

Request for *Ex Parte* Reexamination of
U.S. Patent No. 8,223,117

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Letters Patent of: Bruce R. Ferguson

U.S. Patent No.: 8,223,117

Issue Date: July 17, 2012

For: **METHOD AND APPARATUS TO CONTROL
DISPLAY BRIGHTNESS WITH AMBIENT
LIGHT CORRECTION**

REQUEST FOR *EX PARTE* REEXAMINATION OF
U.S. PATENT NO. 8,223,117

MS *Ex Parte* Reexam

Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 35 U.S.C. §§ 302–307 and 37 C.F.R. § 1.510(a), *Ex Parte* Reexamination of claims 1–7, 9, and 15–18 of U.S. Patent No. 8,223,117 (“the ’117 patent”) is respectfully requested.

The ’117 patent was filed on December 17, 2008, and issued on July 17, 2012. The ’117 patent claims priority to provisional application No. 60/543,094, which was filed on February 9, 2004.

This Request for Reexamination of the ’117 patent is submitted by the undersigned on behalf of Microsoft Corporation (“Requester”), and the undersigned is acting in a representative capacity in accordance with 37 C.F.R. §§ 1.34(a) and 1.510(f).

Request for *Ex Parte* Reexamination of
U.S. Patent No. 8,223,117

The Director is hereby authorized to charge the \$12,600.00 reexamination fee (37 C.F.R. § 1.20(c)(2)) to Deposit Account No. 50-0740 under Order No. 022255.00461.

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List of Exhibits

<u>Exhibit</u>	<u>Description</u>
1	U.S. Patent No. 8,223,117 ('117 Patent)
2	File History for U.S. Patent No. 8,223,117 (File History)
3	Provisional Patent Application No. 60/543,094
4	PTO Form SB/08
5	Japan Patent Office Patent Application Publication No. 1999-316566 (Pioneer)
6	Certified Translation of Japan Patent Office Patent Application Publication No. 1999-316566
7	U.S. Patent No. 7,110,062 (Whitted)
8	U.S. Patent No. 4,386,345 (Narveson)
9	European Patent Office Publication No. 0,570,037 (Godwin)
10	U.S. Patent No. 5,270,818 (Ottenstein)
11	U.S. Patent No. 5,760,760 (Helms)
12	U.S. Patent No. 6,947,017 (Gettemy)
13	U.S. Patent No. 5,554,912 (Thayer)
14	U.S. Patent No. 4,044,375 (Norman)
15	U.S. Patent No. 3,928,867 (Lynch)
16	U.S. Patent No. 6,337,675 (Toffolo)
17	Declaration of Dr. Philip Hobbs
18	Dr. Philip Hobbs <i>curriculum vitae</i>
19	File History for U.S. Patent No. 7,468,722
20	Claim Construction Order for Samsung Litigation

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<u>Exhibit</u>	<u>Description</u>
21	Claim Construction Order for Vizio Litigation
22	Patent Owner Claim Construction Brief for Samsung Litigation

I. INTRODUCTION

Microsoft Corporation (Requester) requests reexamination under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 of claims 1–7, 9, and 15–18 (“the Challenged Claims”) of U.S. Patent No. 8,223,117 (“the ’117 patent”) (Ex. 1) which issued on July 17, 2012, and is assigned to *Polaris PowerLED Technologies, LLC* (“Patent Owner”).

This Request raises prior art and evidence not previously addressed by the Office during prosecution of the ’117 patent, and raises substantial new questions of patentability. In particular, two of the asserted lead references, Pioneer (Ex. 5) and Whitted (Ex. 7), were not cited or considered during prosecution of the ’117 patent. A third asserted lead reference, Narveson (Ex. 8), was the basis for a § 102 rejection during prosecution, and the applicant overcame that rejection by amending the independent claims to add a limitation that is specifically taught by the Whitted reference, which was not considered during prosecution. Additionally, while Ottenstein (Ex. 10) is the only secondary reference that was addressed during prosecution, it was not addressed in the Pioneer, Narveson and Whitted combinations presented here, which includes the Pioneer and Whitted references not presented previously to or otherwise considered by the Office.

Accordingly, none of the combinations of references raised in this Request was previously considered by the Office, including in any other proceeding involving the ’117 patent. Therefore, as more fully explained in Section XI, Pioneer, Narveson, and Whitted form the basis for and raise substantial new questions of patentability.

This Request also includes the declaration of Dr. Philip Hobbs (“Hobbs Decl.”) (Ex. 17), which provides testimonial evidence relating to the understanding of a person of ordinary skill in the art at the time of filing of the ’117 patent (referred to below as a “POSITA” or “one skilled in

the art”) and of the asserted references and the combinations of references raised in this Request. *See, e.g.*, Ex. 17, ¶¶ 21–98.

Whether considered alone or in combination, the references as presented in this Request raise substantial new questions of patentability and render the Challenged Claims anticipated and obvious. Requester thus respectfully requests grant of this *ex parte* reexamination Request, and cancellation of the Challenged Claims as unpatentable.

Requester respectfully urges that this Request be granted and that reexamination be conducted not only with “special dispatch,” but also with “priority over all other cases,” pursuant to 35 U.S.C. § 305 and M.P.E.P. § 2261, respectively.

II. IDENTIFICATION OF CLAIMS FOR WHICH REEXAMINATION IS REQUESTED PURSUANT TO 37 C.F.R. § 1.510(b)(2)

Ex Parte Reexamination under 35 U.S.C. §§ 302–307 and 37 C.F.R. § 1.510(a) of claims 1–7, 9, and 15–18 of U.S. Patent No. 8,223,117 is requested.

III. COPY OF THE ’117 PATENT PURSUANT TO 37 C.F.R. § 1.510(b)(4)

Pursuant to 37 C.F.R. § 1.510(b)(4), annexed hereto as Exhibit 1 is a copy of the entire ’117 patent, including the front face, drawings, and specification/claims (in double column format on one side of each of separate sheets of papers), for which *Ex Parte* Reexamination is requested. Additionally, a full copy of the file history of the ’117 patent is attached as Exhibit 2.

To the best of Requester’s knowledge, as of the date of this Request, no disclaimer, certificate of correction, or reexamination certificate has been issued in connection with the ’117 patent.

IV. CERTIFICATION OF NO ESTOPPEL PURSUANT TO 37 C.F.R. § 1.510(b)(6)

Requester's representative certifies that the statutory estoppel provisions of 35 U.S.C. § 315(e)(1) or 35 U.S.C. § 325(e)(1) do not prohibit the Requester from filing this *Ex Parte* Reexamination Request.

V. COMMUNICATIONS TO THIRD PARTY REQUESTER

Please direct all communications for the third party Requester concerning this Request for *Ex Parte* Reexamination to:

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Covington & Burling LLP
850 Tenth Street, NW
Washington, DC 20001-4956
GDischer@cov.com
(USPTO Registration Number 42,488)

VI. PRIOR AND CONCURRENT LITIGATION INVOLVING THE '117 PATENT

Pursuant to 37 C.F.R. § 1.565, Requester hereby notifies the U.S. Patent & Trademark Office of the following prior or concurrent litigation proceedings in which the '117 patent was or is involved:

- *Polaris PowerLED Technologies, LLC v. Samsung Electronics America, Inc.*, Case No. 2:17-cv-00715 (E.D. Texas) (filed October 27, 2017) ("Samsung Litigation")
- *Samsung Electronics Co., Ltd., et al v. Polaris Power LED Technologies, LLC*, IPR2018-01262 (PTAB) (filed June 15, 2018)
- *Polaris PowerLED Technologies, LLC v. VIZIO, Inc.*, Case No. 8:18-cv-01571 (C.D. California) (filed September 4, 2018) ("Vizio Litigation")
- *Polaris PowerLED Technologies, LLC v. Top Victory Electronics Taiwan Co. Ltd. et al*, Case No. 8:19-cv-01580 (C.D. California) (filed August 16, 2019)

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- *Polaris PowerLED Technologies, LLC v. AmTRAN Technology Co., Ltd. et al*, Case No. 8:19-cv-01630 (C.D. California) (filed August 23, 2019)
- *Polaris PowerLED Technologies, LLC v. Hon Hai Precision Industry Co., Ltd.*, Case No. 8:19-cv-01926 (C.D. California) (filed October 8, 2019)
- *Polaris PowerLED Technologies, LLC v. Wistron Corporation*, 8:19-cv-01935 (C.D. California) (filed October 9, 2019)
- *VIZIO, Inc. v. Polaris PowerLED Technologies, LLC*, IPR2020-00043 (PTAB) (filed October 15, 2019)
- *Polaris PowerLED Technologies, LLC v. LG Electronics Inc. et al*, Case No. 8:20-cv-00125 (C.D. California) (filed January 21, 2019)
- *Polaris PowerLED Technologies, LLC v. Hisense Electronics Manufacturing Company of America Corporation et al*, Case No. 8:20-cv-00123 (C.D. California) (filed January 21, 2020)
- *LG Electronics, Inc. et al v. Polaris PowerLED Technologies, LLC*, IPR2020-01283 (PTAB) (filed July 16, 2020)
- *Hisense Co., Ltd. et al v. Polaris PowerLED Technologies, LLC*, IPR2020-01337 (PTAB) (filed July 21, 2020)
- *Polaris PowerLED Technologies, LLC v. Dell Technologies Inc., et al.*, Case No. 6:22-cv-254 (W.D. Texas) (filed March 10, 2022)
- *Polaris PowerLED Technologies, LLC v. Dell Technologies Inc., et al.*, Case No. 1:22-cv-973 (W.D. Texas) (filed March 10, 2022)
- *Polaris PowerLED Technologies, LLC v. Nintendo Co., Ltd et al*, Case No. 2:22-cv-00386 (W.D. Washington) (filed March 29, 2022)

VII. OVERVIEW OF THE TECHNOLOGY

As of February 8, 2003—more than one year prior to the earliest possible priority date of any claim of the '117 patent—the particular features of the '117 patent's purported invention had been described in numerous references, as described below.

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

Automatic adjustment of the brightness of a display screen based on sensed ambient light levels had been thoroughly described in prior art patents and publications prior to the February 9, 2004 filing of Provisional Application No. 60/543,094, to which the '117 patent claims priority. For example, U.S. Patent No. 5,760,760 to Helms ("Helms") (Ex. 11), which was filed in 1995 and issued in 1998, discloses "a system for automatically adjusting the brightness of an LCD responsive to the amount of ambient light available during operation thereof." Helms at 1:5–8. Helms notes that "it is obvious that the contents of an LCD can be much more easily viewed in a dark room than a bright one." Helms at 1:45–47. Helms also notes that "it is apparent that a user could significantly increase the runtime between battery charges of his or her portable PC by taking advantage of ambient lighting conditions that increase the visibility of the LCD, that is, low ambient light, and decreasing the brightness level of the LCD whenever the PC is being operated in such lighting conditions." Helms at 1:39–45. Helms explains that "a user could take advantage of that fact by decreasing the brightness level of the LCD whenever ambient lighting conditions permit and then subsequently increasing the brightness level only when necessitated by bright ambient lighting conditions." Helms at 1:47–51. Accordingly, Helms discloses a "an intelligent LCD brightness control system which automatically adjusts to the ambient lighting conditions of the environment in which the PC is being used." Helms at 1:66-2:2.

Numerous systems and methods had been developed to automatically adjust a screen's brightness based on the brightness of the environment. In particular, as described in further detail below, a number of pre-2003 patents and publications (such as Godwin (Ex. 9), Narveson (Ex. 8), Ottenstein (Ex. 10), and Pioneer (Ex. 5)) 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. As yet another example, U.S. Patent No. 6,947,017 to Gettemy ("Gettemy") (Ex. 12), filed in 2001, also discloses a system for automatically adjusting the display brightness of a computerized device. Gettemy explains that "displays can not be viewed very well in the sun unless the brightness is turned very high," but that constant "high brightness" (even in dark environments) "can reduce the life of the display and cause poor battery performance." Gettemy at 2:4-5.

B. Adjusting Display Brightness Based on Both Ambient Light Detected by a Sensor and User Preferences

Even in systems where the brightness of a display screen is automatically adjusted based on the level of ambient light (such as described in Section VII.A, *supra*), it was well known prior to 2003 that user input can be used to affect the brightness of the automatically adjusted display so that the display brightness is based on both the level of ambient light and the user input. Godwin (Ex. 9), Narveson (Ex. 8), Ottenstein (Ex. 10), Pioneer (Ex. 5), 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.

For example, U.S. Patent 5,554,912 to Thayer et al. ("Thayer") (Ex. 13), which was filed in 1995 and issued in 1996, teaches that the vehicle instrument display brightness is based not only on the "particular ambient light conditions," but also "a vehicle operator's changes to the display

brightness.” Thayer at Abstract. In particular, Thayer discloses that “a vehicle operator 36 . . . may adjust an instrument display brightness control switch 38 to a more desirable brightness level,” Thayer at 4:17–20, and that the “microprocessor 30” of “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,” Thayer at 4:25–34.

One well-known technique 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 disclosed, for example, in a 1993 European Patent Application to Godwin and a 1993 U.S. Patent to Ottenstein. Godwin explains that the driver uses “contrast adjuster 24” to input a “contrast signal on line 48,” Godwin at 4:12–14. To “obtain a desired output intensity signal” for the displayed image, “the contrast ratio signal is multiplied by the ambient intensity signal” from the ambient light sensor, Godwin at 4:50–56.

Ottenstein discloses that by multiplying the brightness value input by the operator with the sensed level of ambient light, its “automatic brightness control . . . maintains a constant extrinsic contrast over varying reflected ambient light levels for any particular pilot selected brightness settings.” Ottenstein at 4:10–14. “The essence of the invention,” Ottenstein states, “is the concept of varying the foreground brightness in direct proportion to the ratio of ambient light levels, in order to maintain constant extrinsic contrast.” Ottenstein at 2:54–57. Both Godwin and Ottenstein explain that this multiplication technique allows 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.

C. Dark Level Bias - Maintaining Minimum Display Brightness at Negligible Levels of Ambient Light

Maintaining a minimum level of brightness for a display screen—even in conditions of zero or negligible ambient light—was also well known in the art and widely disclosed in the years before 2003. 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. 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. As the 1995 patent to Helms notes, 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,” Helms at 1:54–57, even if the display was in a pitch-black environment.

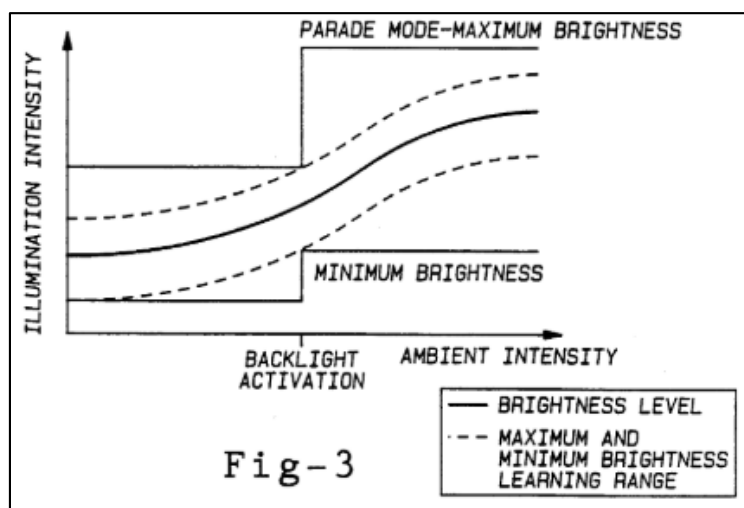
Accordingly, several pre-2003 publications—such as Whitted and Ottenstein—disclose the desirability of setting a minimum brightness regardless of ambient light level. Whitted discloses a “minimum power level [that] is set, e.g., pre-programmed, for the backlight 510 to insure that the display is readable in low light conditions.” Whitted at 8:22–25. Ottenstein discloses that the “sensed ambient brightness level should be limited” to a minimum of 10%. Ottenstein, 3:65–4:4.

D. Limiting Display Screen Brightness

In addition to maintaining a minimum display brightness in the dark, it was also well known before 2003 that the display brightness should not be increased beyond a maximum level even in very bright surroundings. Publications that are decades old, such as U.S. Patent No. 4,044,375 to Norman (“Norman”) (Ex. 14) (issued in 1977), teach that maximum display screen

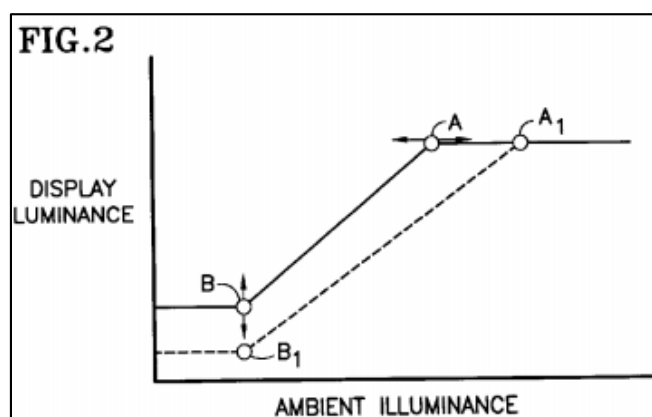
brightness be limited by using a “clamping” circuit with a “brightness limiter 115.” Norman at 3:37–53. Similarly, U.S. Patent No. 3,928,867 to Lynch (“Lynch”) (Ex. 15) (issued in 1975) discloses the use of an “[a]n automatic scene brightness correction circuit” and an “overload protection circuit” which applies signals to a “clamping circuit”—for example, “[u]nder conditions of high ambient lighting” when “the drive current exceeds a predetermined level.” Lynch at 7:28–56. This is especially necessary in cathode ray tube (CRT) displays, which were the dominant display technology in 1977, and which are easily damaged by setting the brightness too high. Any display device has inherent brightness limits beyond which it will be damaged, so there has to be an upper limit somewhere in any event. *See, e.g.*, Hobbs Decl. ¶ 69.

More recent publications also disclose limiting the display brightness under conditions of high ambient lighting. For example, as illustrated in Figure 3 below, Thayer discloses a “maximum brightness of all the instrument display lights,” Thayer at 4:55–58:



Similarly, U.S. Patent No. 6,337,675 to Toffolo et al. (“Toffolo”) (Ex. 16), filed in 1997, described a system with a “maximum luminance” which was a “physical limitation of the

display,” Toffolo at 2:18–21, and “the maximum luminance level that can be displayed by the display,” Toffolo at 2:53–58, as illustrated by A and A₁ in Fig. 2 of Toffolo:



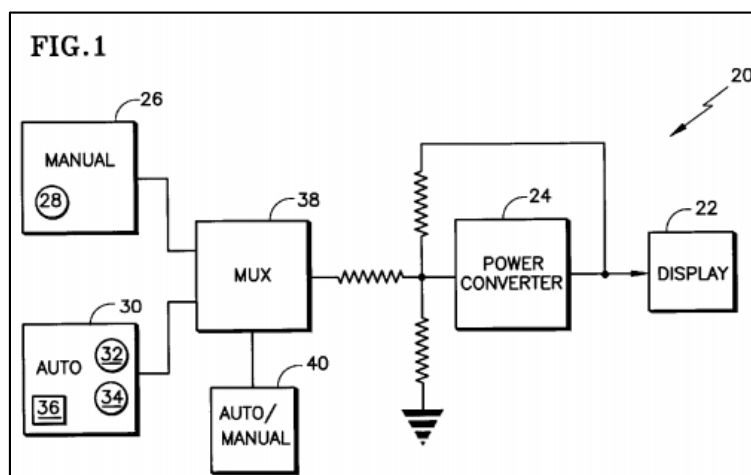
E. Manual and Automatic Screen Brightness Adjustment

As explained by Helms, “manual brightness adjustment” was known well before the pre-2003 automatic brightness control systems and methods described above. Helms at 1:52–54. Helms specifically states that in these systems “a user could . . . decreas[e] the brightness level of the LCD whenever ambient light conditions permit and then subsequently increas[e] the brightness level when necessitated by bright ambient lighting conditions.” Helms at 1:47–51. Similarly, Thayer states that “[g]enerally,” in existing brightness control systems “the vehicle will include an illumination intensity switch that allows the vehicle operator to adjust the intensity of the instrument display or HUD as the operator desires.” Thayer at 2:29–31.

Gettemy recognizes that for some “conscientious users,” the “conventional approach [that] gives the user manual control of the amount of light being produced” is “satisfactory” as such users “regularly monitor the brightness settings and manually adjust them accordingly.” Gettemy at 2:12–17. Accordingly, Gettemy discloses a system in which the “dynamically adjustable range

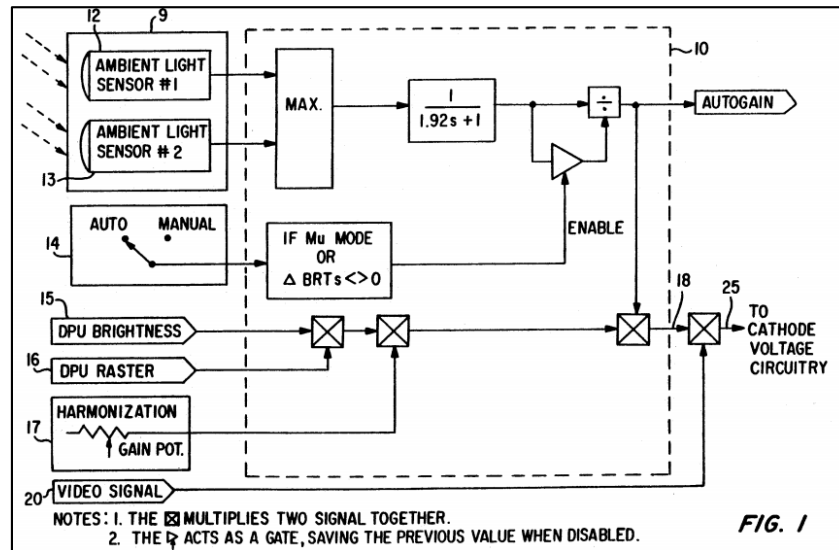
settings . . . can be overridden by the user, enabling the user to control the brightness of the display screen.” Gettemy at 2:54–57.

Other publications also disclose both manual and automatic brightness control modes. For example, Toffolo discloses the use of both a “manual input circuit 26” and an “automatic input circuit 30,” and stated 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,” Toffolo at 2:6–9 (“[a]lternatively,” Toffolo explains, “the multiplexer 38 always selects the manual input circuit 26 whenever a change is detected in the manual input circuit 26 level, such that the manual input circuit 26 overrides the automatic input circuit 30 when the manual input circuit 26 is changed,” Toffolo at 2:9–13), with the switch 40 between the manual and automatic modes shown in Fig. 1 of Toffolo:



As shown by switch 14 in Fig. 1 below, Ottenstein also discloses the use of both manual and automatic brightness modes. Specifically, Ottenstein discloses a “selectable auto mode/manual mode switch 14,” and noted that the “auto mode of auto mode/manual mode switch 14 enables the

operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:23–29.



VIII. OVERVIEW OF THE '117 PATENT AND REMARKS MADE DURING PROSECUTION

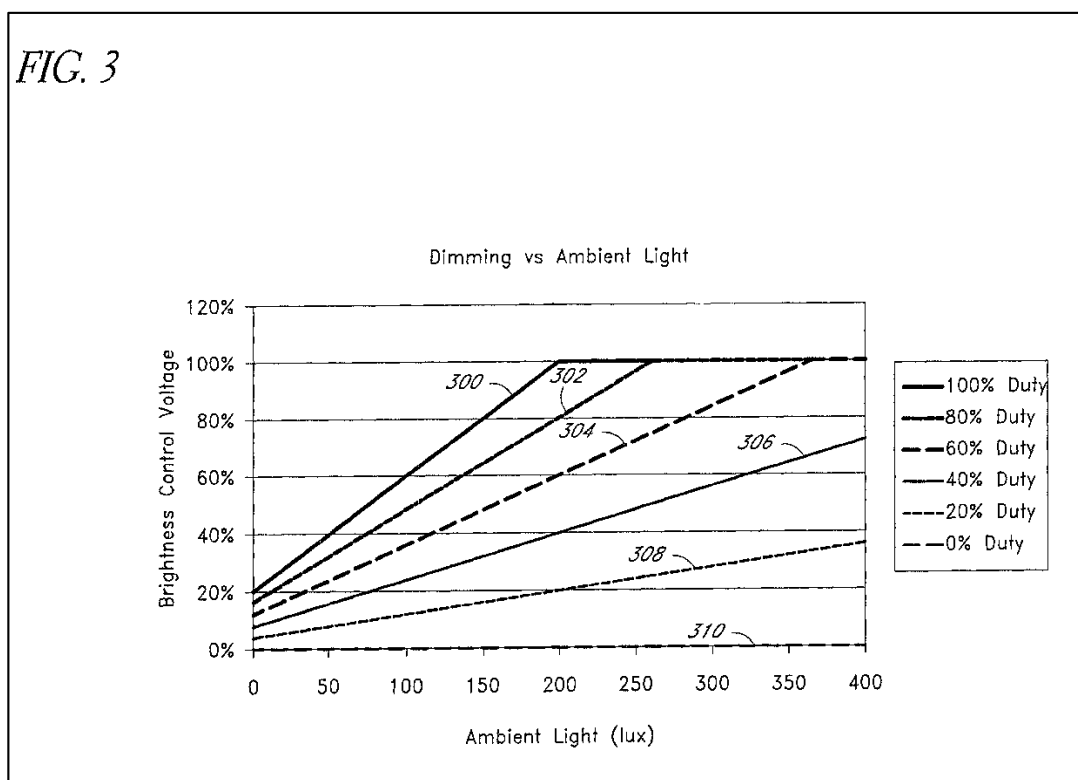
A. Overview of the '117 Patent

The '117 patent (Ex. 1), entitled *Method and Apparatus to Control Display Brightness With Ambient Light Correction*, claims priority to provisional patent application No. 60/543,094, filed February 9, 2004.

The '117 patent pertains to “adjusting display brightness in response to varying ambient lighting conditions in combination with various user preferences,” '117 patent, 1:60–64, and can be used in “portable electronic devices, automotive displays, electronic dashboards, television, and the like,” '117 patent, 4:62–66.

1. Adjusting Display Brightness Based on Ambient Lighting Conditions and User Preferences

Fig. 3 of the '117 patent illustrates brightness control signals as a function of ambient light levels for different user settings. The brightness of the display is varied by multiplying a value indicative of a sensed ambient light by a user input. '117 patent, 3:31–37, 5:44–51:



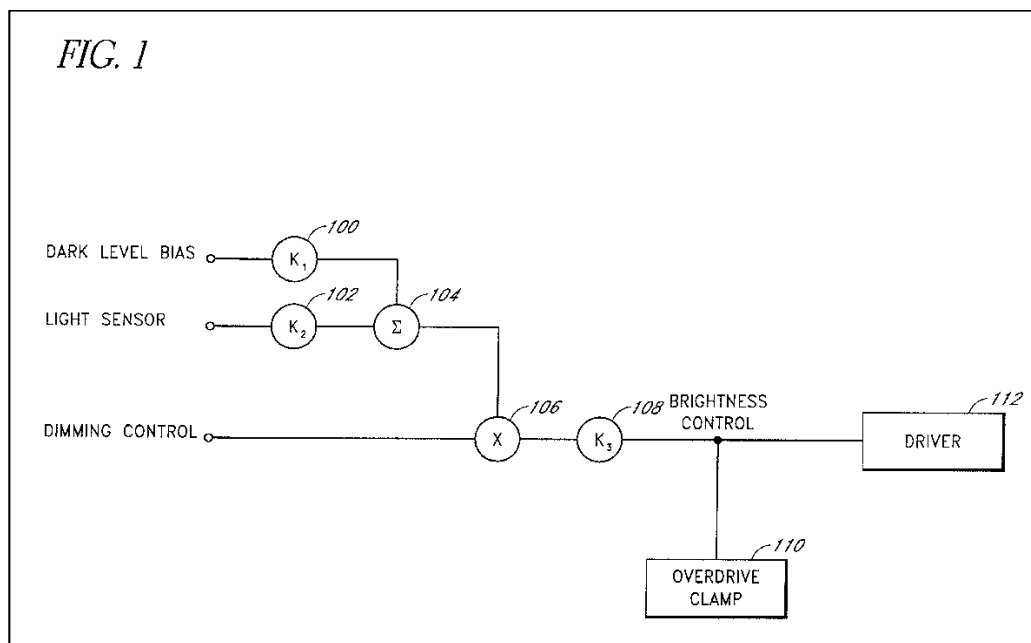
“Ambient light levels are indicated in units of lux (or lumens/square meter)” on the x-axis, and the “brightness control signal levels” used to control the brightness of the display are indicated on the y-axis “as a percentage” of the “full-scale” maximum brightness of the display. '117 patent, 5:46–51. Graphs 300–310 shown in FIG. 3 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.” '117 patent,

6:1–7. As the provisional application explained, this user setting represents the contrast ratio desired by the user. Ex. 3, A-2.

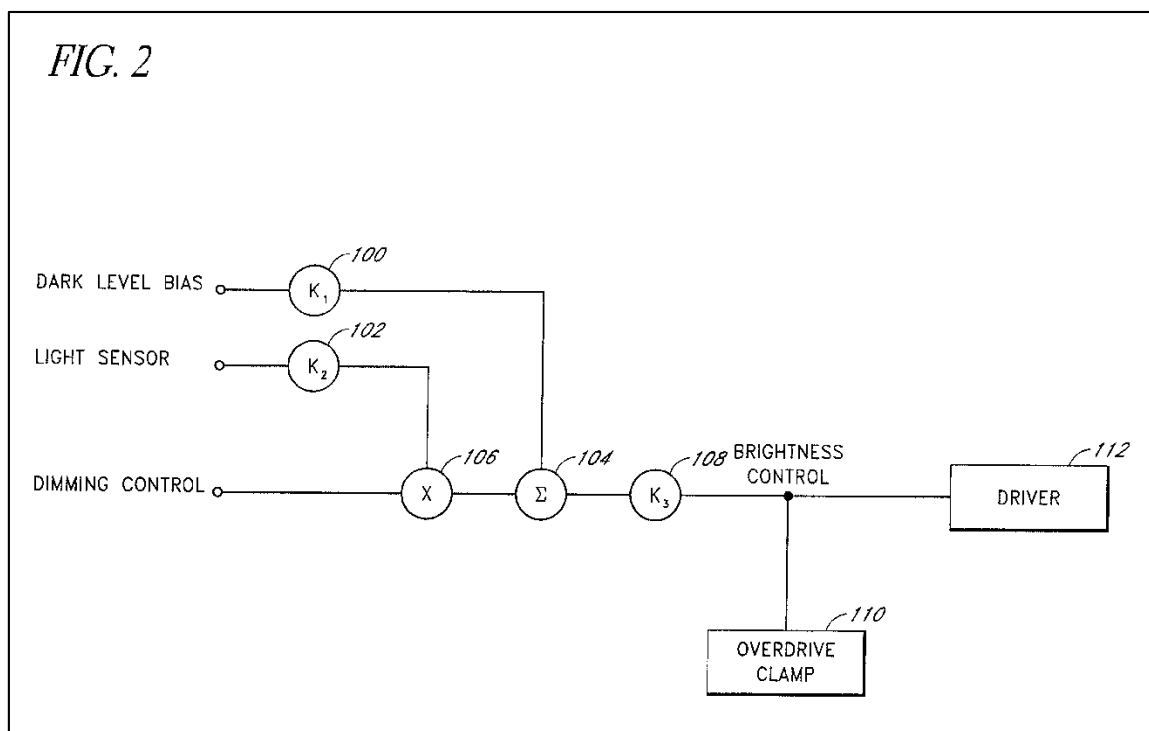
2. Dark Level Bias - Maintaining Minimum Display Brightness at Negligible Levels of Ambient Light

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. ’117 patent, 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,” ’117 patent, 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 and the light sensor output are adjusted by respective scalar circuits (k1, k2) 100, 102 before being added by a summing circuit 104. An output of the summing circuit 104 and the user input is provided to a multiplier circuit 106. An output of the multiplier circuit 106 can be adjusted by a third scalar circuit (k3) 108 to produce the brightness control signal. ’117 patent, 4:45–59:



Another embodiment is illustrated by Fig. 2, in which a light sensor output (LIGHT SENSOR) is adjusted by a scalar circuit (k2) 102 and then provided to a multiplier circuit 106. Summing circuit 104 adds the product to a dark level bias that has been adjusted by scalar circuit (k1) 100. An output of the summing circuit 104 is adjusted by scalar circuit (k3) 108 to generate a brightness control signal for a display driver 112. '117 patent, 5:15–27:



This second embodiment “provides a predefined level of brightness in substantially total ambient darkness” that is “independent of the user input,” ’117 patent, 5:30–42—because the dark level bias is added only after the user input and the light sensor output have been multiplied. By contrast, in the embodiment of Fig. 1 (which results in a graph as depicted in Fig. 3, ’117 patent, 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, ’117 patent, 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, ’117 patent, 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.

