 1029, ¶ 82.

In particular, Godwin discloses a “vehicle head-up display apparatus which can adjust to background illumination levels,” Ex. 1004, 1:49-53, where “the background illumination is the ambient light intensity,” Ex. 1004, 1:25-32.

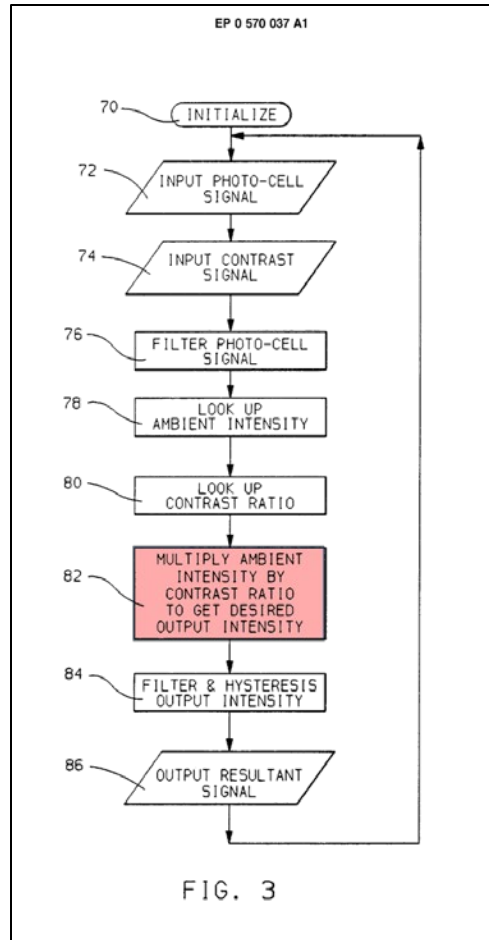
Like Thayer, Godwin uses a microprocessor to calculate a display brightness

based on the ambient light level and an input from a user, as depicted by annotated Fig. 2 of Godwin:



More specifically, Godwin discloses that a driver of the vehicle uses a “contrast adjuster 24,” in this example “a slidable lever-type potentiometer,” Ex. 1004, 3:44-46, to input a “contrast signal” (in red above), Ex. 1004, 3:42-46, 4:12-14. “Sensor” 18 provides “an output signal on line 46 having a voltage related to the amount of light falling on detector 42” (in blue above) of the sensor. Ex. 1004, 3:15-31.

The “microprocessor 52 inputs the sense signal from line 46,” Ex. 1004, 4:12-14, and uses that input sense signal to look up “an ambient intensity signal,” Ex. 1004, 4:37-42. This “ambient intensity signal” is then “multipl[ied]” with a “contrast ratio signal” (which is based on the user’s “input contrast signal”), Ex. 1004, 4:50-56, as depicted in the step 82 in the algorithm illustrated in annotated Fig. 3:



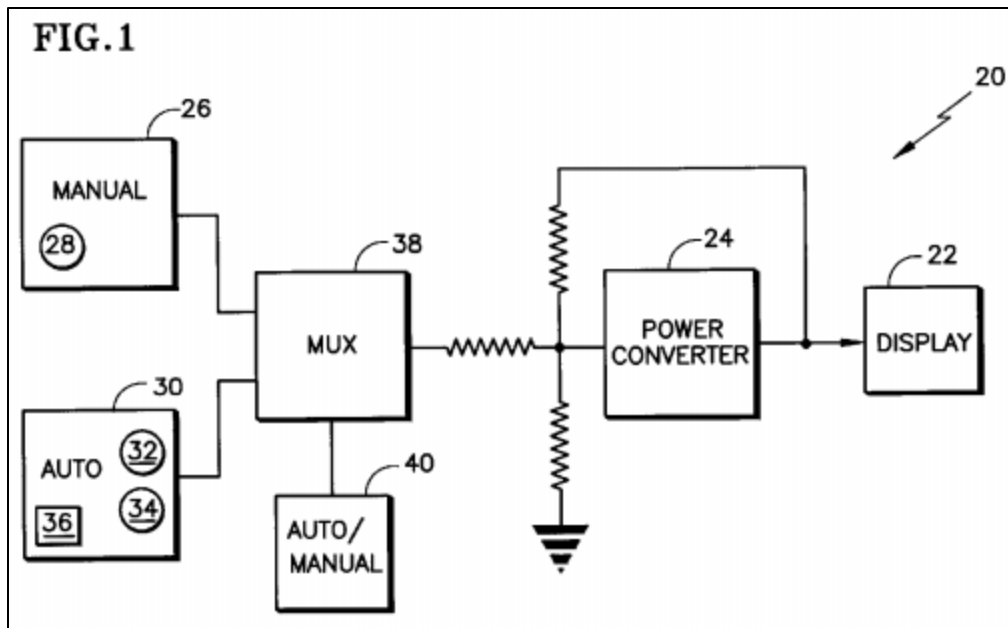
The resulting “output intensity” is then used for “controlling the intensity of the image of the heads-up display” by “driving the image source 56 at the desired brightness.” Ex. 1004, 5:19-24. This causes the displayed image to be “automatically adjusted to maintain a substantially constant contrast ratio with the background illumination and is therefore generally always easily readable by the vehicle driver.” Ex. 1004, 5:25-33.

3. Toffolo (Ex. 1005)

Toffolo is a U.S. Patent titled “Display System with Automatic and Manual Brightness Control” that issued on August 29, 2001, and thus is prior art under 35

U.S.C. § 102(b). Toffolo was not cited or considered during the prosecution of the '117 patent. The Hobbs Declaration (Ex. 1029) provides an overview of Toffolo at paragraphs 88-89. Like Thayer and Godwin, Toffolo discloses an automatic brightness control system for a display screen—in particular, a system that allows a user to switch between manual control of the display brightness and an automatic brightness adjustment mode based on ambient light levels. Ex. 1029, ¶ 88.

Specifically, Toffolo discloses a “display system [that] provides automatic and manual brightness control.” Ex. 1005, Abstract. Toffolo discloses that in the “manual brightness control” mode, *id.*, the user of the display system inputs the display brightness using a “user activated input device 28, such as a switch or rotary knob,” Ex. 1005, 1:65-66. In the “automatic brightness control” mode, “[a] brightness controller varies the luminance of the display based upon ambient light as sensed by an ambient light sensor,” Ex. 1005, Abstract, and the user utilizes “a first user input device 32 and a second user input device 34,” Ex. 1005, 1:66-2:2, to configure the minimum and maximum luminance levels between which the display brightness can automatically vary, Ex. 1005, 2:48-61. A multiplexer 38 in the display system selects between the manual brightness control mode and the automatic brightness control mode based on an input from switch 40, Ex. 1005, 2:6-13, as depicted in Fig. 1 of Toffolo:



4. Morris (Ex. 1006)

Morris is a U.S. Patent titled “Pre-Subtracting Architecture for Enabling Multiple Spectrum Image Sensing” that was filed on May 6, 1998 and published on December 2, 2003, and thus is prior art under 35 U.S.C. §§ 102(a) and (e). Morris was not cited or considered during the prosecution of the ’117 patent. Dr. Hobbs provides an overview of Morris in paragraph 90 of his declaration (Ex. 1029). Morris discloses an ambient light sensor that generates a visible light signal by subtracting sensed infrared spectrum energy from sensed energy from both the infrared and visual light spectra. Ex. 1029, ¶ 90.

Specifically, Morris discloses an “imaging system . . . in which [infrared light] does not appreciably affect resulting visible image signals.” Ex. 1006, 1:60-63. Morris’ imaging system is made up of infrared (“IR”) pixel sensors and pixel

sensors responsive to both IR and visible light. Ex. 1006, 2:41-45. Morris explains that by “electronically subtracting signals generated by IR pixel sensors from signals generated by pixel sensors responsive to both IR and visible light,” “the effect of IR energy upon an image signal is substantially reduced.” Ex. 1006, 2:41-45. The pixel sensors utilized in Morris’ system are photodiodes. Ex. 1006, 3:18-30.

B. Ground I: Claims 1-2, 4, 6-7, 15-16, 18-19 Are Unpatentable Under 35 U.S.C. § 103 Over the Combination of Thayer and Godwin.

