

Description

The present invention relates generally to the recording of exposure data in association with photographs, and more specifically to recording data describing intentional variations from a nominal exposure for providing information to an observer.

Background of the Invention

It is known in the art to record aperture and shutter speed information in relation to photographic pictures. U.S. Patent Nos. 3,843,956 and 4,001,846 to Kauneckas show electronic apparatus for recording such information directly on a film, while U.S. Patent Nos. 3,995,289 to Shono and 3,736,849 to Thompson show opto-mechanical apparatus for doing the same. Further, at least one camera manufacturer makes available a data-back for a camera, including an alpha-numeric keyboard, which permits exposure data in combination with operator-selected messages to be recorded in relation to an exposed film.

US-A-3,968,505 provides a system for recording the shutter speed and aperture of automatic cameras. An electroluminescent display is positioned adjacent to a photographic film contained within an automatic camera. The electroluminescent display is controlled by circuitry coupled to the camera electronics as well as to the manually settable parameters of the camera. In shutter priority cameras, circuitry is provided for sensing the electronic aperture control signal converting the signal to digital form and subsequently driving the electroluminescent display. A similar process applies to aperture priority cameras.

A still photographic film unit is featured in EP-A-0,011,086 which includes a disc of photosensitive material rotatable about a central axis. A core is opaque material is secured in a central aperture of the disk. The core has associated with it magnetic recording material which serves to carry information applied at various stages throughout the life of the film unit. The information may encompass whether or not flash is used, what was the nature of the ambient lighting, or dealer related data concerning his business. The information can be retrieved for assisting in photographic processes such as exposure, processing, printing and handling.

A disadvantage of prior art cameras is that, in instances wherein a user intentionally varies a camera exposure from a suggested nominal exposure, no accommodation is made for recording the varied exposure. Such instances arise, for example, in cameras of the type providing both a recommended nominal exposure, and the ability to deviate from the nominal exposure for such purposes as

exposure bracketing. Since no accommodation is made for recording the varied exposure, this information is not available to the subsequent observer of the finished photographic prints or transparencies. Thus, in situations where the user has intentionally varied an exposure, he is typically left guessing what exposure was used for a subsequently finished print or transparency.

Summary of the Invention

Accordingly, a principle object of the present invention is to provide information indicating an intentional variation from a nominal exposure for use during the evaluation of photographic prints or transparencies.

Another object of the present invention is to provide a photographic camera which automatically records exposure data indicating an intentional variation from a nominal exposure.

In accordance with a first embodiment of the present invention, a new and improved method of operating a photographic camera is defined in claim 1.

Brief Description of the Drawings

While the specification concludes with claims defining the features of the invention that are regarded as novel, it is believed that the invention, together with further objects thereof, will be better understood from a consideration of the following description in conjunction with the drawing Figures, in which:

- FIG. 1 is a block diagram of a photographic camera constructed in accordance with the present invention;
- FIG. 2 is a flow chart illustrating the operation of the camera of FIG. 1;

Detailed Description of the Invention

Referring now to the drawings, FIG. 1 shows a photographic camera 10 including a transport mechanism 12 for supporting and advancing a conventional silver halide filmstrip 14. A lens 16, aperture mechanism 20, and shutter mechanism 22 are positioned to control the exposure of picture frames onto filmstrip 14. As used herein, a "picture frame" comprises an undeveloped, latent image scene. A controller 18, for example a microprocessor, is connected to the aperture and shutter mechanisms 20, 22, and to film transport mechanism 12. An automatic exposure control photosensor 24 and a shutter release button 26 are both connected to controller 18, operation of the shutter release button causing the controller to set aperture 20 and actuate shutter 22. The above-

described components represent conventional features and will not be discussed in detail herein.

In accordance with the present invention, an automatic exposure compensation control mechanism 28 is connected to controller 18. A recording device 30 is likewise connected to controller 18 and positioned adjacent filmstrip 14 for marking the filmstrip. A manual exposure compensation control mechanism 32 includes controls such as thumbwheels (not shown) mounted on the outside of camera 10, the operation of which varies the adjustment of aperture 20 and shutter 22.

Automatic exposure compensation control mechanism 28 comprises apparatus for automatically "bracketing" a nominal exposure selected by controller 18 responsive to the light sensed by sensor 24. Mechanism 28 functions to automatically provide a selected number of exposures in addition to the nominal exposure: i.e. one under- and one over-exposure. The amount of under- and over-exposure can be pre-programmed, or controlled by a photographer. Alternatively, exposure compensation control mechanism 28 can be operated to provide a predetermined under- or over-exposure for selected frames, without the above-described bracketing. Such operation is desirable, for example, to provide purposeful over-exposure to compensate for back-lit scenes.