3. Limiting Display Screen Brightness

The “overdrive clamp” 110 in Figs. 1 and 2 of the ’117 patent (above) sets the maximum value of the brightness control signal. ’117 patent, 4:59–61. This maximum value in Fig. 3, above, is illustrated as the “100%” voltage level, ’117 patent, 6:12–15. The brightness control signal is coupled to overdrive clamp circuit 110, which limits the amplitude of the brightness control signal at the input of the display driver 112. ’117 patent, 4:62–5:14.

4. Manual and Automatic Screen Brightness Adjustment

The ’117 patent “allows a user to switch between a manual brightness adjustment mode” (in which “the user dims or increases the intensity of the backlight as the room ambient light changes”) “and an automatic brightness adjustment mode” (in which, “as the ambient light changes, the backlight automatically adjusts to make the LCD brightness appear to stay consistent at substantially the same perceived level”). ’117 patent, 2:17–27.

B. Summary of the Prosecution History of the '117 Patent

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. *See* '722 patent, File History (Ex. 19).

In the continuation application filed on December 17, 2008 that resulted in the '117 patent, the applicant filed a preliminary amendment that cancelled originally filed claims 1-20 and added claims 21-40. Independent claim 21 recited:

21. (Currently amended) 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 a mathematical product of 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.

'117 patent, Prosecution History (“File History”) (Ex. 2) at 23–26 (12/17/2008 Claims).

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. File History at 100–11 (11/7/2011 Office Action). In particular, the Examiner rejected many of the claims—including the independent claims—as anticipated by Narveson.

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.” File History at 152–64 (01/23/2012 Response to Office Action). The applicant argued that Narveson did not “disclose, teach or suggest

the use of [such] a dark level bias.” According to the applicant, the “boost factor” identified in Narveson served a different purpose than the claimed “dark level bias”—which the applicant characterized as “ensur[ing] a predefined (or minimum) brightness in total ambient darkness.” *Id.* at 159 (01/23/2012 Response to Office Action at 8).

Following this amendment, the Examiner allowed the claims without further comment. File History at 180–84 (03/21/2012 Notice of Allowance). Also of note, the applicant amended pending dependent claim 23 (claim 3 of the ’117 patent), without comment as follows:

The brightness control circuit of claim 2, wherein the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias to generate an output signal corresponding to the brightness control signal.

File History at 153 (01/23/2012 Response to Office Action at 2).

C. Summary of *Inter Partes* Review Proceedings Challenging the ’117 Patent

The ’117 patent has been the subject of four *inter partes* review (“IPR”) challenges before the United States Patent Trial and Appeal Board (the “PTAB” or the “Board”) as follows:

- IPR2018-01262: challenging claims 1, 2, 4–7, 9, 13–16, and 18–20
- IPR2020-00043: challenging claims 1, 2, 4–7, 9, 13–16, and 18
- IPR2020-01283: challenging claims 1, 2, 4–7, 9, 15, and 16
- IPR2020-01337: challenging claims 1, 2, 4–7, 9, 15, 16, and 18

The PTAB denied institution in each of the above IPRs. A brief summary of each IPR is provided below.

1. The Samsung IPR (IPR2018-01262)

On June 15, 2018, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Display Co., Ltd. filed a petition for *inter partes* review challenging claims 1, 2, 4–7, 9,

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13–16, and 18–20 of the ’117 patent, under 35 U.S.C. § 103, on three grounds, each relying on one or more of the following references:

- 1) U.S. Patent No. 5,554,912 (“Thayer”)
- 2) European Patent Office Publication No. 0,570,037 (“Godwin”)
- 3) U.S. Patent No. 6,337,675 (“Toffolo”)
- 4) U.S. Patent No. 6,657,663 (“Morris”)

As the PTAB explained, the petitioner relied on Thayer, or alternatively, the combination of Thayer and Godwin, to teach or suggest the “dark level bias” limitation of claim 1. File History at 218–20 (IPR2018-01262, Institution Decision at 10–12). Alternatively, the petitioner contended that a POSITA would have recognized that the “dark level bias” limitation would have been obvious in view of the combination of Thayer and Godwin. *Id.*

The PTAB found that the petitioner did not sufficiently set forth the reasoning why Thayer or, alternatively, Thayer and Godwin teach or suggest the “dark level bias” limitation of claim 1. *Id.* at 220 (IPR2018-01262, Institution Decision at 12). In addition, the PTAB explained that the petitioner did not “clearly identify exactly what constitutes the ‘brightness control signal that is used to control a brightness level of a visible display’ in Thayer and Godwin.” *Id.* at 221–22 (IPR2018-01262, Institution Decision at 13–14). According to the PTAB, the petitioner “failed to explain how the applied prior art references teach or suggest ‘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 pre-determined level when the ambient light level decreases to approximately zero,’ as claimed.”

The PTAB denied institution of IPR2018-01262 on January 17, 2019.

2. The Vizio IPR (IPR2020-00043)

On October 15, 2019, VIZIO, Inc. filed a petition for *inter partes* review challenging claims 1, 2, 4–7, 9, 13–16, and 18 of the ’117 patent, under 35 U.S.C. §§ 102 and 103, on ten grounds, each relying on one or more of the following references:

- 1) Japanese App. Pub. No. 2003-150291 (“Oki”)
- 2) U.S. Patent Pub. No. 2003/0112353 (“Morris”)
- 3) U.S. Patent Pub. No. 2002/0118182 (“Weindorf”)
- 4) U.S. Patent No. 6,337,675 (“Toffolo”)
- 5) U.S. Patent Pub. No. 2002/0070914 (“Bruning”)

On May 4, 2020, the PTAB exercised discretion to deny institution under 35 U.S.C. § 314(a) due to the advanced state of the district court proceedings. On September 15, 2020, the PTAB granted the petitioner’s request for a rehearing.

As the PTAB explained, the petitioner asserted that Oki discloses each limitation of independent claims 1 and 15. IPR2020-00043, Rehearing Decision at 18. The PTAB determined that the petitioner had not shown a reasonable likelihood of prevailing in demonstrating that Oki discloses the “user [input] signal” and the “dark level bias” because the petitioner relied on the same element (Oki’s minimum luminance value “a”) as disclosing two separate claim limitations—*i.e.*, the “user [input] signal” and the “dark level bias.” *Id.* at 20–21. According to the PTAB, “[t]he Specification [of the ’117 patent] does not indicate that the ‘user [input] signal’ and the ‘dark level bias’ may be the same thing.” *Id.* at 24.

Alternatively, the petitioner asserted that Toffolo discloses each limitation of independent claims 1 and 15. *Id.* at 31. According to the PTAB, the petitioner failed to show that Toffolo

discloses the “multiplier” limitation of claims 1 and 15. The PTAB determined that although Toffolo Figure 2 discloses a graph of a straight line, Toffolo does not expressly disclose the equation for the graph and therefore Toffolo does not disclose “multiplying a user signal (or input signal) with a sensing signal to generate a combined signal.” *Id.* at 35–37. According to the PTAB, the petitioner “would have to show that the claimed limitations are inherent in Toffolo,” and the petitioner did not argue inherency.

The PTAB denied institution of IPR2020-00043 on September 15, 2020.

3. The LG IPR I (IPR2020-01283)

On July 16, 2020, LG Electronics, Inc. and Hisense Co., Ltd. filed a petition for *inter partes* review challenging claims 1, 2, 4–7, 9, 15, and 16 of the ’117 patent, under 35 U.S.C. § 103, on seven grounds, each relying on one or more of the following references:

- 1) Japan Published Application No. H10-122071 (“Yanagiuchi”)
- 2) U.S. Patent No. 6,337,675 (“Toffolo”)
- 3) Japan Published Application No. H11-004005 (“Fujimaki”)
- 4) U.S. Patent No. 5,270,818 (“Ottenstein”)
- 5) U.S. Patent No. 6,198,234 (“Henry”)

As the PTAB explained, the petitioner asserted that the combination of Yanagiuchi and Toffolo discloses each limitation of independent claims 1 and 15. File History at 272 (IPR2020-01283, Institution Decision at 16). The PTAB determined that the petitioner improperly relied on the same element (Yanagiuchi’s user setting P_1) as disclosing both the “user [input] signal” and the “dark level bias.” *Id.* at 275–76 (IPR2020-01283, Institution Decision at 19–21). According to the PTAB, the petitioner did not provide “any explanation or argument as to why these separate

claim elements can be satisfied by P1 in Yanagiuchi.” *Id.* at 280 (IPR2020-01283, Institution Decision at 24).

Alternatively, the petitioner contended that the claims were unpatentable over Fujimaki. *See id.* at 282 (IPR2020-01283, Institution Decision at 26). But the PTAB determined that the variable identified by the petitioner as the “sensing signal” was not the correct representation of “sensing signal.” *Id.* at 290 (IPR2020-01283, Institution Decision at 34).

Lastly, the petitioner contended that independent claims 1 and 15 were unpatentable over Ottenstein and Fujimaki. The PTAB determined that Ottenstein does not disclose the claimed “dark level bias” because, *inter alia*, Ottenstein discloses switching from automatic brightness control to a “night mode” in very low ambient light levels. *Id.* at 296–97 (IPR2020-01283, Institution Decision at 40–41).

The PTAB denied institution of IPR2020-01283 on March 9, 2021.

4. The LG IPR II (IPR2020-01337)

On July 21, 2020, LG Electronics, Inc. and Hisense Co., Ltd. filed a petition for *inter partes* review challenging claims 1, 2, 4–7, 9, 15, 16, and 18 of the ’117 patent, under 35 U.S.C. §§ 102 and 103, on four grounds, each relying on one or more of the following references:

- 1) Japanese App. Pub. No. 2003-150291 (“Oki”)
- 2) U.S. Patent No. 6,198,234 (“Henry”)
- 3) U.S. Patent No. 6,337,675 (“Toffolo”)

As the PTAB explained, the petitioner asserted that Oki discloses each limitation of independent claims 1 and 15. File History at 315 (IPR2020-01337, Institution Decision at 15). Similar to the Vizio IPR, the PTAB determined that the petitioner had not shown a reasonable

likelihood of prevailing in demonstrating that Oki discloses the “user [input] signal” and the “dark level bias” because the petitioner relied on the same element (Oki’s minimum luminance value “a”) as disclosing two separate claim limitations—*i.e.*, the “user [input] signal” and the “dark level bias.” *Id.* at 317–23 (IPR2020-01337, Institution Decision at 17–23).

The PTAB denied institution of IPR2020-01337 on March 9, 2021.

D. Claim Construction

In determining whether a substantial new question of patentability exists, “the PTO must apply the broadest reasonable meaning to the claim language, taking into account any definitions presented in the specification.” *In re Bass*, 314 F.3d 575, 577 (Fed. Cir. 2002) (citing *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984)); accord MPEP § 2258(G). Thus, during reexamination, claims should be given their broadest reasonable interpretation. Additionally, limitations in the specification are not read into the claims for reexamination. MPEP § 2258(G) (citing *In re Yamamoto*, 740 F.2d 1569, 222 USPQ 934 (Fed. Cir. 1984)). This claim construction standard is different from the claim construction standard used in litigation as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316, 75 USPQ2d 1321, 1329 (Fed. Cir. 2005).

Requester submits that under the “broadest reasonable interpretation” standard, none of the terms of the ’117 patent requires an express construction, and each should be given their broadest reasonable interpretation consistent with the ’117 patent specification. Although Requester does not submit a specific construction for any claim terms, the district court judges construed a number of claim terms as described below. *See Claim Construction Orders for Samsung Litigation* (Ex. 20) and *Vizio Litigation* (Ex. 21).

Claim Term	District Court Construction (Samsung and Vizio Litigations)
“a first input configured to receive a user signal indicative of a user selectable brightness setting” (claim 1)	“first input actually programmed or implemented with hardware or software to receive a user signal indicative of a user selectable brightness setting”
“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, wherein the sense signal indicates an ambient light level” (claim 15)	“multiplier configured to” means the multiplier must be “actually programmed or implemented with hardware or software” (Vizio Litigation) “combined signal includes, but is not necessarily limited to, the product of the user signal and the sensing signal” (Samsung Litigation)
“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” (claim 1) “adjusting the combined signal with a dark level bias” (claim 15)	“dark level bias” means “a value that causes a deviation from the combined signal, where the value is a voltage value of an electrical signal or value of a software variable” (Vizio Litigation) “a dark level bias actually programmed or implemented with hardware or software to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display” (Vizio Litigation)
“approximately zero” (claims 1, 15)	“zero or a level close enough to zero that a light sensor would measure zero or a corresponding sending signal would round to zero” (Vizio Litigation)
“an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range” (claim 6)	“to limit its amplitude to a predefined range” means “limit the absolute value of the brightness control signal’s amplitude to be less than a predefined level” (Samsung Litigation)
“second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode” (claim 9)	“second input actually programmed or implemented with hardware or software to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode”

E. Priority Date of the Claims in the '117 Patent

The '117 patent is a continuation of Application No. 11/023,295, filed on December 27, 2004, now Patent No. 7,468,722, which claims the benefit of Provisional Application No. 60/543,094, filed on February 9, 2004 (hereinafter the “Critical Date”). Requester does not concede that the Challenged Claims are entitled to the claimed priority, but applies prior art before the Critical Date. For purposes of this reexamination, the Office need not determine whether any claims of the '117 patent are supported by the February 9, 2004, provisional application filing date.

IX. CITATIONS OF PRIOR ART THAT RAISE SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY

A copy of every patent or printed publication relied upon is submitted herewith, and listed in Exhibit 4 (Form PTO/SB/08). Substantial new questions of patentability affecting claims 1–7, 9, and 15–18 of the '117 patent are raised by the references listed in Exhibit 4, which constitute prior art with respect to the '117 patent under 35 U.S.C. §§ 102(a), 102(b) and/or 102(e).

Japan Patent Office Patent Application Publication No. 1999-316566 (“Pioneer”) and U.S. Patent No. 7,110,062 (“Whitted”) were never considered and discussed by the Office (including the PTAB) in the context of patentability under Sections 102 or 103. As explained below, these references provide technical disclosures that the Office believed to be absent in the prior art. Indeed, Pioneer and Whitted disclose and/or suggest all of the features of claims 1–7, 9, and 15–18. Thus, for these reasons, Pioneer and Whitted—alone or in combination with other prior art publications—raise substantial new questions of patentability with respect to claims 1–7, 9, and 15–18 of the '117 patent. Also accompanying this Request is a declaration of Dr. Philip Hobbs

(Ex. 17), who provides his opinion regarding the prior art and whether a person of ordinary skill in the art would have been motivated to combine certain prior art references.

A discussion showing how the prior art discloses or suggests each limitation of claims 1–7, 9, and 15–18 of the '117 patent is provided in Section XI.

A. Japan Patent Office Application Publication No. 1999-316566 to Homma (“Pioneer”)

Japan Patent Office Patent Application Publication No. 1999-316566 (“Pioneer”) (Ex. 5), entitled *Information Display Device*, published on November 16, 1999, was filed on May 1, 1998. Therefore, Pioneer qualifies as prior art against the '117 patent under at least pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b). A certified translation of Pioneer is attached at Exhibit 6.

Pioneer discloses “an information display device able to adjust and enhance visibility of a display state of the display device to a display state desired by a driver.” Pioneer at Abstract. Pioneer notes that a “liquid crystal panel can become difficult to see when the surrounding brightness changes in various ways.” Pioneer, ¶[0016].

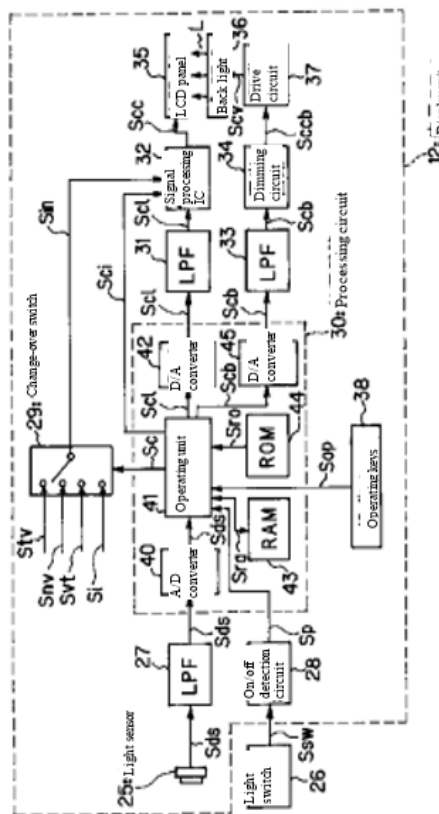
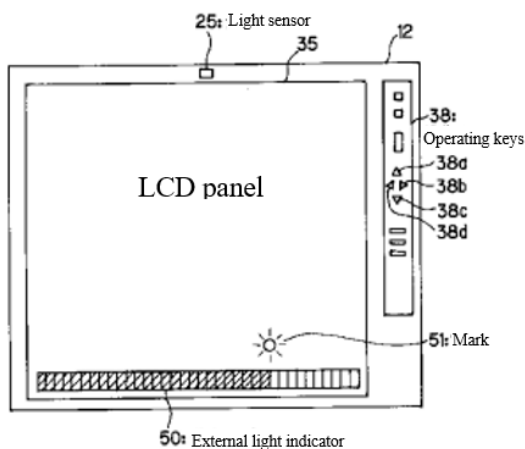
Figures 2 and 3, shown below, depict a front view illustrating the outer appearance of a display unit and a block diagram illustrating a detailed configuration of the display unit, respectively.

[FIG. 3]

Block diagram illustrating a detailed configuration of a display unit according to an embodiment

[FIG. 2]

Front view illustrating the outer appearance of a display unit



Display unit 12 includes a processing circuit 30 and an operating unit 41 that determines display brightness based on ambient light level and an input from a user. Pioneer “[p]rovide[s] an LCD panel 35 for displaying information, an adjusting key 38 for inputting input values for setting display characteristics of the LCD panel 35, a light sensor 25 for detecting a surrounding brightness of the LCD panel 35, and an operating unit 41 for setting the display characteristics of the LCD

panel 35 based on an input value that was input and a detected brightness, and controlling a display on the LCD panel 35 based on the detected brightness and set display characteristics.” *Id.* at Abstract.

In one embodiment, a setting means, such as operating unit 41, “sets a setting value for setting the display characteristics using the input value and the detection value detected when the input value was input, sets the display characteristics based on the setting value, classifies the detection value into each of three pre-set regions based on the level of the detection value, sets one setting value for each of the regions, and sets the display characteristics using the three setting values.” *Id.* at ¶[0026]; *see also* ¶[0019].

Characteristic lines for setting display characteristics (e.g., display brightness) are calculated using the following Equation (1):

[Equation 1]

$$(A) \ y_n = \{(yS2 - yS1) / (xS2 - xS1)\} (x_n - xS1) + yS1$$

(when $x_n \leq xS2$)

$$(B) \ y_n = \{(yS3 - yS2) / (xS3 - xS2)\} \times (x_n - xS2) + yS2$$

(when $xS2 < x_n$).

Pioneer explains that in Equation (1), $yS1$ represents the input display luminance setting at the time the setting value $S1$ was set, $yS2$ represents the input display luminance setting at the time the setting value $S2$ was set, and $yS3$ represents the input display luminance setting at the time the setting value $S3$ was set, while $xS1$ corresponds to the detected surrounding brightness at the time the setting value $S1$ was set, $xS2$ corresponds to the detected surrounding brightness at the time the setting value $S2$ was set, and $xS3$ corresponds to the detected surrounding brightness as the time setting value $S3$ was set. Pioneer at ¶[0120].

In a second embodiment, “it is also possible to divide the surrounding brightness into only two regions, and then set new luminance characteristic lines.” *Id.* at ¶[0143]. In this embodiment, “if the luminance determined with respect to the surrounding brightness x_n using the aforementioned set tentative characteristics line (step S7) is y_n , luminance y_n corresponding to each surrounding brightness value x_n is determined based on the following equation rather than the Equation (1).” (Pioneer at ¶[0145].)

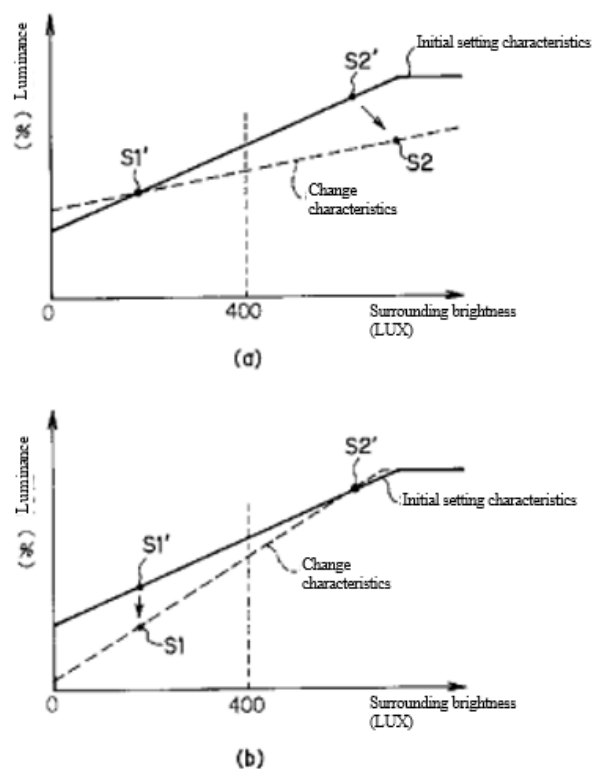
[Equation 2]

$$y_n = \{(yS2 - yS1) / (xS2 - xS1)\} \times (x_n - xS1) + yS1$$

Pioneer at [00145], [00146]. Pioneer discloses that in this embodiment, there are two input values—dark conditions luminance setting $yS1$ (which corresponds to surrounding brightness $xS1$) and bright conditions luminance setting $yS2$ (which corresponds to surrounding brightness $xS2$). Pioneer discloses that the equation for calculating display luminance y_n for corresponding surrounding brightness x_n is based, in part, on a multiplication of the bright conditions luminance setting $yS2$ and the detected surrounding brightness x_n , which is then adjusted by adding the dark conditions luminance setting $yS1$. *See* Pioneer at ¶¶[00145], [00146]. The resulting straight line graph (“tentative characteristics line”) as calculated by Equation 2 is depicted in Figure 8, shown below.

[FIG. 8]

Tentative characteristics line setting process
according to a second embodiment

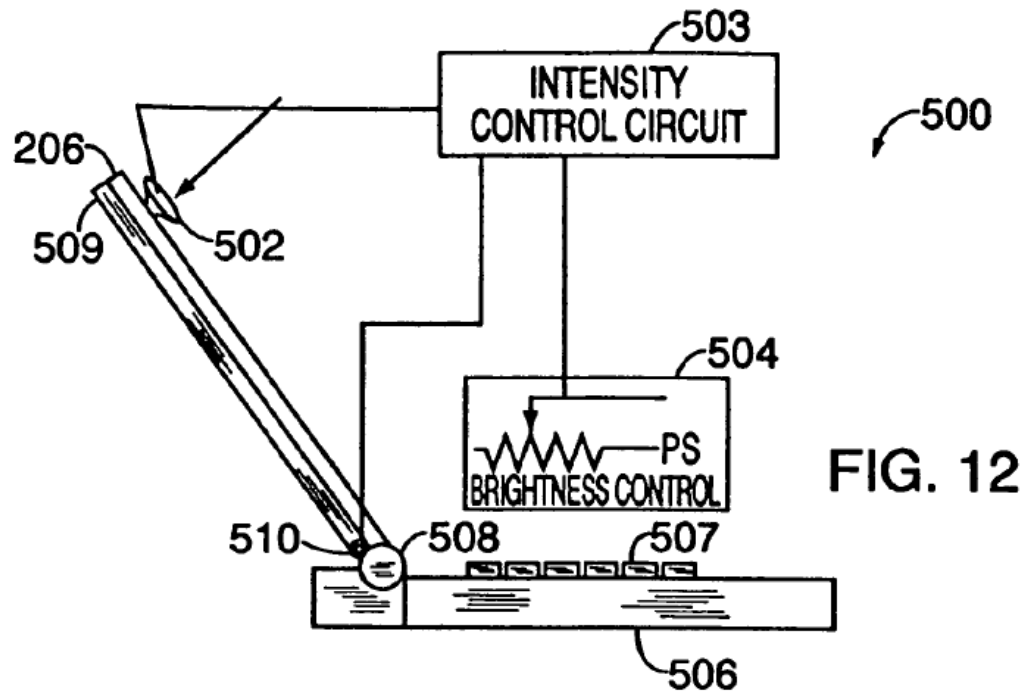


Pioneer explains that “by setting one setting value for each region, the display characteristics can be adjusted more closely to the desires of a user because the display characteristics can be set differently during display characteristics setting when surroundings are bright than when surroundings are dark.” Pioneer at ¶[0160]. Pioneer further discloses that “in cases where luminance maximum and minimum values are preset after a luminance characteristics line has reached the maximum or minimum value thereof, the line becomes parallel to each surrounding brightness axis (x axis). Pioneer at ¶[0118].

B. U.S. Patent No. 7,110,062 to Whitted et al. (“Whitted”)

U.S. Patent No. 7,110,062 (“Whitted”) (Ex. 7), entitled *LCD with Power Saving Features*, issued on September 19, 2006, and was filed on April 26, 1999. Therefore, Whitted qualifies as prior art against the ’117 patent under at least pre-AIA 35 U.S.C. § 102(e).

Whitted discloses a system for automatically adjusting display brightness based on the combination of an ambient light level and a user input. More specifically, Whitted is directed to “[e]nergy efficient transmissive and transreflective display devices [that] use ambient light from a natural or artificial source to supplement light supplied by a backlight.” Whitted at Abstract. Whitted explains that one feature of the invention is “directed to allowing a user of a display device to set the brightness of the display and have that level maintained under a variety of ambient light conditions without requiring further operator intervention. This result is achieved in various embodiments by allowing the user of the display to set the desired brightness and then automatically adjusting the backlight intensity, as a function of sensed light intensity, so that the display will be perceived as having the degree of brightness to which the display was set despite changing light conditions.” Whitted at 3:65–4:7. Figure 12, shown below, illustrates a portable computer with one exemplary embodiment of the invention. *See id.* at 7:52–55.



According to Whitted, the “photo-sensor 502 is mounted on the front of the display panel 206 so that the intensity of light falling on the front of the display panel 206 can be measured.” *Id.* at 7:59–61. “The portable computer 500, further comprises a backlight intensity control circuit 503 and a brightness control circuit 504 which are used to control the amount of power supplied to the backlight 510 and thus the intensity of light supplied to the rear of the display panel 206.” *Id.* at 7:62–66. “The brightness control circuit 504 may be implemented as a potentiometer [and] . . . [a] user may adjust the potentiometer, e.g., by turning a knob, thereby adjusting the brightness control signal supplied to the intensity control circuit 503.” *Id.* at 8:1–8.

Whitted further teaches that the “intensity control circuit 503 determines the amount of power supplied to the backlight 510 as a function of the output of the photo-sensor 502 and the received brightness control signal. The intensity of the backlight 510, as a function of the output

of the photo-sensors and brightness control outputs, is adjusted so that the perceived brightness of the display will remain generally constant despite changes in ambient light conditions.” *Id.* at 8:9–16.

Whitted discloses the use of a “minimum power level [that] is set, e.g., pre-programmed, for the backlight 510 to insure that the display is readable in low light conditions.” *Id.* at 8:22–25. “In one embodiment, even if the output of the photo-sensor 502 indicates little or no incident light, the intensity control circuit 503 does not lower the power output to the backlight 510 below a preselected threshold to insure that in dark or dimly lit conditions, images on the display panel 206 will remain visible.” *Id.* at 8:26–31. “In such an embodiment, intensity control circuit 503 maintains backlight light output between minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

C. U.S. Patent No. 4,386,345 to Narveson (“Narveson”)

U.S. Patent No. 4,386,345 (“Narveson”) (Ex. 8), entitled *Color and Brightness Tracking in a Cathode Ray Tube Display System*, issued on May 31, 1983, was filed on September 22, 1981. Therefore, Narveson qualifies as prior art against the ’117 patent under at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), and/or 102(e).

