

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 June 2005 (16.06.2005)

PCT

(10) International Publication Number
WO 2005/055185 A1

(51) International Patent Classification⁷: **G09G 3/32**

[US/US]; 36 Westfield Commons, Rochester, NY 14625 (US).

(21) International Application Number:
PCT/US2004/039139

(74) Common Representative: **EASTMAN KODAK COMPANY**; 343 State Street, Rochester, NY 14650-2201 (US).

(22) International Filing Date:
22 November 2004 (22.11.2004)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/721,124 25 November 2003 (25.11.2003) US

(71) Applicant (for all designated States except US): **EASTMAN KODAK COMPANY** [US/US]; 343 State Street, Rochester, NY 14650-2201 (US).

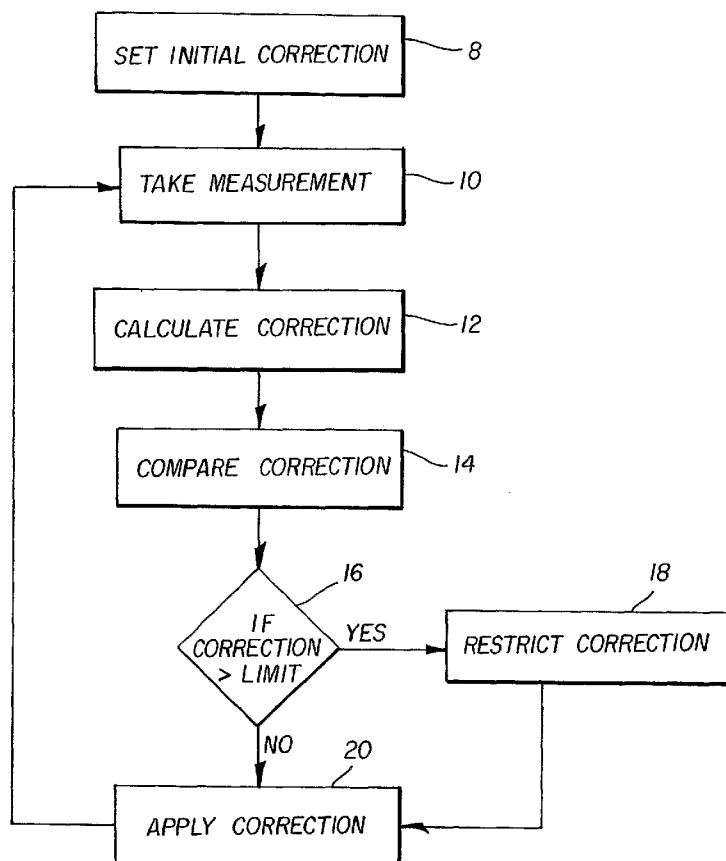
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

(72) Inventor; and

(75) Inventor/Applicant (for US only): **COK, Ronald, Steven**

[Continued on next page]

(54) Title: **ACEING COMPENSATION IN AN OLED DISPLAY**



(57) Abstract: A method for controlling aging compensation in an OLED display having one or more light emitting elements includes the steps of periodically measuring the change in display output to calculate a correction signal; restricting the change in the correction signal at each period to a maximum value; and applying the correction signal to the OLED display to effect a correction in the display output.

WO 2005/055185 A1



European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ,*

BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AGEING COMPENSATION IN AN OLED DISPLAY

FIELD OF THE INVENTION

The present invention relates to OLED flat-panel displays and
5 more particularly to methods for providing aging compensation to such displays.

BACKGROUND OF THE INVENTION

Solid-state organic light emitting diode (OLED) image display
devices are of great interest as a superior flat-panel display technology. These
10 displays utilize current passing through thin films of organic material to generate
light. The color of light emitted and the efficiency of the energy conversion from
current to light are determined by the composition of the organic thin-film
material. Different organic materials emit different colors of light. However, as
the display is used, the organic materials in the device age and become less
15 efficient at emitting light. This reduces the lifetime of the display. The differing
organic materials may age at different rates, causing differential color aging and a
display whose white point varies as the display is used.