The alleged invention recited in claims 1-2, 4, 6-7, 15-16, 18-19 of the ’117 patent would have been obvious to a POSA as of the claimed priority date, in view of the disclosures of Thayer and Godwin.

A POSA would have been motivated to combine the disclosures of Thayer and Godwin and would have recognized the combination to be an obvious one. See Ex. 1029, ¶¶ 94-102. In particular, a POSA would have been motivated to use Godwin’s multiplication algorithm to calculate display brightness values in Thayer’s system because of the express prior art teachings recognizing the benefits of Godwin’s display brightness calculation technique. Ex. 1029, ¶¶ 99-100. See *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-419 (2007) (obvious to substitute known elements for one another, especially where some teaching, suggestion or motivation exists to do so). Specifically, Godwin discloses that its algorithm allows a user to input their desired “comfortable intensity level and contrast level,” Ex. 1004, 3:6-7, and then automatically adjusts the display brightness “to maintain [the] substantially

constant contrast ratio” input by the operator, Ex. 1004, 5:25-33; 3:9-14; Ex. 1029, ¶ 99. By maintaining the contrast ratio at a user-desired level, Godwin explains, the display is “generally always easily readable by the vehicle driver” in all ambient light levels, Ex. 1004, 5:25-33; Ex. 1029, ¶ 99. This was a benefit recognized not only by Godwin, but also by other prior art references such as Ottenstein. Ex. 1014, 4:19-27; Ex. 1029, ¶ 100.

A POSA would also have recognized that replacing Thayer’s algorithm with Godwin’s multiplication algorithm would have entailed a simple substitution of one element (Godwin’s multiplication algorithm) for another (Thayer’s brightness calculation algorithm), yielding predictable results. Ex. 1029, ¶¶ 94-98. *See KSR*, 550 U.S. at 415-419. Both Thayer and Godwin were developed by the same applicant/assignee, Delco Electronics Corporation, and in the same field of endeavor—brightness control systems for vehicle displays. Ex. 1029, ¶ 94. Both Thayer and Godwin are directed to brightness control systems with an ambient light sensor and a user input device which input respective signals into a microprocessor. *Id.* Thayer and Godwin both use their microprocessors to calculate a display brightness signal based on a combination of the ambient light and user input signals, and then use that calculated signal to control the brightness of a display. *Id.*, ¶¶ 95-96. *See CaptionCall, L.L.C. v. Ultratec, Inc.*, IPR2015-01358, Paper 75 (Dec. 9, 2016) at 13 (holding that “a straightforward application” of features “to a system

made by the same inventor and using essentially the same components” “would have a reasonable expectation of success and would yield a predictable result.”); *see also Western Union Co. v. Moneygram Payment Sys., Inc.*, 626 F.3d 1361, 1370 (Fed. Cir. 2010) (“We fail to see how it would have been difficult for a person of ordinary skill in the art to integrate an electronic transaction device that was available from Western Union itself into a well-known money transfer system that was also owned by Western Union at the time of the invention.”).

1. Claims 1, 15, and 19

1[preamble]: “A brightness control circuit with selective ambient light correction comprising:”

15[preamble]: “A method to selectively provide ambient light correction, said method comprising:”

19[preamble]: “A brightness control circuit comprising:”

To the extent that these preambles are limitations, they are disclosed by both Thayer and Godwin. The “brightness control circuit” of claims 1 and 19, and the “method to selectively provide ambient light correction” of claim 15, refer to the ’117 patent’s teachings of a system which automatically “maintain[s] consistent brightness as perceived by the human eye” under changing ambient light levels. Ex. 1001, 2:17-30, 2:47-49; Ex. 1029, ¶ 103. The ’117 patent states that such systems can be used to control, e.g., “automotive displays.” Ex. 1001, 4:62-66.

Thayer discloses just such a brightness control circuit and the methods performed by such a circuit to selectively provide ambient light correction. Thayer

discloses “an adaptive instrument display brightness control system that automatically controls the illumination of a vehicle instrument display based on a vehicle operator’s adjustment of the illumination intensity of the display and the ambient light condition,” Ex. 1003, 1:21-26, “so that the vehicle operator can easily view the vehicle’s instruments in all ambient light conditions,” Ex. 1003, 2:20-23; Ex. 1029, ¶ 104.

Godwin, too, discloses these elements. Godwin discloses “an active brightness control system” designed to “provide active image brightness control.” Ex. 1004, 1:25-36. Godwin explains that its brightness control system is designed to “eliminat[e] the necessity of driver adjustment of the brightness control to compensation for variations in background illumination,” where “background illumination is the ambient light intensity” around the vehicle. Ex. 1004, 1:25-36; Ex. 1029, ¶ 104. A POSA would have appreciated that the brightness control systems of both Godwin and Thayer teach the claimed brightness control circuits. Ex. 1029, ¶ 104.

1[a]: “a first input configured to receive a user signal indicative of a user selectable brightness setting;”

15[a]: “receiving a user input signal indicative of a user selectable brightness setting;”

19[a]: “means for receiving an input signal indicative of a user selectable brightness setting;”

Thayer discloses an input configured to receive a user signal indicative of a

user selectable brightness setting and receiving a user input signal indicative of a user selectable brightness setting, as claimed in 1[a] and 15[a]. Ex. 1029, ¶ 105. Specifically, Thayer discloses “an instrument display brightness control switch 38,” which the vehicle operator uses to “adjust[] the instrument display brightness” “to a more desirable brightness level.” Ex. 1003, 4:12-22. The switch 38 of Thayer corresponds to the claimed “input” or means” for receiving the user’s selected brightness setting and providing a signal representative of that input brightness setting to Thayer’s microprocessor, as illustrated by Fig. 2 of Thayer. Ex. 1029, ¶ 106. These disclosures in Thayer also correspond to the claimed “means for receiving an input signal indicative of a user selectable brightness setting” of claim 19[a]—as discussed above in § VI.C.4, the “dimming control” input in Figs. 1-2 of the ’117 patent is the structure that corresponds to this claimed function, and Thayer’s “brightness control switch” is an example of such a “dimming control.” Ex. 1029, ¶¶ 105-106.

Alternatively, Godwin also discloses these claim elements. In particular, Godwin discloses “an adjuster 24 for driver adjustment,” and that a “vehicle driver controls the adjuster 24 so that the virtual image 13 at image plane 12 is at a comfortable intensity level and contrast level for the driver.” Ex. 1004, 3:1-7. Godwin explains that “the contrast adjuster 24” can be “a slidable lever-type potentiometer” as depicted in Fig. 2 above, Ex. 1004, 3:44-46, and that an “input

contrast signal” is provided from the contrast adjuster 24 through line 48 to Godwin’s microprocessor 52, Ex. 1004, 3:37-52; 4:43-59; Fig. 2. This corresponds directly to the ’117 Patent’s description of using a “potentiometer setting” as the “dimming control” to input a user’s preferred contrast ratio. Ex. 1001 3:28-30, 48-51; Ex. 1029, ¶ 107. A POSA would understand that Godwin’s reference to a “contrast ratio signal” selected by a “contrast adjuster” corresponds to the claimed “user signal indicative of a user selectable brightness setting,” particularly because the ’117 patent’s provisional application states that the user input is that user’s desired contrast ratio. Ex. 1022, A-2; Ex. 1029, ¶ 108. Godwin’s “contrast adjuster,” therefore also teaches the claimed “input” or “means” for receiving the user’s desired brightness setting. Ex. 1029, ¶ 108.

1[b]: “a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;”

15[c]: “wherein the sense signal indicates an ambient light level; and”

19[b]: “means for sensing ambient light to generate a sense signal indicative of the ambient light level;”

As discussed above, Patent Owner has construed this term to mean an “ambient light sensor” which “measures ambient light and outputs a sensing signal indicative of the ambient light level,” and the “light sensor” disclosed in Figs. 1-2 of the ’117 patent corresponds to the claimed means of element 19[b]. Ex. 1029, ¶ 109. Thayer discloses a light sensor configured to sense ambient light and to output a

sensing signal indicative of the ambient light level that corresponds to these claim elements. Specifically, Thayer discloses “an ambient illumination sensor 28 that measures the ambient light intensity within the passenger compartment of the vehicle.” Ex. 1003, 3:60-63. The ambient sensor outputs a “voltage signal . . . indicative of the ambient light intensity” which is “applied to a microprocessor 30” in Thayer’s brightness control system. Ex. 1003, 3:65-67. This “voltage signal” corresponds to the claimed “sense signal” or “sensing signal,” and is illustrated by Fig. 2 of Thayer, which depicts the ambient illumination sensor 28 providing a signal to microprocessor 30. Ex. 1029, ¶ 110.