Narveson is directed to a display apparatus for use under a wide range of ambient light conditions such as in an aircraft cockpit using the “output of at least one cockpit ambient light sensor in addition to a pilot selected brightness.” *See* Narveson at Abstract. “Thus, the display brightness and contrast relative to the cockpit ambient brightness is maintained substantially constant over the entire ambient light intensity spectrum to which it and the pilot’s eyes are subjected.” *Id.* at 2:9–13. Narveson’s apparatus uses a microprocessor 26 to calculate a display

brightness based on the ambient light level and an input from a user (*id.* at 4:3–13.), as depicted in Figure 1 of Narveson:

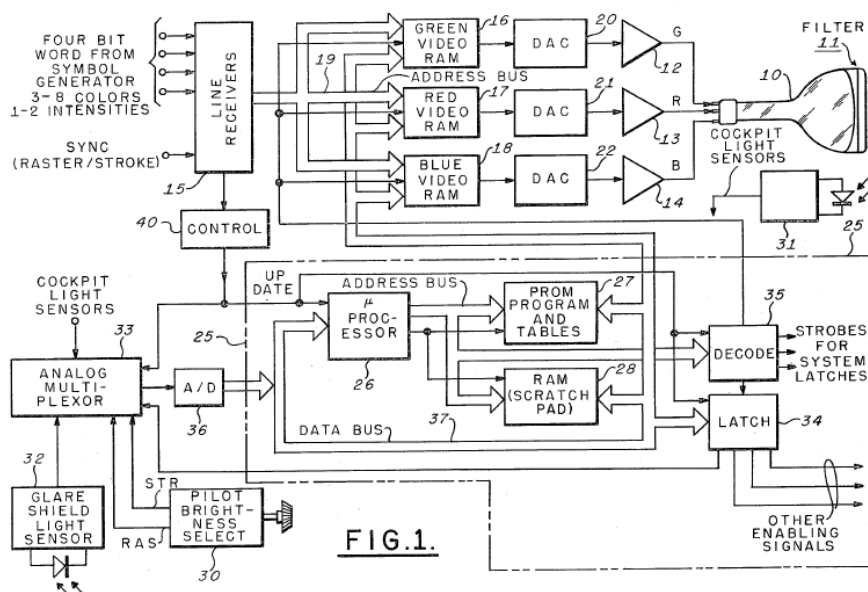
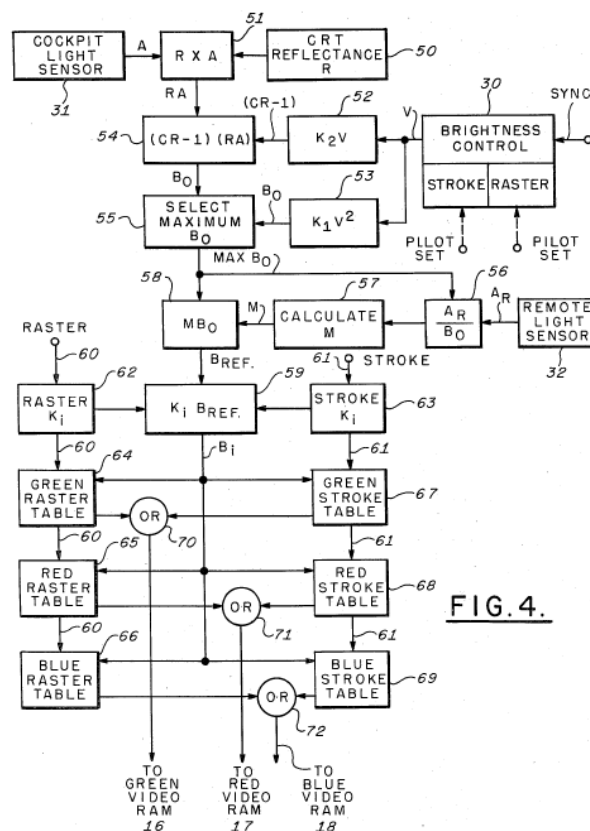
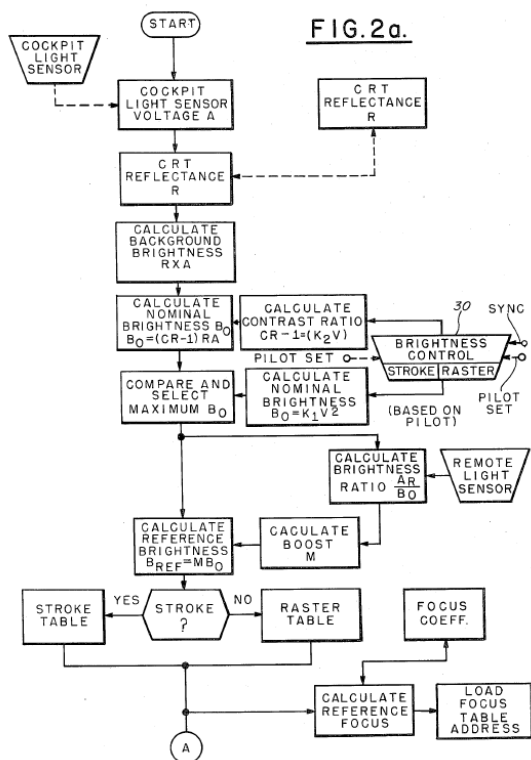


Figure 2a, shown below, depicts a flow chart illustrating the microprocessor color and brightness controller program. Figure 4, shown below, is a schematic block diagram of a hardware embodiment of Narveson's invention.



“The program starts with the sampling of the cockpit light sensor voltage A .” *Id.* at 7:64–65. “The desired contrast ratio CR is determined by the setting of the pilot’s brightness controller 30.” *Id.* at 8:12–14. “The ambient light intensity A from the cockpit light sensors 31 and the CRT reflectance value R stored at 50 are combined in block 51 to provide the value RA . The pilot set brightness control potentiometers 30 provide the output V .” *Id.* at 11:20–24. “The signal V is multiplied by the constant K_2 in the block 52 to form the quantity $(CR-1)$. The nominal brightness B_0 is provided in the block 53 by forming $K_1 V^2$. The contrast ratio signal from block 52 is applied to a block 54 to be combined with the signal RA to form the nominal brightness B_0 based on contrast ratio.” *Id.* at 11:26–32.

Narveson discloses that “[b]ecause the internal light sensor adjusts the display brightness for internal light conditions, the display brightness may not be sufficient for the pilot to immediately respond thereto and therefore the display brightness level should be boosted.” *Id.* at 8:63–67. If the ratio of the remote light sensor signal A_R to nominal brightness B_0 is less than some predetermined value, “substantially constant boost factor is provided (at the lower exterior brightness the boost factor may remain constant).” *Id.* at 8:67–9:12.

As shown in Figure 4, “[t]he values of B_0 from the blocks 53 and 54 are applied to a maximum value selector 55 which selects the maximum B_0 . The output of the maximum value selector 55 is applied as an input to a block 56 which is also responsive to the output of the remote light sensor 32. The block 56 provides the brightness ratio A_R/B_0 to a block 57 wherein the boost factor M is computed in the manner described above. The maximum nominal brightness B_0 and the boost factor M are combined in block 58 to provide the reference brightness B_{REF} .” *Id.* at 11:32–42.

D. European Patent Office Publication No. 0,570,037 to Godwin et al. (“Godwin”)

European Patent Office Publication No. 0,570,037 (“Godwin”) (Ex. 9), entitled *Head-up Display System*, published on November 18, 1993, was filed on April 5, 1993. Therefore, Godwin qualifies as prior art against the ’117 patent under at least pre-AIA 35 U.S.C. §§ 102(a) and 102(b).

Godwin discloses “an active brightness control system for a head-up display system which can maintain the projected head-up display image at a desired contrast ratio with background illumination, in which the background illumination is the ambient light intensity of the scenery in front of the vehicle.” Figure 2, shown below, depicts a control diagram of the head-up display controller fitted in an automobile.

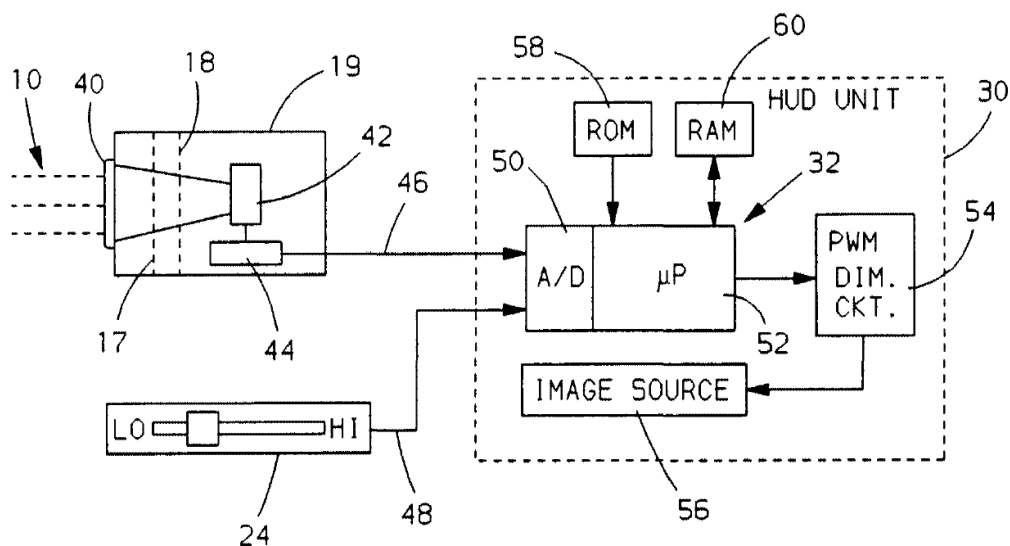


FIG. 2

“Referring to Figure 2, the sensor 18, in this embodiment, includes a housing 19 with a detector 42, such as a photocell, disposed therein. A lens 40 on the front of housing 19 focuses the light arriving from a location in the background of image plane 12 onto the detector 42 so that the impedance across detector 42 responds to background illumination at image plane 12.” Godwin at 3:15–27.

“[D]isposed on the instrumentation panel 26 is an adjuster 24 for driver adjustment of the desired contrast of the virtual image 13 at image plane 12. The 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. As the vehicle is driven and enters situations where the background illumination varies, the controller 32 automatically adjusts the brightness of the image source in the head-up display unit 30 so that the virtual image 13 at the image plane 12 appears to the driver to remain at a substantially constant intensity contrast level with the background illumination.” Godwin at 3:1–14.

Figure 3, shown below, illustrates the flow chart of control routine for the controller of Figure 2.

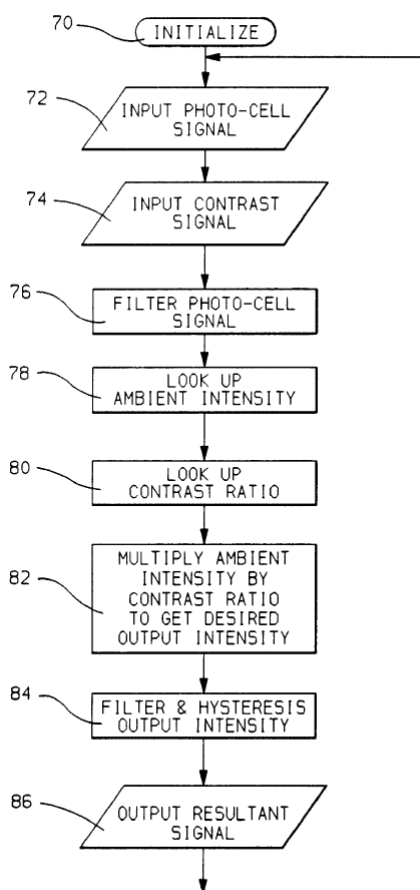


FIG. 3

“At step 72, the microprocessor inputs the sense signal from line 46 and, at step 74, inputs the contrast signal on line 48.” Godwin at 4:12–14. “At step 82 the contrast ratio signal is multiplied by the ambient light intensity to obtain a desired output intensity signal. Alternatively, the output intensity signal may be determined as: $\text{Output intensity} = \text{ambient intensity} * (\text{contrast ratio} - 1)$.” *Id.* at 4:50–56. “The resultant output intensity signal has a substantially continuous range between minimum intensity and maximum intensity for control of the image source 56 over

a large range of intensities.” *Id.* at 5:12–18. “The above-described controller provides for sensing of the ambient conditions in the background In response to the sensed conditions, the head-up display is controlled so that the projected image is automatically adjusted to maintain a substantially constant contrast ratio with the background illumination and is therefore generally always easily readable by the vehicle driver.” *Id.* at 5:25–33.

E. U.S. Patent No. 5,270,818 to Ottenstein (“Ottenstein”)

U.S. Patent No. 5,270,818 (“Ottenstein”) (Ex. 10), entitled *Arrangement For Automatically Controlling Brightness of Cockpit Displays*, issued on December 14, 1993, was filed on September 17, 1992. Therefore, Ottenstein qualifies as prior art against the ’117 patent under at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), and/or 102(e).

Ottenstein discloses “[a]n automatic brightness control [that] provides automatic compensation for the effects of ambient light on a display.” Ottenstein at Abstract. Figure 1, shown below, depicts a control diagram of the preferred embodiment embedded in a cockpit display.

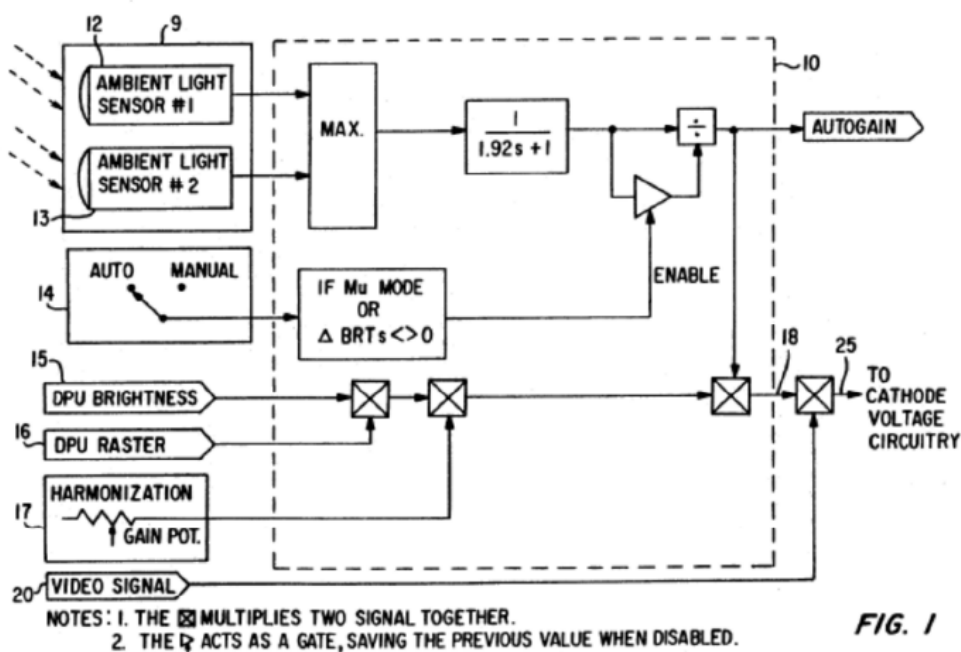


Figure 1 depicts “microprocessor 10 that interfaces with two ambient light sensors 12, 13 . . . [and] also interfaces with selectable auto mode/manual mode switch 14 and two pilot selected brightness settings, DPU Brightness (BRT) 15 and DPU Raster 16.” *Id.* at 2:21–27. “There are three rocker switches on the display 9 which control symbol brightness, raster brightness and overall brightness.” *Id.* at 2:30–33. “The auto brightness control of the present invention is designed to automatically adjust brightness to maintain a constant contrast over changes in the reflected ambient light. However, the contrast should vary when the pilot adjusts the brightness controls.” *Id.* at 3:16–20. Ottenstein discloses an implementation using the equation “ $F = (\text{DPU Brightness}) * (\text{DPU Raster}) * (\text{Harmonized Gain}) * (A/A_0)$ ”, where F and A are the current values of foreground brightness and ambient brightness, respectfully.” *Id.* at 3:29–34. “The expression (F/A) for contrast grows without limit as A approaches zero.” *Id.* at 3:65–66. “The sensed ambient brightness level should be limited so that it is always at least 10% of full scale.” *Id.* at 4:2–4.

* * * * *

A copy of every prior art patent application relied upon or referred to herein is submitted herewith as required by 37 C.F.R. § 1.510(b)(3), as follows:

- a. A copy of Pioneer is annexed hereto as Exhibit 5.
- b. A certified translation of Pioneer is annexed hereto as Exhibit 6.
- c. A copy of Whitted is annexed hereto as Exhibit 7.
- d. A copy of Narveson is annexed hereto as Exhibit 8.
- e. A copy of Godwin is annexed hereto as Exhibit 9.
- f. A copy of Ottenstein is annexed hereto as Exhibit 10.
- g. A copy of Helms is annexed hereto as Exhibit 11.
- h. A copy of Gettemy is annexed hereto as Exhibit 12.

- i. A copy of Thayer is annexed hereto as Exhibit 13.
- j. A copy of Norman is annexed hereto as Exhibit 14.
- k. A copy of Lynch is annexed hereto as Exhibit 15.
- l. A copy of Toffolo is annexed hereto as Exhibit 16.

For convenience, the cited patents and printed publications are listed on a Form PTO/SB/08a, which is attached as Exhibit 4.

X. STATEMENTS POINTING OUT EACH NEW SUBSTANTIAL QUESTION OF PATENTABILITY PURSUANT TO 37 C.F.R. § 1.510(b)(1)

The following statements are made, pursuant to 37 C.F.R. § 1.510(b)(1), pointing out each substantial new question of patentability based on the prior art patents and patent applications listed above, and annexed hereto, in accordance with the “broadest reasonable interpretation” standard as set forth in M.P.E.P. § 2258(I)(G).

For a substantial new question of patentability (SNQ) to be present, it is only necessary that: (A) the prior art patents and/or printed publications raise a substantial question of patentability regarding at least one claim, i.e., the teaching of the prior art patents and printed publications is such that a reasonable Examiner would consider the teaching to be important in deciding whether or not the claim is patentable; and (B) the same question of patentability as to the claim has not been decided by the Office in a previous examination or pending reexamination of the patent or in a final holding of invalidity by the Federal Courts in a decision on the merits involving the claim. *See* M.P.E.P. § 2242. Furthermore, “[i]t must first be demonstrated that a patent or printed publication that is relied upon in a proposed rejection presents a new, non-cumulative technological teaching that was not previously considered and discussed on the record during the prosecution of the application that resulted in the patent for which reexamination is requested, and

during the prosecution of any other prior proceeding involving the patent for which reexamination is requested.” M.P.E.P. § 2216.

The Director determines “whether a substantial new question of patentability affecting any claim of the patent concerned is raised by the request, with or without consideration of other patents or printed publications.” 35 U.S.C. § 303(a). “The existence of a substantial new question of patentability is not precluded by the fact that a patent or printed publication was previously cited by or to the Office or considered by the Office.” *Id.* “The ‘substantial new question of patentability’ requirement prevents potential harassment of patentees by ‘act[ing] to bar reconsideration of any argument already decided by the [PTO], whether during the original examination or an earlier reexamination.’” *In re Swanson*, 540 F.3d 1368, 1375 (Fed. Cir. 2008) (quoting from H.R. Rep. No. 96—1307(I)(1980)).

As set forth in detail below in Section XI, the foregoing prior art printed publications would have been considered important by a reasonable Examiner in deciding whether to allow claims 1–7, 9, and 15–18 of the ’117 patent. The same questions of patentability set forth below as to the claims have not been considered or decided by the Office in an earlier concluded examination or authoritative review of the patent, or in a final holding of invalidity by a federal court. Therefore these prior art references raise substantial new questions of patentability, as follows:

A. Claims 1, 2, 4–7 and 15–18 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Pioneer

As recognized and conceded by patent owner during the prosecution of the ’117 patent, 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

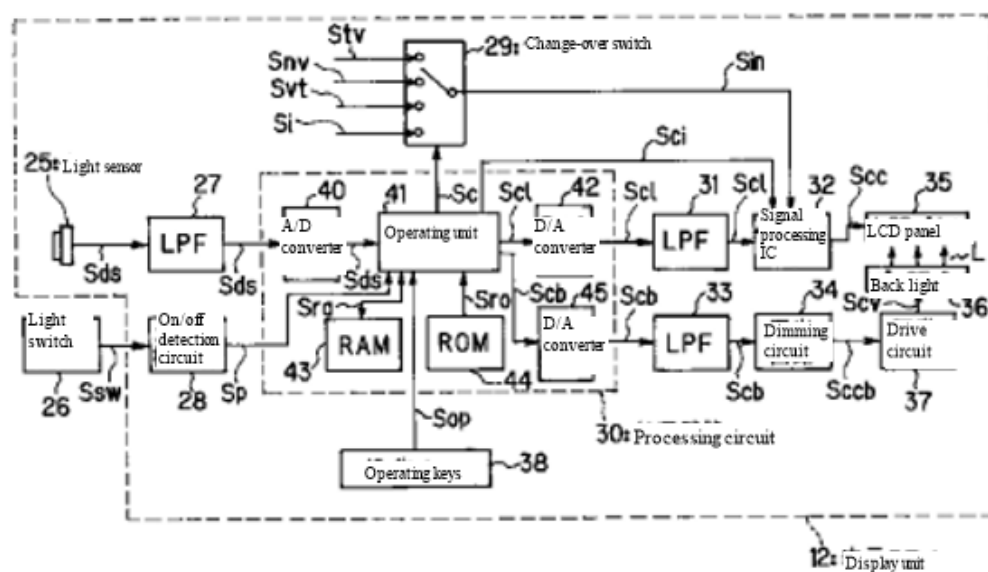
level; a multiplier configured to selectively generate a combined signal based on a mathematical product of the user signal and the sensing signal; and a dark level bias configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display (e.g., the limitations recited in independent claim 21 during prosecution), was known in the art, at the time of the earliest possible priority date of the '117 patent.

During prosecution, patent owner never argued or contested that Narveson does not disclose a brightness control circuit with selective ambient light correction. Patent owner also never argued that Narveson did not disclose any of the claim limitations recited in independent claim 21. Instead, patent owner accepted the rejection of independent claim 21 based on Narveson and amended claim 21 to recite “such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.” Patent owner then “respectfully submit[ted] that Claim 21 is patentably distinguished . . . and respectfully request[ed] allowance of Claim 21.” '117 Patent, File History at 158–60 (01/23/2012 Response to Office Action). By conceding to the rejection of claim 21 based on Narveson during prosecution of the '117 patent, patent owner admitted that the combination of all of those recited features were not novel.

However, maintaining a brightness control signal above a predetermined level when the ambient light level decreases to approximately zero was also not novel at the time of filing the '117 patent. For example, Pioneer discloses a dark level bias ($S1$) configured to adjust the combined signal ($(yS2/xS2) * xn$) to generate a brightness control signal (yn) that is used to control the brightness level of a visible display (LCD panel 35) such that the brightness control

signal (y_n) is maintained above a predetermined level (y_{S1}) when the ambient light level decreases to approximate zero (i.e., $x_n = 0$).

Pioneer describes a system for automatically adjusting display brightness based on the combination of an ambient light level and a user input. Pioneer teaches that the brightness of the display is controlled by the “operating unit” 41 which sets “adjustment values” and provides a signal (“Scb”) to the “dimming circuit” 34 and “drive circuit” 37. The drive circuit then adjusts the “backlight” 36 for the “LCD panel” 35. *See, e.g.*, Pioneer, ¶¶[0088]–[0094], Fig. 3. The operating unit receives an input from “light sensor 25.” The light sensor detects surrounding brightness and sends a “brightness detection signal Sds” to the operating unit 41. *See, e.g.*, Pioneer, ¶[0098], Fig. 3. The operating unit also receives an input from “adjusting keys 38a through 38d.” When the adjustment keys are operated, they send an “operating signal Sop” to the operating unit 41. *See, e.g.*, Pioneer, ¶¶[104]–[106], Fig. 3.



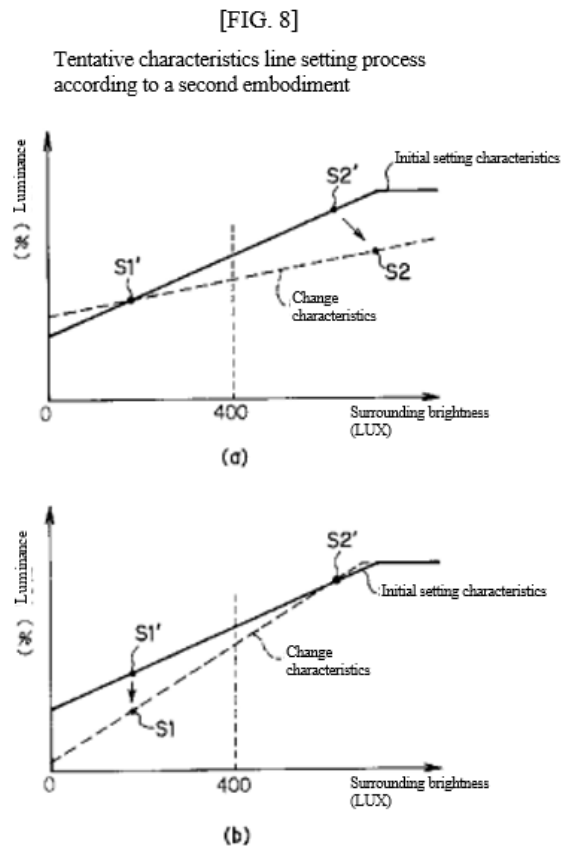
Block diagram illustrating a detailed configuration of a display unit according to an embodiment

[FIG. 3]

Pioneer's system sets display brightness by calculating "luminance characteristic lines" based on two luminance values input by the user: S1 (which sets the display luminance (yS1) for dark conditions and corresponds to surrounding brightness xS1) and S2 (which sets the luminance (yS2) for bright conditions and corresponds to surrounding brightness xS2). Pioneer provides an equation for a straight line (i.e., in " $y = mx + b$ " format) that fits the two input values—S1 and S2—and calculates display luminance y_n for corresponding surrounding brightness x_n :

$$y_n = \frac{(yS2 - yS1)}{(xS2 - xS1)} \times (x_n - xS1) + yS1$$

The luminance graph setting the characteristics lines corresponding to Equation 2 is shown below in Figure 8.



Accordingly, Pioneer discloses a brightness control signal (yn), which provides the equation for the “luminance characteristics lines” that are fit to two input values: the bright region setting S2 (“user signal”) and the dark region setting S1 (“dark level bias”). The above equation, discloses a “multiplier” that generates a combined signal based on the “user signal” (S2) and “sensing signal” (xn). The combined signal is then adjusted by the “dark level bias” (S1)—*i.e.*, the luminance setting for the dark region of the graph. This generates the brightness control signal (yn) for a corresponding sensing signal (xn). As shown in Figure 8 above, the dark level bias (S1) maintains the brightness control signal above a minimum level when ambient light level decreases to approximately zero.

As explained further below in Section XI, Pioneer discloses all of the features recited in claims 1, 2, 4–7 and 15–18. Accordingly, a reasonable Examiner would consider Pioneer important in deciding whether or not issued claims 1, 2, 4–7 and 15–18 are patentable. *See* M.P.E.P. § 2242. Therefore, Pioneer raises a substantial new question of patentability for issued claims 1, 2, 4–7 and 15–18 of the ’117 patent.

B. Claim 3 is unpatentable under 35 U.S.C. § 103 as obvious over Pioneer

As discussed above in Section X.A, claim 1 requires that the dark level bias adjusts the “combined signal” that is generated by a multiplier “based on both the user signal and the sensing signal.” Claim 3 recites that there are three inputs into the “multiplier”: the user signal, the sensing signal, and the dark level bias. Claim 3 merely changes the order of sequence in which the signals are applied to the multiplier, requiring the multiplier to multiply a sum of the user signal and the sensing signal by the dark level bias.

As explained further below in Section XI, Pioneer suggests that signals can be combined such that the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias. Accordingly, a reasonable Examiner would consider Pioneer important in deciding whether or not issued claim 3 is patentable. *See* M.P.E.P. § 2242. Therefore, Pioneer raises a substantial new question of patentability for issued claim 3 of the '117 patent.

C. Claims 1–7, 9, and 15–18 are unpatentable Under 35 U.S.C. § 103 as obvious over Pioneer in view of Ottenstein

As discussed above in Sections **Error! Reference source not found.** and X.B, Pioneer discloses or suggests all limitations of claims 1–7 and 15–18, including maintaining the brightness control signal above a minimum level when the ambient light level decreases to approximately zero, which is the language added by amendment to independent claim 21 during prosecution that led to allowance of the '117 patent.

Independent claim 1 of the '117 patent recites that the multiplier is configured to *selectively generate* a combined signal, and independent claim 15 recites a *selectively multiplying* step. For the reasons explained above and below, under the “broadest reasonable interpretation” standard, Pioneer discloses the *selectively* limitations of these claims. However, during prior litigation, the patent owner argued that the plain and ordinary meaning of *selectively* is “on a selective basis” and that “to selectively generate” means that “a selection must be made to determine whether the generation occurs.” Plaintiff’s Claim Construction Brief from Samsung Litigation at 5 (Ex. 22).

In support of its proposed construction, the patent owner pointed to the specification’s description of selecting between “auto” and “manual” modes in the '117 patent. *See id.* (citing '117 patent at 2:17–27). In the event the Office determines that the broadest reasonable interpretation of *selectively* does *not* encompass the selective multiplication disclosed by Pioneer

(see Sections XI.A.1.d and XI.A.7.c, *infra*), claims 1–7, 9, and 15–18 would have been obvious over Pioneer in view of Ottenstein.

Ottenstein discloses allowing a user to switch between manual and automatic brightness control modes. For example, Ottenstein discloses that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:24–30.

With regard to claim 9, Ottenstein discloses 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*. Ottenstein at 1:50–55, 2:24–30; see also File History at 110 (11/7/2012 Office Action at 11) (citing Ottenstein, Fig. 1 and accompanying text).

As explained further below in Section XI, the combination of Pioneer and Ottenstein discloses or suggests all of the features recited in claims 1–7, 9, and 15–18. Accordingly, a reasonable Examiner would consider Pioneer and Ottenstein important in deciding whether or not issued claims 1–7, 9, and 15–18 are patentable. See M.P.E.P. § 2242. Therefore, the combination of Pioneer and Ottenstein raises a substantial new question of patentability for issued claims 1–7, 9, and 15–18 of the ’117 patent.

D. Claims 1–7, 9, and 15–18 are unpatentable under 35 U.S.C. § 103 as obvious over Narveson in view of Whitted and Ottenstein

As discussed above in Section X.A, during prosecution patent owner did not argue that Narveson did not disclose any of the claim limitations recited in independent claim 21. Instead, patent owner accepted the rejection of independent claim 21 based on Narveson and amended

claim 21 to recite “such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.” Whitted discloses a “minimum power level” (dark level bias) that is “pre-programmed” into the intensity control circuit to insure that the display will be readable in low light conditions. Whitted at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to “maintain[] backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

Therefore, it was well known to one of ordinary skill in the art at the time of filing of the ’117 patent that a brightness control could be maintained above a predetermined level when the ambient light level decreases to approximately zero, as disclosed in Whitted, for example.

Also, as explained above in Section X.C, Ottenstein discloses allowing a user to switch between manual and automatic brightness control modes. For example, Ottenstein discloses that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:24–30.

As explained further below in Section XI, the combination of Narveson in view of Whitted and Ottenstein discloses or suggests all of the features recited in claims 1–7, 9, and 15–18. Accordingly, a reasonable Examiner would consider the combination of Narveson in view of Whitted and Ottenstein important in deciding whether or not issued claims 1–7, 9, and 15–18 are patentable. *See* M.P.E.P. § 2242. Therefore, the combination of Narveson in view of Whitted and

Ottenstein raises a substantial new question of patentability for issued claims 1–7, 9, and 15–18 of the '117 patent.

E. Claims 1–7, 9, and 15–18 are unpatentable under 35 U.S.C. § 103 as obvious over Whitted in view of Godwin and Ottenstein

As discussed above in Section X.A, during prosecution patent owner did not argue that Narveson did not disclose any of the claim limitations recited in independent claim 21. Instead, patent owner accepted the rejection of independent claim 21 based on Narveson and amended claim 21 to recite “such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.”

Whitted’s brightness control circuit provides ambient light correction through a combined signal that is based on a user signal and sensing signal and incorporates a dark level bias that adjusts 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. While Whitted suggests the use of multiplication to generate its combined signal, Godwin discloses a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal. Godwin at 4:50–56.

Also, as explained above in Section X.C, Ottenstein discloses 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, as recited in claim 9. In prior litigation, the patent owner has argued that the claim term selectively from independent claims 1 and 15 should be construed to

require a feature like that disclosed in Ottenstein in which the automatic mode is selectively disabled.