Referring to Fig. 2, a graph illustrating the typical light output of a
prior-art OLED display device as current is passed through the OLEDs is shown.
20 The three curves represent typical change in performance of red, green and blue
light emitters over time. As can be seen by the curves, the decay in luminance
between the differently colored light emitters is different. Hence, in conventional
use, with no aging correction, as current is applied to each of the differently
colored OLEDs, the display will become less bright and the color, in particular the
25 white point, of the display will shift.

A variety of methods for measuring or predicting the aging of the
OLED materials in displays are known in the art. For example, U.S. Patent No.
6,456,016 issued September 24, 2002 to Sundahl et al., titled "Compensating
Organic Light Emitting Displays" relies on a controlled reduction of current
30 provided at an early stage of device use followed by a second stage in which the

display output is gradually decreased. US Patent No. 6,414,661 entitled "Method And Apparatus For Calibrating Display Devices And Automatically Compensating For Loss In Their Efficiency Over Time" issued July 2, 2002 to Shen et al, describes a method and associated system that compensates for long-term variations in the light-emitting efficiency of individual organic light emitting diodes (OLEDs) in an OLED display device, by calculating and predicting the decay in light output efficiency of each pixel based on the accumulated drive current applied to the pixel and derives a correction coefficient that is applied to the next drive current for each pixel. US Published Patent Application No. 2002/0167474 "Method Of Providing Pulse Amplitude Modulation For OLED Display Drivers" published November 14, 2002 by Everitt describes a pulse width modulation driver for an organic light emitting diode display. One embodiment of a video display comprises a voltage driver for providing a selected voltage to drive an organic light emitting diode in a video display. The voltage driver may receive voltage information from a correction table that accounts for aging, column resistance, row resistance, and other diode characteristics.

US Patent No. 6,504,565 titled "Light-Emitting Device, Exposure Device, And Image Forming Apparatus", issued January 7, 2003 to Narita et al describes a light-emitting device which includes a light-emitting element array formed by arranging a plurality of light-emitting elements, a driving unit for driving the light-emitting element array to emit light from each of the light-emitting elements, a memory unit for storing the number of light emissions for each light-emitting element of the light-emitting element array, and a control unit for controlling the driving unit based on the information stored in the memory unit so that the amount of light emitted from each light-emitting element is held constant.

JP 2002/278514 A titled "Electro-Optical Device" and published September 27, 2002 by Koji describes a method in which a prescribed voltage is applied to organic EL elements by a current-measuring circuit and the current

flows are measured. A temperature measurement circuit estimates the temperature of the organic EL elements.

All of the methods described above change the output of the OLED display to compensate for changes in the OLED light emitting elements.

5 However, it is preferable that any changes made to the display be imperceptible to a user. Since displays are typically viewed in a single-stimulus environment, slow changes over time are acceptable, but large, noticeable changes are objectionable. Since continuous, real-time corrections are usually not practical because they interfere with the operation of the OLED display, most changes in OLED display
10 compensation are done periodically. Hence, if an OLED display output changes significantly during a single period, a noticeably objectionable correction to the appearance of the display may result.

It is also true that in any real system, measurement anomalies may occur due to environmental or system perturbations or noise that do not reflect the
15 actual situation. Corrections in response to such anomalies are undesirable and may result in damage to the system or may degrade display performance. Manufacturing processes used to make OLED displays also exhibit variability that affects the performance of the display and this manufacturing variability needs to be accommodated in any practical aging correction method.

20 Referring to Fig. 3, prior art systems providing aging compensation to OLED displays typically include a display **30** for displaying images. The display **30** is controlled by a controller **32** that receives image or data signals **34** from an external device. The image or data signals **34** are converted into the appropriate control signals **36** using conversion circuitry **38** within the controller
25 **32** and applied to the display **30**. A performance attribute of the display, for example the current or voltage within the display **30**, is measured and a feedback signal **40** is supplied through a measurement circuit **42** and provided to the controller **30**. The controller then uses the measured feedback signal **40** to change the control signals **36** to compensate for any aging detected in the display **30**.

30 The measurement circuit **42** may be incorporated into the display **30**, into the controller **32**, or may be a separate circuit **42** (as shown). Likewise,

the feedback signal may be detected within the display (as shown) or measured externally by the controller 32 or some other circuit. For example, the luminance of the display 32 may be measured by an external photo-sensor or camera or be detected by photosensors on the display itself.