Alternatively, Godwin also discloses these claimed elements. Specifically, Godwin discloses “a sensor 18 for sensing the ambient light level or illumination” which “provides a signal indicative of the background illumination intensity.” Ex. 1004, 2:41-48. Godwin discloses that this signal, which corresponds to the claimed sense / sensing signal, is provided to the microprocessor of Godwin’s system through line 46, as illustrated by Fig. 2 of Godwin. *See also* Ex. 1004, 3:37-52; 4:12-14; 4:34-42; Ex. 1029, ¶ 111.

1[c]: “a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal; and”

15[b]: “selectively multiplying the input signal with a sense signal to generate a combined signal,”

19[c]: “means for multiplying the input signal with the sense signal to generate a combined signal; and”

As discussed above in § VI.C.1, Patent Owner asserts that the claim limitations above encompass software that generates a combined signal based on the input signal from a user and the sense signal from an ambient light sensor. *See* Ex. 1023, 30-31, 48, 52; Ex. 1024, 16-17, 27-28, 31-32; Ex. 1025, 26-27, 44-45, 51; Ex. 1026, 8-11, 22, 26-27. Moreover, regarding claim 19’s “means for multiplying,” the ’117 patent discloses a “multiplier circuit 106,” which “can be implemented using [a] software algorithm or analog/mixed-signal circuitry.” Ex. 1001 at 5:37-38. Under either Patent Owner’s construction or the plain meaning of these terms, these claim limitations would have been obvious in view of Thayer combined with Godwin. Ex. 1029, ¶¶ 112-118.

Thayer discloses generating a combined signal based on both the user signal and the sensing signal. Thayer discloses that the “output illumination values” in its look-up table, Ex. 1003, 4:4-10, can be adapted by a user, Ex. 1003, 5:1-10, and that these adapted look-up table values are calculated by a microprocessor based on both “the ambient intensity from the sensor” as well as “the setting of the [brightness control] switch” by the operator of the system, Ex. 1003, 4:22-31. Indeed, Thayer’s claim 1 recites “adjusting the illumination intensity . . . based on a combination of the ambient light intensity and the position of the switch means.” Ex. 1003, 7:49-56. Further, Thayer notes that by adjusting its look-up table values in this way, “the

system 26 adapts the instrument display brightness over time within the range of ambient light intensities sensed by the sensor 28 to the brightness level desired by the vehicle operator.” Ex. 1003, 4:31-34. The adjusted look-up table value corresponds to the claimed “combined signal.” Ex. 1029, ¶ 113. Thus, the software running on Thayer’s microprocessor that determines display brightness based on both sensed ambient light levels and a user setting satisfies Patent Owner’s construction of this claim element. Ex. 1029, ¶ 113.

Even if Patent Owner’s construction, which encompasses combination of sensor and user signals (not necessarily multiplication) is not adopted, the combination of Thayer and Godwin renders this limitation obvious by specifically disclosing microprocessor hardware executing a software routine that generates a combined signal by multiplying a user input by the ambient light signal, resulting in a mathematical product of the two signals. In particular, as explained by Dr. Hobbs, while Thayer does not expressly disclose mathematically *multiplying* the user input by the ambient brightness level, a POSA would have recognized that Godwin does just this. Ex. 1029, ¶¶ 114-115. Namely, Godwin describes multiplying a user input value with a value provided by an ambient light sensor to calculate a display brightness value. Specifically, Godwin discloses “a microprocessor 52” that executes a routine in which the “contrast ratio signal” (which, as discussed above, is input by a driver via an “adjuster 24,” Ex. 1004, 3:1-7) “is multiplied by the ambient

intensity signal” (which, also as discussed above, is output by ambient light sensor 18, Ex. 1004, 2:41-57) “to obtain a desired output intensity signal.” Ex. 1004, 4:7-56; Fig. 3 at 82; Ex. 1029, ¶ 115. Godwin further discloses that this “output intensity signal” is utilized by “controller 32” to “automatically adjust the brightness” of the displayed image, and therefore corresponds to the claimed “combined signal.” Ex. 1004, 3:7-14; 2:48-57.

A POSA would have recognized that invoking Godwin’s multiplication “routine” to calculate the “combined signal” in the microprocessor of Thayer’s system would have been a simple substitution of one element (Godwin’s multiplication algorithm) for another (Thayer’s brightness calculation algorithm), which would have yielded predictable results. See Ex. 1029, ¶ 116. Both references were developed by the same entity. Both references are directed to display brightness control systems for vehicles. And both references receive a desired brightness signal from a user input and an ambient light signal from a light sensor, and calculate a display brightness value from those signals using a microprocessor.

Furthermore, as Dr. Hobbs explains, the prior art explained *why* one of ordinary skill would have been motivated to implement this combination. Godwin explained that its multiplication technique, which provides for a “substantially constant contrast ratio,” ensures that the display is “generally always easily readable by the vehicle driver” in all ambient light levels, Ex. 1004, 5:25-33. A POSA

wishing to include this desirable feature in Thayer's system would have thus readily turned to Godwin's technique. Ex. 1029, ¶ 117. The fact that Godwin and Thayer were filed by the same applicant demonstrates that the challenged claim at issue amounts to nothing more than the "predictable use of prior art elements according to their established functions." *KSR*, 550 U.S. at 417. Moreover, other prior art also recognized the benefits of using a brightness calculation technique involving multiplication. Ex. 1029, ¶ 117; see *Bayer Healthcare Pharmaceuticals, Inc. v. Watson Pharmaceuticals, Inc.*, 713 F.3d 1369, 1374 (Fed. Cir. 2016) ("the cited prior art references set forth every limitation required by the asserted claims and provide express motivation to combine those teachings").

1[d]: "a dark level bias configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero."

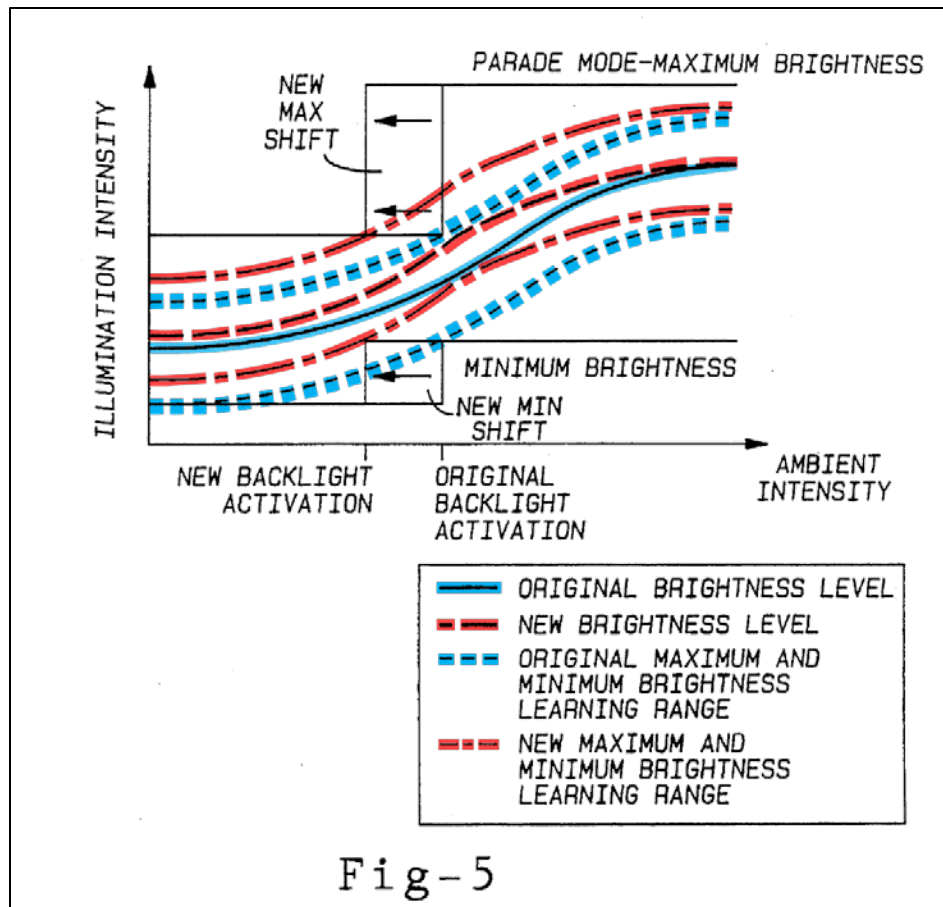
15[d]: "adjusting the combined signal with a dark level bias to generate a brightness control signal for controlling brightness of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero."