As explained further below in Section XI, the combination of Whitted, Godwin and Ottenstein discloses or suggests all of the features recited in claims 1–7, 9, and 15–18. Accordingly, a reasonable Examiner would consider the combination of Whitted, Godwin and Ottenstein important in deciding whether or not issued claims 1–7, 9 and 15–18 are patentable. *See* M.P.E.P. § 2242. Therefore, the combination of Whitted, Godwin and Ottenstein raises a substantial new question of patentability for issued claims 1–7, 9 and 15–18 of the '117 patent

XI. DETAILED EXPLANATION OF THE PERTINENCE AND MANNER OF APPLYING THE CITED PRIOR ART PURSUANT TO 37 C.F.R. § 1.510(b)(2)

Reexamination of claims 1–7, 9, and 15–18 of the '117 patent is requested. The following proposed rejections provide a detailed explanation of the pertinence and manner of applying the prior art to each of claims 1–7, 9, and 15–18 pursuant to 37 C.F.R. § 1.510(b)(2). The detailed explanations below show, for each limitation of the '117 patent, where that limitation is found within each prior art reference. The analysis contained in these explanations reflects the broadest reasonable interpretation (*see* Section VIII.D, *supra*), as well as constructions applied in prior district court litigation, neither of which necessarily reflects the construction that Requester believes should be given to the claims under the *Phillips* standard.

A. Proposed Rejection 1: Claims 1, 2, 4–7 and 15–18 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Pioneer

Pioneer anticipates claims 1, 2, 4–7 and 15–18 because Pioneer teaches every element of these claims.

1. Independent Claim 1

a) Claim Limitation 1 [preamble]: A brightness control circuit with selective ambient light correction comprising:

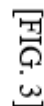
To the extent the preamble is a limitation, Pioneer discloses *a brightness control circuit (processing circuit 30) with selective ambient light correction (controlling a display on the LCD panel 35 based on the detected brightness and set display characteristics)*¹ as recited in claim 1.

For example, Pioneer described its system as follows:

Provide an LCD panel 35 for displaying information, an adjusting key 38 for inputting input values for setting display characteristics of the LCD panel 35, a light sensor 25 for detecting a surrounding brightness of the LCD panel 35, and **an operating unit 41 for setting the display characteristics of the LCD panel 35 based on an input value that was input and a detected brightness, and controlling a display on the LCD panel 35 based on the detected brightness and set display characteristics.**

Pioneer at Abstract (emphasis added). Figure 3, shown below, is a block diagram illustrating a detailed configuration of the display unit, including processing circuit 30.

¹ Throughout this Section XI, Requester denotes the '117 patent's claim language in *italics* instead of with quotation marks.



b) Claim Limitation 1 [a]: a first input configured to receive a user signal indicative of a user selectable brightness setting;

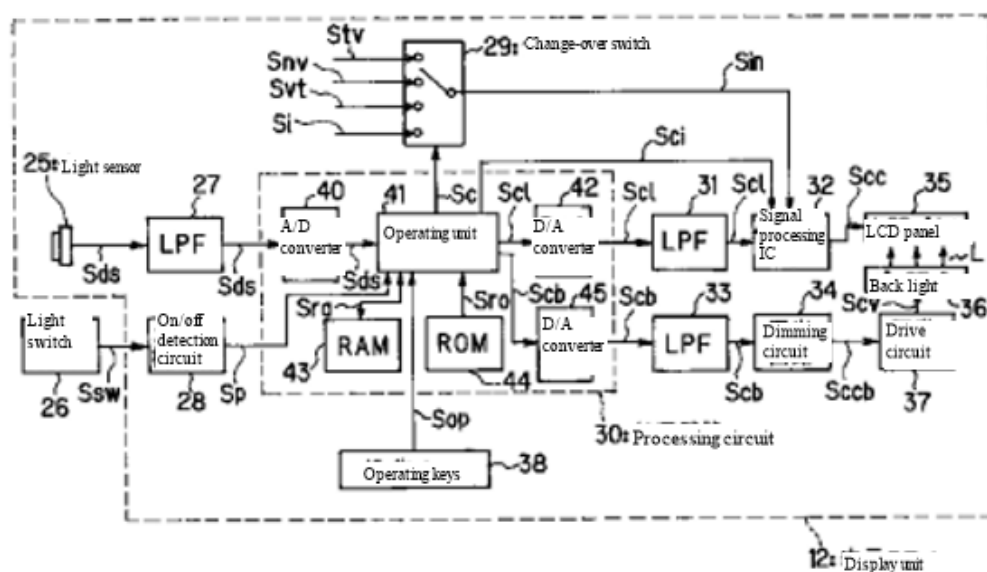
Additionally, with regard to the display state (image quality) control, **an adjusting key for adjusting display states is provided on an operating unit inside driver's seat, which key is configured to temporarily store an adjustment value input by a driver operating the adjusting key, and so as to be able to classify and adjust the display state to a brightness desired by the driver** in, for example, 50 stages.

54

In order to resolve the aforementioned problems, the invention according to claim 1 includes display means, such as an LCD panel, or the like, for displaying information; **input means, such as an adjustment key, or the like, for inputting an input value for setting display characteristics for the display means;** detection means, such as a light sensor, or the like, for detecting a surrounding brightness of the display means as a detection value; setting means, such as an operating unit, or the like, for setting display characteristics based on the input value that was input and the detected detection value; and control means, such as an operating unit, or the like, for controlling the display means based on the detected detection value **and the set display characteristics.**

Pioneer at [0019] (emphasis added).

Pioneer's apparatus uses a processing circuit which incorporates an operating unit that determines display brightness based on ambient light level and an input from a user, as shown in Figure 3 below.



Block diagram illustrating a detailed configuration of a display unit according to an embodiment

[FIG. 3]

Pioneer teaches that the brightness of the display is controlled by the “operating unit” 41 which sets “adjustment values” and provides a signal “Scb” to the “dimming circuit” 34 and “drive circuit” 37. The drive circuit then adjusts the “backlight” 36 for the “LCD panel” 35. *See, e.g.,*

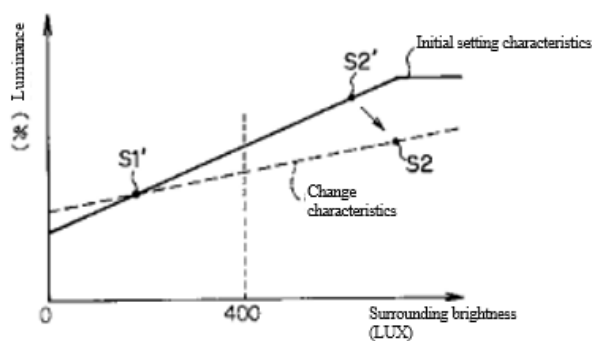
Pioneer, ¶¶[0088]–[0094], Fig. 3. The operating unit receives an input from “operating keys” 38, or “adjusting keys 38a through 38d” (shown as “operating keys 38” in Figure 3). When the adjustment keys are operated, they send an “operating signal Sop” to the operating unit 41. *See, e.g.*, Pioneer, ¶¶[0104]–[0106], Fig. 3.

Pioneer discloses an equation and a graph (which graphs the display luminance vs. surrounding brightness) for calculating “luminance characteristics lines” and setting display brightness, as shown by Equation (2) and Figure 8 below.

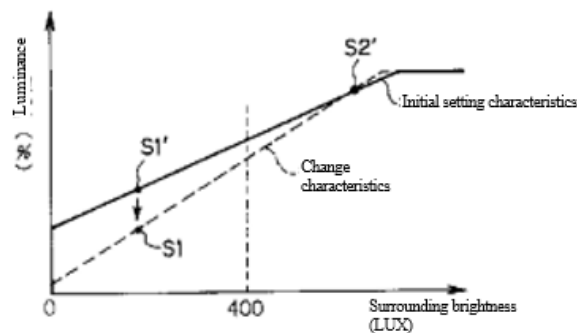
$$yn = \frac{(yS2 - yS1)}{(xS2 - xS1)} \times (xn - xS1) + yS1$$

[FIG. 8]

Tentative characteristics line setting process
according to a second embodiment



(a)



(b)

Pioneer teaches dividing ambient brightness into two regions, and then setting characteristics lines based on two user inputs: S1 (which sets the luminance y_{S1} for dark conditions and corresponds to surrounding brightness x_{S1}) and S2 (which sets the luminance y_{S2} for bright conditions and corresponds to surrounding brightness x_{S2}). The luminance y_n for a given surrounding brightness x_n is determined by Equation (2). Pioneer at ¶[0143]. Pioneer discloses:

Therefore, by setting one setting value for each region, the display characteristics can be adjusted more closely to the desires of a user because the display characteristics can be set differently during display characteristics setting when surroundings are bright than when surroundings are dark.

Pioneer at ¶[0160]. As demonstrated by Equation (2), the display luminance setting for bright conditions, i.e., S2, corresponds to the user signal indicative of a user selectable brightness setting.

Accordingly, Pioneer discloses that its brightness control circuit comprises *a first input (S2) configured to receive a user signal (operating signal Sop) indicative of a user selectable brightness setting* (i.e., “brightness desired by the driver” set by “operating keys 38” or “adjusting keys 38a through 38d”) as recited in claim 1 of the ’117 patent.

c) Claim Limitation 1[b]: a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;

Pioneer discloses that its brightness control circuit comprises *a light sensor* (light sensor 25) *configured to sense ambient light* (surrounding brightness) *and to output a sensing signal* (“brightness detection signal Sds” represented by x_n in Equation (2)) *indicative of the ambient light level* as recited in claim 1 of the ’117 patent. For example, Pioneer discloses:

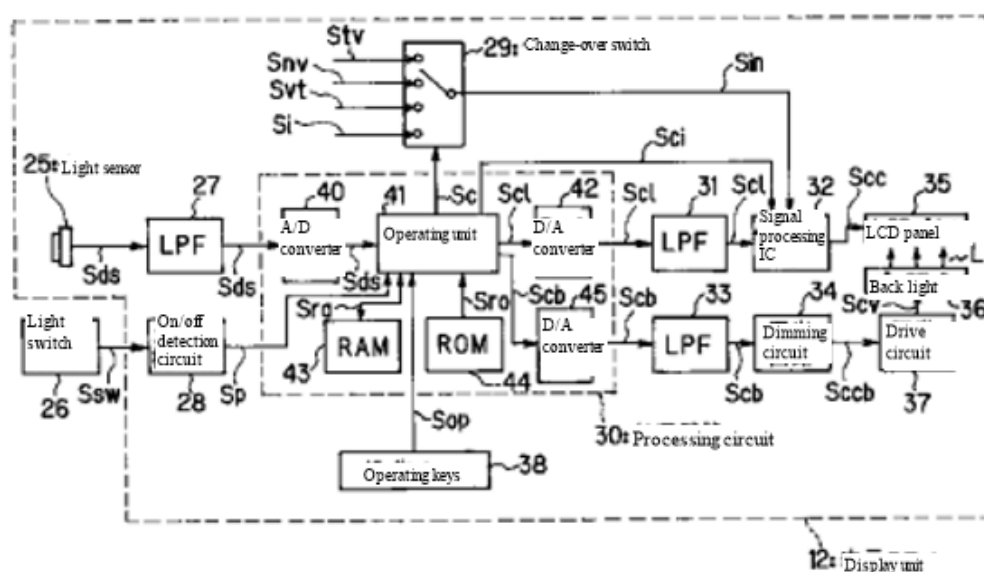
In order to resolve the aforementioned problems, the invention according to claim 1 includes display means, such as an LCD panel, or the like, for displaying information; input means, such as an adjustment key, or the like, for inputting an

input value for setting display characteristics for the display means; **detection means, such as a light sensor, or the like, for detecting a surrounding brightness of the display means as a detection value**; setting means, such as an operating unit, or the like, for setting display characteristics based on the input value that was input and the detected detection value; and control means, such as an **operating unit, or the like, for controlling the display means based on the detected detection value** and the set display characteristics.

Pioneer at ¶[0019] (emphasis added).

More particularly, Pioneer further discloses that “the detection means detects the surrounding brightness of the display means as the detection value,” Pioneer at ¶[0021], and “a light receiving surface of a light sensor 25 is provided above the LCD panel 35.” Pioneer at ¶[0053].

Pioneer's apparatus uses a processing circuit (30) which incorporates an operating unit (41) that determines display brightness based on ambient light level and an input from a user, as shown in Figure 3 below.



Block diagram illustrating a detailed configuration of a display unit according to an embodiment

[FIG. 3]

Pioneer teaches that the brightness of the display is controlled by the “operating unit” 41 which sets “adjustment values” and provides a signal to the “dimming circuit” 34 and “drive circuit” 37. The drive circuit then adjusts the “backlight” 36 for the “LCD panel” 35. *See, e.g.*, Pioneer, ¶¶[0088]–[0094], Fig. 3. The operating unit receives an input from “light sensor 25.” The light sensor detects surrounding brightness and sends a “brightness detection signal Sds” to the operating unit 41. *See, e.g.*, Pioneer, ¶[0098], Fig. 3.

Accordingly, Pioneer discloses that its brightness control circuit comprises *a light sensor* (light sensor 25) *configured to sense ambient light* (surrounding brightness) *and to output a sensing signal* (“brightness detection signal Sds” represented by xn in Equation (2)) *indicative of the ambient light level* as recited in claim 1 of the ’117 patent.

d) Claim Limitation 1[c]: a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal; and

Pioneer discloses that its brightness control circuit comprises *a multiplier* (logic within operating unit 41, as reflected in Equation 2 discussed below, that performs “the process for setting luminance characteristics”) *configured to selectively generate a combined signal* ($(yS2/xS2) * xn$) *based on both the user signal* ($S2$ —i.e., the luminance setting $yS2$ for corresponding brightness $xS2$) *and the sensing signal* (xn) as recited in claim 1 of the ’117 patent.

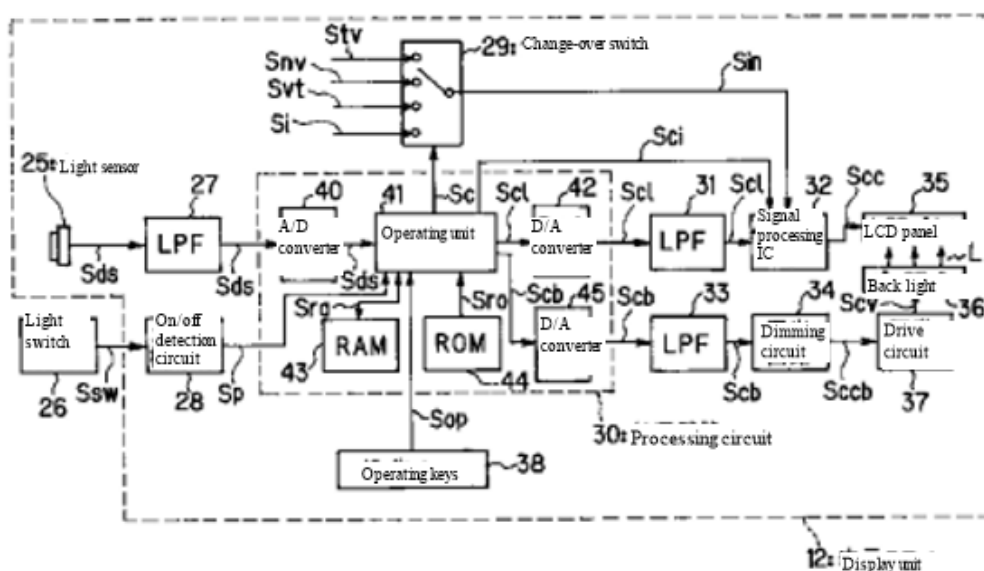
For example, Pioneer discloses:

Furthermore, the operating unit 41 sets display characteristics in the display of the LCD panel 35 or the back light 36 based on the input brightness detection signal Sds and the operating signal Sop, sets adjustment values (luminance adjustment value in the case of the back light 36) for the various display states based on the set display characteristics, and then stores the values as an adjustment value signal Sra in RAM 43.

Pioneer at ¶[0075] (emphasis added). Pioneer further discloses:

Additionally, the operating unit 41; reads the adjustment values for the various display states from RAM 43 as the adjustment value signal Sra based on operating commands input as a result of the input source switching key operation, the on/off detection signal Sp, and the brightness detection signal Sds; generates adjustment signals Scl and Scb; and outputs the signal to D/A converter 42 or 45, respectively, to thus adjust and control the various display states in the LCD panel 35 or the back light 36.

Pioneer at ¶[0077] (emphasis added). Pioneer's apparatus uses a processing circuit 30 which incorporates an operating unit 41 that determines display brightness based on ambient light level and an input from a user, as shown in Figure 3 below.



Block diagram illustrating a detailed configuration of a display unit according to an embodiment

[FIG. 3]

Pioneer teaches that the brightness of the display is controlled by the “operating unit” 41 which sets “adjustment values” based on either Equation (1) or Equation (2) (discussed below) and provides a signal to the “dimming circuit” 34 and “drive circuit” 37. The drive circuit 37 then adjusts the “backlight” 36 for the “LCD panel” 35. *See, e.g.*, Pioneer, ¶[0088]–[0094], Fig. 3. The operating unit 41 receives an input from “light sensor 25.” The light sensor 25 detects surrounding brightness and sends a “brightness detection signal Sds” to the operating unit 41. *See,*

e.g., Pioneer, ¶[0098], Fig. 3. The operating unit 41 also receives an input from “adjusting keys 38a through 38d” (shown as “operating keys 38” in Figure 3). When the adjusting keys 38a–38d are operated, they send an “operating signal Sop” to the operating unit 41. *See, e.g.*, Pioneer, ¶¶[0104]–[0106], Fig. 3.

Pioneer discloses two embodiments in which “luminance characteristics lines” are calculated to fit two or three input values as a function of detected “surrounding brightness.” In both embodiments, the luminance graph is divided into “regions” based on surrounding brightness—the first embodiment is divided into three regions and the second embodiment is divided into two regions. *Id.* at ¶¶[0103], [0112]–[0120], [0143]–[0146].

For the **first embodiment**, Pioneer discloses three input values (one for each region) and the equation for the resulting “luminance characteristics line” as given by Equation (1):

[Equation 1]

$$(A) \ y_n = \{(y_{S2} - y_{S1}) / (x_{S2} - x_{S1})\} (x_n - x_{S1}) + y_{S1}$$

(when $x_n \leq x_{S2}$)

$$(B) \ y_n = \{(y_{S3} - y_{S2}) / (x_{S3} - x_{S2})\} \times (x_n - x_{S2}) + y_{S2}$$

(when $x_{S2} < x_n$)

Pioneer at ¶[0120]. Pioneer also discloses:

Note that, in the Equation (1), y_{S1} shows the input value at the time the setting value S1 was set, y_{S2} shows the input value at the time the setting value S2 was set, and y_{S3} shows the input value at the time the setting value S3 was set, while x_{S1} shows the detection values at the time the setting value S1 was set, x_{S2} shows the detection value at the time the setting value S2 was set, and x_{S3} shows the detection value as the time setting value S3 was set.

Pioneer at ¶[0120].

In the *second embodiment*, Pioneer discloses that “it is also possible to divide the surrounding brightness into only two regions, and then set new characteristics lines, and the like.”

Id. at ¶[0143].

Pioneer further discloses:

Therefore, by setting one setting value for each region, the display characteristics can be adjusted more closely to the desires of a user because the display characteristics can be set differently during display characteristics setting when surroundings are bright than when surroundings are dark.

Pioneer at ¶[0160]. In addition, Pioneer discloses:

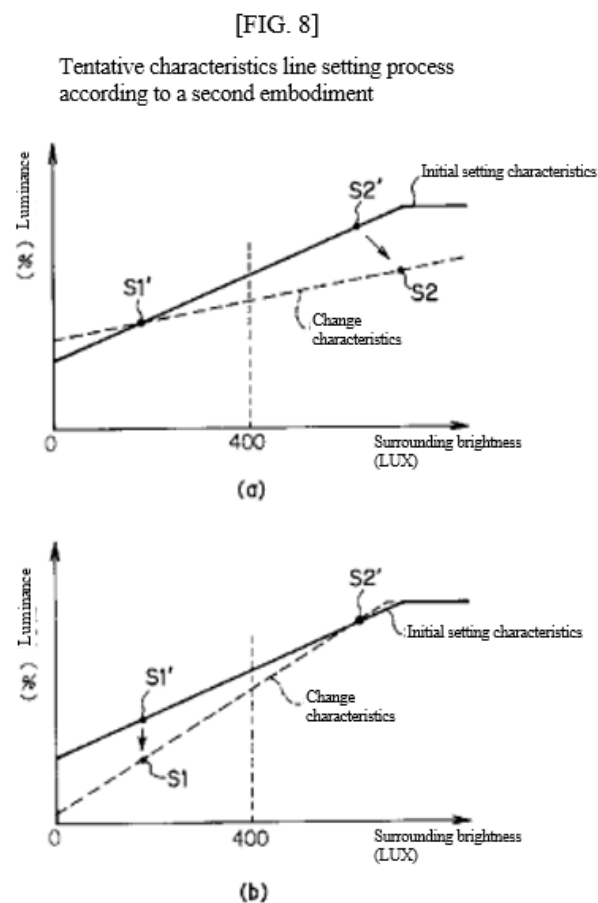
In step S9 in this case, if the luminance determined with respect to the surrounding brightness x_n using the aforementioned set tentative characteristics line (step S7) is y_n , luminance y_n corresponding to each surrounding brightness value x_n is determined based on the following equation rather than the Equation (1).

[Equation 2]

$$y_n = \{(yS2 - yS1) / (xS2 - xS1)\} \times (x_n - xS1) + yS1$$

Pioneer at ¶¶[0145]–[0146].

Figure 8, shown below, illustrates the “tentative characteristics line setting process” according to the second embodiment:



Pioneer, Fig. 8. In the second embodiment, as shown in Figure 8, the user inputs two luminance values: S1 (which sets the luminance y_{S1} for dark conditions and corresponds to surrounding brightness x_{S1}) and S2 (which sets the luminance y_{S2} for bright conditions and corresponds to surrounding brightness x_{S2}). The luminance y_n for a given surrounding brightness x_n is determined by Equation (2).

In Equation 2 and accompanying Figure 8, Pioneer discloses a brightness control signal y_n , which provides the equation for the “luminance characteristics lines” that are fit to two input

values: the bright region setting S2 (based on the user signal) and the dark region setting S1 (dark level bias). Equation 2, reproduced below, as well as the graphs depicted in Figure 8, disclose a “multiplier” that generates a combined signal based on the “user signal” (S2) and “sensing signal” (xn).

$$yn = \frac{(yS2 - yS1)}{(xS2 - xS1)} \times (xn - xS1) + yS1$$

For example, when Equation 2 is multiplied out, it includes the term $((yS2/xS2) * xn)$, which includes a mathematical product ($yS2 * xn$) of the user signal (S2—in particular, the luminance setting $yS2$) and sensing signal (xn). Pioneer discloses that the “operating unit 41 sets display characteristics in the display of the LCD panel 35 or the back light 36 based on the input brightness detection signal Sds [from light sensor 25] and the operating signal Sop [from operating keys 38].” Pioneer at ¶[0075]. Therefore, Pioneer discloses a “multiplier” (logic within operating unit 41 that performs “the process for setting luminance characteristics”) that generates a “combined signal” $((yS2/xS2) * xn)$ based on both the “user signal” S2 (i.e., the luminance setting $yS2$ for corresponding brightness $xS2$) and the “sensing signal” (xn).

* * * * *

Pioneer discloses that its multiplier (logic within operating unit 41, as reflected in Equation 2, that performs “the process for setting luminance characteristics”) *selectively* generates the combined signal in two ways, both of which are consistent with the ’117 patent’s use of *selectively* to refer to different modes of operation, such as recited in claim 9.

First, the “on/off detection circuit 28” in Fig. 3 sends a signal to operating unit 41 as to whether the vehicles headlights are switched on or off. *See, e.g.*, Pioneer at ¶[0068]. Pioneer states that “the adjustment values for the various display characteristics were set based on whether the

headlights were on or off.” Pioneer at ¶[0139]. Pioneer further states that “by setting values that express characteristics based on whether the headlights are on or off, it is possible to perform an easy-to-see display in a vehicle that corresponds to whether the headlights are on or off.” Pioneer at ¶[0150]. Therefore, Pioneer discloses that the multiplier (logic in the operating unit) *selectively generates* the combined signal based on the user switching the vehicles headlights on or off.

Second, as noted above, Pioneer discloses two embodiments (and two corresponding equations) for generating a combined signal. Pioneer explains that because in the second embodiment “there are only two setting values that correspond to the range of the surrounding brightness” (as opposed to three setting values in the first embodiment), “each characteristics line can be set using a simple operation.” Pioneer at ¶[0149]. Therefore, Pioneer discloses that the multiplier (logic in the operating unit) *selectively generates* the combined signal based on whether the user inputs two or three setting values.

Accordingly, Pioneer discloses that its brightness control circuit comprises *a multiplier* (logic within operating unit 41 that performs “the process for setting luminance characteristics”) *configured to selectively generate a combined signal $((yS2/xS2) * xn)$ based on both the user signal (S2—i.e., the luminance setting $yS2$ for corresponding brightness $xS2$) and the sensing signal (xn)* as recited in claim 1 of the ’117 patent.

- e) **Claim Limitation 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.**

Pioneer discloses that its brightness control circuit comprises *a dark level bias (S1) configured to adjust the combined signal $((yS2/xS2) * xn)$ to generate a brightness control*

signal (yn) that is used to control a brightness level of a visible display (LCD panel 35) such that the brightness control signal (yn) is maintained above a predetermined level (yS1) when the ambient light level decreases to approximately zero (i.e., xn = 0), as recited in claim 1 of the '117 patent.

In the second embodiment, Pioneer discloses that “it is also possible to divide the surrounding brightness into only two regions, and then set new characteristics lines, and the like.”

Id. at ¶[0143]. Pioneer discloses:

Therefore, by setting one setting value for each region, the display characteristics can be adjusted more closely to the desires of a user because the display characteristics can be set differently during display characteristics setting when surroundings are bright than when surroundings are dark.

Pioneer at ¶[0160]. Pioneer further discloses:

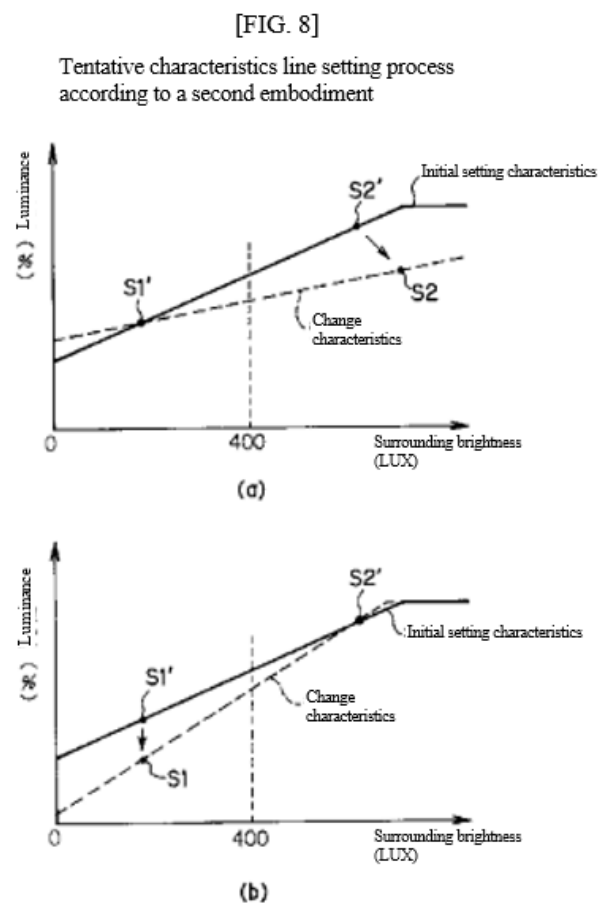
In step S9 in this case, if the luminance determined with respect to the surrounding brightness xn using the aforementioned set tentative characteristics line (step S7) is yn, luminance yn corresponding to each surrounding brightness value xn is determined based on the following equation rather than the Equation (1).

[Equation 2]

$$y_n = \{(y_{S2} - y_{S1}) / (x_{S2} - x_{S1})\} \times (x_n - x_{S1}) + y_{S1}$$

Pioneer at ¶¶[0145]–[0146].

Figure 8, shown below, illustrates the “tentative characteristics line setting process” according to the second embodiment:



Pioneer, Fig. 8. In the second embodiment, as shown in Figure 8, the user inputs two luminance values: S1 (which sets the luminance ($yS1$) for dark conditions and corresponds to surrounding brightness $xS1$) and S2 (which sets the luminance ($yS2$) for bright conditions and corresponds to surrounding brightness $xS2$). The luminance (yn) for a given surrounding brightness (xn) is determined by Equation (2).

In Equation 2 and accompanying Figure 8, Pioneer discloses a brightness control signal (yn), which provides the equation for the “luminance characteristics lines” that are fit to two input

values: the bright region setting S2 (“user signal”) and the dark region setting S1 (“dark level bias”). Equation 2, reproduced below, as well as the graphs depicted in Figure 8, disclose a “multiplier” that generates a combined signal based on the “user signal” (S2) and “sensing signal” (xn).

$$yn = \frac{(yS2 - yS1)}{(xS2 - xS1)} \times (xn - xS1) + yS1$$

The combined signal is then adjusted by the “dark level bias” (S1)—*i.e.*, the luminance setting for the dark region of the graph. This generates the brightness control signal (yn) for a corresponding sensing signal (xn). As shown in Figure 8 and Equation (2) above, the dark region setting (S1) can maintain the brightness control signal above a minimum level when ambient light level decreases to approximately zero.

Moreover, Pioneer discloses that the user has control over both coordinates of the dark level bias (S1)—*i.e.*, the user selects luminance level ($yS1$) and the corresponding surrounding brightness ($xS1$). For example, a user may set the dark region luminance level ($yS1$) when surrounding brightness ($xS1$) is zero, which will set a minimum output level along the y-axis. In that scenario, where $xS1$ is set to zero, Equation (2) simplifies as follows:

$$yn = \frac{(yS2 - yS1)}{(xS2)} \times (xn) + yS1$$

As shown in the above equation, the y-value ($yS1$) for the dark level bias (S1) maintains a minimum level for brightness control output (yn) when ambient light level (xn) decreases to approximately zero. And as shown in Figure 8, the graph of the straight line provided by Equation (2) crosses the y-axis at a positive y-intercept point. Indeed, this equation mirrors the embodiment

depicted in Figure 2 of the '117 patent in which the dark level bias is added to the result of the multiplication.

Accordingly, Pioneer discloses that its brightness control circuit comprises *a dark level bias (S1) configured to adjust the combined signal $((yS2/xS2) * xn)$ to generate a brightness control signal (y_n) that is used to control a brightness level of a visible display (LCD panel 35) such that the brightness control signal is maintained above a predetermined level ($yS1$) when the ambient light level decreases to approximately zero (i.e., $xn = 0$)* as recited in claim 1 of the '117 patent.

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.

