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**D E C I S I O N**  
**of 18 May 1995**

**Case Number:** T 0400/93 - 3.5.1

**Application Number:** 86116706.2

**Publication Number:** 0224904

**IPC:** H04N 9/73

**Language of the proceedings:** EN

**Title of invention:**  
White balance adjusting device of color video camera

**Applicant:**  
HITACHI, LTD.

**Opponent:**

**Headword:**

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step - yes"

**Decisions cited:**

**Catchword:**



Case Number: T 0400/93 - 3.5.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.5.1**  
**of 18 May 1995**

**Appellant:**

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**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the European  
Patent Office dated 18 December 1992 refusing  
European patent application No. 86 116 706.2  
pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** P. K. J. van den Berg  
**Members:** A. S. Clelland  
C. Holtz

## Summary of Facts and Submissions

I. European patent application No. 86 116 706.2, publication No. 224 904, was refused by a decision of the Examining Division dated 18 December 1992.

The reason for the refusal was that the subject matter of the claims according to both the main and auxiliary requests lacked an inventive step having regard to the following prior art documents:

D1: EP-A-0 116 435

D2: DE-A-33 20 690.

The Appellant (Applicant) lodged an appeal against this decision and in a statement of grounds received on 27 April 1993 argued that the claims of both requests were patentable; he also requested oral proceedings. In a communication of the Board pursuant to Article 110(2) EPC dated 28 June 1994 the Rapporteur remarked in particular on the clarity and support of the claims (Article 84 EPC).

In response, the Appellant filed on 8 February 1995 new claims and amendments to the description.

Oral Proceedings were held on 18 May 1995. In the course of the proceedings the application was further amended. In particular, the embodiment according to Figure 10 was deleted, the auxiliary request withdrawn and the main request further amended.

Claim 1 filed in the oral proceedings reads (excluding the reference signs):

"A white balance adjusting device for automatically white-balancing a color video camera having an image pickup device, comprising:  
variable gain amplifiers to which at least red and blue signals of color component signals generated by processing the output signals of said image pickup device are supplied and a gain of which is controlled by respective gain control signals;  
characterized by  
means for producing a color temperature change detection signal as a single output signal by processing component signals of the red and blue signals output from said variable gain amplifiers or by processing chrominance signals produced by processing color component signals;  
comparison/amplification means for generating said gain control signals to be fed back to said variable gain amplifiers by comparing said color temperature change detection signal with a reference voltage and by amplifying a comparison signal."

The Appellant argued that it would not have been obvious to combine the teachings of D1 and D2 in order to arrive at the invention. The methods of adjusting the white balance were quite different in the two documents. D1, in addition to a camera tube, provided a separate, dedicated photodetector in which red and blue signals were combined into a single output signal fed forward to the red and blue amplifiers. According to D2, in contrast, the white balancing was performed by means of signals derived from the output of the camera tube; two signals were derived which were fed back to variable gain amplifiers in the red and blue colour paths.

The Appellant requests that a patent be granted on the basis of the following application documents:

**Claims:**

1 to 7 filed on 18 May 1995.

**Description:**

Pages 1, 2, 4 to 7, 10 to 16 as originally filed  
Page 3b filed on 8 February 1995  
Pages 3, 3a, 8, 9 and 17 filed on 18 May 1995

**Drawings:**

Figures 2 to 9 as originally filed  
Figure 1 filed on 1 April 1992.

**Reasons for the Decision**

*Amendments*

1. The Board is satisfied that the amendments to the patent application do not contravene Article 123(2) EPC.

*Inventive step*

2. The only issue to be decided is whether the subject-matter of Claim 1 involves an inventive step.
  - 2.1 The invention is concerned with white balancing in a colour video camera. As is known in the art, white balancing is effected in order to reproduce a white surface as subjectively white independently of the nature of the illumination. The human visual system is capable of correcting automatically for differences in illumination; thus a white object is perceived as white whether the light source is the sun (having a high colour temperature) or a filament lamp (having a low colour temperature). A video camera, on the other hand, requires the white balance to be adjusted for differing light sources. Perfect balance implies that, when a

perfectly white object is scanned, the red, green and blue (RGB) colour component signals are equal in level; only then does the video image of the object actually appear white to a viewer. Normally colour balance is adjusted by the use of a white colour card or at least a white area serving for calibration, variable gain amplifiers in at least some of the colour paths being adjusted for balance of the colour component signals.

2.2 According to Claim 1 colour balance can be achieved without the use of a white area by means of a device in which the R and B signals, but not the G signal, are processed to form a single colour temperature change detection signal, which is used to generate gain control feedback signals for controlling both the R and B amplifiers.

2.3 The application was rejected on the argument that all the features of Claim 1 were disclosed in the combination of D1 and D2 and moreover could be considered as an aggregation of known solutions to known problems which did not entail any surprising additional effect over and above the known solutions.