19[d]: "means for adjusting the combined signal with a dark level bias to generate a brightness control signal that is maintained above a minimum level when the ambient light level decreases to approximately zero."

As discussed above in § VI.C.2, Patent Owner asserts that these limitations

are met by “a software variable” that “is used to control the brightness control signal such that the brightness control signal is maintained above a predefined brightness” “[w]hen the ambient light level decreases to approximately zero.” Ex. 1023, 37, 48, 52-53; Ex. 1024, 17-19, 28, 32; Ex. 1025, 27-30, 45, 51-52; Ex. 1026, 11-13, 22, 27. As for claim 19’s “means for adjusting,” the ’117 patent discloses a “dark level bias circuit” as well as “dark level bias” input 100 in Figures 1 and 2. Under either Patent Owner’s construction or the plain meaning of these terms, these claim limitations would have been obvious in view of the combination of Thayer and Godwin. Ex. 1029, ¶ 119.

Under Patent Owner’s construction, Thayer discloses these claim limitations. Specifically, Thayer discloses that the microprocessor of its system always maintains the brightness of the display above a predefined minimum brightness level, even when the ambient light level decreases to approximately zero. Ex. 1029, ¶¶ 119-120. As shown below by the brightness levels on both the originally calibrated (blue) and user-adjusted (red) brightness curves in annotated Fig. 5 of Thayer, even at a level of zero ambient light (the points at which these curves intersect with the y-axis), Thayer maintains the brightness of its display at a positive level:



Ex. 1029, ¶ 120. Thayer further discloses that the user cannot adjust the brightness control signal lower than the “MINIMUM BRIGHTNESS” threshold in Fig. 5, even when the ambient light level is zero, Ex. 1003, 4:58-60; Ex. 1029, ¶ 121. A POSA would understand that this minimum brightness limit, which serves as a lower bound on the display brightness values calculated by the software running on Thayer’s microprocessor, corresponds to the “software variable” used to maintain the calculated display brightness signals above a “predefined brightness” under Patent Owner’s construction. Ex. 1029, ¶ 121; *see also* Ex. 1023, 37 (“When the ambient light level decreases to approximately zero, the dark level bias is used to control the

brightness control signal such that the brightness control signal is maintained above a predefined brightness.”).

Even if Patent Owner’s construction for these limitations is *not* adopted, a POSA would have recognized that these limitations would have been obvious in view of the combination of Thayer and Godwin, as explained by Dr. Hobbs. *See* Ex. 1029, ¶ 122. A POSA would have been aware that the need to adapt screen brightness for dark conditions was a well-known problem, and that a well-known solution was maintaining screen brightness above a minimum level, as discussed in numerous prior art references. *KSR*, 550 U.S. at 415-419 (obvious to apply known techniques to known devices to yield predictable results); Ex. 1029, ¶ 122 (citing Exs. 1005, 1007, 1011, 1013), ¶¶ 35-41.

For example, the prior art (e.g., Ottenstein) recognized the problem caused by low ambient light levels when using a multiplication technique for combining a user signal and an ambient signal like the one disclosed by Godwin. Ex. 1029, ¶ 123. Ottenstein identified a problem where the sensed ambient signal “approaches zero” in “very low ambient light levels” such that numerical combination with this signal results in an asymptotic condition—specifically, that the “expression (F/A) for contrast” desired by the operator “grows without limit as A approaches zero.” Ex. 1014, 3:65-4:2; Ex. 1029, ¶ 123. Therefore, a dark-level minimum should be used: “[t]he sensed ambient brightness level should be limited so that it is always at least

10% of full scale.” Ex. 1014, 4:2-4; Ex. 1029, ¶ 123.

Ottenstein discusses a similar multiplication algorithm as Godwin’s. This shows that a POSA would have recognized that at low ambient light levels, the brightness values calculated by a multiplication algorithm such as Godwin’s would need to be adjusted with the claimed “dark level bias” to maintain at least a minimum brightness for the display, as disclosed by Thayer and numerous other prior art references. *See* Ex. 1029, ¶¶ 122-125. *See also* KSR, 550 U.S. at 419-20 (“One of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.”).

2. Claim 2

“The brightness control circuit of claim 1, wherein the dark level bias is provided to the multiplier such that the amount of adjustment to the combined signal is dependent on the user selectable brightness setting.”

Claim 2 states that the dark level bias is “provided to the multiplier,” corresponding to the embodiment of the ’117 patent depicted in Fig. 1 (explained above in § VI.A.2) where the bias is added to the sensed ambient light level *before* multiplying by the user input. Ex. 1029, ¶ 127. This would have been obvious to a POSA in view of the combined teachings of Thayer and Godwin.

Specifically, a POSA would have recognized there were two straightforward and basic arithmetic options for ensuring that the brightness calculated by

Godwin's multiplication algorithm does not drop below a minimum when the ambient light level is zero or near-zero (the problem recognized by Ottenstein and discussed above, *see* Ex. 1029, ¶ 128). The first of these two options is addressed by claim 2 (discussed in this section), and the second option is addressed by claims 4, 5, and 18 (discussed below in §§ VII.B.3 and VII.B.4). Ex. 1029, ¶ 129. A POSA would have known that an adjustment would need to be added either before (claim 2) or after (claims 4, 5, and 18) multiplying the user input by the ambient light level to avoid multiplication by zero (and, as a result, the screen going dark), and would have expected each of those two options to produce predictable results. Ex. 1029, ¶¶ 129, 136.

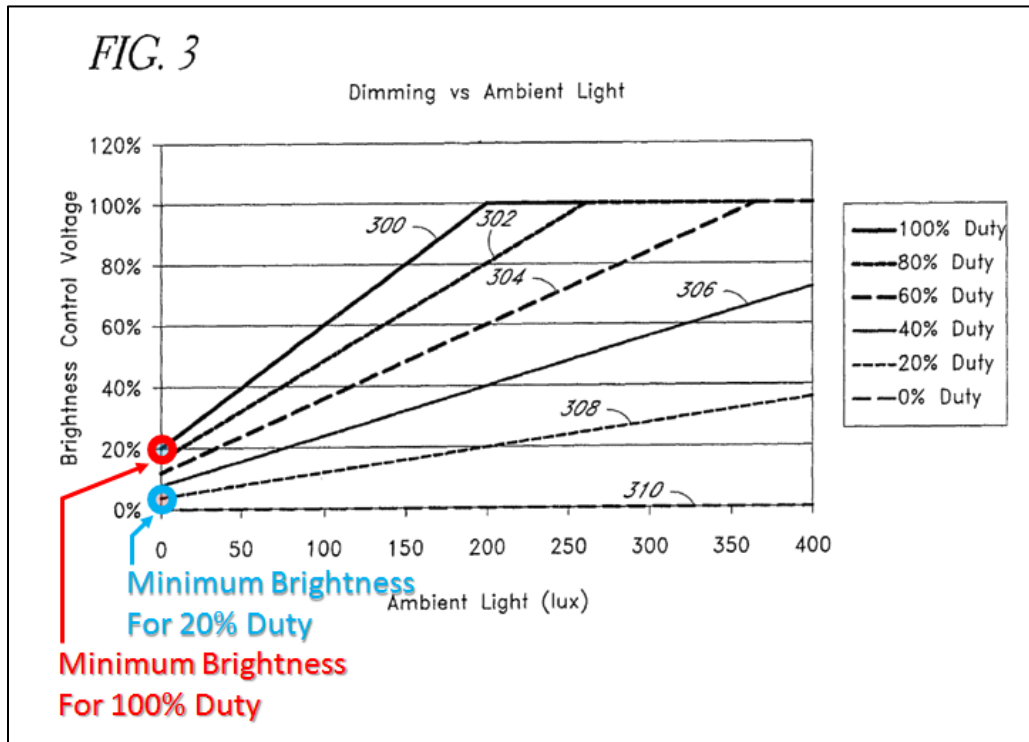
In the first of these two options, as recited by claim 2 and illustrated in the '117 patent's Fig. 1, an adjustment (the claimed "dark level bias") would be added to the sensed ambient light level *before* multiplication takes place, ensuring that the product of the multiplication exceeds a desired minimum brightness level. Ex. 1029, ¶ 129. Alternatively, as shown in Fig. 2 of the '117 patent (discussed below for claims 4, 5, and 18), the user input is first multiplied by the zero ambient light level, and the adjustment is added to the zero product *after* multiplication to adjust that product to be greater than the desired minimum display brightness level. Ex. 1029, ¶¶ 129, 137. As Dr. Hobbs explains, each of these two options would produce different results, and would have alternatively been chosen by a POSA