Pioneer anticipates claim 2. Specifically, Pioneer discloses *the dark level bias (S1) is provided to the multiplier $((yS2/xS2) * xn)$ such that the amount of adjustment to the combined signal is dependent on the user selectable brightness setting ($yS2$)* as recited in claim 2. Pioneer discloses that the user has control over both coordinates of the dark level bias (S1)—*i.e.*, the user selects luminance level ($yS1$) and the corresponding surrounding brightness ($xS1$). Therefore, Pioneer discloses at least two methods for adjusting the combined signal with a dark level bias: either along the x-axis or the y-axis (or both). When the combined signal is adjusted along the x-axis, the amount of adjustment is dependent on the user selectable brightness setting.

For example, a user may set the dark region luminance level ($yS1$) when surrounding brightness ($xS1$) is non-zero, which will adjust the signal also along the x-axis. In this scenario, as confirmed by Equation (2) below, the adjustment by the x-value of the dark level bias will be provided to the multiplier such that the amount of adjustment is multiplied by the user signal (S2).

$$y_n = \frac{(y_{S2} - y_{S1})}{(x_{S2} - x_{S1})} \times (x_n - x_{S1}) + y_{S1}$$

Therefore, the amount of adjustment by the dark level bias is dependent on the user selectable brightness setting. In other words, the amount of adjustment by the dark level bias (S1) changes with a change in the user signal (S2). To illustrate, consider the following scenario:

Bright region luminance setting (y_{S2}): **80%**

Bright region setting surrounding brightness (x_{S2}): **600 LUX**

Dark region luminance setting (y_{S1}): **30%**

Dark region setting surrounding brightness (x_{S1}): **100 LUX**

In this scenario, the “user signal” S2 is set to 80% luminance with corresponding ambient brightness of 600 LUX, and the “dark level bias” S1 is set to 30% luminance with corresponding ambient brightness of 100 LUX. Substituting these values into Equation 2 and solving for y_n when $x_n = 0$ (i.e., zero ambient light) gives the following:

$$y_n = \frac{(0.80 - 0.30)}{(600 - 100)} \times (x_n - 100) + 0.30$$

$$y_n = 0.001 \times (x_n - 100) + 0.30$$

$$y_n = 0.20, \quad \text{when } x_n = 0$$

As shown in the equation above, the dark level bias (S1) is configured to adjust the combined signal (here, $\frac{(y_{S2}-y_{S1})}{(x_{S2}-x_{S1})} \times (x_n)$) to generate a brightness control signal (y_n) that is used to control a brightness level of a visible display such that the brightness control signal (y_n) is maintained above a predetermined level (here, 20% luminance) when the ambient light level (x_n) decreases to approximately zero (i.e., $x_n = 0$). As also demonstrated in the above scenario, the amount of adjustment by the dark level bias changes with a change in the user selectable brightness

setting (S2). For example, if the user selectable brightness setting is changed to 90% at 600 LUX, the minimum brightness signal y_n as ambient light decreases to approximately zero (i.e., $x_n = 0$) changes as follows:

$$y_n = \frac{(0.90 - 0.30)}{(600 - 100)} \times (x_n - 100) + 0.30$$

$$y_n = 0.0012 \times (x_n - 100) + 0.30$$

$$y_n = 0.18, \quad \text{when } x_n = 0$$

As shown above, a change in the user selectable brightness setting from 80% to 90% luminance changes the minimum brightness signal from 20% luminance to 18% luminance as ambient light decreases to approximately zero. Therefore, the amount of adjustment by the dark level bias to the combined signal is dependent on the user selectable brightness setting.

Accordingly, claim 2 of the '117 patent is anticipated by Pioneer.

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.

Pioneer anticipates claim 4. Specifically, Pioneer discloses *the dark level bias (S1) is added to the combined signal $((y_{S2}/x_{S2}) * x_n)$ such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting (y_{S2})* as recited in claim 2. Pioneer discloses that the user has control over both coordinates of the dark level bias (S1)—i.e., the user selects luminance level (y_{S1}) and the corresponding surrounding brightness (x_{S1}). Therefore, Pioneer discloses at least two methods for adjusting the combined signal with a dark level bias: either along the x-axis or the y-axis (or both). For example, a user may set the dark region luminance level (y_{S1}) when surrounding brightness (x_{S1}) is zero, which will set a minimum

output level along the y-axis. As shown in Figure 8, the graph of the straight line provided by Equation (2) crosses the y-axis at a positive y-intercept point. In this scenario, as confirmed by Equation (2) below, the adjustment by the dark level bias S1 (in this case, only yS1, where xS1 equals zero) is independent of the user signal (S2).

$$yn = \frac{(yS2 - yS1)}{(xS2)} \times (xn) + yS1$$

In other words, the amount of adjustment by the dark level bias (yS1) does not change with a change in the user signal (S2). To illustrate this, consider the following scenario with sample values:

Bright region luminance setting (yS2): **80%**

Bright region setting surrounding brightness (xS2): **600 LUX**

Dark region luminance setting (yS1): **20%**

Dark region setting surrounding brightness (xS1): **0 LUX**

In this scenario, the “user signal” S2 is set to 80% luminance with corresponding ambient brightness of 600 LUX, and the “dark level bias” S1 is set to 20% luminance with corresponding ambient brightness of 0 LUX. Substituting these values into Equation (2) and solving for yn when xn = 0 gives the following:

$$yn = \frac{(0.80 - 0.20)}{(600)} \times (xn) + 0.20$$

$$yn = 0.001(xn) + 0.20$$

$$yn = 0.20, \quad \text{when } xn = 0$$

As shown in the equation above, the dark level bias (S1) is configured to adjust the combined signal (here, $\frac{(yS2 - yS1)}{(xS2)} \times (xn)$) to generate a brightness control signal (yn) that is used

to control a brightness level of a visible display such that the brightness control signal (y_n) is maintained above a predetermined level (here, 20% luminance) when the ambient light level (x_n) decreases to approximately zero (i.e., $x_n = 0$). As also demonstrated in the above scenario, the amount of adjustment by the dark level bias does not change with a change in the user selectable brightness setting. For example, if the user signal (S2) was changed to 90% at 600 LUX, the minimum brightness signal remains at 20% luminance as ambient light decreases to approximately zero. Therefore, the amount of adjustment by the dark level bias to the combined signal is independent of the user selectable brightness setting (y_{S2}). In other words, the amount of adjustment by the dark level bias (y_{S1}) does not change with a change in the user signal (S2).

Accordingly, claim 4 of the '117 patent is anticipated by Pioneer.

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

As shown in Equation (2), the dark level bias (S1) is *added* to the combined signal $((y_{S2}/x_{S2}) * x_n)$. And as explained above with regard to claim 1[c] and claim 1[d], the “output of the multiplier” in Pioneer includes the combined signal that is based on both the user signal (S2) and the sensing signal (x_n). Therefore, the “combined signal” in claim 4 exists at the “output of the multiplier,” so the dark level bias is added to both at the same time.

Accordingly, claim 5 of the '117 patent is anticipated by Pioneer.

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.

Pioneer discloses that its brightness control circuit comprises *an overdrive clamp circuit (luminance maximum value) coupled to the brightness control signal (y_n) to limit its amplitude*

to a predefined range (between luminance maximum and luminance minimum values) as recited in claim 6. For example, Pioneer discloses:

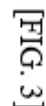
At this time, in cases where luminance maximum and minimum values are preset after a luminance characteristics line has reached the maximum or minimum value thereof, the line becomes parallel to each surrounding brightness axis (x axis).

Pioneer at [0118] (emphasis added). This is similar to the “overdrive clamp” 110 in the ’117 patent which sets the maximum value of the brightness control signal. ’117 patent, 4:59–61. The maximum value in Fig. 3 of the ’117 patent is illustrated as the “100%” voltage level, in which the brightness lines become parallel to the x-axis. ’117 patent, 6:12–15, Fig. 3. Accordingly, claim 6 of the ’117 patent is anticipated by Pioneer.

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.

Pioneer discloses that *the brightness control signal (yn) is provided to a display driver (drive circuit 37) to control backlight illumination (backlight 36) of a liquid crystal display (LCD panel 35), as recited in claim 7.*

Figure 3, shown below, illustrates the liquid crystal display panel 35, backlight 36, and drive circuit 37.



7. Independent Claim 15:

- See Claim Limitation 1[preamble], (Section XI.A.1.a), *supra*.

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See Claim Limitation 1[a], (Section XI.A.1.b), *supra*.

- c) **Claim Limitation 15[b]: selectively multiplying the input signal with a sense signal to generate a combined signal, wherein the sense signal indicates an ambient light level; and**

See Claim Limitation 1[b], (Section XI.A.1.c), *supra*, and Claim Limitation 1[c], (Section XI.A.1.d), *supra*.

- d) **Claim Limitation 15[c]: 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.**

See Claim Limitation 1[d], (Section XI.A.1.e), *supra*.

Claim 15 of the '117 patent is a method claim that closely corresponds to claim 1, and includes very similar claim limitations. During prosecution, the Examiner rejected independent claim 15 based on the same fundamental reasoning as claim 1. The applicant responded with the same amendment to claim 15 and advanced the same argument to overcome the rejection. Therefore, claim 15 is also anticipated by Pioneer for the same or substantially the same reasons as those set forth with regard to claim 1, which are incorporated fully herein, as set forth above.

8. **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.**

See Claim Limitation 1[c], (Section XI.A.1.d), *supra*, which is incorporated herein by reference.

Pioneer discloses *the step of selectively multiplying the input signal (S2) with the sense signal (xn) is performed by a software algorithm, an analog circuit, or a mixed-signal circuit* (processing circuit 30 with A/D converter 40 and D/A converters 42 and 45), as recited in claim



[FIG. 3]

Pioneer, Fig. 3. Pioneer discloses:

As illustrated in FIG. 3, the display unit 12 according to the embodiment is configured of; the light sensor 25 as detection means; LPFs (Low Pass Filters) 27, 31, and 33; an on/off detection circuit 28, a change-over switch 29, **a processing circuit 30, a signal processing IC 32, a dimming circuit 34, the LCD panel 35 as display means and liquid crystal display means, a back light 36 as display means, a drive circuit 37, and operating keys 38.**

Furthermore, **the processing circuit 30** is configured of; **an A/D converter 40**, an operating unit 41 as display means and control means, **D/A converters 42 and 45**, RAM (Random Access Memory) 43, and ROM (Read Only Memory) 44.

Pioneer at [0065]–[0066] (emphasis added). Therefore, Pioneer discloses an *analog circuit* or *mixed-signal circuit* (processing circuit 30 with A/D converter 40 and D/A converters 42 and 45).

9. **Claim 17:** The method of claim 15, wherein the dark level bias is added to the sense signal before selective multiplication such that

the amount of adjustment to the combined signal is dependent on the input signal.

See Claim 2, (Section XI.A.2), *supra*, which is incorporated herein by reference.

For the same or substantially the same reasons as those discussed in reference to claim 2, Pioneer discloses *the dark level bias (S1) is added to the sense signal (xn) before selective multiplication such that the amount of adjustment to the combined signal ((yS2/xS2) * xn) is dependent on the input signal (S2)*, as recited in claim 17.

As explained above with regard to claim 2, Section XI.A.2, *supra*, Pioneer discloses that the user has control over both coordinates of the dark level bias (S1)—*i.e.*, the user selects luminance level (yS1) and the corresponding surrounding brightness (xS1). Therefore, Pioneer discloses at least two methods for adjusting the combined signal with a dark level bias: either along the x-axis or the y-axis (or both). When the combined signal is adjusted along the x-axis, the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment is dependent on the input signal.

For example, a user may set the dark region luminance level (yS1) when surrounding brightness (xS1) is non-zero, which will adjust the signal also along the x-axis. *Id.* In this scenario, as confirmed by Equation (2) below, the adjustment by the x-value of the dark level bias (xS1) is applied to the sense signal (xn) before selective multiplication.

$$yn = \frac{(yS2 - yS1)}{(xS2 - xS1)} \times (xn - xS1) + yS1$$

Therefore, the amount of adjustment by the dark level bias (S1) is dependent on the input signal (represented by S2). In other words, the amount of adjustment by the dark level bias (S1) changes with a change in the user signal (S2). Accordingly, claim 17 is anticipated by Pioneer for

the same or substantially the same reasons as those stated above in reference to claim 2, which are incorporated fully herein.

10. Claim 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.

See Claim 4, (Section XI.A.3), *supra*, which is incorporated herein by reference.

For the same or substantially the same reasons as those discussed in reference to claim 4, Pioneer discloses *the dark level bias (S1) is added to the combined signal ((yS2/xS2) * xn) after selective multiplication such that the amount of adjustment to the combined signal ((yS2/xS2) * xn) is independent of the input signal (S2) and the sense signal (xn) as recited in claim 18.*

As explained above, Pioneer discloses that the user has control over both coordinates of the dark level bias (S1)—*i.e.*, the user selects luminance level (yS1) and the corresponding surrounding brightness (xS1). Therefore, Pioneer discloses at least two methods for adjusting the combined signal with a dark level bias: either along the x-axis or the y-axis (or both). For example, a user may set the dark region luminance level (yS1) when surrounding brightness (xS1) is zero, which will set a minimum output level along the y-axis. In this scenario, as confirmed by Equation (2) below, the dark level bias (yS1) is added to the combined signal after selective multiplication.

$$y_n = \frac{(yS2 - yS1)}{(xS2)} \times (x_n) + yS1$$

Therefore, the amount of adjustment by the dark level bias (yS1) is independent of the input signal (represented by S2) and the sense signal (xn). In other words, the amount of adjustment by the dark level bias (yS1) remains unchanged with a change in the input signal (S2)

and sense signal (x_n). Accordingly, claim 18 is anticipated by Pioneer for the same or substantially the same reasons as those stated above in reference to claim 4, which are incorporated fully herein.

B. Proposed Rejection 2: Claim 3 is unpatentable under 35 U.S.C. § 103 as obvious over Pioneer.

1. Claim 3: The brightness control circuit of claim 2, wherein the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias to generate an output signal corresponding to the brightness control signal.

Claim 3 is obvious over Pioneer. As discussed above, claim 1 requires that the dark level bias adjusts the “combined signal” that is generated by a multiplier “based on both the user signal and the sensing signal.” Claim 3 recites that there are three inputs into the “multiplier”: the user signal, the sensing signal, and the dark level bias. Claim 3 merely changes the order of sequence in which the signals are applied to the multiplier, requiring the multiplier to multiply *a sum of the user signal and the sensing signal by the dark level bias*.² There are a limited number of arrangements for which the three signals can be applied to the multiplier, and a POSITA would have understood that the various signals disclosed in Pioneer could be added at different times and in different ways. Moreover, a POSITA would have readily understood, based on simple mathematical operations, whether the adjustment by the dark level bias would generate a brightness control signal that is maintained above a predetermined level when the ambient light level decreases to approximately zero. Therefore, combining the signals such that *the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias* would have been

² Requester reserves the right to argue in litigation that claim 3 is indefinite under 35 U.S.C. § 112.

obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143. Accordingly, claim 3 is obvious over Pioneer.

C. Proposed Rejection 3: Claims 1–7, 9, and 15–18 are unpatentable under 35 U.S.C. § 103 as obvious over Pioneer in view of Ottenstein

As explained above in Sections XI.A and XI.B, Pioneer discloses or suggests all limitations of claims 1–7 and 15–18.

Independent claim 1 of the ’117 patent recites that the multiplier is configured to *selectively generate* a combined signal, and independent claim 15 recites a *selectively multiplying* step. For the reasons explained above, under the “broadest reasonable interpretation” standard, Pioneer discloses the *selectively* limitations of these claims. However, during prior litigation, the patent owner argued that the plain and ordinary meaning of *selectively* is “on a selective basis” and that “to selectively generate” means that “a selection must be made to determine whether the generation occurs.” Plaintiff’s Claim Construction Brief from Samsung Litigation at 5 (Ex. 22).

In support of its proposed construction, the patent owner pointed to the specification’s description of selecting between “auto” and “manual” modes in the ’117 patent. *See id.* (citing ’117 patent at 2:17–27) In the event the Office determines that the broadest reasonable interpretation of *selectively* does *not* encompass the selective multiplication disclosed by Pioneer (see Sections XI.A.1.d and XI.A.7.c, *supra*), claims 1–7 and 15–18 would have been obvious over Pioneer in view of Ottenstein.

Ottenstein discloses allowing a user to switch between manual and automatic brightness control modes. For example, Ottenstein discloses that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14

enables the operation of the automatic brightness control and the manual mode disables it.”
Ottenstein at 2:24–30.

With regard to claim 9, Ottenstein discloses 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*, as recited in claim 9. Ottenstein at 1:50–55; *see also* File History at 110 (11/7/2012 Office Action at 11) (citing Ottenstein, Fig. 1 and accompanying text). Therefore, as explained further below, claim 9 is also obvious over Pioneer in view of Ottenstein.

1. Independent Claim 1:

a) Claim Limitation 1[preamble]: A brightness control circuit with selective ambient light correction comprising:

See Proposed Rejection 1, Claim Limitation 1[preamble], (Section XI.A.1.a), *supra*.

b) Claim Limitation 1[a]: a first input configured to receive a user signal indicative of a user selectable brightness setting;

See Proposed Rejection 1, Claim Limitation 1[a], (Section XI.A.1.b), *supra*.

c) Claim Limitation 1[b]: a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;

See Proposed Rejection 1, Claim Limitation 1[b], (Section XI.A.1.c), *supra*.

d) Claim Limitation 1[c]: a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal; and

See Proposed Rejection 1, Claim Limitation 1[c], (Section XI.A.1.d), *supra*.

* * * * *

As noted above, independent claim 1 recites that the multiplier is configured to *selectively generate* a combined signal, and independent claim 15 recites a *selectively multiplying* step. For

the reasons explained above, under the “broadest reasonable interpretation” standard, Pioneer discloses the *selectively* limitations of these claims. However, during prior litigation, the patent owner argued that the plain and ordinary meaning of *selectively* is “on a selective basis” and that “to selectively generate” means that “a selection must be made to determine whether the generation occurs.” Plaintiff’s Claim Construction Brief from Samsung Litigation at 5 (Ex. 22).

In support of its proposed construction, the patent owner pointed to the specification’s description of selecting between “auto” and “manual” modes in the ’117 patent. *See id.* (citing ’117 patent at 2:17–27) In the event the Office determines that the broadest reasonable interpretation of *selectively* does *not* encompass the selective multiplication disclosed by Pioneer (see Sections XI.A.1.c and XI.A.7.c, *supra*), these claims would have been obvious over Pioneer in view of Ottenstein.

As explained above, prior art references such as Ottenstein disclose allowing a user to switch between manual and automatic brightness control modes. *See supra*, Section VII.E. For example, Ottenstein discloses that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:24–30.

A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Pioneer’s system in order to provide a user of Pioneer’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). *See* Hobbs Decl. ¶¶ 93–98. Indeed, the prior art discloses that both manual and automatic modes for adjusting display brightness were associated with specific, unique benefits. For example, as noted above, the prior art recognized that for some

“conscientious users,” the “conventional approach [that] gives the user manual control of the amount of light being produced” is “satisfactory” as such users “regularly monitor the brightness settings and manually adjust them accordingly.” *See* Section VII.E, *supra*.

A POSITA would also have recognized the benefit of using Pioneer’s “adjusting keys” (which provide the user input to the operating unit) to adjust display brightness in both manual display brightness and automatic display brightness adjustment modes, and that Pioneer’s operating unit would be used to switch between manual and automatic brightness adjustment modes, as performed by Ottenstein’s microprocessor. *See* Hobbs Decl. ¶ 97. A POSITA would have looked to the disclosures of these references together to implement these functionalities, and combining Ottenstein’s functionality with Pioneer’s system would be no more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See* Hobbs Decl. ¶ 97. Implementing such a feature and switching to manual mode would bypass the automatic control feature and the multiplier, and thus the multiplier would *selectively generate* a combined signal or provide selective multiplication, as recited in claims 1–7 and 15–18 of the ’117 patent.

- e) **Claim Limitation 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.**

See Proposed Rejection 1, Claim Limitation 1[d], (Section XI.A.1.e), *supra*.

- 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.

See Proposed Rejection 1, Claim 2, (Section XI.A.2), supra.

- 3. Claim 3: The brightness control circuit of claim 2, wherein the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias to generate an output signal corresponding to the brightness control signal.**

See Proposed Rejection 2, Claim 3, (Section XI.B.1), supra.

- 4. 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.**

See Proposed Rejection 1, Claim 4, (Section XI.A.3), supra.

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

See Proposed Rejection 1, Claim 5, (Section XI.A.4), supra.

- 6. 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.**

See Proposed Rejection 1, Claim 6, (Section XI.A.5), supra.

- 7. 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.**

See Proposed Rejection 1, Claim 7, (Section XI.A.6), supra.

- 8. Claim 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.**

Claim 9 is rendered obvious over Pioneer in view of Ottenstein. Ottenstein discloses *a second input* (“enable” signal) *configured to receive a selection signal* (“selectable auto

mode/manual mode switch 14”) *to selectively operate the brightness control circuit in an auto mode (“auto mode”) or a manual mode (“manual mode”), wherein the selection signal (“selectable auto mode/manual mode switch 14”) enables the light sensor (“light sensors 12, 13”) in the auto mode (“auto mode”) and disables the light sensor (“light sensors 12, 13”) in the manual mode (“manual mode”)* as recited in claim 9. During prosecution of the ’117 patent, the Examiner stated:

Ottenstein discloses a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode (14), wherein the selection signal enables the light sensor (9) in the auto mode and disables the light sensor in the manual mode.

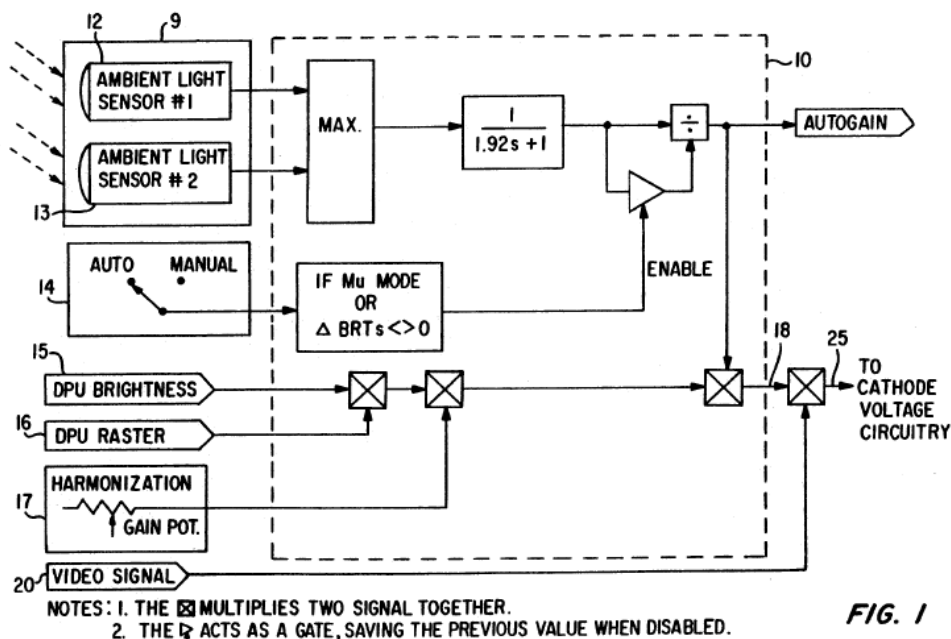
File History at 110 (11/7/2012 Office Action at 11) (citing Ottenstein, Fig. 1 and accompanying text). In addition, the Examiner stated—and the applicant did not dispute:

At the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the auto mode or the manual mode similar to that taught by Ottenstein to achieve further adjust brightness and contrast in the circuit of Narveson. As one of ordinary skill in the art would appreciate, the suggestion or motivation for doing so would have been to achieve predictable result of providing automatic compensation for the effects of ambient light on a display.

Id. For example, Ottenstein discloses:

3. The display has a **selectable auto mode versus manual mode switch. When auto mode is selected, automatic brightness control is engaged. In manual mode the pilot manually maintains the brightness settings.**

Ottenstein at 1:50–55 (emphasis added). Figure 1, shown below, illustrates the selectable auto mode/manual mode switch 14 which disables the light sensors (through the “enable” signal) when the switch is in manual mode.



Ottenstein, Fig. 1. Ottenstein disclosed:

Microprocessor 10 also interfaces with selectable auto mode/manual mode switch 14 and two pilot selected brightness settings, DPU Brightness (BRT) 15 and DPU Raster 16. The auto mode of auto mode/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.

Ottenstein at 2:23–30 (emphasis added). A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Pioneer’s system in order to provide a user of Pioneer’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). *See* Hobbs Decl. ¶¶ 93–98. Combining Ottenstein’s functionality with Pioneer’s system would be no more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See* Hobbs Decl. ¶ 97. Indeed, the prior art discloses that both manual and automatic modes for adjusting display brightness were associated with specific, unique benefits. *See, e.g.,* Section

VII.E, *supra*. A POSITA would also have recognized that Pioneer’s “adjusting keys” would be used to adjust display brightness in both manual display brightness and automatic display brightness adjustment modes, and that Pioneer’s operating unit would be used to switch between manual and automatic brightness adjustment modes, as performed by Ottenstein’s microprocessor. Hobbs Decl. ¶ 97. Therefore, a POSITA would have looked to the disclosures of these references together to implement these functionalities. Hobbs Decl. ¶ 97.

Moreover, a POSITA would have understood that both Ottenstein and Pioneer disclose similar mechanisms for controlling display brightness, including ambient light sensors and a user input for adjusting display brightness. Notably, Ottenstein and Pioneer involve systems that combine a signal indicative of an ambient light level (as detected by a sensor) and a signal indicative of a user brightness setting (derived from the “rocker switches” in Ottenstein and “the input value” derived from “an adjustment key” in Pioneer). *See* Hobbs Decl. ¶ 96. The benefits of combining the solution of Ottenstein with Pioneer to provide an advanced system for controlling display brightness would have been clear and predictable to a POSITA, and involved nothing more than applying known techniques to improve similar devices in similar ways to yield predictable results. Hobbs Decl. ¶ 97.

Accordingly, claim 9 is rendered obvious over Pioneer in view of Ottenstein.

9. Independent Claim 15:

- a) **Claim Limitation 15[preamble]: A method to selectively provide ambient light correction, said method comprising:**

See Proposed Rejection 1, Claim Limitation 1[preamble], (Section XI.A.1.a), *supra*.

- b) **Claim Limitation 15[a]: receiving a user input signal indicative of a user selectable brightness setting;**

See Proposed Rejection 1, Claim Limitation 1[a], (Section XI.A.1.b), *supra*.

- c) **Claim Limitation 15[b]: selectively multiplying the input signal with a sense signal to generate a combined signal, wherein the sense signal indicates an ambient light level; and**

See Proposed Rejection 1, Claim Limitation 1[b], (Section XI.A.1.c), *supra*; Proposed Rejection 1, Claim Limitation 1[c], (Section XI.A.1.d), *supra*; Proposed Rejection 3, Claim Limitation 1[c], (Section XI.C.1.d), *supra*.

- d) **Claim Limitation 15[c]: 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.**

See Proposed Rejection 1, Claim Limitation 1[d], Section (XI.A.1.e), *supra*; Proposed Rejection 1, Claim Limitation 15[c], (Section XI.A.7.d); *supra*.

10. **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.**

See Proposed Rejection 1, Claim 16, (Section XI.A.8), *supra*, which is incorporated herein by reference.

11. **Claim 17: The method of claim 15, wherein the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment to the combined signal is dependent on the input signal.**

See Proposed Rejection 1, Claim 17, (Section XI.A.9), *supra*, which is incorporated herein by reference.

12. **Claim 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.

See Proposed Rejection 1, Claim 18, (Section XI.A.10), *supra*, which is incorporated herein by reference.

D. Proposed Rejection 4: Claims 1–7, 9, and 15–18 are unpatentable under 35 U.S.C. § 103 as obvious over Narveson in view of Whitted and Ottenstein

Claims 1–7, 9, and 15–18 of the '117 patent are rendered obvious by Narveson in view of Whitted and Ottenstein. As explained above, during prosecution, the Examiner found that claims 1–7 and 15–18 were anticipated by Narveson. The Examiner further found that claim 9 of the '117 patent was obvious over Narveson in view of Ottenstein.

The applicant overcame the rejection of all claims by arguing that Narveson fails to disclose that its dark level bias operates *such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero*. Whitted teaches this exact feature. Specifically, Whitted teaches that “[a] minimum power level is set, e.g., pre-programmed, for the backlight 510 to insure that the display will be readable in low light conditions.” Whitted at 8:9–25. “[E]ven if the output of the photo-sensor 502 indicates little or no incident light, the intensity control circuit 503 does not lower the power output to the backlight 510 below a preselected threshold to insure that in dark or dimly lit conditions, images on the display panel 206 will remain visible.” Whitted at 8:26–32. Thus, Whitted teaches the precise features that the Office apparently relied upon to allow claims 1–7, 9, and 15–18 of the '117 patent.

In addition, Ottenstein discloses 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, as recited in claim 9. In prior litigation, the patent owner has argued that the claim term *selectively* from independent claims 1 and 15 should be construed to require a feature like that disclosed in Ottenstein in which the automatic mode is selectively disabled.

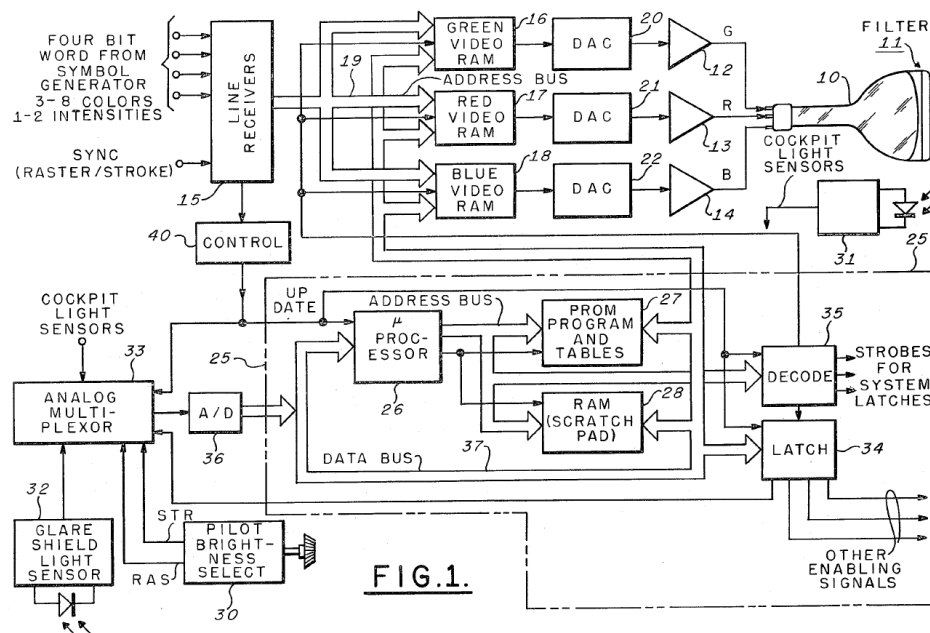
Therefore, claims 1–7, 9, and 15–18 of the '117 patent are rendered obvious by Narveson in view of Whitted and Ottenstein.