2.4 Turning to the prior art documents, the Board notes that **D2** is the document having the largest number of features in common with the invention. It describes a colour video camera having automatic white balancing. According to Figure 1, to which the Examining Division refers in the correspondence and which in fact shows the prior art acknowledged by D2, the chrominance signals R-Y and B-Y (where Y, the luminance signal, contains the R, G and B components in standardised proportions) are each compared with a reference level and signals are derived which are fed back to control the amplification of the R and B signals from the camera tube. The G signal is not controlled and serves effectively as a reference for the

R and B signals. White balance is apparently achieved when the chrominance signals R-Y and B-Y are in balance. The Board notes however that the signals which are fed back are crossed over, so that the signal derived from the R-Y chrominance channel is used to control the B amplifier and vice-versa; the significance of this is not clear.

2.5 The D2 arrangement performs a special balancing operation prior to use of the camera and requires the use of a white colour balance card or diffuser. Compared with this prior art, as noted at paragraph 2.2 above the claimed invention solves the problem of effecting white balancing if a colour card or even a white area is not available, such that the scene is not quite white but slightly green or magenta, implying that the proportion of G is too high or too low, respectively. The skilled person, reading D2 and aware of this problem, would not derive the claimed solution from D2 without the exercise of invention.

2.6 The Examining Division referred also to D1. This document describes a camera provided - in addition to the camera tube - with a photodetector for generating R and B signals which are used to set the gain of the R and B video amplifiers for white balancing by means of a single signal, proportional to  $\log R/B$ . Since the signal is a function of the ratio R/B it changes solely in accordance with a change in the colour temperature of the light source, independently of the light intensity incident on the photodetector. Since the control signal is not derived from an output of the camera tube D1 is an **open-loop** system.

2.7 The Board notes that in D1, as in D2, what is cited is the acknowledged prior art as shown in Figure 1. The document as a whole adds nothing more of relevance. From

the description it can be seen that the Figure 1 embodiment is primarily concerned with rendering the white balancing independent of the brightness of the illumination, whereas the invention aims at a partial independence of the colour of the averaged image used for the balancing.

2.8 It appears that the device of D1, like the invention, would indeed be insensitive to a green or magenta hue in a nominally white reference object. However, this property seems not to have been recognised in D1. The skilled person, faced with the problem of performing white balancing when the reference colour is not truly white, would initially have to appreciate that D1 provides a solution.

2.9 It is therefore clear to the Board that neither D1 nor D2, read individually in the light of the skilled person's common general knowledge, would lead to the claimed arrangement without the exercise of invention.

2.10 It remains to be considered whether the skilled person would derive from a combination of D1 and D2 the claimed subject-matter. However, the Board have some difficulty in ascertaining on what grounds the Examining Division considered that the two documents could or should be read together; neither refers to the other, nor do they individually contribute partial solutions to an overall problem. The impugned decision assumes that the combination is permissible without giving any reasons why. Nor does the decision demonstrate in a coherent manner which features are known from which document. It is noted that the features discussed are not, as might be expected, those of Claim 1, but rather only those newly introduced into the claim; no mention is made of

the existing features and the Board can only conclude that these were considered as being known from a prior art document. From the Summary of Facts and Submissions this document was apparently D2.

2.11 The Board have accordingly considered whether the skilled person would have found it obvious to modify the D2 arrangement to incorporate the teaching of D1 in such a manner as to arrive at the claimed invention.

2.12 As noted at paragraph 2.8 above, the cited documents do not discuss the solution to the problem of white balancing where the scene viewed has a green or magenta hue. However, if the skilled person implementing the D2 circuit were concerned with ameliorating the sensitivity of the white balancing operation to light level, he might be led by the disclosure of D1 to form a single control signal as in D1. This control signal is however derived from the outputs of the separate photodetector and the Board can see no justification for arguing that the skilled person would abandon this arrangement in favour of using outputs derived from the chrominance signal as in D2.

Such an arrangement effectively destroys the teaching of D2 and does not result in the claimed arrangement. Even if for the sake of argument the skilled person were to abandon the photodetector, the teaching of D1 is to use R and B signals, so that the obvious signals to choose are the R and B outputs of the camera tube. Such an arrangement is a **feedforward** rather than a **feedback** system as claimed in Claim 1.

The Board therefore concludes that the skilled person would not be led by D1 to modify the D2 arrangement so as to arrive at the claimed invention.

2.13 Using D1 as the starting point for the invention, the Board reaches the same conclusion. The technical problem may be regarded as avoiding the need for a photodetector to generate the R and B control signals. As noted at paragraph 2.12 above, the obvious solution to this problem is to make use of the R and B signals from the picture tube, thus providing a feedforward rather than a feedback path.

2.14 For these reasons, D1 and D2 do not lead the skilled person to the invention. Since no other prior art documents are on file, the subject matter of Claim 1 must be regarded as involving an inventive step.

#### **Order**

#### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. A patent is granted in accordance with the Appellant's request.

The Registrar:

The Chairman:

M. Kiehl

P. K. J. van den Berg