depending on the desired application. Ex. 1029, ¶¶ 130-31, 137.

A POSA would have recognized that either of these options would have been a basic arithmetic adjustment to the multiplication technique of Godwin to avoid the undesirable situation of having the screen go dark when ambient light levels reduce to zero. Ex. 1029, ¶¶ 128-29, 137. The first option results in a brightness value at zero ambient light that is dependent on the user input contrast ratio, as disclosed by Thayer. Ex. 1029, ¶¶ 129-130. This type of user-dependent minimum brightness would have been obvious to try, as it would have merely been a choice of one of two different identified, predictable solutions for ensuring a minimum display brightness when using Godwin’s algorithm — particularly where each of those solutions would have a reasonable expectation of success. Ex. 1029, ¶¶ 128-31, 136-37. *See KSR*, 550 U.S. at 421 (“[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp”).

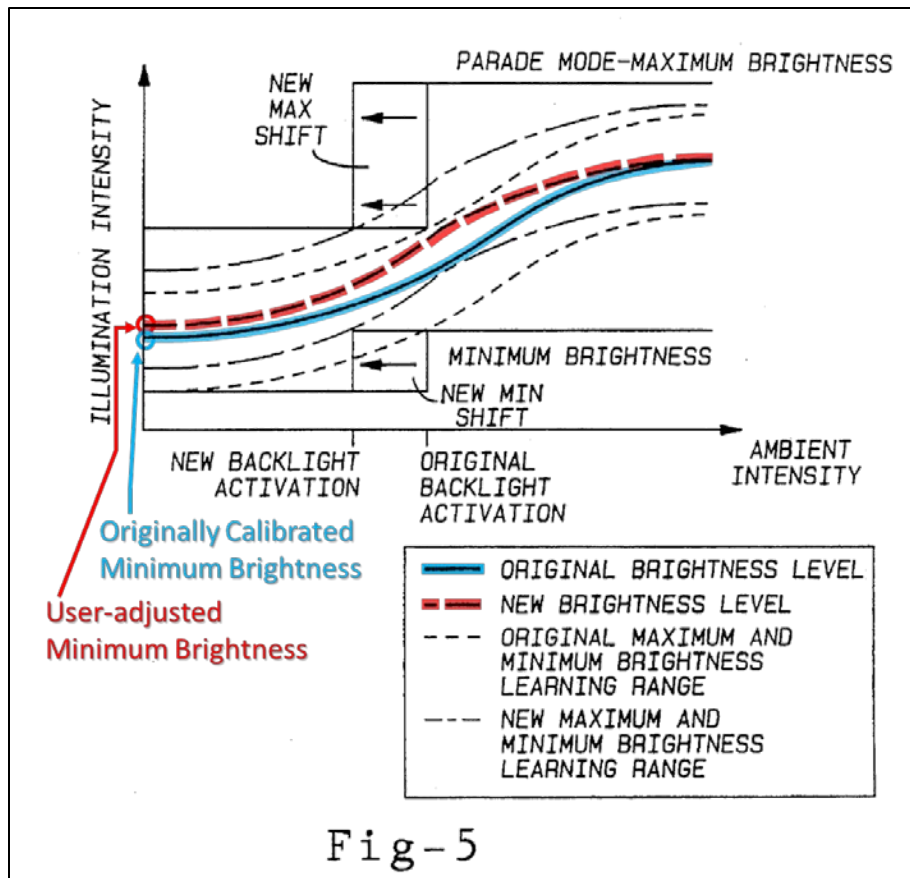
Claim 2 also requires that the “amount of adjustment to the combined signal is dependent on the user selectable brightness setting”—that is, the brightness control signal at approximately zero ambient light varies based on the value of the user input signal. Ex. 1029, ¶ 132. This claim element is depicted in Fig. 3 of the ’117 patent, Ex. 1001, 6:9-11 (“[t]he brightness control signal near zero lux is a

function of a dark bias level and also depends on the user setting”), in which the amount of adjustment to the brightness control signal at a level of 0 lux is greater for a user input contrast ratio of “100% duty” (red) than for a smaller user input contrast ratio of “20% duty” (blue):



Ex. 1029, ¶¶ 132-133.

A POSA would have recognized that Thayer discloses this aspect of claim 2. Ex. Ex. 1029, ¶ 134. Like Fig. 3 of the '117 patent, Thayer discloses varying the minimum brightness (at zero ambient light) based on the magnitude of the user input, as depicted in annotated Fig. 5 of Thayer below, in which the brightness of the user input at zero ambient light is increased through user input, from the value indicated by the blue circle to the value indicated by the red circle:



Ex. 1029, ¶ 134. Thayer states that Fig. 5 discloses a scenario in which “the vehicle operator has made adaptations to the instrument display brightness that increases the brightness over the entire range of ambient light intensities,” so that “at any particular ambient light intensity . . . the new adaptations will give an increased instrument display brightness than would have previously been given at the original calibrated brightness levels,” including the adapted minimum brightness value at zero ambient light (red circle above). Ex. 1003, 7:18-32; Ex. 1029, ¶ 135. Cf. Ex. 1023, 38 (“The dark level bias is a variable that depends on the user selectable brightness setting. The dark level bias increases or decreases based on the user

selectable brightness setting.”). A POSA would have recognized that a user-dependent minimum brightness, as disclosed by Thayer, would have resulted from adding an offset adjustment *before* performing multiplication in Godwin’s algorithm, as discussed above. Ex. 1029, ¶ 135. And a POSA would have been motivated to incorporate Thayer’s user-adjusted minimum brightness feature in the combined system of Thayer and Godwin, especially in applications in which a user would need to preserve his or her dark-adapted vision. Ex. 1029, ¶¶ 130-31.

3. Claim 4

“The brightness control circuit of claim 1, wherein the dark level bias is added to the combined signal such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting.”

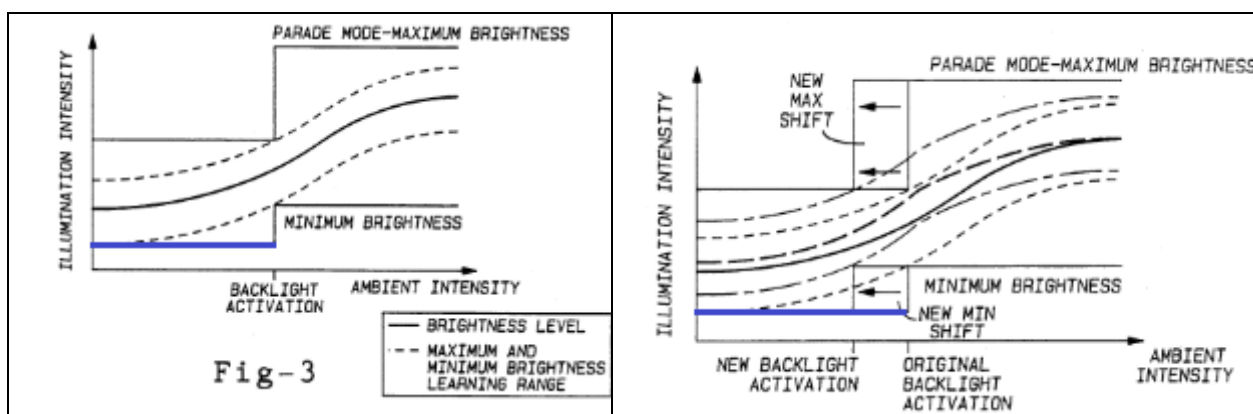
For reasons similar to those articulated above for claim 2, a POSA would have recognized that the combination of Thayer and Godwin also discloses the limitations of claim 4, thus rendering obvious this claim.