1. Independent Claim 1

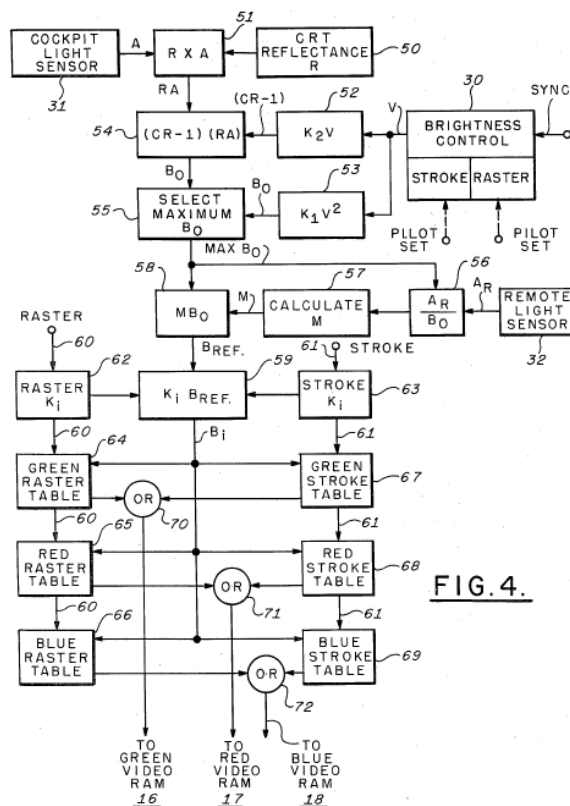
a) Claim Limitation 1[preamble]: A brightness control circuit with selective ambient light correction comprising:

To the extent the preamble is a limitation, Narveson discloses *a brightness control circuit* (“microprocessor controller”) *with selective ambient light correction* (“calculate a reference brightness level for the sensed ambient brightness conditions”) as recited in claim 1.

For example, Narveson describes its system as follows: “The output of at least one cockpit ambient light sensor in addition to a pilot selected brightness is used on a continuous basis **to calculate a reference brightness level for the sensed ambient brightness conditions.**” Narveson at Abstract (emphasis added). Figure 1, shown below, is a block diagram illustrating the digital microprocessor controller dedicated to the operation of the display.



Narveson, Fig. 1. Figure 4, shown below, is a schematic block diagram of Narveson's invention.



Narveson, Fig. 4. Accordingly, Narveson discloses *a brightness control circuit with selective ambient light correction* as recited in claim 1.

b) Claim Limitation 1[a]: a first input configured to receive a user signal indicative of a user selectable brightness setting;

Narveson discloses that its brightness control circuit comprises *a first input* (“contrast ratio signal from block 52”) *configured to receive a user signal* (“output voltage V”) *indicative of a user selectable brightness setting* (“pilot selected brightness” as set by selector 30”) as recited in claim 1 of the ’117 patent.

Indeed, during prosecution, the Examiner found that Narveson discloses this limitation, which the applicant conceded. *See* File History at 105 (11/7/2021 Non-Final Rejection at 6) (citing Narveson “brightness control 30”, fig. 4). In particular, Narveson discloses:

Thus, the pilot selected brightness signal generated as an analog voltage by selector 30, the cockpit light sensor signal generated as an analog voltage by, for example, an optical diode associated with sensor 31 and the glare shield sensor signal generated as an analog signal by an optic diode associated with sensor 32 are all supplied to a conventional analog selector or multiplexer 33. Each of these signals is called up by the microprocessor brightness control program through conventional latches 34 responsive to program decoder 35 as they are required. Each analog input signal is converted to digital signal format by A/D converter 36 which signal is supplied to microprocessor data bus 37, all using conventional and well known digital techniques.

Narveson at 6:25–38 (emphasis added). Narveson further discloses:

The microprocessor is programmed to compute the cathode drive voltages required by the specific characteristics of the CRT for each of the three cathodes dependent upon the pilot selected brightness as set by selector 30, and in accordance with one or more ambient light sensors 31 in the cockpit, preferably closely adjacent to or built into the bezel of the display unit.

Narveson at 6:2–9 (emphasis added). Narveson further discloses:

The desired contrast ratio CR is determined by the setting of the pilot's brightness controller 30. In those embodiments of the invention which include the pilot's separate control of the brightness of raster written symbology and stroke

- c) **Claim Limitation 1[b]: a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;**

Narveson discloses that its brightness control circuit comprises *a light sensor* (“cockpit light sensors 31”) *configured to sense ambient light and to output a sensing signal* (“ambient light intensity A”) *indicative of the ambient light level* as recited in claim 1 of the ’117 patent.

Indeed, the Examiner found that Narveson discloses this limitation, which the applicant conceded. *See* File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson “light sensor 31”, Fig. 4). In particular, Narveson discloses:

Thus, the pilot selected brightness signal generated as an analog voltage by selector 30, **the cockpit light sensor signal generated as an analog voltage by, for example, an optical diode associated with sensor 31** and the glare shield sensor signal generated as an analog signal by an optic diode associated with sensor 32 are all supplied to a conventional analog selector or multiplexer 33. Each of these signals is called up by the microprocessor brightness control program through conventional latches 34 responsive to program decoder 35 as they are required. **Each analog input signal is converted to digital signal format by A/D converter 36 which signal is supplied to microprocessor data bus 37, all using conventional and well known digital techniques.**

Narveson at 6:25–38 (emphasis added). An illustration of Narveson’s “cockpit light sensor” outputting a sensing signal is shown as element 31 in Figures 1 and 4 below.

by the constant K_2 in the block 52 to form the quantity (CR-1)” (Narveson)) *and the sensing signal* (ambient light intensity A (Narveson)) as recited in claim 1 of the ’117 patent.

During prosecution, the Examiner found Narveson discloses this limitation, which the applicant conceded. *See* File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson at 11:37–42). In particular, Narveson discloses:

The ambient light intensity A from the cockpit light sensors 31 and the CRT reflectance value R stored at 50 are combined in block 51 to provide the value RA . The pilot set brightness control potentiometers 30 provide the output V which is the value from the stroke potentiometer or the raster potentiometer as selected by the SYNC signal. The signal V is multiplied by the constant K_2 in the block 52 to form the quantity (CR-1). The nominal brightness B_0 is provided in the block 53 by forming $K_1 V^2$. **The contrast ratio signal from the block 52 is applied to a block 54 to be combined with the signal RA to form the nominal brightness B_0 based on contrast ratio.** The values of B_0 from the blocks 53 and 54 are applied to a maximum value selector 55 which selects the maximum B_0 . **The output of the maximum value selector 55 is applied as an input to a block 56 which is also responsive to the output of the remote light sensor 32. The block 56 provides the brightness ratio A_R/B_0 ,** to a block 57 wherein the boost factor M is computed in the manner described above. The maximum nominal brightness B_0 and the boost factor M are combined in a block 58 to provide the reference brightness B_{REF} .

Narveson at 11:20–42 (emphasis added).

Figure 4, shown below, illustrates the contrast ratio (which is based on the pilot brightness control 30 and output voltage V (user signal)) and the value RA (which is based on the ambient light intensity A (sensing signal) from the cockpit light sensors 31) are multiplied at box 54 to generate a combined signal (the nominal brightness B_0).

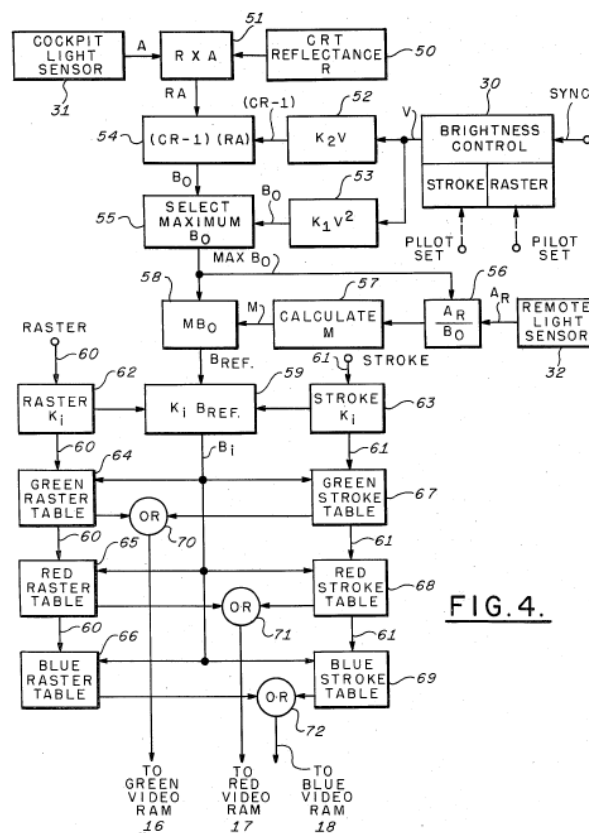


FIG. 4.

Narveson, Fig. 4. Narveson further discloses:

The program starts with the sampling of the cockpit light sensor voltage A, A/D converted and latched onto the processor data bus. This signal is converted to a logarithmic value ($\log A$) in terms of foot candles using well known table 'look-up' techniques. . . . The program then calls for a multiplication of these terms through adding their logs, the resultant being the background brightness RA, i.e., the internal cockpit ambient light intensity in foot candles. The nominal brightness ratio B_0 is then calculated through an expression for the contrast ratio, $CR = (B_0 + RA) / RA$. The desired contrast ratio CR is determined by the setting of the pilot's brightness controller 30. . . . The program calls up the potentiometer signal V, converts it to $\log V$ and multiplies (adds) by a constant factor K_2 stored as a log value in memory, the constant K_2 scaling the product to read directly in foot lamberts. At low ambient light levels, the contrast ratio CR potentially is very large while at high ambients it is low. Therefore, under low ambient conditions the display brightness should be based on absolute brightness and at higher ambients it should be based on contrast ratio. To compute this nominal brightness the potentiometer signal is 'squared' ($\log V$ is added to $\log V$) and multiplied by a constant K_1 to convert the result to foot lamberts ($\log K_1$ added to $2 \log V$). It will be appreciated that functions of the pilot's brightness control other than squaring

may be utilized in accordance with desired results. The program compares the two values of nominal brightness and selects the maximum, which value is used in the remainder of the programmed computations.

Narveson at 7:64–8:42.

Claim limitation 1[c] recites that the multiplier is configured to *selectively generate* the combined signal. During prior litigation, the patent owner argued that the plain and ordinary meaning of *selectively* is “on a selective basis” and that “to selectively generate” means that “a selection must be made to determine whether the generation occurs.” Plaintiff’s Claim Construction Brief from Samsung Litigation at 5 (Ex. 22). In support of its proposed construction, the patent owner pointed to the specification’s description of selecting between “auto” and “manual” modes in the ’117 patent. *See id.*

Ottenstein teaches that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:24–30.

A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Narveson’s system in order to provide a user of Narveson’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). *See* Hobbs Decl. ¶¶ 61, 75–79. Combining Ottenstein’s functionality with Narveson’s system would be no more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See* Hobbs Decl. ¶ 79. Implementing such a feature and switching to manual mode would disable the automatic control feature, and thus the multiplier would *selectively generate* a combined signal or provide selective multiplication, as recited in the ’117 patent.

- e) **Claim Limitation 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.**

During prosecution, the Examiner determined that Narveson discloses “a dark level bias (32) configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display.” *See* File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson at 6:13–24 and column 11). In particular, Narveson discloses:

Alternatively, a further light sensor, 32 preferably mounted on the glare shield and subjected to the light intensity forward of the aircraft, **may be employed to further boost the tube brightness in accordance therewith.** The purpose of this remote light sensor is to compensate for the relatively slow response of the pilot’s eyes in adapting to the interior cockpit lighting after looking out of the cockpit front windshield.

Narveson at 6:9–16 (emphasis added). Narveson further discloses:

Because the internal light sensor adjusts the display brightness for internal light conditions, **the display brightness may not be sufficient for the pilot to immediately respond thereto and therefore the display brightness level should be boosted.** The program calls up the remote light sensor signal AR, converts AR to log AR, and determines the ratio thereof with the nominal (internal) brightness B₀ by subtraction of logs. If the value of this ratio is less than some predetermined value, dependent at least in part upon the eye’s physiology, a first relatively low value, substantially constant boost factor is proved (at lower exterior brightness the boost factor may remain constant)”

Narveson at 8:63–9:6 (emphasis added). Narveson further discloses:

The pilot set brightness control potentiometers 30 provide the output V which is the value from the stroke potentiometer or the raster potentiometer as selected by the SYNC signal. The signal V is multiplied by the constant K₂ in the block 52 to form the quantity (CR-1). The nominal brightness B₀ is provided in the block 53 by forming K₁V². The contrast ratio signal from the block 52 is applied to a block 54 to be combined with the signal RA to form the nominal brightness B₀ based on contrast ratio. **The values of B₀ from the blocks 53 and 54 are applied to a maximum value selector 55 which selects the maximum B₀. The output of the maximum value selector 55 is applied as an input to a block 56 which is also**

responsive to the output of the remote light sensor 32. The block 56 provides the brightness ratio AR/B_0 to a block 57 wherein the boost factor M is computed in the manner described above. **The maximum nominal brightness B_0 and the boost factor M are combined in a block 58 to provide the reference brightness B_{REF} .**

Narveson at 11:23–42 (emphasis added). Therefore, the Examiner found that Narveson discloses *a dark level bias (“boost factor M ”) configured to adjust the combined signal (“nominal brightness B_0 ”) to generate a brightness control signal (“reference brightness B_{REF} ”) that is used to control a brightness level of a visible display (“display unit”),* as recited in claim 1 of the ’117 patent.

During prosecution, the applicant argued that the purpose of Narveson’s “boost factor” is different than the purpose of the “dark level bias” in the ’117 patent. The applicant argued:

The boost factor appears to boost the initial brightness of the CRT display to compensate for the slowness of the human eye in responding to abrupt changes in light intensity, such as when the pilot is looking out of the windshield and then looks at his instrument display. . . . In contrast, an embodiment comprises 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 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.

See File History at 159 (01/23/2012 Response to Office Action at 8). The applicant amended claim 1 to add the following limitation: *such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.* According to the applicant:

Thus, in an embodiment, the dark level bias circuit ensures a predefined (or minimum) brightness in total ambient darkness, which is not a boost factor to compensate for the physiology of the human eye trying to adjust to ambient light from a brighter remote light source.

File History at 159 (01/23/2012 Response to Office Action at 8).

Whitted discloses *a dark level bias (minimum power level) configured to adjust the combined signal (i.e., “function of the output of the photo-sensor 502 and the received brightness control signal”) to generate a brightness control signal (output of the intensity control circuit, i.e., “power output to the backlight 510”) that is used to control a brightness level of a visible display (display panel 206) such that the brightness control signal (output of the intensity control circuit, i.e., “power output to the backlight 510”) is maintained above a predetermined level (“pre-programmed” or “preselected threshold”) when the ambient light level decreases to approximately zero (i.e., “even if the output of the photo-sensor 502 indicates little or no incident light”).* For example, Whitted discloses:

The intensity control circuit 503 determines the amount of power supplied to the backlight 510 as a function of the output of the photo-sensor 502 and the received brightness control signal. The intensity of the backlight 510, as a function of the photo-sensors and brightness control outputs, is adjusted so that the perceived brightness of the display will remain generally constant despite changes in ambient light conditions. Accordingly, when the output of the photo-sensor 502 indicates an increase in the intensity of the ambient light striking the screen 206, the power to the backlight 510 will be increased. As the intensity of the ambient light striking the screen 206 decreases, the intensity control circuit decreases the power supplied to the backlight 510 and thus the intensity of the light output therefrom. **A minimum power level is set, e.g., pre-programmed, for the backlight 510 to insure that the display will be readable in low light conditions.**

Whitted at 8:9–25 (emphasis added). Whitted further discloses:

In one embodiment, **even if the output of the photo-sensor 502 indicates little or no incident light, the intensity control circuit 503 does not lower the power output to the backlight 510 below a preselected threshold to insure that in dark or dimly lit conditions, images on the display panel 206 will remain visible.** In such an embodiment, intensity control circuit 503 maintains backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.”

Id. at 8:26–35 (emphasis added). As explained above, Whitted’s “intensity control circuit” output (brightness control signal) controls the brightness of the display based on the combined signal (i.e.,

“function of the output of the photo-sensor 502 and the received brightness control signal”). Whitted teaches that as ambient light decreases, power supplied to the backlight decreases and in low light conditions (i.e., where there is little or no incident light), the combined signal would be so low that the power output would not allow the images on the display panel to remain visible. *Id.* at 8:26–35. Thus, in conditions where there is little or no incident light, Whitted discloses a “minimum power level” (dark level bias) that is “pre-programmed” into the intensity control circuit to insure that the display will be readable in low light conditions. *Id.* at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to “maintain[] backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

As Dr. Hobbs explains, a POSITA would have been motivated to combine the teachings of Narveson with Whitted. Hobbs Decl. ¶¶ 62–67. A POSITA would have recognized that Narveson’s boost factor could be used to set a minimum brightness level, as taught by Whitted, or alternatively, a POSITA would have recognized that Whitted’s “minimum power level” could be incorporated into Narveson’s brightness control system. Hobbs Decl. ¶¶ 63–67. Moreover, a POSITA would have understood from Whitted that when utilizing Narveson’s “multiplier” that combines an ambient light signal with a user signal through a mathematical product, “[a]s the intensity of the ambient light striking the screen 206 decreases, the intensity control circuit decreases the power supplied to the backlight 510 and thus the intensity of the light output therefrom.” Hobbs Decl. ¶ 64. (quoting Whitted, 8:19–22). A POSITA would therefore have been motivated to incorporate a “minimum power level” that is “pre-programmed” to “insure that the

display will be readable in low light conditions.” Hobbs Decl. ¶¶ 64–66. (quoting Whitted, 8:22–25). A POSITA would have been motivated to either (1) utilize Narveson’s “boost factor” to ensure a “minimum power level,” as taught by Whitted; or (2) incorporated the “preselected threshold” from Whitted to adjust Narveson’s combined signal (nominal brightness B_0) “to insure that in dark or dimly lit conditions, images on the display panel will remain visible.” Hobbs Decl. ¶ 65. (quoting Whitted, 8:26–31).

Dr. Hobbs further explains that Whitted describes a straightforward technique, performed by a control circuit in a similar system, for adjusting a combined signal with a value that sets a preselected minimum power level. Hobbs Decl. ¶¶ 64–67. Specifically, Whitted discloses that where there is little or no incident light, a “minimum power level” (dark level bias) can be “pre-programmed” into the intensity control circuit to ensure that the display will be readable in low light conditions. Hobbs Decl. ¶ 66. (quoting Whitted, 8:22–25).

A POSITA would have recognized that Whitted’s preselected threshold for maintaining minimum power level would have been executed just as readily on Narveson’s microprocessor as on Whitted’s control circuit. Hobbs Decl. ¶ 66. Both Narveson and Whitted are directed to displays for outdoor use (portable computer devices enabled for “out of doors use” in “direct sunlight” in Whitted and airplanes in Narveson), and they have related teachings, namely automatic brightness adjustment, based on both ambient light sensors and user inputs, for lighted display systems. Hobbs Decl. ¶ 61. Moreover, both Narveson and Whitted disclose similar mechanisms for controlling display brightness, including ambient light sensors and a user input for adjusting display brightness (called a “potentiometer” in both Whitted and Narveson). Notably, both Narveson and Whitted involve systems that combine a signal indicative of an ambient light level (as detected by a sensor)

and a signal indicative of a user brightness setting. *See id.* The benefits of combining the solution of Narveson with Whitted to provide an advanced system for controlling display brightness would have been clear and predictable, and involved nothing more than applying known techniques to improve similar devices in similar ways to yield predictable results. *Id.* ¶ 67

Accordingly, claim 1 of the '117 patent is rendered obvious by Narveson in view of Whitted and Ottenstein.

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.

During prosecution, the Examiner stated:

Narveson discloses the brightness control circuit of Claim 21, wherein the dark level bias (32) is provided to the multiplier (56) such that the amount of adjustment to the combined signal is dependent on the user selectable brightness setting.

File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson at 8:10–49). For example, Narveson discloses:

Thus, it will be noted that at high ambients the brightness of the displayed symbology is controlled primarily in accordance with the ambient light sensor signal as modified by CRT reflectance characteristics and a desired contrast ratio, while at lower ambients, the brightness of the displayed symbology is controlled primarily in accordance with a nominal brightness set by the pilot.

Narveson at 8:28–49. According to the applicant, Narveson fails to disclose this limitation for the same reasons as those argued with regard to the independent claim. *See* File History at 160 (01/23/2012 Response to Office Action at 9).

As Dr. Hobbs explains, a POSITA would have understood that there were two primary methods for implementing Whitted's dark level bias into a brightness control circuit that utilizes a multiplier like that of Narveson—either along the y-axis or the x-axis. Hobbs Decl. ¶¶ 52–53. In

other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). Hobbs Decl. ¶¶ 52–59. Each of these two methods for implementing Whitted’s dark level bias would have at least been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143.

Applying the second method, the dark level bias (b) is multiplied by the user input (m) and thus the amount of adjustment to the combined signal is dependent on the user selectable brightness setting. *See* Hobbs Decl. ¶¶ 57–59. As Dr. Hobbs explains, applying a “bias” or minimum output to the light sensor itself—*i.e.*, along the x-axis—was well-known in the art. *See id.* For example, Ottenstein discloses that in its automatic brightness controller, “[t]he sensed ambient brightness level should be limited so that it is always at least 10% of full scale.” Ottenstein at 4:2–4. As Dr. Hobbs explains, this disclosure teaches applying a bias to the light sensor such that the output of the sensor will remain above a predetermined level even when there is no sensed ambient light. *See id.*

Accordingly, claim 2 of the ’117 patent is rendered obvious by Narveson in view of Whitted and Ottenstein.

3. Claim 3: The brightness control circuit of claim 2, wherein the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias to generate an output signal corresponding to the brightness control signal.

During prosecution, the Examiner explained:

Narveson discloses the brightness control circuit of Claim 22, wherein the multiplier multiplies a sum of the user signal and the dark level bias to generate an output signal corresponding to the brightness control signal.

File History at 106 (11/7/2012 Non-Final Rejection at 7) (citing Narveson at 11:40–42). However, according to the applicant, Narveson fails to disclose this limitation for the same reasons as those argued with regard to the independent claim. File History at 160 (01/23/2012 Response to Office Action at 9).

As explained above, Whitted fills the gap that was identified by the applicant and was the apparent basis for allowance. In any event, claim 3 merely changes the order of sequence in which the signals are applied to the multiplier, requiring the multiplier to multiply *a sum of the user signal and the sensing signal by the dark level bias*.³ Claim 3 recites that there are three inputs into the “multiplier”: the user signal, the sensing signal, and the dark level bias. There is a limited number of arrangements for which the three signals can be applied to the multiplier, and a POSITA would have understood that the various signals disclosed in Narveson and Whitted could be added at different times and in different ways. Moreover, a POSITA would have readily understood, based on simple mathematical operations, whether the adjustment by the dark level bias would generate a brightness control signal that is maintained above a predetermined level when the ambient light level decreases to approximately zero. Therefore, combining the signals such that *the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias* would have been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143. Accordingly, claim 3 is obvious over Narveson in view of Whitted and Ottenstein.

³ Requester reserves the right to argue in litigation that claim 3 is indefinite under 35 U.S.C. § 112.

4. 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.

During prosecution, the Examiner explained:

Narveson discloses the brightness control circuit of Claim 21, wherein the dark level bias (32) is added to the combined signal such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting.

File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson at 9:7–15). According to the applicant, Narveson fails to disclose this limitation for the same reasons as those argued with regard to the independent claim. File History at 160 (01/23/2012 Response to Office Action at 9). As explained above, Whitted fills the gap that was identified by the applicant and was the apparent basis for allowance.

Moreover, as Dr. Hobbs explains, a POSITA would have understood that there were two methods for implementing Whitted’s dark level bias into a brightness control circuit that utilizes Narveson’s multiplier—either along the y-axis or the x-axis. In other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See* Hobbs Decl. ¶¶ 52–59. Each of these two methods for implementing Whitted’s dark level bias would have at least been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143.

Applying the first method, the dark level bias (b) is added to the combined signal (mx) such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting (m). Hobbs Decl. ¶¶ 54–56. As Dr. Hobbs explains, adjusting the output of the

multiplier—*i.e.*, along the y-axis—was well-known in the art. *See id.* For example, Narveson teaches that the “maximum nominal brightness B_0 ” is based on a multiplication of the pilot set brightness and ambient light signal, depicted in block 54 of Figure 4. Narveson further discloses that “maximum nominal brightness B_0 ” and “the boost factor M are combined in a block 58 to provide the reference brightness B_{REF} .” *See id.* (quoting Narveson at 11:23–42). Therefore, Narveson teaches applying a bias to the output of the multiplier.

Accordingly, claim 4 of the '117 patent is rendered obvious by Narveson in view of Whitted and Ottenstein.

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

As explained above with regard to claim 1[c] and claim 1[d], the “output of the multiplier” in both Narveson and Whitted includes the combined signal that is based on both the user signal and the sensing signal. Therefore, the “combined signal” in claim 4 exists at the “output of the multiplier,” so the dark level bias is added to both at the same time.

6. 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.

Narveson discloses that its brightness control circuit comprises *an overdrive clamp circuit* (“predetermined maximum value”) *coupled to the brightness control signal* (reference brightness B_{REF}) *to limit its amplitude to a predefined range* (“predetermined constant value to a predetermined maximum value”) as recited in claim 6 of the '117 patent. As the Examiner explained, “Narveson discloses the brightness control circuit of Claim 21, further comprising an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a

predefined range.” *See* File History at 106 (11/7/2021 Non-Final Rejection at 7) (citing Narveson at 5:65–6:9). For example, Narveson discloses:

In accordance with the present invention, the color brightness/contrast is automatically maintained at the level manually selected by the pilot on the display system controlled over the very wide range of ambient light conditions experienced in the cockpit of an air craft. The microprocessor is programmed to compute the cathode drive voltages required by the specific characteristics of the CRT for each of the three cathodes dependent upon the pilot selected brightness as set by selector 30, and in accordance with one or more ambient light sensors 31 in the cockpit, preferably closely adjacent to or built into the bezel of the display unit.

Narveson at 5:65–6:9. Narveson further discloses:

If the value of this ratio is less than some predetermined value, dependent at least in part upon the eye’s physiology, a first relatively low value, substantially constant boost factor is provided (at the lower exterior brightness the boost factor may remain constant); if greater than predetermined A_R/B_0 value, **a second boost factor is provided which varies, i.e., increases, substantially linearly from the predetermined constant value to a predetermined maximum value in accordance with increases in exterior light conditions.**

Narveson at 9:2–12 (emphasis added). According to the applicant, Narveson fails to disclose this limitation for the same reasons as those argued with regard to the independent claim. File History at 160 (01/23/2012 Response to Office Action at 9).

As explained above, Whitted fills the gap that was identified by the applicant and was the apparent basis for allowance. Moreover, as explained above (*see supra* Section VII.D), it was well known before 2003 that the display brightness should not be increased beyond a maximum level even in very bright surroundings. Any display device has inherent brightness limits beyond which it will be damaged, so there has to be an upper limit somewhere in any event. A POSITA would have incorporated a feature to limit the amplitude of the brightness control signal for a number of reasons, including viewability, power savings, and extending the life of the system. *See* Hobbs Decl. ¶¶ 61, 68–71. For example, Whitted teaches that “[i]n portable devices such as battery

powered notebook computers, minimizing power consumption is important.” Whitted at 2:4–6.

Whitted further discloses:

Since the amount of power delivered by batteries is often a function of their size and thus weight, **it is desirable to minimize power consumption requirements in portable devices to allow for longer periods of use between battery recharges and/or the use of smaller, lighter, batteries.**

Whitted at 2:27–31 (emphasis added). Whitted further discloses:

By measuring ambient light conditions and adjusting backlight intensity, e.g., at power up and/or periodically during use, **the intensity of the backlight is adjusted so that it does not significantly exceed a level required to display images in a manner deemed suitable by a user of the system.** A user may indicate the desired degree of contrast between the incident light and the light output by a display by manually adjusting a brightness control. **By automatically adjusting backlight intensity as a function of ambient light conditions, power savings can be achieved.** User selectable normal and power saving modes of operation are easily supported. In the power saving mode a minimal backlight intensity is maintained as a function of detected light conditions. During normal mode operation a somewhat brighter screen appearance is maintained.

Whitted at 7:38–52 (emphasis added).

7. 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.

Whitted discloses that *the brightness control signal* (output of the intensity control circuit) *is provided to a display driver* (“power output to the backlight 510”) *to control backlight illumination* (“automatically controlling the intensity of a backlight”) *of a liquid crystal display* (“liquid crystal display”) as recited in claim 7 of the ’117 patent. For example, Whitted discloses that “[t]he intensity control circuit 503 determines the amount of power supplied to the backlight 510.” Whitted at 8:9–12. Whitted further discloses:

The present invention relates to methods and apparatus for implementing display devices and, more particularly, **to methods and apparatus for reducing the amount of electrical power required by display devices, e.g., transmissive and/or transreflective liquid crystal display (LCD) devices.**

Whitted at 1:5–10 (emphasis added). Whitted further discloses:

One feature of the present invention is directed to automatically controlling the intensity of a backlight as a function of ambient, e.g., external, light levels. In accordance with this feature of the present invention, the ambient light intensity at the front, e.g., viewing surface, of an LCD is sensed using a sensor and the intensity of the backlight is automatically adjusted as a function of the sensed light intensity.

Whitted at 3:25–32. During prosecution of the '117 patent, the Examiner found:

At the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the LCD similar to that taught by Brave to achieve further adjust brightness and contrast in the CRT of Narveson. As one of ordinary skill in the art would appreciate, the suggestion or motivation for doing so would have been to achieve predictable result of controlling a high quality of the image being displayed.

File History at 108 (11/07/2011 Non-Final Rejection at 9). Likewise, Dr. Hobbs explains that a POSITA would have been motivated to modify the LCD disclosed in Whitted with the brightness controller in Narveson to achieve a higher quality brightness control system. *See* Hobbs Decl. ¶¶ 61, 72–74. The benefits of combining the solution of Narveson with Whitted to provide an advanced system for controlling display brightness would have been clear and predictable, and involved nothing more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See id.*

8. **Claim 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.**

Claim 9 is rendered obvious over Narveson in view of Whitted and Ottenstein. Ottenstein discloses *a second input* (“enable” signal) *configured to receive a selection signal* (“selectable auto mode/manual mode switch 14”) *to selectively operate the brightness control circuit in an auto mode* (“auto mode”) *or a manual mode* (“manual mode”), *wherein the selection signal* (“selectable

auto mode/manual mode switch 14”) *enables the light sensor (“light sensors 12, 13”) in the auto mode (“auto mode”) and disables the light sensor (“light sensors 12, 13”) in the manual mode (“manual mode”)* as recited in claim 9. Indeed, during prosecution, the Examiner explained:

Ottenstein discloses a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode (14), wherein the selection signal enables the light sensor (9) in the auto mode and disables the light sensor in the manual mode.

File History at 110 (11/07/2011 Non-Final Rejection at 11) (citing Ottenstein, Fig. 1 and accompanying text). The Examiner further explained—and the applicant did not dispute:

At the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the auto mode or the manual mode similar to that taught by Ottenstein to achieve further adjust brightness and contrast in the circuit of Narveson. As one of ordinary skill in the art would appreciate, the suggestion or motivation for doing so would have been to achieve predictable result of providing automatic compensation for the effects of ambient light on a display.