5 In some prior art embodiments, the feedback signal 40 is not produced by the display 30, but is produced by analyzing the control signals 36 input to the display 30. For example, a useful feedback signal known in the prior art is the accumulation of current provided to the display 30. Since aging depends on total current passed through a display, a measurement of the accumulated
10 current can be used to predict the aging of the display 30. Alternatively, the luminance signal sent to the display 30 as part of the control signals 36 may be accumulated over time to provide the feedback signal 40. A knowledge of the intended luminance of the display 30 can be used to predict aging and then the effects of aging can be compensated. Although a continuous correction of aging
15 is possible in some of these configurations, corrections are often applied periodically so as not to interfere with the use of the device.

 It is also the case that some environmental factors, for example temperature of operation, length of operation, and time since previous operation all contribute to the efficiency of the display. It is difficult to accommodate all
20 environmental factors in a correction scheme. Therefore, it is important to provide corrections that are robust in the face of unanticipated environmental variables. The methods shown in the prior art do not address these environmental variables.

 There is a need therefore for an improved aging compensation
25 method for organic light emitting diode displays.

SUMMARY OF THE INVENTION

 The need is met by providing a method for controlling aging compensation in an OLED display having one or more light emitting elements that
30 includes the steps of periodically measuring the change in display output to

calculate a correction signal; restricting the change in the correction signal at each period; and applying the correction signal to the OLED display to effect a correction in the display output.

5

ADVANTAGES

An advantage of this invention is that it compensates for the aging of the organic materials in a display in the presence of varying environmental factor and system noise, and provides a correction that does not become objectionably visible to a user of the display.

10

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a flow chart showing an embodiment of the method of the present invention;

Fig. 2 is a graph showing typical aging characteristics for differently colored OLEDs in a prior art display; and

15

Fig. 3 is a schematic diagram of a display device with feedback and control circuits according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

20

Referring to Fig. 1, in one embodiment of the present invention, a correction signal value is initialized **8**, to a value representing no change in the control signals used to drive the display. When the display is in use, a change in display output is measured **10**. From this measurement, a correction signal value is calculated **12**. Rather than simply applying the correction signal to the control signals, as is done in the prior art, any change in the correction signal value is compared **14** to a correction limit. In decision step **16**, if the change in the correction signal value is within the correction limit, a correction is applied **20** to the control signals **36**. If the change in the correction signal value exceeds the correction limit, the correction signal value is restricted **18** by reducing the magnitude of the change in the correction signal value, and then applying **20** the restricted correction signal to the control signals **36**. In this case, the correction

25

30

will not have corrected for all of the aging dictated by the feedback signal 40, but the amount of correction will be restricted to a correction that is not visibly objectionable to a viewer, or result in an undesirable correction due to noise.

Once the correction is applied, the cycle is complete. After some
5 period the cycle repeats. The period can be defined in a variety of ways, for example by time of use or by events such as power-up or power-down. Over time the correction applied will accommodate the display aging but in circumstances where the display ages very rapidly, the accommodation may take several cycles to fully accommodate the display aging. Since a long period of use may occur
10 between the correction cycles described in Fig. 1, perceptible aging may occur in a display before a new correction value is applied. However, because the aging is gradual and viewing of the display generally takes place in a single stimulus context, it is not likely that the aging of the display will be noticed by a user. However, if a large correction is applied all at once, the correction may be
15 perceptible to a user. Moreover, a correction based on an anomalous or incorrect measurement due to environmental factors or noise may cause damage or inhibit proper performance of a display. The present invention provides a slowly varying aging correction that will be robust in the presence of noisy measurements and will be imperceptible to a user under a wide variety of environmental
20 circumstances.