Claim 4 is directed to the second of the two options for ensuring minimum brightness discussed above for claim 2: in which Godwin’s algorithm multiplies the user input contrast ratio by a zero (or near-zero) level of ambient light, and an adjustment is then added to that zero (or near-zero) product *after* multiplication to adjust the product to be greater than the desired minimum display brightness level. Ex. 1029, ¶ 136.

Just as with the other approach of claim 2, this offset avoids multiplication by

zero, and the resulting undesirable condition of the screen going dark at zero ambient light levels. Ex. 1029, ¶ 136. A POSA would have recognized that this second option would have resulted in a constant minimum brightness value at zero ambient brightness, which would not change even as the user varied the contrast ratio input. Ex. 1029, ¶ 137. And, as discussed above, a POSA would have recognized that choosing this second of two options would have been obvious to try, as it would have merely been a choice of one of two different identified, predictable solutions for ensuring a minimum display brightness when using Godwin’s algorithm, where each of those solutions would have a reasonable expectation of success. Ex. 1029, ¶ 136. See *KSR*, 550 U.S. at 421.

Thayer discloses a constant, predefined “minimum instrument intensity for any ambient light intensity” that does not vary based on user input, Ex. 1003, 4:58-60, as represented by the (blue) horizontal “MINIMUM BRIGHTNESS” line in annotated Figs. 3 and 5 of Thayer:



Ex. 1029, ¶ 138. Therefore, it would have been obvious to a POSA to incorporate

a predefined, user-independent minimum brightness value such as Thayer's "MINIMUM BRIGHTNESS" limit into Godwin's algorithm to ensure that the display brightness value does not drop below that minimum level, regardless of the user-input contrast ratio. Ex. 1029, ¶ 139. A POSA would have been motivated to use this second, alternative technique for ensuring minimum brightness, especially in applications requiring fast response or the recognition of fine details on the display screen. Ex. 1029, ¶¶ 130, 137.

4. Claims 5 and 18

5: "The brightness control circuit of claim 4, wherein the dark level bias is added to an output of the multiplier."

18: "The method of claim 15, wherein the dark level bias is added to the combined signal after selective multiplication such that the amount of adjustment to the combined signal is independent of the input signal and the sense signal."

A POSA would have recognized that claims 5 and 18 were obvious over the combination of Thayer and Godwin.

More specifically, each of these claims is also directed to the second of the two options for ensuring minimum brightness: where Godwin's algorithm multiplies the user input contrast ratio by a zero (or near-zero) level of ambient light, and a positive numerical value is added to that zero (or near-zero) product *after* multiplication to adjust that product to be greater than the desired minimum display brightness level. Ex. 1029, ¶ 136. As discussed above, a POSA would have recognized that this second option for avoiding a dark screen in dark ambient light

levels would have resulted in a constant minimum brightness value at a zero level, which would not change even as the user varied the contrast ratio input. Ex. 1029, ¶ 137. Further, a POSA would have recognized that Thayer discloses a constant, predefined “minimum instrument intensity for any ambient light intensity” that does not vary based on user input, Ex. 1003, 4:58-60, as represented by the horizontal “MINIMUM BRIGHTNESS” line in Figs. 3 and 5 of Thayer. Ex. 1029, ¶ 138.

Just as with claim 4, because a POSA would have recognized that choosing this second option would have been obvious to try, a POSA would have found claims 5 and 18 to be obvious over the combination of Thayer and Godwin. Ex. 1029, ¶ 139. In particular, a POSA would have been motivated to include a minimum brightness for the display screen independent of user input for applications requiring high visual acuity, as discussed above. Ex. 1029, ¶¶ 130, 137.

5. Claim 6

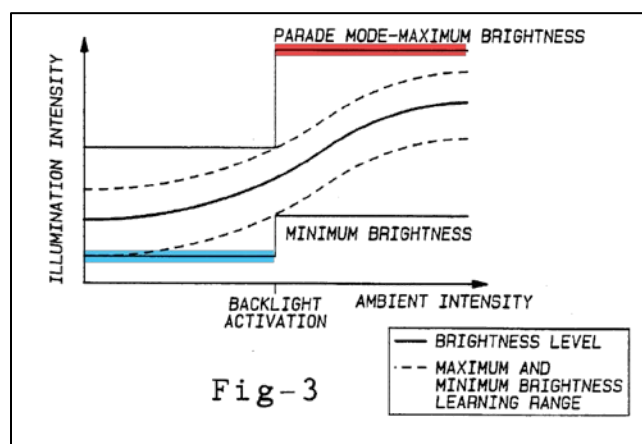
“The brightness control circuit of claim 1, further comprising an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range.”

The combination of Thayer and Godwin further discloses the requirements of claim 6, and thus renders obvious this claim.

As discussed above in § VI.C.3, the claimed “overdrive clamp circuit” encompasses software for limiting the amplitude of the display brightness to a predetermined range. Thayer discloses that the brightness at which the instrument

display is illuminated is limited by a “maximum brightness line,” which “represents the maximum brightness achievable at any given ambient light intensity.” Ex. 1003, 4:55-58. Ex. 1029, ¶ 141. This maximum brightness level is consistent with the ’117 Patent’s description of the “overdrive clamp”: “[t]he overdrive clamp circuit limits the brightness control signal to be less than a predetermined level.” Ex. 1001, 2:61-62. Ex. 1029, ¶¶ 140-141. Moreover, a POSA would have been aware of numerous other prior art references teaching how to implement a maximum brightness limit in display systems. *Id.*, ¶¶ 42-47.

If the claimed “predetermined range” is construed to require a minimum value, Thayer also discloses a “minimum brightness line” which represents the minimum instrument intensity for any given ambient light intensity,” Ex. 1003, 4:43-67, as illustrated by the red (maximum) and blue (minimum) lines in annotated Fig. 3 of Thayer, below:



Ex. 1029, ¶¶ 141-142; *see also* Ex. 1003 at 2:65-67 (“Maximum or minimum

adjustments to the instrument brightness are not adapted by the system because they represent extreme situations.”). Thus, a POSA would have recognized that these “maximum brightness” and “minimum brightness” lines, which limit the maximum and minimum values of Thayer’s display brightness, correspond to the claimed “overdrive clamp circuit” for limiting the amplitude display brightness to a predetermined range. Ex. 1029, ¶ 142.

6. Claim 7

“The brightness control circuit of claim 1, wherein the brightness control signal is provided to a display driver to control backlight illumination of a liquid crystal display.”

The combination of Thayer and Godwin further teaches the elements of claim 7, and thus renders obvious this claim.

Specifically, the ’117 patent states that “[t]he display driver 112 can be . . . a LED driver that controls backlight illumination of LCDs in portable electronic devices[], automotive displays, electronic dashboards, television, and the like.” Ex. 1001, 4:62-66. Similarly, Thayer discloses that the brightness value determined from the look-up table “is sent to an illumination system 34 that controls the illumination of the instrument display panel 10.” Ex. 1003, 4:12-17. “The illumination system 34 can be any applicable illumination system known in the art used to illuminate instrument displays of a vehicle that is appropriate for the purposes described herein.” Ex. 1003 at 4:14-17. Thayer also repeatedly discloses

that the “instrument display illumination” may be a “liquid crystal display[] (LCD[]),” Ex. 1003, 2:23-26, 3:55-60. A POSA would have recognized that Thayer’s illumination system corresponds to the claimed “display driver,” which would be used to control the “instrument display illumination” of Thayer’s LCD (such as backlighting, Ex. 1003, 2:18-31; 3:53-60). Ex. 1029, ¶ 144 (citing Ex. 1004, 5:19-24, 7:47-51). Godwin also discloses this element insofar as it teaches “driving the image source at the desired brightness,” Ex. 1004, 5:19-24, and that “[v]ariations on the image source may include liquid crystal displays.” Ex. 1004, 7:47-51; Ex. 1029, ¶ 144.