Id. In particular, Ottenstein discloses:

3. The display has a **selectable auto mode versus manual mode switch. When auto mode is selected, automatic brightness control is engaged. In manual mode the pilot manually maintains the brightness settings.**

Ottenstein at 1:50–55 (emphasis added). Figure 1, shown below, illustrates the selectable auto mode/manual mode switch 14 which disables the light sensors when the switch is in manual mode.

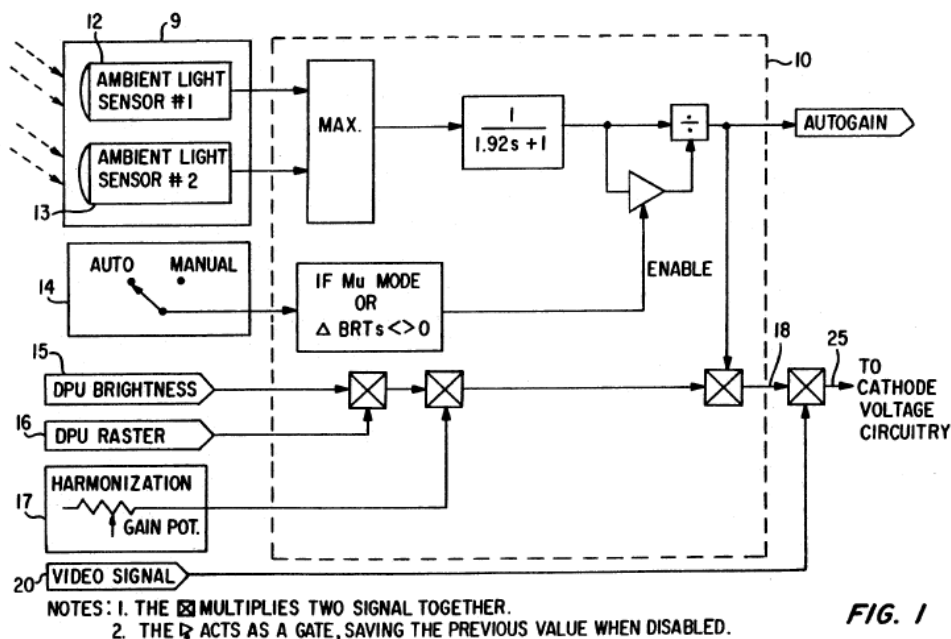


FIG. 1

Ottenstein, Fig. 1. Ottenstein discloses:

Microprocessor 10 also interfaces with selectable auto mode/manual mode switch 14 and two pilot selected brightness settings, DPU Brightness (BRT) 15 and DPU Raster 16. The auto mode of auto mode/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.

Ottenstein at 2:23–30 (emphasis added). As noted above, the Examiner explained that it would have been obvious to a POSITA “to have modified the auto mode or the manual mode similar to that taught by Ottenstein to achieve further adjust brightness and contrast in the circuit of Narveson. . . . the suggestion or motivation for doing so would have been to achieve predictable result.”

Moreover, as Dr. Hobbs explains, a POSITA would have been motivated to combine Narveson and Whitted with Ottenstein. Hobbs Decl. ¶¶ 61, 75–79. A POSITA would have recognized that switching between manual and automatic brightness control for a display was a

well-known technique in the art, and that such a technique was disclosed by Ottenstein. *See id.* Specifically, Ottenstein discloses a microprocessor which “interfaces with selectable auto mode/manual mode switch 14.” Ottenstein, 2:24-26. A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Narveson’s system in order to provide a user of Narveson’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). *See* Hobbs Decl. ¶¶ 61, 75–79. A POSITA would also have recognized that Narveson’s microprocessor could be used to adjust display brightness in both manual display brightness and automatic display brightness adjustment modes, and that Narveson’s microprocessor could be used to switch between manual and automatic brightness adjustment modes, as disclosed by Ottenstein. Therefore, one skilled in the art would have looked to the disclosures of these references together to implement these functionalities.

Narveson, Whitted, and Ottenstein are each directed to displays for outdoor use (displays used in aircraft cockpits in Narveson, displays used in transportation vehicle instrument panels in Ottenstein, and portable computer devices enabled for “out of doors use” in “direct sunlight” in Whitted), and they have related teachings, namely automatic brightness adjustment, based on both ambient light sensors and user inputs, for lighted display systems. *See id.* ¶ 61. Moreover, Narveson, Whitted, and Ottenstein each disclose similar mechanisms for controlling display brightness, including ambient light sensors and a user input for adjusting display brightness (called a “potentiometer” in both Narveson and Whitted, and “rocker switches” in Ottenstein). *See id.* Notably, Narveson, Whitted, and Ottenstein involve systems that combine a signal indicative of an ambient light level (as detected by a sensor) and a signal indicative of a user brightness setting.

See id. Therefore, a POSITA would have been motivated to combine Narveson with Whitted and Ottenstein to create a system with “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.” *See id.* ¶ 79. The benefits of combining the solution of Narveson with Whitted and Ottenstein to provide an advanced system for controlling display brightness would have been clear and predictable, and involved nothing more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See id.*

9. Independent Claim 15:

- a) **Claim Limitation 15[preamble]: A method to selectively provide ambient light correction, said method comprising:**

See Claim Limitation 1[preamble], (Section XI.D.1.a), *supra*.

- b) **Claim Limitation 15[a]: receiving a user input signal indicative of a user selectable brightness setting;**

See Claim Limitation 1[a], (Section XI.D.1.b), *supra*.

- c) **Claim Limitation 15[b]:selectively multiplying the input signal with a sense signal to generate a combined signal, wherein the sense signal indicates an ambient light level; and**

See Claim Limitation 1[b], (Section XI.D.1.c), *supra*, and Claim Limitation 1[c], (Section XI.D.1.d), *supra*.

- d) **Claim Limitation 15[c]: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.**

See Claim Limitation 1[d], (Section XI.D.1.e), *supra*.

Claim 15 of the '117 patent is the method claim version of claim 1 and includes nearly identical claim limitations. During prosecution, the Examiner rejected independent claim 15 on identical grounds to claim 1. The applicant responded with the same amendment to claim 15 and advanced the same argument to overcome rejection. Therefore, claim 15 is rendered obvious over Narveson in view of Whitted and Ottenstein for the same or substantially the same reasons as those stated in reference to claim 1, which are incorporated fully herein.

10. 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.

Narveson discloses *the step of selectively multiplying the input signal* (“output voltage V” which is “multiplied by the constant K2 in the block 52 to form the quantity (CR-1)”) *with the sense signal* (ambient light intensity A) *is performed by a software algorithm, an analog circuit* (“analog circuitry”), *or a mixed-signal circuit* as recited in claim 16.

The above described embodiment of the invention was explained in terms of a **microprocessor with the control program** described above with respect to flow charts of FIGS. 2a and 2b, **The computer architecture illustrated in FIG. 1 is conventional and well known to those skilled in the art. Alternatively, the described functions may be implemented utilizing dedicated digital logic or analog circuitry.**

Narveson at 11:1–8 (emphasis added). In addition, Whitted discloses:

It should also be noted that the computer system 503 may include a central processing unit (CPU), a memory device and various software routines which are stored in the memory device and executed by the CPU. **The intensity control circuit 505 may be implemented using software which controls the intensity of the backlight 510 as a function of the various input signals which are shown as being supplied to the intensity control circuit 505.** In fact, the intensity control function may be incorporated into, and/or be implemented as, operating system routines executed by the CPU included in the computer 500.

Whitted at 9:31–41 (emphasis added).

11. Claim 17: The method of claim 15, wherein the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment to the combined signal is dependent on the input signal.

See Claim 2, (Section XI.D.2), *supra*.

For the same or substantially the same reasons as those stated above in reference to claim 2, Narveson and Whitted disclose *the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment to the combined signal is dependent on the input signal* as recited in claim 17.

For example, as explained above, Whitted’s “intensity control circuit” output (brightness control signal) controls the brightness of the display based on the combined signal (i.e., “as a function of the output of the photo-sensor 502 and the received brightness control signal”). Whitted teaches that as ambient light decreases, power supplied to the backlight decreases and in low light conditions (*i.e.*, where there is little or no incident light), the combined signal would be so low that the power output would not allow the images on the display panel to remain visible. Whitted at 8:26–35. Thus, in conditions where there is little or no incident light, Whitted discloses a “minimum power level” (dark level bias) that is “pre-programmed” into the intensity control circuit to insure that the display will be readable in low light conditions. *Id.* at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to “maintain[] backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

As further explained above, a POSITA would have understood that there were two primary methods for implementing Whitted's dark level bias into a brightness control circuit that utilizes a multiplier like that disclosed in Narveson: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See* Hobbs Decl. ¶¶ 61–67.

Applying the second method, the dark level bias is added to the sense signal before selective multiplication by the user input and thus the amount of adjustment to the combined signal is dependent on the input signal. *See* Hobbs Decl. ¶¶ 61–67. As explained above, applying a “bias” or minimum output to the light sensor itself—*i.e.*, along the x-axis—was well-known in the art. *See id.* For example, Ottenstein discloses that in its automatic brightness controller, “[t]he sensed ambient brightness level should be limited so that it is always at least 10% of full scale.” Ottenstein at 4:2–4.

Accordingly, claim 17 is rendered obvious over Narveson in view of Whitted for the same reasons or substantially the same as those stated above in reference to claim 2, which are incorporated fully herein.

12. Claim 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.

See Claim 4, (Section XI.D.4), *supra*.

For the same or substantially the same reasons as those stated above in reference to claim 4, Narveson and Whitted disclose *the dark level bias is added to the sense signal after selective*

multiplication such that the amount of adjustment to the combined signal is independent of the input signal and the sense signal as recited in claim 18.

For example, as explained above, Whitted's "intensity control circuit" output (brightness control signal) controls the brightness of the display based on the combined signal (i.e., "as a function of the output of the photo-sensor 502 and the received brightness control signal"). Whitted teaches that as ambient light decreases, power supplied to the backlight decreases and in low light conditions (*i.e.*, where there is little or no incident light), the combined signal would be so low that the power output would not allow the images on the display panel to remain visible. Whitted at 8:26–35. Thus, in an embodiment where there is little or no incident light, Whitted discloses a "minimum power level" (dark level bias) that is "pre-programmed" into the intensity control circuit to insure that the display will be readable in low light conditions. *Id.* at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to "maintain[] backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504." *Id.* at 8:31–35.

As further explained above, a POSITA would have understood that there were two primary methods for implementing Whitted's dark level bias into a brightness control circuit that utilizes a multiplier like that disclosed in Narveson: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See* Hobbs Decl. ¶¶ 61–67. Applying the first method, the dark level bias b is added to the combined signal mx after selective multiplication such that the amount of

adjustment to the combined signal is independent of the input signal and sense signal. *See id.* As Dr. Hobbs explains, adjusting the output of the multiplier—*i.e.*, along the y-axis—was well-known in the art. *See id.* For example, Narveson discloses that the “maximum nominal brightness B_0 ”—which is based on a multiplication of the pilot set brightness and ambient light signal (*see supra* claim 1[c])—“and the boost factor M are combined in a block 58 to provide the reference brightness B_{REF} .” Narveson at 11:23–42.

Accordingly, claim 18 is rendered obvious over Narveson in view of Whitted for the same or substantially the same reasons as those stated above in reference to claim 4, which are incorporated fully herein.

E. Proposed Rejection 5: Claims 1–7, 9, and 15–18 are unpatentable under 35 U.S.C. § 103 as obvious over Whitted in view of Godwin and Ottenstein

Whitted’s intensity control circuit provides ambient light correction through a combined signal that is based on a user signal and sensing signal and incorporates a dark level bias that adjusts the combined signal to generate a control signal that is used to control a brightness level of a visible display such that the control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero. While Whitted suggests the use of multiplication to generate its combined signal, Godwin discloses a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal, and Ottenstein teaches benefits of using the multiplication technique.

With regard to claim 9, Ottenstein discloses 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*. In prior litigation, the patent owner has argued that the claim term *selectively*

from independent claims 1 and 15 should be construed to require a feature like that disclosed in Ottenstein in which the automatic mode is selectively disabled.

Therefore, claims 1–7, 9, and 15–18 of the '117 patent are rendered obvious by Whitted in view of Godwin and Ottenstein.

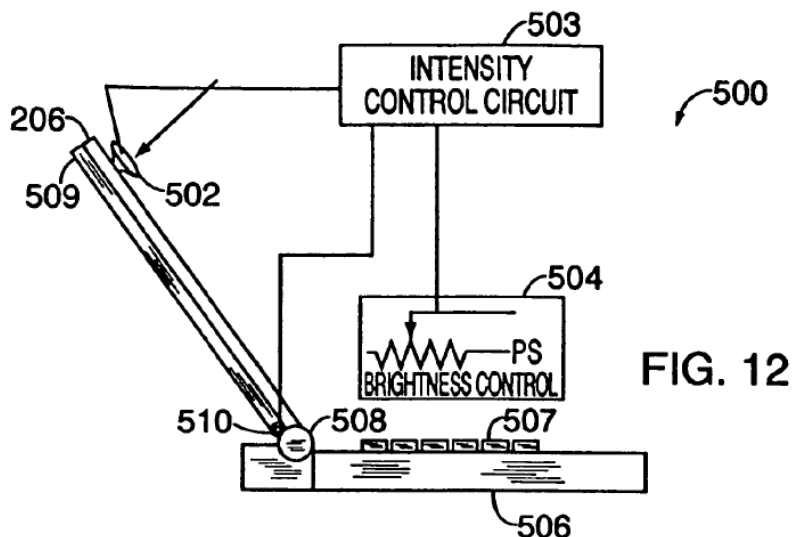
1. Independent Claim 1

a) Claim Limitation 1 [preamble]: A brightness control circuit with selective ambient light correction comprising:

To the extent the preamble is a limitation, Whitted discloses *a brightness control circuit* (“intensity control circuit 503”) *with selective ambient light correction* (“intensity of the backlight is automatically adjusted as a function of the sense light intensity”) as recited in claim 1. For example, Whitted describes its system as follows:

One feature of the present invention is directed to automatically controlling the intensity of a backlight as a function of ambient, e.g., external, light levels. In accordance with this feature of the present invention, the ambient light intensity at the front, e.g., viewing surface, of an LCD is sensed using a sensor and the intensity of the backlight is automatically adjusted as a function of the sensed light intensity.

Whitted at 3:25–32 (emphasis added). Figure 12, shown below, illustrates Whitted’s “intensity control circuit 503.”



Whitted, Fig. 12. Whitted further discloses:

The portable computer 500, further comprises a backlight intensity control circuit 503 and a brightness control circuit 504 which are used to control the amount of power supplied to the backlight 510 and thus the intensity of light supplied to the rear of the display panel 206. The intensity control circuit may be implemented using software routines executed by a CPU included in the base portion 506. The brightness control circuit 504 may be implemented as a potentiometer which has one terminal coupled to a power supply represented by the symbol PS and another terminal coupled to the intensity control circuit 503. A user may adjust the potentiometer, e.g., by turning a knob, thereby adjusting the brightness control signal supplied to the intensity control circuit 503. The intensity control circuit 503 determines the amount of power supplied to the backlight 510 as a function of the output of the photo-sensor 502 and the received brightness control signal.

Whitted at 7:62–8:12 (emphasis added). Therefore, Whitted discloses a brightness control circuit (backlight intensity control circuit 503) with selective ambient light correction.

b) Claim Limitation 1[a]: a first input configured to receive a user signal indicative of a user selectable brightness setting;

Whitted discloses that its brightness control circuit comprises *a first input* (brightness control circuit input to the intensity control circuit 503) *configured to receive a user signal*

(“brightness control signal” from brightness control circuit 504) *indicative of a user selectable brightness setting* (i.e., “the desired degree of contrast between the incident light and the light output by a display” set by a “knob” or “potentiometer”) as recited in claim 1 of the ’117 patent.

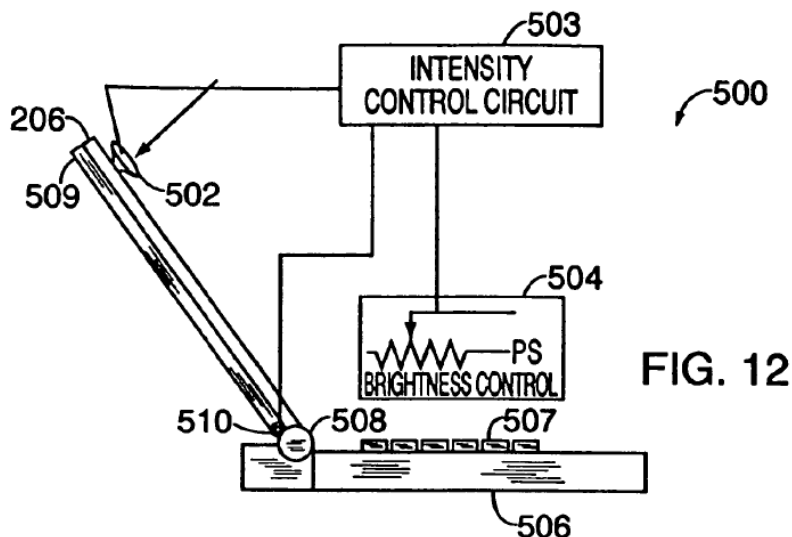
For example, Whitted discloses:

One feature of the present invention is directed to **allowing a user of a display device to set the brightness of the display** and have that level maintained under a variety of light conditions without requiring further operator intervention. This result is achieved in various embodiments by **allowing the user of the display to set the desired brightness and then automatically adjusting backlight intensity**, as a function of sensed light intensity, so that the display will be perceived as having the degree of brightness to which the display was set despite changing light conditions.”

Whitted at 3:65–4:7 (emphasis added). Whitted further discloses:

The inventors of the present application recognized that by automating all or part of the backlight intensity adjustment process, to take into consideration changes in ambient light conditions, power savings could be achieved. In accordance with one power saving feature of the present invention a photo-sensor is used to measure the intensity of light impinging on at least a portion of the front of a display screen. The result of this light measurement is then used to control backlight intensity. By measuring ambient light conditions and adjusting backlight intensity, e.g., at power up and/or periodically during use, the intensity of the backlight is adjusted so that it does not significantly exceed a level required to display images in a manner deemed suitable by a user of the system. **A user may indicate the desired degree of contrast between the incident light and the light output by a display by manually adjusting a brightness control.** By automatically adjusting backlight intensity as a function of ambient light conditions, power savings can be achieved. User selectable normal and power saving modes of operation are easily supported. In the power saving mode a minimal backlight intensity is maintained as a function of detected light conditions. During normal mode operation a somewhat brighter screen appearance is maintained.

Whitted at 7:30–52 (emphasis added). Figure 12, shown below, illustrates Whitted’s “brightness control circuit 504.”



Whitted, Fig. 12. Whitted further discloses:

The portable computer 500, further comprises a backlight intensity control circuit 503 and **a brightness control circuit 504** which are used to control the amount of power supplied to the backlight 510 and thus the intensity of light supplied to the rear of the display panel 206. The intensity control circuit may be implemented using software routines executed by a CPU included in the base portion 506. **The brightness control circuit 504 may be implemented as a potentiometer which has one terminal coupled to a power supply represented by the symbol PS and another terminal coupled to the intensity control circuit 503. A user may adjust the potentiometer, e.g., by turning a knob, thereby adjusting the brightness control signal supplied to the intensity control circuit 503.**

Whitted at 7:62–8:8 (emphasis added). This disclosure is similar to an embodiment of the '117 patent “in which the user preference is indicated by a potentiometer setting.” '117 patent at 3:48–51.

- c) **Claim Limitation 1[b]: a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;**

Whitted discloses that its brightness control circuit comprises *a light sensor* (photo-sensor 502) *configured to sense ambient light and to output a sensing signal* (“output of the photo-sensor

502”) *indicative of the ambient light level* (i.e., “intensity of light impinging on at least a portion of the front of a display screen”) as recited in claim 1 of the ’117 patent. For example, Whitted discloses:

One feature of the present invention is directed to allowing a user of a display device to set the brightness of the display and have that level maintained under a variety of light conditions without requiring further operator intervention. This result is achieved in various embodiments by allowing the user of the display to set the desired brightness and then **automatically adjusting backlight intensity, as a function of sensed light intensity**, so that the display will be perceived as having the degree of brightness to which the display was set despite changing light conditions.

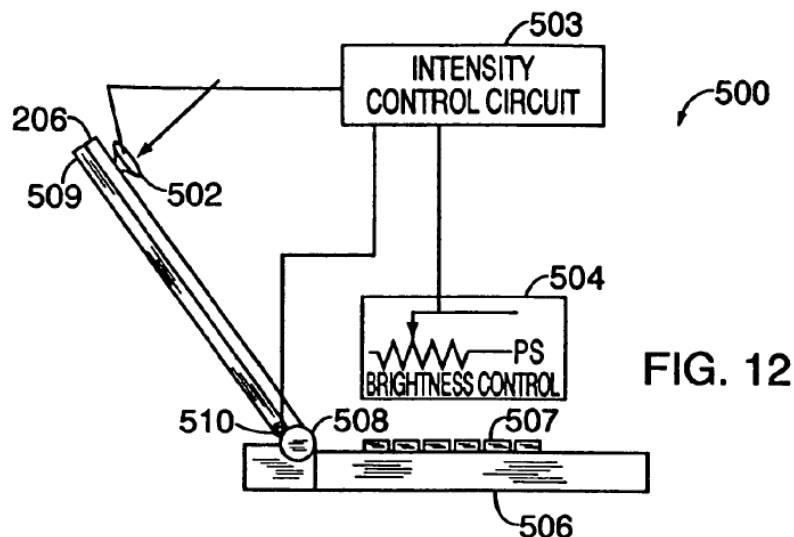
Whitted at 3:65–4:7 (emphasis added). Whitted further discloses:

In accordance with the present invention the selected brightness setting is maintained **as a function of one or more sensed light intensity levels**. Thus, the desired brightness setting can automatically be maintained under a wide range of light conditions without requiring user adjustments of brightness levels.

Whitted at 4:16–22 (emphasis added). Whitted further discloses:

The inventors of the present application recognized that by automating all or part of the backlight intensity adjustment process, to take into consideration changes in ambient light conditions, power savings could be achieved. **In accordance with one power saving feature of the present invention a photo-sensor is used to measure the intensity of light impinging on at least a portion of the front of a display screen. The result of this light measurement is then used to control backlight intensity.** By measuring ambient light conditions and adjusting backlight intensity, e.g., at power up and/or periodically during use, the intensity of the backlight is adjusted so that it does not significantly exceed a level required to display images in a manner deemed suitable by a user of the system. A user may indicate the desired degree of contrast between the incident light and the light output by a display by manually adjusting a brightness control. By automatically adjusting backlight intensity as a function of ambient light conditions, power savings can be achieved. User selectable normal and power saving modes of operation are easily supported. In the power saving mode a minimal backlight intensity is maintained as a function of detected light conditions. During normal mode operation a somewhat brighter screen appearance is maintained.

Whitted at 7:30–52 (emphasis added). Fig. 12, shown below, illustrates Whitted’s “photo-sensor 502.”



Whitted, Fig. 12. Whitted further discloses:

FIG. 12 illustrates a portable computer 500 implemented in accordance with one exemplary embodiment of the present invention. The portable computer 500 comprises a base portion 506, keyboard 507 and a hinge 508. The hinge 508 attaches a display comprising a backlight 510, diffuser 509, transmissive display panel 206 and **a photo-sensor 502. The photo-sensor 502 is mounted on the front of the display panel 206 so that the intensity of light falling on the front of the display panel 206 can be measured.**

Whitted at 7:53–61 (emphasis added). Whitted further discloses that “[t]he intensity control circuit 503 determines the amount of power supplied to the backlight 510 **as a function of the output of the photo-sensor 502 and the received brightness control signal.**” Whitted at 8:9–12.

- d) **Claim Limitation 1[c]: a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal; and**

Whitted discloses or suggests that its brightness control circuit comprises *a multiplier* (a “function” that “determines the amount of power supplied to the backlight”) *configured to selectively generate a combined signal* (“as function of the output of the photo-sensor 502 and the received brightness control signal”) *based on both the user signal* (“received brightness control

signal”) *and the sensing signal* (“output of the photo-sensor 502”) as recited in claim 1 of the ’117 patent. For example, Whitted discloses:

The intensity control circuit 503 determines the amount of power supplied to the backlight 510 **as a function of the output of the photo-sensor 502 and the received brightness control signal.** The intensity of the backlight 510, as a function of the photo-sensors and brightness control outputs, is adjusted so that the **perceived brightness of the display will remain generally constant despite changes in ambient light conditions.** Accordingly, when the output of the photo-sensor 502 indicates an increase in the intensity of the ambient light striking the screen 206, the power to the backlight 510 will be increased. **As the intensity of the ambient light striking the screen 206 decreases, the intensity control circuit decreases the power supplied to the backlight 510** and thus the intensity of the light output therefrom. A minimum power level is set, e.g., pre-programmed, for the backlight 510 to insure that the display will be readable in low light conditions.

Whitted at 8:9–25 (emphasis added). Whitted discloses that the output intensity is determined by “a function” of the combined user signal and the sensing signal. While Whitted does not provide the mathematical formula within its “function,” Whitted suggests that the amount of power supplied to the backlight is based on the mathematical product of the output of the photo-sensor 502 and the output of the brightness control circuit 504. For example, Whitted’s disclosure that the perceived brightness remains “generally constant despite changes in ambient light conditions” suggests a multiplication of the two signals. Whitted further discloses:

A minimum power level is set, e.g., pre-programmed, for the backlight 510 to insure that the display will be readable in low light conditions. **In one embodiment, even if the output of the photo-sensor 502 indicates little or no incident light, the intensity control circuit 503 does not lower the power output to the backlight 510 below a preselected threshold to insure that in dark or dimly lit conditions, images on the display panel 206 will remain visible.**

Whitted at 8:9–25 (emphasis added). Whitted teaches that “[a]s the intensity of the ambient light striking the screen 206 decreases, the intensity control circuit decreases the power supplied to the backlight 510.” As Dr. Hobbs explains, Whitted recognizes that as ambient light decreases to zero,

there is a need for a “minimum power level” to be pre-programmed into the intensity control circuit to ensure that the display remains visible in low light conditions. Hobbs Decl. ¶¶ 47–48. Therefore, Whitted teaches that as the output of the photo-sensor approaches zero, the power output to the backlight approaches zero. *See id.* According to Dr. Hobbs, a multiplication technique would have been obvious to try because it is a simple approach that achieves the goals disclosed in Whitted. Hobbs Decl. ¶¶ 47–49.

In any event, as Dr. Hobbs explains, a POSITA would have been motivated to incorporate a multiplication of the output of the photo-sensor and the received brightness control signal in Whitted’s intensity control circuit. Hobbs Decl. ¶¶ 81–87. Multiplication was a well-known method for combining signals for use in a brightness control circuit. For example, Godwin discloses a multiplier (i.e., “[a]t step 82 the contrast ratio signal is multiplied by the ambient light intensity signal”) configured to selectively generate a combined signal (output intensity signal) based on both the user signal (contrast ratio signal) and the sensing signal (ambient intensity signal).

Godwin discloses:

The invention can provide an **active brightness control system** for a head-up display system which can maintain the projected head-up display image at a **desired contrast ratio with background illumination**, in which the background illumination is the **ambient light intensity** of the scenery in front of the vehicle at the position at which the head-up display image is viewed. The invention can provide active image brightness control, eliminating the necessity of driver adjustment of the brightness control to compensate for variations in background illumination.

Godwin at 1:25–36 (emphasis added). Figure 2, shown below, illustrates the inputs from the “adjuster 24” and the “detector 40” into the “controller 30.”

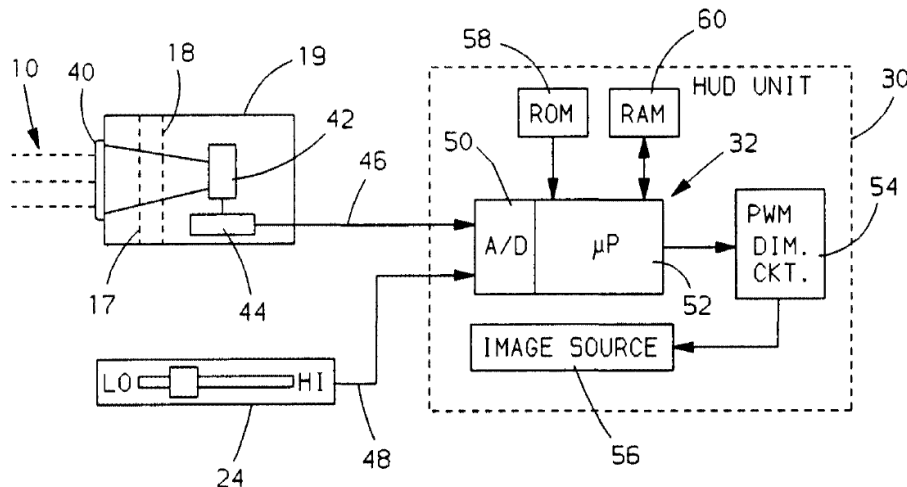


FIG. 2

Godwin, Fig. 2. Godwin further discloses:

Also disposed on the instrumentation panel 26 is **an adjuster 24 for driver adjustment of the desired contrast** of the virtual image 13 at image plane 12. The 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. As the vehicle is driven and enters situations where the background illumination varies, **the controller 32 automatically adjusts the brightness of the image source in the head-up display unit 30 so that the virtual image 13 at the image plane 12 appears to the driver to remain at a substantially constant intensity contrast level with the background illumination.**

Godwin at 3:1-14 (emphasis added). Figure 3, shown below, illustrates a flow chart of the control routine for the controller of Figure 2.

