

COLOUR IMAGE PRODUCTION CONTROL

(S.N. 2272538)

Application no. 9401004.8 divided out from the present application and entitled "Colour Balance Detection" describes and claims a method of detecting the colour balance of an image, and a hue step tablet for use in the method.

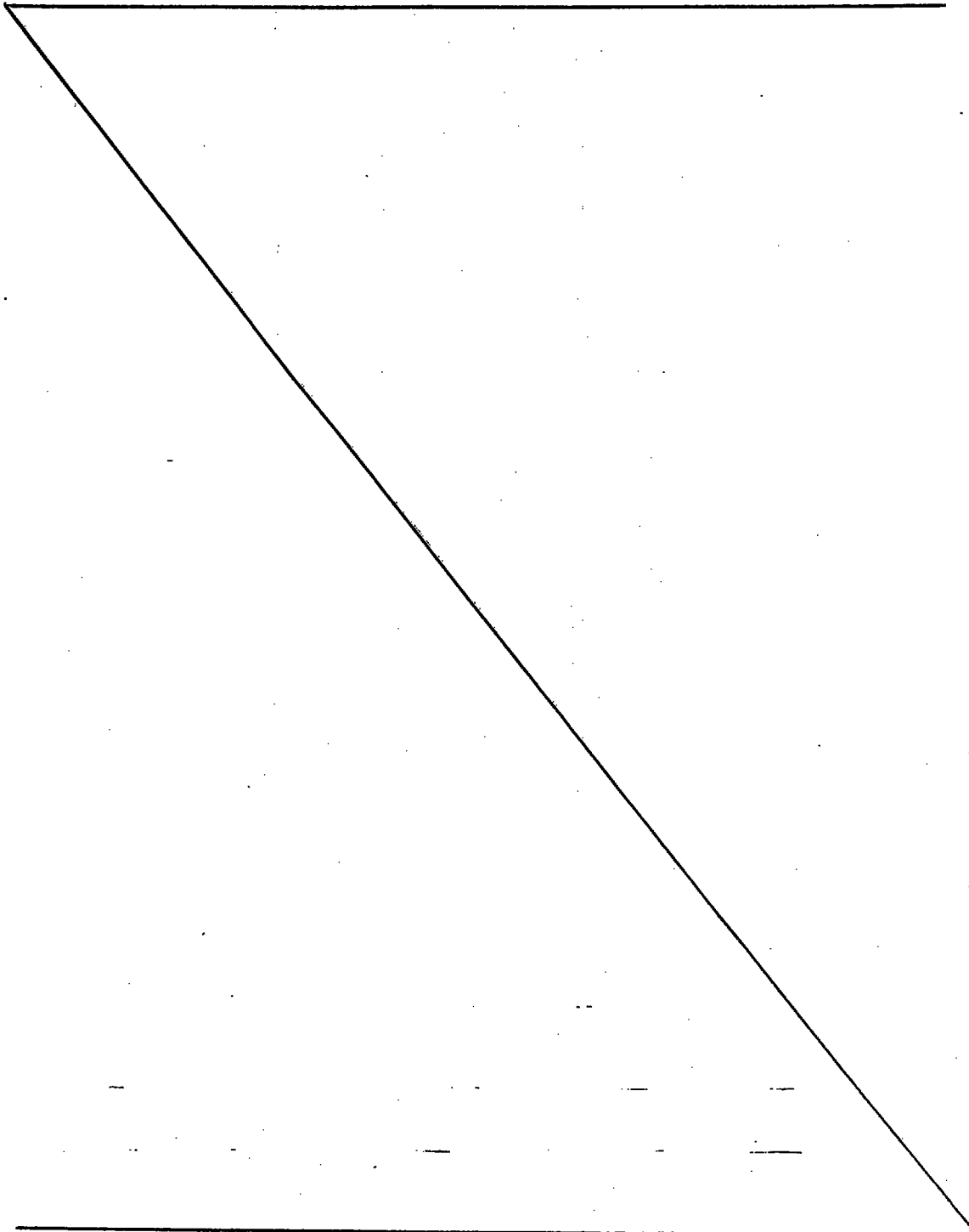
In a photographic printing system, it is necessary to photographically measure density of an original film (e.g. a negative film) in order to determine the exposure amount or correction amount in photographic printing. Existing methods of machine analyzer exposure determination include the LATD (large area transmittance density) method, and also other method of which the printing system reads off from a negative film that is segmented into a large number of arrayed pixels for detecting image information. Either of the methods would result with a print that has a density being predetermined by a formula after correlating to the image information. This is based on the empirical rule that the average reflectivity or transmittance of three colours obtained by integration of the whole scene, when an ordinary scene is photographed, is substantially constant.