7. Claim 16

“The method of claim 15, wherein the step of selectively multiplying the input signal with the sense signal is performed by a software algorithm, an analog circuit, or a mixed-signal circuit.”

The combination of Thayer and Godwin further teaches the elements of claim 16, and thus renders obvious this claim.

As discussed above, Thayer discloses that the “output illumination values” in its look-up table, Ex. 1003, 4:4-10, are calculated by a microprocessor, Ex. 1003, 4:22-31. A POSA would have recognized that Thayer’s microprocessor would have been executing a software routine or algorithm to perform this functionality. Ex. 1029, ¶ 146. As also described above, a POSA would have recognized that Godwin specifically teaches a multiplication technique involving selectively multiplying a

user input signal with a sense signal, and would have been motivated to use this multiplication technique in the microprocessor of Thayer's system to compute brightness levels from the user input and ambient light level, with predictable results. Ex. 1029, ¶ 146.

Further, a POSA would have understood that Godwin's multiplication technique was performed by "a software algorithm, an analog circuit, or a mixed signal circuit," as required by the additional limitation of this claim, because Godwin discloses that the multiplication is part of a software "routine . . . executed by [a] microprocessor," Ex. 1004, 4:7-14; Ex. 1029, ¶ 147. Godwin further discloses that "the microprocessor 52 may be replaced by dedicated processing circuitry or analogue equivalents," Ex. 1004, 7:32-35, corresponding to the "analog circuit" language of claim 16, Ex. 1029, ¶ 147. Therefore, the combination of Godwin and Thayer renders obvious this claim.

C. Ground II: Claims 9 and 20 Are Unpatentable Under 35 U.S.C. § 103 Over the Combination of Thayer, Godwin, and Toffolo

Claims 9 and 20 are directed to selectively operating the claimed brightness control circuit in an auto mode or a manual mode, where the sensor is enabled in the auto mode and disabled in the manual mode. These claims would have been obvious in view of the disclosures of Thayer, Godwin, and Toffolo, as shown below.

1. Claims 9 and 20

9: “The brightness control circuit of claim 1, further comprising a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode, wherein the selection signal enables the light sensor in the auto mode and disables the light sensor in the manual mode.”

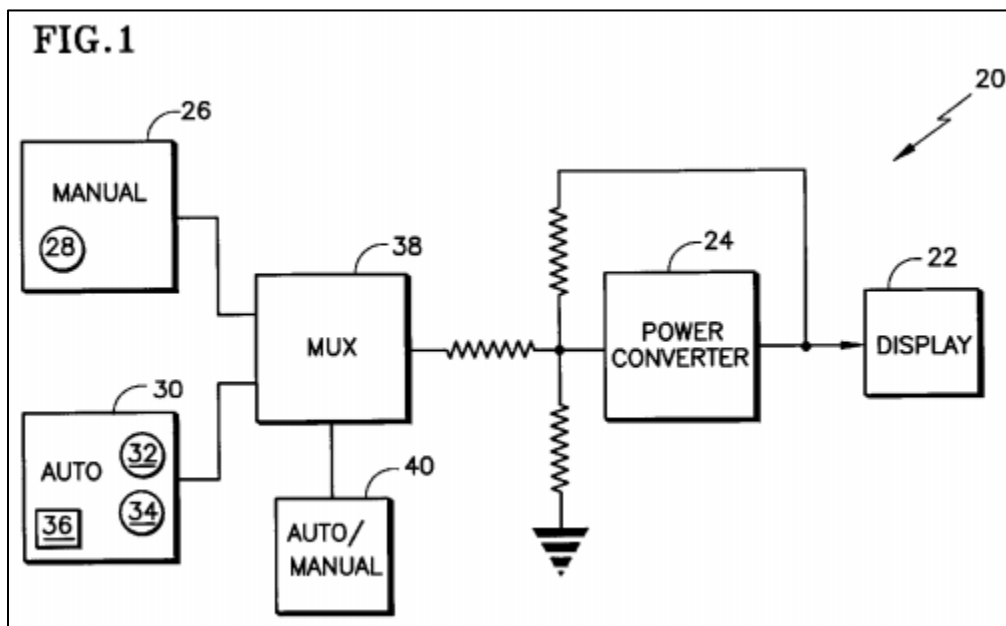
20: “The brightness control circuit of claim 19, further comprising means for selectively operating in a manual mode or an auto mode, wherein the means for sensing ambient light is enabled in the auto mode and disabled in the manual mode.”

As discussed above in § VI.C.6, the claims above encompass software for “selectively operating in a manual mode” (in which the light sensor is disabled) “or an auto mode” (in which the light sensor is enabled) “depending on selection by a user.” These claims would have been obvious in view of the combination of Thayer, Godwin, and Toffolo.

While both Thayer and Godwin describe prior systems in which the brightness of a display was manually controlled based on user input, Ex. 1003, 2:29-31; Ex. 1004, 1:3-6, they are directed to systems in which the brightness of the display automatically varies based on ambient light levels and do not expressly disclose switching between that automatic mode and a manual mode in which an ambient light sensor is disabled, Ex. 1029, ¶ 149.

Toffolo, however, describes a technique for allowing a user to select between an automatic brightness control mode (in which the display brightness is based at

least in part on the signal from an ambient light sensor) and a manual brightness control mode (in which the display brightness is based solely on user input). Ex. 1029, ¶ 156. Toffolo discloses a “display system” that provides both “automatic and manual brightness control” modes, Ex. 1005, Abstract; Ex. 1029, ¶ 156. In Toffolo’s “automatic brightness control” mode, “the luminance of the display [is] based upon ambient light as sensed by an ambient light sensor,” Ex. 1005, Abstract, and in the “manual brightness control” mode, the display brightness of Toffolo’s system is based on input from “a user activated input device,” Ex. 1005, 1:65-66; Ex. 1029, ¶¶ 150, 156. Toffolo discloses that “a multiplexer 38 selectively chooses the input from either the manual input circuit 26 or the automatic input circuit 30 as determined by a switch 40,” Ex. 1005, 2:6-13, as illustrated by Fig. 2 of Toffolo:



Ex. 1029, ¶¶ 151, 157-58. A POSA would have recognized that when the

multiplexer is set to selectively choose the input from the manual input circuit by the switch, the photo sensor 36 used in the automatic input circuit would be unnecessary and would be disabled. Ex. 1029, ¶ 159.

A POSA would have been motivated to combine the disclosures of Toffolo with those of Thayer and Godwin because of the benefit of giving a user the option of such a switch, and would have recognized the combination to be an obvious one. Ex. 1029, ¶¶ 152-53, 160-61. Incorporating Toffolo's switch for switching between manual and automatic brightness control modes for a display into Thayer's system for controlling display brightness would have been a straightforward combination of prior art elements according to known methods. *Id.*; see *KSR*, 550 U.S. at 415-19.

A POSA would have recognized that this combination would have yielded predictable results. Ex. 1029, ¶¶ 152-53, 160-61. Thayer, Godwin, and Toffolo all disclose systems for display brightness control in the same field of endeavor—brightness control systems for vehicle displays. Ex. 1029, ¶ 148. A POSA would have recognized that Toffolo's switch for toggling between manual and automatic display brightness modes would readily have been incorporated into the combined system of Thayer and Godwin—Thayer and Godwin each disclose both a user input and an ambient light sensor, and the microprocessors of Thayer and Godwin could be used to control the display brightness, either manually or automatically.

Ex. 1029, ¶¶ 153, 160.