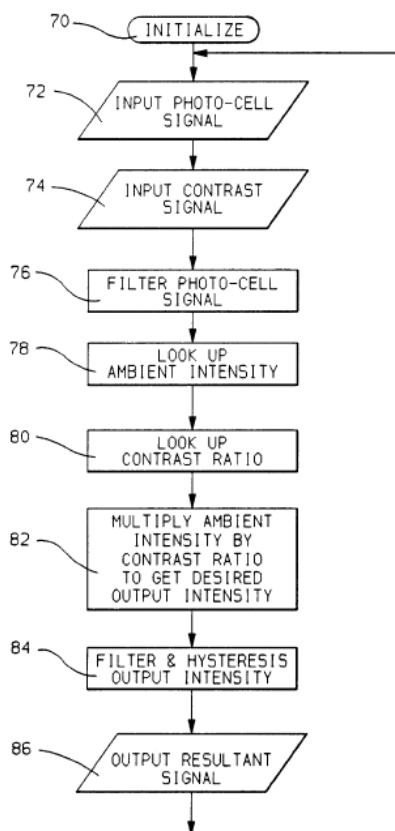


FIG. 3

Godwin, Fig. 3. Godwin further discloses:

At step 82 **the contrast ratio signal is multiplied by the ambient intensity signal to obtain a desired output intensity signal.** Alternatively, the output intensity signal may be determined as: **Output intensity = ambient intensity*(contrast ratio - 1).**

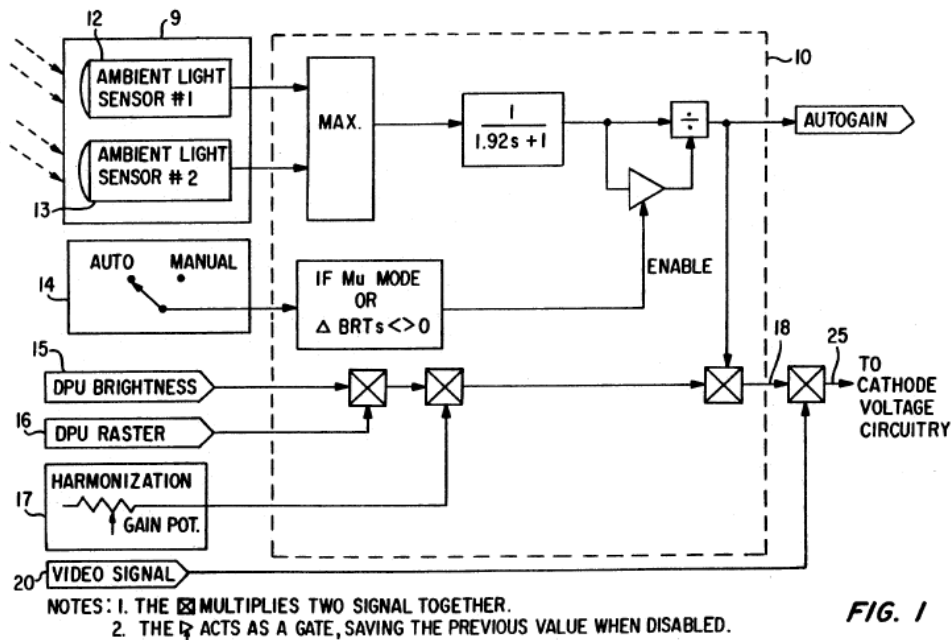
Godwin at 4:50–56 (emphasis added).

In addition, Ottenstein shows that multiplication was a well-known method for combining signals for use in a brightness control circuit, and teaches the benefits of utilizing the multiplication technique. For example, Ottenstein discloses:

An automatic brightness control provides automatic compensation for the effects of ambient light on a display. A microprocessor interfaced to **ambient light sensors, pilot selected brightness controls** and a harmonization gain

potentiometer, implements a control program and outputs a raster gain signal. A video signal is multiplied with the raster gain signal therefore producing a cathode voltage that provides the automatic compensation.

Ottenstein at Abstract (emphasis added). Figure 1, shown below, illustrates a control diagram of the preferred embodiment.



Ottenstein, Fig. 1. Ottenstein further discloses:

Microprocessor 10 also interfaces with selectable auto mode/manual mode switch 14 and two pilot selected brightness settings, DPU Brightness (BRT) 15 and DPU Raster 16.

Ottenstein at 2:23–27 (emphasis added). Ottenstein further discloses:

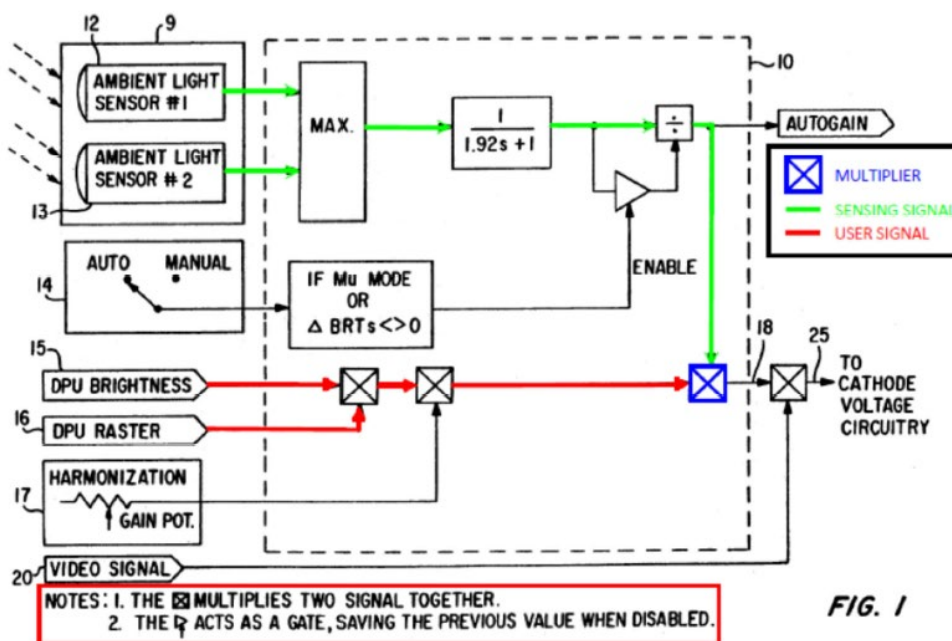
As shown in FIG. 1, the present invention utilizes microprocessor 10 that interfaces with two ambient light sensors 12, 13 embedded in the bezel around the face of a display designated by the numeral 9.

Ottenstein at 2:20–24 (emphasis added). Ottenstein further discloses:

In the present implementation $F0 = (\text{DPU Brightness}) * (\text{DPU Raster}) * (\text{Harmonized Gain})$ thus, $F = (\text{DPU Brightness}) * (\text{DPU Raster}) * (\text{Harmonized Gain}) * (A/A0)$,

where F and A are the current values of foreground brightness and ambient brightness, respectively.

Ottenstein at 3:29–47 (emphasis added). Therefore, Ottenstein discloses the use of a multiplier (“ $F = (\text{DPU Brightness}) * (\text{DPU Raster}) * (\text{Harmonized Gain}) * (A/A_0)$ ”) configured to selectively generate a combined signal (foreground brightness F) based on both the user signal (DPU Brightness) and the sensing signal (ambient brightness A). This is further illustrated in the annotated version of Figure 1, shown below.



Ottenstein, Fig. 1 (annotated).

As Dr. Hobbs explains, a POSITA would have looked to references such as Godwin and Ottenstein to determine how to combine the user signal and sensing signal in Whitted’s “function.” Hobbs Decl. ¶¶ 80–87. Godwin describes a straightforward technique, performed by a microprocessor in a similar system to Whitted, for multiplying a user input value with a value provided by an ambient light sensor to calculate a display brightness value. *Id.* A POSITA would

have recognized that Godwin's multiplication algorithm for calculating display brightness would have been executed just as readily on Whitted's control circuit as on Godwin's microprocessor to calculate the brightness of the display screen. *Id.* ¶ 84. As Dr. Hobbs explains in greater detail, it would have been straightforward to use Godwin's multiplication technique in Whitted's system, and moreover, one skilled in the art would have understood that several benefits would result and so would have been motivated to use the multiplication technique in Whitted's "function." *Id.* ¶¶ 85–87. For example, Ottenstein states about such multiplication techniques, that "the essence of the invention is the concept of varying the foreground brightness in direct proportion to the ratio of ambient light levels, in order to maintain constant extrinsic contrast," Ottenstein at 2:54–57, and listed several benefits of using the multiplication technique: "(1) The display contrast remains constant over varying ambient brightness (2) The display brightness can be controlled by the operator in Auto mode for any fixed level of ambient brightness. (3) More specifically, the display contrast is selectable by the operator, and the last operator selected contrast will be maintained over varying ambient brightness," Ottenstein at 4:19–27. *See* Hobbs Decl. ¶¶ 85–86.

Moreover, Whitted, Godwin, and Ottenstein are each directed to displays for outdoor use (displays used in transportation vehicle instrument panels in Godwin and Ottenstein and portable computer devices enabled for "out of doors use" in "direct sunlight" in Whitted), and they have related teachings, namely automatic brightness adjustment, based on both ambient light sensors and user inputs, for lighted display systems. *See id.* ¶ 80. Whitted, Godwin, and Ottenstein each disclose similar mechanisms for controlling display brightness, including ambient light sensors and a user input for adjusting display brightness (called an "adjuster 24" in Godwin, "potentiometer" or "knob" in Whitted, and "rocker switches" in Ottenstein). *See id.* Notably,

Whitted, Godwin, and Ottenstein involved systems that combine a signal indicative of an ambient light level (as detected by a sensor) and a signal indicative of a user brightness setting. *See id.* The benefits of combining the solution of Whitted with Godwin and Ottenstein to provide an advanced system for controlling display brightness would have been clear and predictable, and involved nothing more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See id.*

* * * * *

Claim limitation 1[c] recites that the multiplier is configured to *selectively generate* the combined signal. Whitted discloses this limitation. For example, Whitted discloses that “[u]ser selectable normal and power saving modes of operation are easily supported. In power saving mode a minimal backlight intensity is maintained as a function of detected light conditions. During normal mode operation a somewhat brighter screen appearance is maintained.” Whitted at 7:48–52. Therefore, this “user selectable” feature enables Whitted’s multiplier to *selectively generate* the combined signal.

During prior litigation, the patent owner argued that the plain and ordinary meaning of *selectively* is “on a selective basis” and that “to selectively generate” means that “a selection must be made to determine whether the generation occurs.” Plaintiff’s Claim Construction Brief from Samsung Litigation at 5 (Ex. 22). In support of its proposed construction, the patent owner pointed to the specification’s description of selecting between “auto” and “manual” modes in the ’117 patent. *See id.* As explained in the Overview of Technology section (*see supra* Section VII.E), “manual brightness adjustment” was known well before the pre-2003 automatic brightness control systems and methods described herein. Prior art references such as Ottenstein disclose allowing a

user to switch between manual and automatic brightness control modes. For example, Ottenstein teaches that “Microprocessor 10 also interfaces with selectable auto/manual mode switch 14 The auto mode of auto/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.” Ottenstein at 2:24–30.

A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Whitted’s system in order to provide a user of Whitted’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). *See* Hobbs Decl. ¶¶ 88–92 . A POSITA would have understood that he or she could incorporate “manual control” in Whitted’s control circuit, and would have enabled Whitted’s “brightness control circuit” to directly set display brightness. *See* Hobbs Decl. ¶ 91. Combining Ottenstein’s functionality with Whitted’s system would be no more than applying known techniques to improve similar devices in similar ways to yield predictable results. *See* Hobbs Decl. ¶ 91. Implementing such a feature and switching to manual mode would bypass the automatic control feature, and thus the multiplier would *selectively generate* a combined signal or provide selective multiplication, as recited in the ’117 patent.

- e) **Claim Limitation 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.**

Whitted discloses that its brightness control circuit comprises *a dark level bias* (minimum power level) *configured to adjust the combined signal* (i.e., “function of the output of the photo-sensor 502 and the received brightness control signal”) *to generate a brightness control signal* (output of the intensity control circuit, i.e., “power output to the backlight 510”) *that is used to*

control a brightness level of a visible display (display panel 206) such that the brightness control signal (output of the intensity control circuit, i.e., “power output to the backlight 510”) is maintained above a predetermined level (“pre-programmed” or “preselected threshold”) when the ambient light level decreases to approximately zero (i.e., “even if the output of the photo-sensor 502 indicates little or no incident light”) as recited in claim 1 of the ’117 patent. For example,

Whitted discloses:

The intensity control circuit 503 determines the amount of power supplied to the backlight 510 as a function of the output of the photo-sensor 502 and the received brightness control signal. The intensity of the backlight 510, as a function of the photo-sensors and brightness control outputs, is adjusted so that the perceived brightness of the display will remain generally constant despite changes in ambient light conditions. Accordingly, when the output of the photo-sensor 502 indicates an increase in the intensity of the ambient light striking the screen 206, the power to the backlight 510 will be increased. **As the intensity of the ambient light striking the screen 206 decreases, the intensity control circuit decreases the power supplied to the backlight 510 and thus the intensity of the light output therefrom. A minimum power level is set, e.g., pre-programmed, for the backlight 510 to insure that the display will be readable in low light conditions.**

Whitted at 8:9–25 (emphasis added). Whitted further discloses:

In one embodiment, **even if the output of the photo-sensor 502 indicates little or no incident light, the intensity control circuit 503 does not lower the power output to the backlight 510 below a preselected threshold to insure that in dark or dimly lit conditions, images on the display panel 206 will remain visible.** In such an embodiment, intensity control circuit 503 maintains backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.

Whitted at 8:26–35 (emphasis added).

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.**

Whitted discloses *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* as recited

in claim 2. A POSITA would have understood that there were two primary methods for implementing Whitted's dark level bias into a brightness control circuit that utilizes a multiplier like that of Godwin—either along the y-axis or the x-axis. Hobbs Decl. ¶¶ 50–59. In other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See id.* ¶¶ 53–59. Each of these two methods for implementing Whitted's dark level bias would have at least been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143.

Applying the second method, the dark level bias (b) is multiplied by the user input (m) and thus *the amount of adjustment to the combined signal is dependent on the user selectable brightness setting*. As Dr. Hobbs explains, applying a “bias” or minimum output to the light sensor itself—*i.e.*, along the x-axis—was well-known in the art. Hobbs Decl. ¶¶ 57–59. For example, Ottenstein discloses that in its automatic brightness controller, “[t]he sensed ambient brightness level should be limited so that it is always at least 10% of full scale.” Ottenstein at 4:2–4. As Dr. Hobbs explains, this disclosure teaches applying a bias to the light sensor such that the output of the sensor will remain above a predetermined level even when there is no sensed ambient light. *See id.*

Accordingly, claim 2 is rendered obvious over Whitted in view of Godwin and Ottenstein.

3. Claim 3: The brightness control circuit of claim 2, wherein the multiplier multiplies a sum of the user signal and the sensing signal

by the dark level bias to generate an output signal corresponding to the brightness control signal.

Claim 3 is obvious over Whitted in view of Godwin and Ottenstein. In any event, claim 3 merely changes the order of sequence in which the signals are applied to the multiplier, requiring the multiplier to multiply *a sum of the user signal and the sensing signal by the dark level bias*.⁴ Claim 3 recites that there are three inputs into the “multiplier”: the user signal, the sensing signal, and the dark level bias. There is a limited number of arrangements for which the three signals can be applied to the multiplier, and a POSITA would have understood that the various signals from Whitted and Godwin could be added at different times and in different ways. Moreover, a POSITA would have readily understood, based on simple mathematical operations, whether the adjustment by the dark level bias would generate a brightness control signal that is maintained above a predetermined level when the ambient light level decreases to approximately zero. Therefore, combining the signals such that *the multiplier multiplies a sum of the user signal and the sensing signal by the dark level bias* would have been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143.

4. 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

⁴ Requester reserves the right to argue in litigation that claim 3 is indefinite under 35 U.S.C. § 112.

adjustment to the combined signal is independent of the user selectable brightness setting.

Whitted discloses *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 as recited in claim 4.*

As Dr. Hobbs explains, a POSITA would have understood that there were two methods for implementing Whitted's dark level bias into a brightness control circuit that utilizes a multiplier like that of Godwin—either along the y-axis or the x-axis. *See Hobbs Decl. ¶¶ 52–59.* In other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See id.* These two methods for implementing Whitted's dark level bias would have at least been obvious to try given that a POSITA could choose from a “finite number of identified, predictable solutions, with a reasonable expectation of success.” MPEP § 2143.

Applying the first method, the dark level bias (b) is added to the combined signal (mx) such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting (m). *See Hobs Decl. ¶¶ 52–56.* As Dr. Hobbs explains, adjusting the output of the multiplier—*i.e.*, along the y-axis—was well-known in the art. *See id.*

Accordingly, claim 4 of the '117 patent is rendered obvious by Whitted in view of Godwin and Ottenstein.

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

As explained above with regard to claim 1[c] and claim 1[d], the “output of the multiplier” in each of Whitted, Ottenstein, and Godwin includes the combined signal that is based on both the user signal and the sensing signal. Therefore, the “combined signal” in claim 4 exists at the “output of the multiplier,” so the dark level bias is added to both at the same time.

6. 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.

Whitted discloses that its brightness control circuit comprises *an overdrive clamp circuit* (i.e., an “adjust[ment] so that [backlight intensity] does not significantly exceed a level required to display images”) *coupled to the brightness control signal* (output of the intensity control circuit) *to limit its amplitude to a predefined range* as recited in claim 6. For example, Whitted teaches that “[i]n portable devices such as battery powered notebook computers, minimizing power consumption is important.” Whitted at 2:4–6. Whitted further discloses:

Since the amount of power delivered by batteries is often a function of their size and thus weight, **it is desirable to minimize power consumption requirements in portable devices to allow for longer periods of use between battery recharges and/or the use of smaller, lighter, batteries.**

Whitted at 2:27–31 (emphasis added). Whitted further discloses:

By measuring ambient light conditions and adjusting backlight intensity, e.g., at power up and/or periodically during use, **the intensity of the backlight is adjusted so that it does not significantly exceed a level required to display images in a manner deemed suitable by a user of the system.** A user may indicate the desired degree of contrast between the incident light and the light output by a display by manually adjusting a brightness control. **By automatically adjusting backlight intensity as a function of ambient light conditions, power savings can be achieved.** User selectable normal and power saving modes of operation are easily supported. In the power saving mode a minimal backlight intensity is maintained as a function of detected light conditions. During normal mode operation a somewhat brighter screen appearance is maintained.

Whitted at 7:38–52 (emphasis added). In addition, Godwin discloses:

The **resultant output intensity signal has a substantially continuous range between minimum intensity and maximum intensity** for control of the image source 56 over a large range of intensities.

Godwin at 5:12–18 (emphasis added).

7. **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.**

Whitted discloses that *the brightness control signal* (output of the intensity control circuit) *is provided to a display driver* (“power output to the backlight 510”) *to control backlight illumination* (“automatically controlling the intensity of a backlight”) *of a liquid crystal display* (“liquid crystal display”) as recited in claim 7 of the ’117 patent. For example, Whitted discloses that “[t]he intensity control circuit 503 determines the amount of power supplied to the backlight 510.” Whitted at 8:9–12. Whitted further discloses::

The present invention relates to methods and apparatus for implementing display devices and, more particularly, **to methods and apparatus for reducing the amount of electrical power required by display devices, e.g., transmissive and/or transreflective liquid crystal display (LCD) devices.**

Whitted at 1:5–10 (emphasis added). Whitted further discloses:

One feature of the present invention is directed to **automatically controlling the intensity of a backlight** as a function of ambient, e.g., external, light levels. In accordance with this feature of the present invention, the ambient light intensity at the front, e.g., viewing surface, **of an LCD is sensed using a sensor and the intensity of the backlight is automatically adjusted as a function of the sensed light intensity.**

Whitted at 3:25–32 (emphasis added).

8. **Claim 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.

Ottenstein discloses *a second input (“enable” signal) configured to receive a selection signal (“selectable auto mode/manual mode switch 14”) to selectively operate the brightness control circuit in an auto mode (“auto mode”) or a manual mode (“manual mode”), wherein the selection signal (“selectable auto mode/manual mode switch 14”) enables the light sensor (“light sensors 12, 13”) in the auto mode (“auto mode”) and disables the light sensor (“light sensors 12, 13”) in the manual mode (“manual mode”)* as recited in claim 9. Indeed, during prosecution, the Examiner explained:

Ottenstein discloses a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode (14), wherein the selection signal enables the light sensor (9) in the auto mode and disables the light sensor in the manual mode.

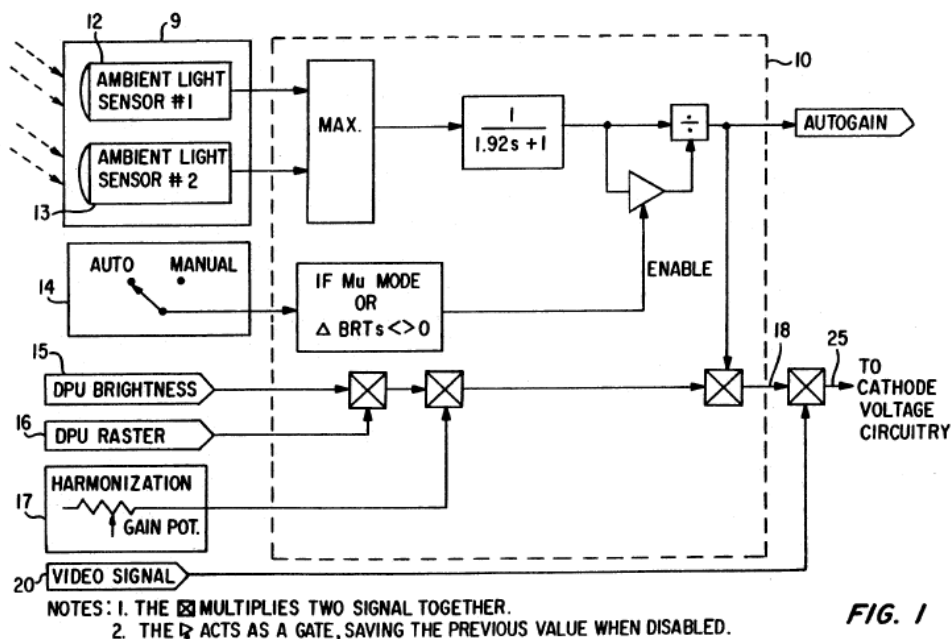
File History at 110 (11/07/2011 Non-Final Rejection at 11) (citing Ottenstein, Fig. 1 and accompanying text). In addition, the Examiner explained:

At the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the auto mode or the manual mode similar to that taught by Ottenstein to achieve further adjust brightness and contrast in the circuit of Narveson. As one of ordinary skill in the art would appreciate, the suggestion or motivation for doing so would have been to achieve predictable result of providing automatic compensation for the effects of ambient light on a display.

Id. For example, Ottenstein discloses:

3. The display has a **selectable auto mode versus manual mode switch. When auto mode is selected, automatic brightness control is engaged. In manual mode the pilot manually maintains the brightness settings.**

Ottenstein at 1:50–55 (emphasis added). Figure 1, shown below, illustrates the selectable auto mode/manual mode switch 14 which disables the light sensors when the switch is in manual mode.



Ottenstein, Fig. 1. Ottenstein further discloses:

Microprocessor 10 also interfaces with selectable auto mode/manual mode switch 14 and two pilot selected brightness settings, DPU Brightness (BRT) 15 and DPU Raster 16. The auto mode of auto mode/manual mode switch 14 enables the operation of the automatic brightness control and the manual mode disables it.

Ottenstein at 2:23–30 (emphasis added).

Whitted also teaches that manual control of display brightness was well known in the art.

For example, Whitted discloses:

In most portable computer devices, backlight intensity is controlled by a user accessible control, e.g., a potentiometer. **In most known computer devices, the brightness of the backlight is fixed at the intensity determined by the user.**

Whitted at 7:15–18. Moreover, as Dr. Hobbs explains, a POSITA would have been motivated to combine Whitted and Godwin with Ottenstein. Hobbs Decl. ¶¶ 80, 88–92. A POSITA would have recognized that switching between manual and automatic brightness control for a display was a well-known technique in the art and that such a technique was disclosed by Ottenstein. *See id.* ¶

89. Specifically, Ottenstein discloses a microprocessor which “interfaces with selectable auto mode/manual mode switch 14.” Ottenstein, 2:24-26. A POSITA would have been motivated to include Ottenstein’s functionality of switching between manual and automatic modes in Whitted’s system in order to provide a user of Whitted’s system with the option of selecting either manual or automatic mode (and, consequently, access to the benefits associated with each mode). Hobbs Decl. ¶¶ 88–92. A POSITA would also have recognized that Whitted’s brightness control circuit could be used to adjust display brightness in both manual display brightness and automatic display brightness adjustment modes, and that Whitted’s intensity control circuit would be used to switch between manual and automatic brightness adjustment modes, as disclosed by Ottenstein. Hobbs Decl. ¶ 91. Therefore, one skilled in the art would have looked to the disclosures of these references together to implement these functionalities. Hobbs Decl. ¶¶ 80, 88–92.

9. Independent Claim 15:

- a) **Claim Limitation 15[preamble]: A method to selectively provide ambient light correction, said method comprising:**

See Claim Limitation 1[preamble], (Section XI.E.1.a), *supra*.

- b) **Claim Limitation 15[a]: receiving a user input signal indicative of a user selectable brightness setting;**

See Claim Limitation 1[a], (Section XI.E.1.b), *supra*.

- c) **Claim Limitation 15[b]: selectively multiplying the input signal with a sense signal to generate a combined signal, wherein the sense signal indicates an ambient light level; and**

See Claim Limitation 1[b], (Section XI.E.1.c), *supra*, and Claim Limitation 1[c], (Section XI.E.1.d), *supra*.

- d) **Claim Limitation 15[c]: 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.**

See Claim Limitation 1[d], (Section XI.E.1.e), *supra*.

Claim 15 of the '117 patent is the method claim version of claim 1 and includes nearly identical claim limitations. During prosecution, the Examiner rejected independent claim 15 on identical grounds to claim 1. The applicant responded with the same amendment to claim 15 and advanced the same argument to overcome the rejection. Therefore, claim 15 is rendered obvious over Whitted in view of Godwin and Ottenstein for the same or substantially the same reasons as those stated in reference to claim 1, which are incorporated fully herein.

10. 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.

Whitted discloses *the step of selectively multiplying the input signal* (“brightness control signal”) *with the sense signal* (“output of the photo-sensor 502”) *is performed by a software algorithm* (“implemented using software”), *an analog circuit, or a mixed-signal circuit* (intensity control circuit 505) as recited in claim 16. For example, Whitted discloses:

The portable computer 500, further comprises a backlight intensity control circuit 503 and a brightness control circuit 504 which are used to control the amount of power supplied to the backlight 510 and thus the intensity of light supplied to the rear of the display panel 206. **The intensity control circuit may be implemented using software routines executed by a CPU included in the base portion 506.** The brightness control circuit 504 may be implemented as a potentiometer which has one terminal coupled to a power supply represented by the symbol PS and another terminal coupled to the intensity control circuit 503. A user may adjust the potentiometer, e.g., by turning a knob, thereby adjusting the brightness control signal supplied to the intensity control circuit 503.

Whitted at 7:62–8:8 (emphasis added). Whitted further discloses:

It should also be noted that the computer system 503 may include a central processing unit (CPU), a memory device and various software routines which are stored in the memory device and executed by the CPU. **The intensity control circuit 505 may be implemented using software which controls the intensity of the backlight 510 as a function of the various input signals which are shown as being supplied to the intensity control circuit 505.** In fact, the intensity control function may be incorporated into, and/or be implemented as, operating system routines executed by the CPU included in the computer 500.

Whitted at 9:31–41 (emphasis added). In addition, Godwin discloses:

The above-described embodiments may be modified in a variety of ways. For example, **the microprocessor 52 may be replaced by dedicated processing circuitry or analogue equivalents.**

Godwin at 7:32–35 (emphasis added). Accordingly, claim 16 is rendered obvious over Whitted in view of Godwin and Ottenstein.

11. **Claim 17: The method of claim 15, wherein the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment to the combined signal is dependent on the input signal.**

See Claim 2, (Section XI.E.2), *supra*.

For the same or substantially the same reasons as those stated in reference to claim 2, Whitted discloses *the dark level bias is added to the sense signal before selective multiplication such that the amount of adjustment to the combined signal is dependent on the input signal as recited in claim 17.*

For example, as explained above, Whitted’s “intensity control circuit” output (brightness control signal) controls the brightness of the display based on the combined signal (i.e., “function of the output of the photo-sensor 502 and the received brightness control signal”). Whitted teaches that as ambient light decreases, power supplied to the backlight decreases and in low light conditions (*i.e.*, where there is little or no incident light), the combined signal would be so low that the power output would not allow the images on the display panel to remain visible. Whitted at

8:26–35. Thus, in conditions where there is little or no incident light, Whitted discloses a “minimum power level” (dark level bias) that is “pre-programmed” into the intensity control circuit to insure that the display will be readable in low light conditions. *Id.* at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to “maintain[] backlight light output between a minimum threshold level and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

As Dr. Hobbs explains, a POSITA would have understood that there were two primary methods for implementing Whitted’s dark level bias into a brightness control circuit that utilizes a multiplier like that of Godwin—either along the y-axis or x-axis. Hobbs Decl. ¶¶ 50–59. In other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See id.*

Applying the second method, the dark level bias (b) is added to the sense signal before selective multiplication by the user input and thus the amount of adjustment to the combined signal is dependent on the input signal. *See* Hobbs Decl. ¶¶ 57–59. As Dr. Hobbs explains, applying a “bias” or minimum output to the light sensor itself—*i.e.*, along the x-axis—was well-known in the art. *See id.* For example, Ottenstein discloses that in its automatic brightness controller, “[t]he sensed ambient brightness level should be limited so that it is always at least 10% of full scale.” Ottenstein at 4:2–4.

Accordingly, claim 17 is rendered obvious over Whitted in view of Godwin and Ottenstein for the same or substantially the same reasons as those stated above in reference to claim 2, which are incorporated fully herein.

12. Claim 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.

See Claim 4, (Section XI.E.4), *supra*.

For the same or substantially the same reasons as those stated in reference to claim 4, Whitted discloses *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* as recited in claim 18.

For example, as explained above, Whitted's "intensity control circuit" output (brightness control signal) controls the brightness of the display based on the combined signal (i.e., "as a function of the output of the photo-sensor 502 and the received brightness control signal"). Whitted teaches that as ambient light decreases, power supplied to the backlight decreases and in low light conditions (*i.e.*, where there is little or no incident light), the combined signal would be so low that the power output would not allow the images on the display panel to remain visible. Whitted at 8:26–35. Thus, in conditions where there is little or no incident light, Whitted discloses a "minimum power level" (dark level bias) that is "pre-programmed" into the intensity control circuit to insure that the display will be readable in low light conditions. *Id.* at 8:22–25. Under such conditions, the minimum power level (dark level bias) adjusts the combined signal within the intensity control circuit to "maintain[] backlight light output between a minimum threshold level

and full intensity as a function of the output of the photo-sensor 502 and the brightness control circuit 504.” *Id.* at 8:31–35.

As Dr. Hobbs explains, a POSITA would have understood that there were two primary methods for implementing Whitted’s dark level bias into a brightness control circuit that utilizes a multiplier like that of Godwin —either along the y-axis or x-axis. *See* Hobbs Decl. ¶¶ 50–59. In other words: (1) the bias could be applied to the output of the multiplier of the user signal and the sensing signal (*i.e.*, $y = mx + b$); or (2) the bias could be applied to the light sensor output, thereby ensuring that the light sensor output never goes to zero (*i.e.*, $y = m(x + b)$). *See id.* Applying the first method, the dark level bias (b) is added to the combined signal (mx) after selective multiplication such that the amount of adjustment to the combined signal is independent of the input signal and sense signal. *See id.* ¶¶ 54–56. As Dr. Hobbs explains, adjusting the output of the multiplier—*i.e.*, along the y-axis—was well-known in the art. *See id.*

Accordingly, claim 18 is rendered obvious over Whitted in view of Ottenstein and Godwin for the same or substantially the same reasons as those stated above in reference to claim 4, which are incorporated fully herein.

XII. CONCLUSION

As explained in detail above, the references cited in this Request raise substantial new questions of patentability with respect to claims 1–7, 9, and 15–18 of the ’117 patent. The prior art applied in this *Ex Parte* Reexamination Request anticipates and/or renders obvious each of claims 1–7, 9, and 15–18 under 35 U.S.C. §§ 102 and 103. For at least the reasons detailed above, reexamination of claims 1–7, 9, and 15–18 of the ’117 patent should be granted.

Request for *Ex Parte* Reexamination of
U.S. Patent No. 8,223,117

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