On the other hand, if a density image on a film is highly biased, the average transmittance due to the integration of the whole scene substantially varies from the empirical constant. Then the printing systems would tend to compensate exposure resulting with a print that is incorrectly exposed. In such instance, the operator would have to manually key in the filtration amount in order to correct the colour deficiency in the print. It is not always easy to identify the cause of a evident colour cast. For example, a yellow cast may have been brought about not only through excessive gain in the yellow but also through too low values in the cyan or the magenta. Hence problem arises due to the operators' difficulties in identifying the hue correction required of a particular colour cast, consequence with many trial and error attempts. Therefore

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attempts to print from inherently bias colour negative inevitably lead to the ineffective use of the printing system, resulting with increased machine down-time.

5 The difficulties of printing from bias colour negatives also explains the typical 1-hour photo-lab



outlets, or fast photo-print finishers, reluctance to include in their product line the printing of photographic name cards and advertising prints. Most 1-hour automatic printing systems can perform 55mm x 89mm size prints, a typical name card dimensions, by having additional machine accessories. But the printing from inherently bias density colour negatives, being derived from the typically colour bias graphic layout of name cards and advertisement prints, would cause a printing system down time. Therefore, even though the printing of photo-name cards has a much higher margin of profit relative to the printing of the amateur photographers' photo-prints, this market has traditionally been the domain of few entrepreneurs using costly custom-built photo-print system. These latter printing systems, which entail substantial manual colour keys manipulation, are designed especially for printing typical photo-name card of 55mm x 89mm dimensions.

Figure 1 shows how a balancing zone 11 with a density bias that complements the inherent bias of the desired image 10. A prior art base on the United Kingdom patent application GB 2046943-A requires a purposely built device into the photographic printing system to identify the colour panel present on a colour film so as to automatically effect a machine processor colour adjustment according to the make of film. The said balancing zone is distinct from prior art in that it utilises the existing system of colour analyzer by working in tandem to a pre-determined formulae of exposure base on certain empirical value. Additionally, while the prior art has a colour panel that is outside of the film image analyzing area, this invention would require the said balancing zone to be within the image analyzing area as in Figure 1(a), at least initially. An additional distinction is that the characteristic of the invented colour zone is dependent on both the film characteristics as well as the image characteristic, whereas prior art has a colour panel that is independent of the image characteristic. This

distinction is very important because the prior art does not solve the exposure compensation problem encounter when making photographic print from high colour bias image on the film.

5 Figure 2 is a simple illustration of obtaining a "2R" size print 6 being trimmed from "3R" print 2B via a negative 2A having dual images incorporated into a 35mm frame colour negative. A method for PHOTOGRAPHIC PRODUCTION OF BUSINESS AND NAME CARDS is described in a
10 United Kingdom Patent GB-2172714-B. This prior art requires a copied image on the emulsion film to be processed in a manner that produce a high contrast. The same problem of operator's difficulties in achieving optimum colour balance print derived from an inherently
15 biased negative film image still remains. An important distinction between the said prior art and this aspect of the invention is the inclusion of a balancing zone 3A and zone 3B that is complementary to the bias colour image. With the inclusion of this said zone, an inherently colour
20 bias film image can advantageously be produced with relative ease through reliance on a photographic printing system's automatic detect and print features; thus little manual intervention by the operator is needed.