Furthermore, a POSA would have been motivated to incorporate Toffolo's manual/automatic brightness control switch into the combined system of Thayer and Godwin because of the express teachings in the prior art recognizing the benefits of a manual option for display brightness control. Ex. 1029, ¶¶ 152, 161, 48-51. For example, U.S. Patent No. 6,947,017 to Gettemy (filed in 2001) specifically stated that "giv[ing] the user manual control of the amount of light being produced" is "satisfactory for conscientious users who regularly monitor the brightness settings and manually adjust them accordingly." Ex. 1013, 2:12-17; Ex. 1029, ¶¶ 152, 161. *See KSR*, 550 U.S. at 415-19 (obvious to combine prior art elements according to known methods, especially where some teaching, suggestion or motivation exists to do so).

D. Ground III: Claims 13 and 14 Are Unpatentable Under 35 U.S.C. § 103 Over the Combination of Thayer, Godwin, and Morris

Claims 13 and 14 are directed to an ambient light sensor capable of separately measuring infrared light. These claims would have been obvious in view of the disclosures of Thayer, Godwin, and Morris, as shown below.

1. Claim 13

"The brightness control circuit of claim 1, wherein the light sensor comprises a full spectrum PIN diode, an infrared sensitive PIN diode, and an amplifier configured to generate the sensing signal based on a difference between an output

of the full spectrum PIN diode and an output of the infrared sensitive PIN diode.”

Godwin discloses that the detectors in its ambient light sensors “may be any type of photo-responsive devices, such as photo-diodes or photo-transistors.” Ex. 1004, 7:44-47; Ex. 1029, ¶ 165. Godwin also states that its ambient light sensor “is responsive only to colours which affect the visibility of the virtual image 14 projected” on the display. Ex. 1004, 3:31-36; Ex. 1029, ¶ 165. While Godwin and Thayer do not expressly disclose that their ambient light sensors comprise a full spectrum sensor and an infrared sensor, and that the sensing signal is generated by subtracting the output of the infrared sensor from the output of the full spectrum sensor, such sensors were well known in the prior art and a POSA would have had a motivation to include such a sensor in the combined system of Thayer and Godwin. Ex. 1029, ¶ 166.

In particular, Morris discloses a light sensor that comprises a full spectrum PIN diode, an infrared sensitive PIN diode, and an amplifier configured to generate a sensing signal based on a difference between an output of the full spectrum PIN diode and an output of the infrared sensitive PIN diode, as recited in claim 11. Ex. 1029, ¶ 167. More specifically, Morris discloses a device in which “the effect of IR energy upon an image signal is substantially reduced by electronically subtracting signals generated by IR pixel sensors from signals generated by pixel sensors responsive to both IR and visible light.” Ex. 1006, 2:41-45; Ex. 1029, ¶ 167.

Morris further discloses that these pixel sensors are photodiodes. Ex. 1006, 3:18-30; Ex. 1029, ¶ 167.

A POSA would have been motivated to combine the disclosures of Thayer, Godwin, and Morris, and would have recognized the combination to be an obvious one. Ex. 1029, ¶ 168. In particular, a POSA would have recognized that incorporating Morris' image sensors, which subtract the output from infrared-sensitive photodiodes from full spectrum-sensitive photodiodes, into the combined system of Thayer and Godwin, would have been a simple substitution of one element (Morris' image sensors) for another (the more basic ambient light sensors disclosed by Thayer and Godwin). Ex. 1029, ¶ 168. *See KSR*, 550 U.S. at 415-419 (obvious to substitute known elements for one another, especially where some teaching, suggestion or motivation exists to do so).

A POSA further would have recognized that this simple substitution would have yielded predictable results. Ex. 1029, ¶ 168. Morris' image sensor produces an output signal representing the sensed (visible) ambient light which would readily be used for calculating display brightness in the combined system of Thayer and Godwin. Ex. 1029, ¶ 168.

Importantly, a POSA would have been motivated to use Morris' image sensor for measuring ambient light in the combined system of Thayer and Godwin because of the express teachings recognizing the benefits of using such a sensor. Ex. 1029,

¶ 168. Morris explains that its image sensing devices advantageously filter out the infrared spectrum from the sensed light in order to “create a representation of the visible light present,” which would otherwise be “distort[ed]” by the detected non-visible infrared spectrum. Ex. 1006, 1:18-30; Ex. 1029, ¶ 163. Such a sensor would meet the criteria for an ambient light sensor found in Godwin, which states that the ambient light sensor should be “responsive only to colours which affect the visibility of the virtual image 14 projected” on the display, Ex. 1004, 3:31-36; Ex. 1029, ¶¶ 163, 168. A POSA would have readily understood that removing the infrared spectrum, as taught by Morris, is important in automotive applications (such as Thayer and Godwin) because artificial lighting, including road-side and vehicle lights, emits high levels of infrared energy that can cause unexpected brightness adjustments if not removed. Ex. 1029, ¶¶ 53-56.

2. Claim 14

“The brightness control circuit of claim 13, wherein the light sensor further comprises a low pass filter to reduce sensitivity to transient variations of ambient light.”

The combination of Thayer, Godwin, and Morris further discloses the limitations of claim 14, and thus renders obvious this claim.

The '117 patent explains that the “low pass filter” recited by claim 14 can be used “to slow down the response time of the visible light sensor such that the sensor current signal remain[s] substantially unchanged during transient variations in the

ambient light (e.g., when objects pass in front of the display).” Ex. 1001, 3:15-20; *see also* 8:51-62 (“it may be desirable to slow down the response time of the ambient light sensor so that the automatic brightness control is insensitive to passing objects (e.g., moving hands or a person walking by)”). Similarly, Godwin discloses a low pass filter that reduces sensitivity to transient variations of ambient light. Ex. 1029, ¶ 170.

Specifically, Godwin discloses “filtering the sense signal” to “help[] dampen the affect [sic] of rapidly changing signals.” Ex. 1004, 4:17-19. Godwin explains that this “prevent[s] the projected image . . . from flickering with the rapidly varying signal,” for example “when a vehicle is driven on a bright sunny day down a road shaded with trees through which various pockets of sunlight shine,” resulting in “the pockets of sunlit and shading areas [being] rapidly passed by the vehicle so that the sensor 18 outputs a rapidly varying signal.” Ex. 1004, 4:19-33. Godwin states that “any [] suitable filter routine may be implemented” to perform this task, Ex. 1004, 4:32-33; Ex. 1029, ¶ 171.

A POSA would have recognized that this claim element would have been obvious over the combination of Thayer, Godwin, and Morris, and that incorporating Godwin’s technique of filtering the ambient light signal would have been the straightforward use of a known technique (Godwin’s filtering of sensed ambient light signals) to improve similar devices (Thayer and Godwin’s display brightness

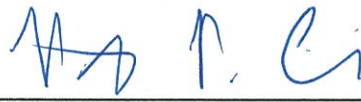
control systems) in the same way. Ex. 1029, ¶ 172. Further, a POSA would have been motivated to improve the combined system with Godwin's filtering technique because of the express benefits of the technique recognized by Godwin, as described above. Ex. 1029, ¶ 172. *See KSR*, 550 U.S. at 415-419 (obvious to use known techniques to improve similar devices, especially where some teaching, suggestion or motivation exists to do so).

VIII. CONCLUSION

For the above reasons, Petitioner respectfully requests *inter partes* review of claims 1-2, 4-7, 9, 13-16, and 18-20 of the '117 patent, and after trial, cancellation of the challenged claims.

Date: June 15, 2018

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24(D)

I certify that the foregoing complies with the type-volume limitation of 37 C.F.R. § 42.24 and contains 13,668 words based on the word count indicated by the word-processing system used to prepare the paper, and excluding those portions exempted by § 42.24(a).

Date: June 15, 2018



Peter P. Chen, Esq.
Registration No.: 39,631

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6 and 42.105, I certify that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 8,223,117 Under 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq.*, together with Petitioner's Exhibits Nos. 1001–1032, was served by FedEx, a means at least as fast and reliable as Priority Mail Express®, on the following correspondence address of record for patent owner:

Knobbe Martens Olson & Bear LLP
2040 Main Street
Fourteenth Floor
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With an additional courtesy copy sent to patent owner's litigation counsel:

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Date: June 15, 2018

A handwritten signature in blue ink, appearing to read 'Peter P. Chen', is written over a horizontal line.

Peter P. Chen, Esq.
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