Recording device 30 comprises apparatus for recording data onto filmstrip 14 in, for example, a latent image, mechanical, or magnetic format. If latent image recording is desired, recording device 30 can comprise a light pipe or light emitting diode (LED). If mechanical recording is desired, device 30 can comprise a mechanical punch. Similarly, if part of filmstrip 14 is adapted for magnetic recording, recording device 30 can comprise a magnetic write head.

Manual compensation control mechanism 32 comprises apparatus for permitting an operator (not shown) to manually override the nominal exposure automatically supplied by controller 18, and to manually adjust aperture 20 and/or shutter 22 to provide a user-selected exposure. Manual compensation control mechanism 32 can comprise, for example, user-operable thumbwheels appropriately connected to aperture and shutter mechanisms 20, 22.

In operation, described with respect to the flow chart of FIG. 2, upon the activation of shutter release button 26 by a user, controller 18 functions to automatically provide a nominal exposure for filmstrip 14. This nominal exposure is selected responsive to the ambient light sensed by sensor 24, and the selective activation of a flash (not shown). The providing of such pre-programmed or calculated nominal exposures is well known to those skilled in the art, and will not be discussed

further herein.

Next, controller 18 senses the input of automatic exposure compensation control 28 and manual exposure compensation control 32 to determine if the user has manipulated either control to select an exposure other than the automatically provided nominal exposure. If no exposure compensation is provided, the filmstrip 14 is exposed with the nominal exposure. Recording device 30 is then activated to record on filmstrip 14 data indicating that the nominal exposure was used. Alternatively, the absence of data could be used to indicate the nominal exposure was used.

If controller 18 determines that exposure compensation has been provided, either through automatic controller 28 or manual controller 32, aperture 20 and shutter 22 are set to provide the desired, user-selected exposure to filmstrip 14. Controller 18 calculates/determines the difference between the automatically provided nominal exposure and the user-selected exposure. Such a difference is typically expressed in "stops", for example one change in f-stop, or a halving (or doubling) of shutter speed. The user-selected exposure is made on filmstrip 14, and controller 18 activates recording device 30 to record data indicating the difference between the nominal and user-selected exposures on the filmstrip. If automatic exposure bracketing is selected as described above, the compensated exposure and concomitant data recording will, of course, be performed for each of the bracketing exposures.

It will be understood that the data need not be recorded coincident with the exposure of each individual frame. The data may, for example, be stored in controller 18, and recorded on filmstrip 14 during a rewind operation. The data may be recorded on a leading or trailing end of filmstrip 14, or on a cartridge associated with the filmstrip. The data may also be placed on the non-emulsion side of filmstrip 14.

The present invention has particular application with respect to the analysis of photographic transparencies. As is known in the art, transparency film is particularly sensitive to deviations from the nominal exposure. Further, because no printing process is used wherein deviations in exposure can be corrected, any exposure compensation provided by a camera will be very apparent upon viewing the transparencies.

There is thus provided a method and apparatus for associating data indicating user-provided exposure compensations with each latent image exposed in a camera.

While preferred embodiments of the invention have been illustrated and described, it will be clear that the invention is not so limited. Numerous modifications, changes, variations, substitutions and

equivalents will occur to those skilled in the art without departing from the scope of the present invention.

Claims

1. A method of operating a photographic camera to provide exposure information in association with an exposed image picture frame, comprising the steps of:

automatically providing a nominal exposure for said picture frame;

providing an operator-selected exposure for said picture frame which differs from said nominal exposure by a known under- or over-exposure;

exposing said picture frame in accordance with said operator-selected exposure;

automatically calculating the difference between said nominal and operator-selected exposures; and

automatically recording data in association with said picture frame which indicates the difference between said nominal and operator-selected exposures.

2. The method of claim 1 wherein said recording step includes recording data on the same film medium as said picture frame.

3. The method of claim 2 wherein said recording step includes recording said data as a latent image on said photographic film.

4. The method of claim 2 wherein said recording step includes recording magnetically coded data on said photographic film.

The method of claim 2 wherein said recording step includes mechanically coding data onto said photographic film.

6. A photographic camera (10) for providing exposure information in association with an exposed image picture frame, comprising:

means (28) for automatically providing a nominal exposure for said picture frame;

means (32) for providing an operator-selected exposure for said picture frame which differs from said nominal exposure by a known under- or over-exposure;

means (18,26) for exposing said picture frame in accordance with said operator-selected exposure; said photographic camera is characterized by:

means (18) for automatically calculating the difference between said nominal and operator selected exposures;

means (30) for automatically recording data in association with said picture frame which indicates the difference between said nominal and operator-selected exposures.