Figure 3 illustrate use of colour panel/s for colour
25 assessment. A United Kingdom Patent Application GB 2046943-A has made use of at least one colour panel on a colour film to effect a printing system automatic colour exposure correction due to the different inherent colour bias film by different film manufacturers. The invented
30 colour panel described herewith is distinctly different from the said prior art in that:

(i) prior art serve to identify colour bias attributed only to the make of film by different manufacturers; whereas this said invented colour panel here
35 identify an inherent colour bias attributed to both the make of film and the colour image within.

(ii) prior art identify a film bias by relying on the machine processor to compare the measured spectral transmissivity of the colour panel on the emulsion film to that of a known standard values corresponding to known different film types; whereas this said invented colour panel identify a bias primarily by null field comparison test via the basic colour changes being effected by an additional presence or absence of a hue.

It is an object of the present invention to overcome the problem of an image producing system tendency to compensate the exposure of an inherently biased image during the process of light projection. According to one aspect of the present invention there is provided a method of colour printing including the steps of exposing a colour emulsion film with an image and printing the image by means of a printing machine having an automatic metering system for determining colour settings, characterised in that a balancing zone is provided adjacent the image on the film having a bias generally complementary to a bias of the image, and in that the automatic metering system makes measurements integrated over both the biased image and the balancing zone so that a correct exposure for printing the biased image is determined.

Preferably the balancing zone is provided in a region outside the normally printable area of the film, and in the step of printing the film the film is offset from its normal printing position with respect to the analyzer so that the analyzer views both part of the biased image and the balancing zone, the printing machine is locked at the exposure thereby determined, and the film is moved back to its normal printing position for printing of the image.

According to a second aspect of the invention there is provided a method of producing graphic prints, and colour bias image prints; including a step of colour printing by a method in accordance with the first aspect of the invention, the finished artwork or object having been photographically recorded together with the balancing zone

as a single assembly in at least one exposure onto a frame of the colour emulsion film, and the exposed colour film having been processed, in which the processed colour film is printed onto colour photographic paper, and the latter is cut to size thus providing the desired number of prints in colour.

In preferred embodiments of this aspect of the invention, there is provided a method of producing name cards, graphic prints and bias density image prints. Artwork, comprising pictures, symbols, logos, numerical and/or alphabetic characters, in any desired colours and in any desired arrangement is copied together with a balancing zone of density and colour that complements the desired image density as a single assembly in at least one exposure onto a colour emulsion film. The exposed colour film is normally processed; the processed colour film is printed onto colour photographic paper; and the latter is cut to size thus providing the desired number of prints in colour.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 diagrams show how a complementary balancing zone is utilised on a colour negative and the subsequent locking of the exposure settings; and

Figure 2 diagrams show a method of "3R" size print being composed of "2-UPs" images and also a balancing zone being included on a 35mm colour negative.

The ensuing description specifically relates to the use of the balancing zone invention in connection with a colour negative film being process by typical 1-hour photo-lab outlets, though the invention also applies generally to photographic films having blue-, green- and red-sensitive layers as well as image production system having the three primary colour as its primary elements. The primary colour refers to either or both the subtractive and the additive colour principle of colour production.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a device embodying this invention method wherein an image information detecting apparatus 6 being linked to the exposure control unit 3 which processes the detected image signals therefrom. First, a negative film 9(A) and negative film 10 is mounted at the printing section. Negative film 9(A) or 9(B) is an unexposed but already processed part of the negative, located between two adjacent frames of images, being selected as a complementary balancing zone. The printing section is illuminated with light from a light source 1 via colour compensation means 2 of three complementary colours of yellow (Y), magenta (M) and cyan (C), and the light transmitted through the negative film 9A and negative 10 is directed to a photographic sheet of paper 11 via a lens unit 7(A) and a black shutter 7(B). The subtractive filters 2 can be inserted into the path of the printing light by means of respective magnets 5 which are controlled by current supplied from a conventional exposure control unit 3, for example of the kind described in United Kingdom Patent GB No. 2046943A. After the exposure has been automatically determined, a projection onto the paper 11 would include a saturated black zone on the paper and a portion of the desired image being "trimmed" from sight. This composite image is undesirable hence this projection exposure should not be printed but its useful exposure settings should be retained.