A variety of restrictions on changes in correction signal values may be used. For example, the changes may be restricted to monotonically increasing corrections. Since aging in a display increases over time, restricting the changes in correction to a positive value at a variety of rates depending on the usage of the
25 display provides a robust limit on the correction values. This can be important because noisy feedback values from the displays can appear to indicate that the display aging has been reversed. For example, the light output by a display depends on the current passed through the OLED light emitting elements in the display but also depends on the temperature of the OLED elements. If an initial
30 measurement is made at a higher temperature and a subsequent measurement is made at a lower temperature, the efficiency of the display light emitting elements

may appear to increase. If a correction value is then reduced to accommodate the apparent increase in display efficiency and the display is then used in a hot environment, the display will not be as bright as intended. This can occur not only by exposure to a variety of external temperatures but by measuring the feedback
5 value at different times during the use of the display. Typically, the display is at room temperature when first turned on. The display then heats up as it is used and the length of time the display is used and the type of content shown on the display markedly affect the temperature of the display and the value of the feedback signals.

10 Another restriction that may be applied is the magnitude of the change in aging correction parameters. A user may choose to use a display for a long time. If the aging correction cycle is predicated on a usage parameter such as power-up or power-down, significant aging may occur during a single period of use. Because the aging is gradual, it may not be noticeable to the user,
15 particularly because she may have no external comparison reference. However, if a correction to the aging is made all at once, the change may be noticeable, particularly if the change is made during use. By restricting the magnitude of the change to a fixed percentage, for example five percent, the change may be made imperceptible to the user.

20 Using the present invention, the restriction on corrections can be changed over time. For example, the rate of change in aging of an OLED display tends to decrease over time. Accordingly, the restrictions on the changes in the correction signal can be less during the early portion of the OLED display lifetime and greater during the latter portion of the lifetime of the display. It is also
25 possible to reduce the frequency of corrections as the rate of change in aging of the display decreases during the lifetime of the display.

Another problem that can be encountered when measuring and analyzing the performance of a display is the phenomenon of charge trapping. In normal use, OLED displays may become less efficient due to charge trapping in
30 the organic layers employed to emit light. After some time in an off state, the charges are relinquished and the efficiency of the display improves. If

measurements of the display are taken when no charge trapping is present but the device was previously measured and is operated when charges are trapped, an inappropriately optimistic measurement and performance correction will result. Restricting the correction to a monotonically increasing value will inhibit
5 inappropriate corrections of this sort.

Measurements of changes in various display outputs as a whole or for individual light emitting elements or groups of light emitting elements may be made in a variety of ways. For example, the change in current used by the display may be measured, the change in voltage supplied to the display to provide power
10 for a given control signal may be measured, or photosensors may be employed to measure changes in the brightness of the display or individual or groups of pixels. A table of accumulated luminance or current values corresponding to each light emitting element may be employed to track usage of the light emitting elements to estimate changes in brightness of the display. Typical data provided to the display
15 may be sampled to provide estimates of changes in the output of the display. The change in temperature of the display may also be measured to calculate the correction signal.

The groups of light emitting elements to which corrections are applied may include groups of common-color light emitters or light emitters that
20 are spatially distinct, for example contiguous elements in a restricted location. Groups may include light emitting elements at a common brightness level. The corrections applied to the groups may differ. For example, one correction may be applied to light emitting elements emitting light of a particular color at a particular brightness. The restrictions applied in the present invention to the groups may
25 differ. For example, changes in low brightness signals may be less restricted than changes in high brightness signals, or changes in control signals for light emitting elements of one color may be less restricted than changes in control signals for light emitting elements of another color.

The output of the display may be controlled in a variety of ways,
30 depending on the display specifications. For example, the voltage applied to the

display may be increased to accommodate an overall reduction in display brightness. Alternatively, the control signals applied to the display representing the desired brightness (typically an analog voltage) may be modified.

A combination of measurements and control mechanisms may also
5 be employed. Moreover, a history of changes may be stored and used to track the changes applied over time. This information may be used to predict future changes or to more intelligently restrict the allowed changes depending on prior display usage patterns. Alternatively, a usage and correction history may be used to modify the restrictions to provide a more robust change correction in the
10 presence of noise.