7. A camera in accordance with claim 6 wherein said recording means (30) includes means for recording data on the same film base as said picture frame.

8. A camera in accordance with claim 7 wherein said recording means (30) includes means for recording a latent image on said photographic film.

9. A camera in accordance with claim 7 wherein said recording means (30) includes means for recording magnetically coded data on said photographic film.

10. A camera in accordance with claim 7 wherein said recording means (30) includes means for mechanically coding data onto said photographic film.

Patentansprüche

1. Verfahren, bei dem in einer fotografischen Kamera Informationen über Belichtungswerte für jedes belichtete Bildfeld eines Films erhalten werden,

dadurch gekennzeichnet, daß

ein nominaler Belichtungswert für jedes Bildfeld automatisch festgelegt wird,

ein durch den Benutzer gewählter Belichtungswert für das Bildfeld festgelegt wird, der um einen vorgegebenen Korrekturwert von dem nominalen Belichtungswert abweicht, um eine Unter- oder Überbelichtung zu erhalten,

das Bildfeld gemäß dem vom Benutzer gewählten Belichtungswert belichtet wird,

der Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch errechnet wird, und

Daten über den Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch aufgezeichnet werden.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Daten auf demselben Filmmedium aufgezeichnet werden wie das Bildfeld.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß die Daten als latentes Bild auf dem fotografischen Film aufgezeichnet werden.

equivalents will occur to those skilled in the art without departing from the scope of the present invention.

Claims

1. A method of operating a photographic camera to provide exposure information in association with an exposed image picture frame, comprising the steps of:
 - automatically providing a nominal exposure for said picture frame;
 - providing an operator-selected exposure for said picture frame which differs from said nominal exposure by a known under- or over-exposure;
 - exposing said picture frame in accordance with said operator-selected exposure;
 - automatically calculating the difference between said nominal and operator-selected exposures; and
 - automatically recording data in association with said picture frame which indicates the difference between said nominal and operator-selected exposures.
2. The method of claim 1 wherein said recording step includes recording data on the same film medium as said picture frame.
3. The method of claim 2 wherein said recording step includes recording said data as a latent image on said photographic film.
4. The method of claim 2 wherein said recording step includes recording magnetically coded data on said photographic film.
- The method of claim 2 wherein said recording step includes mechanically coding data onto said photographic film.
6. A photographic camera (10) for providing exposure information in association with an exposed image picture frame, comprising:
 - means (28) for automatically providing a nominal exposure for said picture frame;
 - means (32) for providing an operator-selected exposure for said picture frame which differs from said nominal exposure by a known under- or over-exposure;
 - means (18,26) for exposing said picture frame in accordance with said operator-selected exposure; said photographic camera is characterized by:
 - means (18) for automatically calculating the difference between said nominal and operator selected exposures;

means (30) for automatically recording data in association with said picture frame which indicates the difference between said nominal and operator-selected exposures.

7. A camera in accordance with claim 6 wherein said recording means (30) includes means for recording data on the same film base as said picture frame.
8. A camera in accordance with claim 7 wherein said recording means (30) includes means for recording a latent image on said photographic film.
9. A camera in accordance with claim 7 wherein said recording means (30) includes means for recording magnetically coded data on said photographic film.
10. A camera in accordance with claim 7 wherein said recording means (30) includes means for mechanically coding data onto said photographic film.

Patentansprüche

1. Verfahren, bei dem in einer fotografischen Kamera Informationen über Belichtungswerte für jedes belichtete Bildfeld eines Films erhalten werden,
 - dadurch gekennzeichnet, daß**
 - ein nominaler Belichtungswert für jedes Bildfeld automatisch festgelegt wird,
 - ein durch den Benutzer gewählter Belichtungswert für das Bildfeld festgelegt wird, der um einen vorgegebenen Korrekturwert von dem nominalen Belichtungswert abweicht, um eine Unter- oder Überbelichtung zu erhalten,
 - das Bildfeld gemäß dem vom Benutzer gewählten Belichtungswert belichtet wird,
 - der Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch errechnet wird, und
 - Daten über den Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch aufgezeichnet werden.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Daten auf demselben Filmmedium aufgezeichnet werden wie das Bildfeld.
3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß die Daten als latentes Bild auf dem fotografischen Film aufgezeichnet werden.



4. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß magnetisch kodierte Daten auf dem fotografischen Film aufgezeichnet werden.
5. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß Daten mechanisch auf dem fotografischen Film kodiert werden.
6. Fotografische Kamera (10), die Informationen über Belichtungswerte für jedes belichtete Bildfeld eines Films liefert, mit
 - einer Einrichtung (28), die den nominalen Belichtungswert für jedes Bildfeld automatisch festlegt,
 - einer Einrichtung (32), die einen durch den Benutzer gewählten Belichtungswert für das Bildfeld festlegt, der um einen vorgegebenen Korrekturwert vom nominalen Belichtungswert abweicht, um eine Unter- oder Überbelichtung zu erhalten,
 - Mitteln (18, 26), die das Bildfeld gemäß dem vom Benutzer gewählten Belichtungswert belichten,
 gekennzeichnet durch
 - eine Einrichtung (18), die den Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch errechnet, und
 - eine Einrichtung (30), die Daten über den Differenzwert zwischen dem nominalen und dem vom Benutzer gewählten Belichtungswert automatisch aufzeichnet.
7. Kamera nach Anspruch 6, dadurch gekennzeichnet, daß die Aufzeichnungseinrichtung (30) Mittel umfaßt, die Daten auf derselben Filmunterlage aufzeichnen, auf der auch das Bildfeld aufgezeichnet ist.
8. Kamera nach Anspruch 7, dadurch gekennzeichnet, daß die Aufzeichnungseinrichtung (30) Mittel umfaßt, die ein latentes Bild auf dem fotografischen Film aufzeichnen.
9. Kamera nach Anspruch 7, dadurch gekennzeichnet, daß die Aufzeichnungseinrichtung (30) Mittel umfaßt, die magnetisch kodierte Daten auf dem fotografischen Film aufzeichnen.
10. Kamera nach Anspruch 7, dadurch gekennzeichnet, daß die Aufzeichnungseinrichtung (30) Mittel umfaßt, die Daten auf dem fotografischen Film mechanisch kodieren.

Revendications

1. Procédé de mise en oeuvre d'un appareil photographique de prise de vues pour fournir une

information relative à l'exposition en association avec une plage image exposée comprenant les étapes consistant à :

- fournir automatiquement une exposition nominale pour ladite plage image,
- fournir une exposition déterminée par l'opérateur pour ladite plage image, exposition qui diffère de l'exposition nominale d'une quantité connue de sous-exposition ou de sur-exposition ;
- réaliser l'exposition de ladite plage image en fonction du réglage déterminé par l'opérateur ;
- calculer automatiquement la différence entre l'exposition nominale et l'exposition déterminée par l'opérateur ; et
- enregistrer automatiquement l'information relative à cette différence en association avec ladite plage image.

2. Procédé selon la revendication 1, dans lequel l'étape d'enregistrement comprend l'enregistrement de l'information sur le même support de film que ladite plage image.
3. Procédé selon la revendication 2, dans lequel l'étape d'enregistrement comprend l'enregistrement de l'information sous la forme d'une image latente sur le film photographique.
4. Procédé selon la revendication 2, dans lequel l'étape d'enregistrement comprend l'enregistrement magnétique de l'information codée sur le film photographique.
5. Procédé selon la revendication 2, dans lequel l'étape d'enregistrement comprend l'enregistrement mécanique de l'information codée sur le film photographique.
6. Appareil photographique (10) de prise de vues pour fournir une information relative à l'exposition en association avec une plage image exposée, comprenant :
 - des moyens (28) pour fournir automatiquement une exposition nominale de ladite plage image ;
 - des moyens (32) pour fournir une exposition de ladite plage image déterminée par l'opérateur et qui diffère de l'exposition nominale d'une quantité connue de sous-exposition ou de sur-exposition ;
 - des moyens (18, 26) pour exposer ladite plage image en fonction de l'exposition déterminée par l'opérateur, appareil caractérisé par :
 - des moyens (18) pour calculer automatiquement la différence entre l'exposition



nominale et l'exposition déterminée par l'opérateur ;

- des moyens (30) pour enregistrer automatiquement une information en association avec ladite plage image, cette information étant représentative de ladite différence.

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7. Appareil selon la revendication 6, dans lequel les moyens d'enregistrement (30) comprennent des moyens pour enregistrer ladite information sur le même support que ladite plage image.

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8. Appareil selon la revendication 7, dans lequel lesdits moyens d'enregistrement (30) comprennent des moyens pour enregistrer une image latente sur ledit film photographique.

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- Appareil selon la revendication 7, dans lequel lesdits moyens d'enregistrement (30) comprennent des moyens pour enregistrer magnétiquement l'information sur le film photographique.

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10. Appareil selon la revendication 7, dans lequel lesdits moyens d'enregistrement (30) comprennent des moyens pour enregistrer mécaniquement l'information sur le film photographique.

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