The Figure 1(b) shows the same device as in Figure 1(a) but with the subsequent step of activating an exposure lock 4 which has been coupled to the exposure control unit 3, followed by the physical displacement of negative 9A by a complete image of negative 10. The negative 10 is then exposed onto the paper with the retained colour exposure settings producing a colour balance image on print.

Figure 2 shows the method for producing photographic name cards from a 35mm colour negative film 1, print exposure being derived from a composite images of the "2-

UPs" picture and a balancing zone 3A on a single 35mm frame of negative 2A or as in negative frame 4A corresponding to the photographic paper print 2B and print 4B respectively. A typical name card print size 6 is cut from paper print 2B. The "2-UPs" dual images is obtained by making double exposure of a single finished artwork "A" placed against a black velvet cloth background. The black velvet cloth is necessary to obtain a colourless or unexposed balance zone on the negative.

10 The said balancing zone can be substituted in various manner with substantially similar result when combined with an inherently biased image. For example,

15 * the balancing zone can be an area of colour selection that compliments and thus form part of the overall graphic design.

 * if an image has a heavy red cast over its entire image, the balancing zone on the print could have a combination of saturated black colour zone and a saturated cyan zone.

20 * if an image is preferred to have a light colour cast or substantiate light background, generally, a saturated black zone on the print would achieve a good result print.

25 * in addition, a colour zone can in effect be a colour cast superimpose over the entire image with substantially the same result.

 * The amount of colour cast can also be converted into the printing system exposure control unit as a programme in logarithm form.

30 Essentially, the said balancing zone exist in any useful form for communicating a presence of another bias hue value so that its integrated density value when being combined with a desired image of biased density value, computed by an image analyzer, would produce an exposure of 35 the desired characteristics.

 It should be understood that many modifications and adaptions of the invention will become apparent to those

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skilled in the art and it is intended to encompass such obvious modifications and changes within the scope of the claims appended hereto.

CLAIMS

1. A method of colour printing including the steps of exposing a colour emulsion film with an image and printing the image by means of a printing machine having an automatic metering system for determining colour settings, characterised in that a balancing zone is provided adjacent the image on the film having a bias generally complementary to a bias of the image, and in that the automatic metering system makes measurements integrated over both the biased image and the balancing zone so that a correct exposure for printing the biased image is determined.
2. A method according to claim 1, in which the balancing zone comprises a uniform colourless field of an area and density complementary to a bias in the density of the exposed image.
3. A method according to claim 1, in which the balancing zone comprises a uniform field of a hue complementary to the dominant hue in the biased image.
4. A method according to any one of the preceding claims, in which the balancing zone is exposed on the emulsion film at the same time as the biased image.
5. A method according to any one of claims 1 to 3, in which the balancing zone is formed by attaching a film of appropriate area and colour to the exposed emulsion film carrying the biased image.
6. A method according to any one of the preceding claims, in which the balancing zone is provided in a region outside the normally printable area of the film, and in the step of printing the film the film is offset from its normal printing position with respect to the analyzer so that the analyzer views both part of the biased image and the balancing zone, the printing machine is locked at the exposure thereby determined, and the film is moved back to its normal printing position for printing of the image.



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7. A method according to any one of the preceding claims, in which the automatic metering system includes an LATD analyzer.
 - 5 8. A method of producing graphic prints, and colour bias image prints; including a step of colour printing by a method according to any preceding claim the finished artwork or object having been photographically recorded together with the balancing zone as a single assembly in at least one exposure onto a frame of the colour emulsion
 - 10 film, and the exposed colour film having been processed, in which the processed colour film is printed onto colour photographic paper, and the latter is cut to size thus providing the desired number of prints in colour.
 - 15 9. A method of producing business cards including the steps of photocomposing and printing a business card by a method according to any one of the preceding claims.
 10. A method of colour printing substantially as described with respect to the accompanying drawings.
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