The corrected control signal may take a variety of forms depending on the OLED display device. For example, if analog voltage levels are used to drive the OLEDs, the correction will modify the voltages of the control signal. This can be done using amplifiers as is known in the art. In a second example, if
15 digital values are used, for example corresponding to a charge deposited at an active-matrix pixel location, a lookup table may be used to convert the digital value to another digital value as is well known in the art. In a typical OLED display device, either digital or video signals are used to drive the display. The actual OLED may be either voltage- or current-driven depending on the circuit
20 used to pass current through the OLED.

The correction signal values used to modify the display control signal such as data signals 34 to form a corrected control signal 36 may be used to correct a wide variety of display performance attributes over time. For example, correction signal values applied to an input data signal may hold the average
25 luminance of the display constant. Alternatively, the correction signal values may be restricted to allow the average luminance of the display to degrade more slowly than it would otherwise due to aging. The display may be held at a constant average luminance output over its lifetime. Alternatively, the luminance may be allowed to decrease in a preferred, controlled fashion over the lifetime of the
30 display.

The present invention can be employed in most top- or bottom-emitting OLED device configurations. These include simple structures comprising a separate anode and cathode per OLED and more complex structures, such as passive matrix displays having orthogonal arrays of anodes and cathodes to form pixels, and active matrix displays where each pixel is controlled independently, for example, with a thin film transistor (TFT). As is well known in the art, OLED devices and light emitting layers include multiple organic layers, including hole and electron transporting and injecting layers, and emissive layers. Such configurations are included within this invention.

In a preferred embodiment, the invention is employed in a device that includes Organic Light Emitting Diodes (OLEDs) which are composed of small molecule or polymeric OLEDs as disclosed in but not limited to US Patent 4,769,292, issued September 6, 1988 to Tang et al. and US Patent 5,061,569, issued October 29, 1991 to VanSlyke et al. Many combinations and variations of organic light emitting displays can be used to fabricate such a device.

PARTS LIST

- 8 initialize correction signal step
- 10 take measurement step
- 12 calculate correction step
- 14 compare correction step
- 16 decision step
- 18 restrict correction step
- 20 apply correction step
- 30 display
- 32 controller
- 34 data signals
- 36 control signal
- 38 conversion circuitry
- 40 feedback signal
- 42 measurement circuit

CLAIMS:

1. A method for controlling aging compensation in an OLED display having one or more light emitting elements comprising the steps of
5 periodically measuring the change in display output to calculate a correction signal; restricting the change in the correction signal at each period; and applying the correction signal to the OLED display to effect a correction in the display output.
- 10 2. The method claimed in claim 1 wherein the measurement is one or more measurements from the group including a light output of one or more of the light emitting elements; a current used by one or more of the light emitting elements; a voltage across one or more of the light emitting elements; an accumulation over time of the use of current by one or more of the light emitting
15 elements; an accumulation of the luminance values provided to one or more of the light emitting elements; an accumulation of the time that one or more of the light emitting elements is in use; a sampling of the data displayed on the display; and a temperature of the display.
- 20 3. The method claimed in claim 1 wherein the correction is restricted to be monotonically increasing.
4. The method claimed in claim 1 wherein the correction is restricted to a fixed percentage change in the correction value.
- 25 5. The method claimed in claim 1 wherein the correction is restricted to be monotonically increasing and to a fixed percentage change in the correction value.

6. The method claimed in claim 1 further comprising the step of storing a history of changes in the correction signal and using the history with the measured change to determine the restrictions.

5 7. The method claimed in claim 1 wherein the restrictions change over time.

8. The method claimed in claim 1 wherein the correction signal is one or more of the group including a voltage applied to the display; a voltage
10 applied to each pixel; a charge applied to each pixel; and a data value applied to each pixel.

9. The method claimed in Claim 1 wherein the OLED display is a passive-matrix display.
15

10. The method claimed in Claim 1 wherein the OLED display is an active-matrix display.

11. The method claimed in Claim 1 wherein the corrections are
20 applied to groups of light emitting elements.

12. The method claimed in Claim 1 wherein different corrections and/or restrictions are applied to groups of light emitting elements.

25 13. The method claimed in Claim 12 wherein the groups are colors of light emitting elements.

14. The method claimed in Claim 12 wherein the groups are spatially distinct groups of light emitting elements.
30

15. The method claimed in Claim 1 wherein different restrictions and/or corrections are applied to light emitting elements for different display brightness levels.

5 16. The method claimed in Claim 1 wherein the change in display output is measured at power-up of the display.

17. The method claimed in Claim 1 wherein the change in display output is measured at power-down of the display.

10

18. The method claimed in Claim 1 wherein the change in display output is measured periodically while the display is in use.

15 19. The method claimed in Claim 18 wherein the period of measuring the change in display output changes over time.

20. The method claimed in Claim 1 wherein the corrections maintain a constant average luminance output for the display over its lifetime.

20 21. The method claimed in Claim 1 wherein the corrections maintain a decreasing level of luminance over the lifetime of the display at a rate slower than that of an uncorrected display.

22. The method claimed in Claim 1 wherein the correction is
25 applied with a lookup table.

23. The method claimed in Claim 1 wherein the correction is applied with an amplifier.

30 24. The method claimed in Claim 1 wherein the display output is the brightness of the display.

1/2

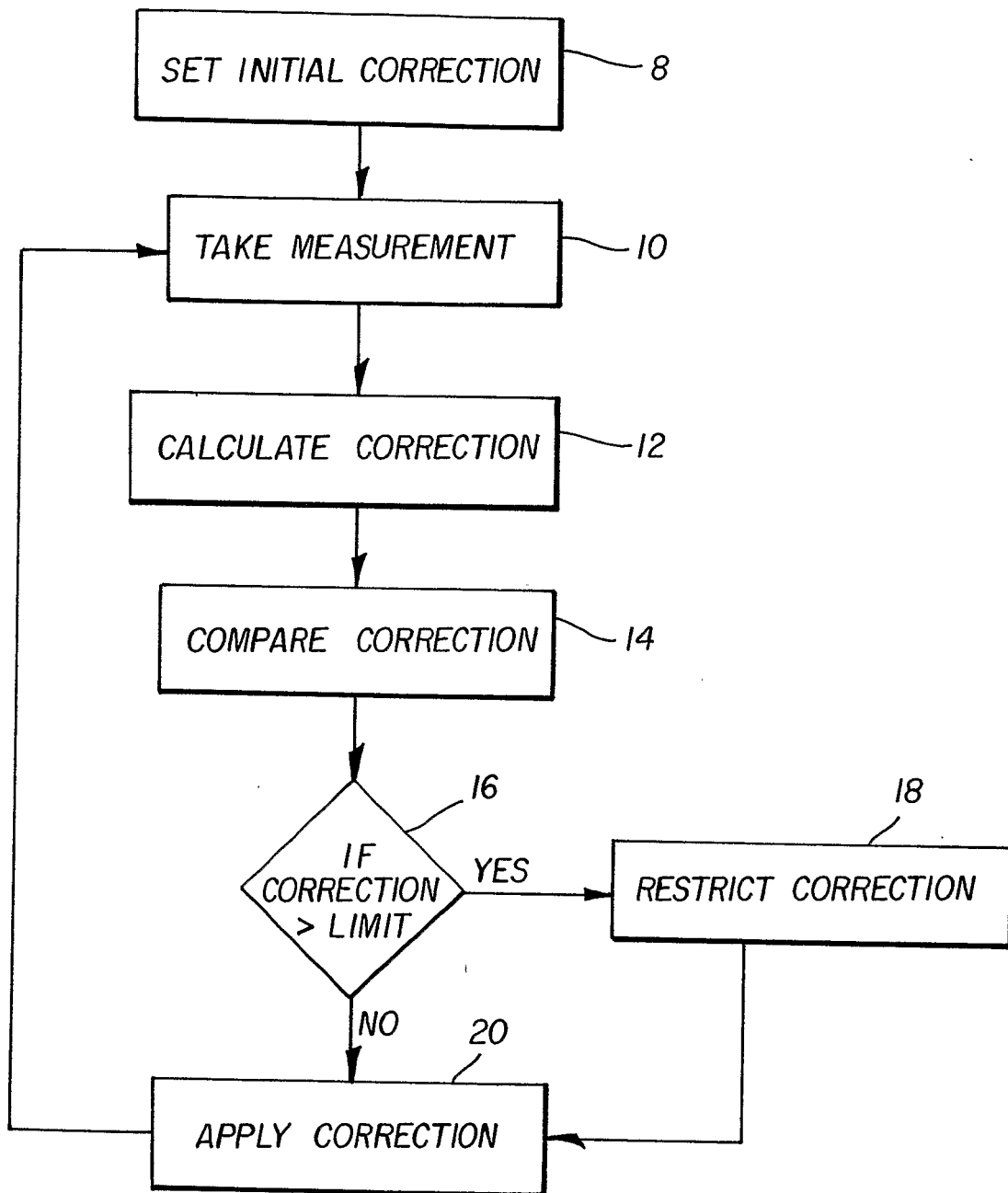


FIG. 1

2/2

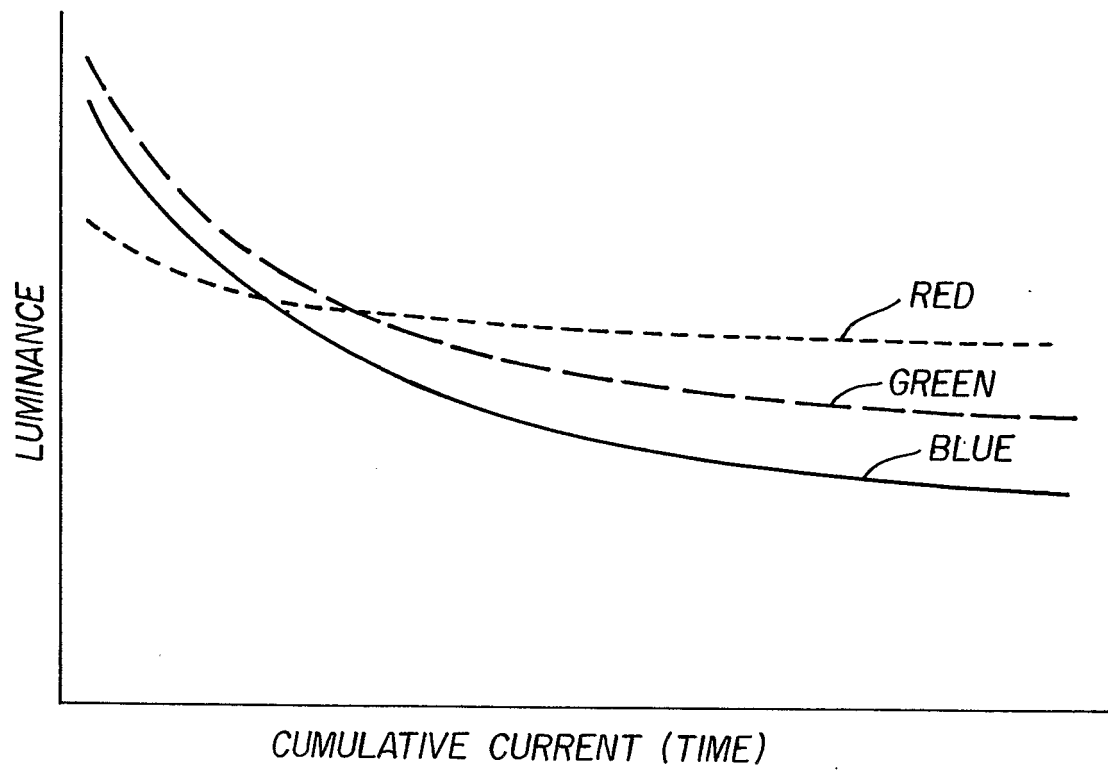


FIG. 2
(Prior Art)

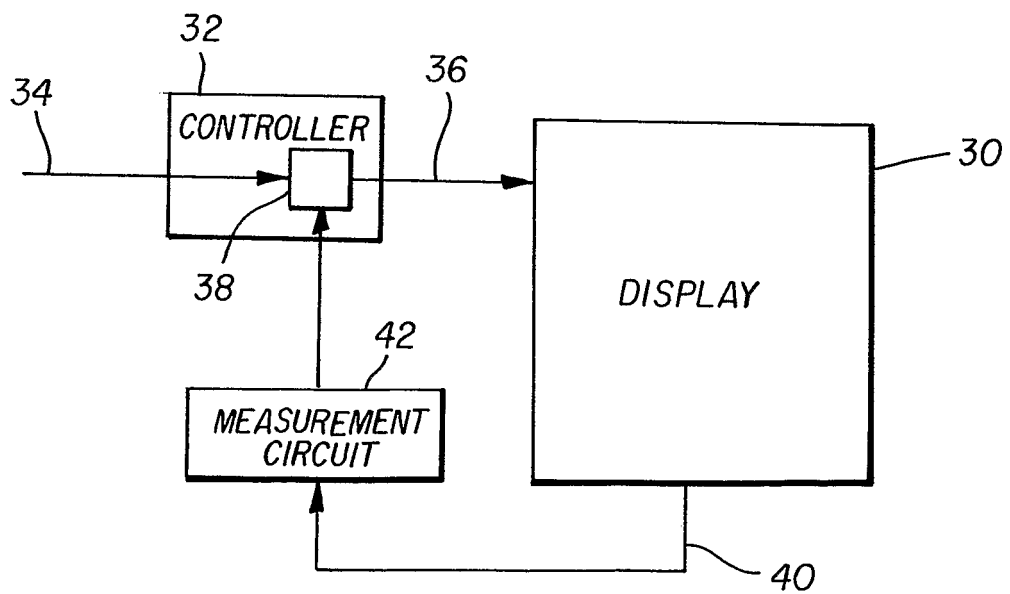


FIG. 3
(Prior Art)

INTERNATIONAL SEARCH REPORT

PCT/US2004/039139

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G09G3/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 225 557 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD) 24 July 2002 (2002-07-24) paragraph '0180! - paragraph '0195!; figures 34-38	1,8,9, 16,17, 20,21
A	US 2003/071804 A1 (YAMAZAKI SHUNPEI ET AL) 17 April 2003 (2003-04-17) paragraph '0056! - paragraph '0064!; figures 1-4	1,10,21
A	US 6 501 230 B1 (FELDMAN RODNEY D) 31 December 2002 (2002-12-31)	
A	US 2003/048243 A1 (KWASNICK ROBERT F) 13 March 2003 (2003-03-13)	

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

1 April 2005

Date of mailing of the international search report

12/04/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Faricella, L

INTERNATIONAL SEARCH REPORT

PCT/US2004/039139

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 1225557	A	24-07-2002	EP	1225557 A1	24-07-2002
			CN	1377495 A	30-10-2002
			WO	0126085 A1	12-04-2001
			JP	2001350442 A	21-12-2001
			TW	472277 B	11-01-2002
US 2003071804	A1	17-04-2003	CN	1409404 A	09-04-2003
			EP	1310938 A2	14-05-2003
			JP	2003177714 A	27-06-2003
			JP	2003173164 A	20-06-2003
			TW	546596 B	11-08-2003
US 6501230	B1	31-12-2002	EP	1291840 A2	12-03-2003
			JP	2003151765 A	23-05-2003
			TW	591942 B	11-06-2004
US 2003048243	A1	13-03-2003	NONE		

专利名称(译)	OLED显示屏中的点火补偿		
公开(公告)号	EP1687795A1	公开(公告)日	2006-08-09
申请号	EP2004811797	申请日	2004-11-22
[标]申请(专利权)人(译)	伊斯曼柯达公司		
申请(专利权)人(译)	伊士曼柯达公司		
当前申请(专利权)人(译)	全球OLED科技有限责任公司		
[标]发明人	COK RONALD STEVEN		
发明人	COK, RONALD, STEVEN		
IPC分类号	G09G3/32		
CPC分类号	G09G3/3216 G09G3/3225 G09G2320/029 G09G2320/043 G09G2320/048 G09G2360/145		
优先权	10/721124 2003-11-25 US		
其他公开文献	EP1687795B1		
外部链接	Espacenet		

摘要(译)

一种用于控制具有一个或多个发光元件的OLED显示器中的老化补偿的方法，包括周期性地测量显示输出的变化以计算校正信号的步骤;将每个周期的校正信号的变化限制在最大值;并将校正信号应用于OLED显示器以实现显示输出的校正。