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**D E C I S I O N**  
of 15 November 1996

**Case Number:** T 0470/95 - 3.5.1

**Application Number:** 89311743.2

**Publication Number:** 0369720

**IPC:** H04N 1/46

**Language of the proceedings:** EN

**Title of invention:**  
Color image processing apparatus

**Applicant:**  
CANON KABUSHIKI KAISHA

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 52(1), 56  
R. 27(1)(b)

**Keyword:**  
"Inventive step (no) "

**Decisions cited:**  
T 0654/92

**Catchword:**  
-



Case Number: T 0470/95 - 3.5.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.5.1  
of 15 November 1996

**Appellant:** CANON KABUSHIKI KAISHA  
30-2, 3-chome, Shimomaruko  
Ohta-ku  
Tokyo (JP)

**Representative:** Beresford, Keith Denis Lewis  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 27 December 1994  
refusing European patent application  
No. 89 311 743.2 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. This is an appeal against the decision of 27 December 1994 of the examining division, rejecting European patent application No. 89 311 743.2 on the ground that the subject-matter of claim 1 lacked an inventive step.

II. In its decision the examining division referred to the following documents:

D1: DE-A-3 521 259

D2: DE-A-2 559 826.

III. On 24 February 1995 the appellant (applicant) lodged an appeal against this decision and paid the prescribed fee. A statement of grounds of appeal was filed on 3 May 1995, together with a revised set of claims to replace those previously on file. The appellant argued that the subject-matter of the revised claims was clearly distinguished from that of documents D1 and D2, so that the claims were allowable. Oral proceedings were requested for the event that the appellant's arguments were not considered persuasive.

IV. In a first communication dated 7 November 1995 the rapporteur, on behalf of the Board, drew attention to two further documents:

D3: US-A-4 642 682

D4: McGraw-Hill Encyclopedia of Science and  
Technology, 1982 edition, ISBN-0-07-079280-1,  
page 779.

Document D3 was cited in accordance with Article 114(1) EPC, whilst D4 was cited to illustrate the common general knowledge in the art.

The rapporteur took the preliminary view that the application contained solutions for two separate and unrelated problems; the problems were said to be on the one hand that of converting specific colours in the image into different colours, and on the other hand that of black edge enhancement. The former problem was said to be solved by the disclosure of document D3, whilst the latter was said to be common general knowledge as exemplified by D4.

V. In a submission received on 17 May 1996 the appellant argued against the rapporteur's view. A revised set of claims was filed to replace the previous set. In a second communication dated 10 July 1996 the rapporteur made further preliminary observations on the new claims. Oral proceedings were appointed; these were held on 15 November 1996. At the oral proceedings the appellant made the requests set forth below.

VI. The appellant's **main request** was that the Examining Division's decision be set aside and a patent be granted on the basis of the following documents:

- Claims:** 1 to 4 as received on 17 May 1996
- Description:** pages 1 to 8 as received on 17 May 1996; column 5 line 29 to column 9 line 7 of the published application
- Drawings:** Figures 1 to 13 as published

In accordance with an **auxiliary request** the above claims were replaced by claims 1 to 3 as filed at the oral proceedings on 15 November 1996.

VII. Claim 1 of the main request reads as follows:

"Color image processing apparatus for processing color image data for output by an output apparatus, the color

image processing apparatus comprising:  
means for receiving color image data representing an original color image;  
means (2) for carrying out color correction on the color image data so as to correct the color image data in accordance with the output apparatus;  
black character extraction means (5) for extracting black character data from the color image data;  
means (4) for carrying out edge emphasis on the color image data corrected by said color correction means in response to the output of said black character extraction means; and  
control means (CPU) for controlling the operation of the processing apparatus; and characterised in that the apparatus additionally comprises color converting means (1) for converting a selected color of the original color image into a different pre-selected color so that in the output image the selected color is replaced by said different pre-selected color, the color converting means including means (7, 8, 9) for detecting whether or not the color data of the received original color image lies within a predetermined range (Ymax, Ymin, Mmax, Mmin, Cmax, Cmin) set by said control means; and  
means for replacing the color data which lies within said range with color data (Y', M', C') pre-set by said control means, and wherein said means for extracting black character data are adapted to extract the black character data from the image data which has been color converted by said color converting means."

VIII. Claim 1 of the auxiliary request reads as follows:

"Color image processing apparatus for processing color image data for output by an output apparatus, the color image processing apparatus comprising:

means for receiving color image data in the form of separate color component signals representing an original color image;

means (2) for carrying out color correction on the color image data so as to correct the color image data in accordance with the output apparatus;

black character extraction means (5) for extracting black character data from the color image data;

means (4) for carrying out edge emphasis on the color image data corrected by said color correction means in response to the output of said black character extraction means; and

control means (CPU) for controlling the operation of the processing apparatus; and characterised in that the apparatus additionally comprises color converting means (1) for converting a selected color of the original color image into a different pre-selected color so that in the output image the selected color is replaced by said different pre-selected color, the color converting means comprising a plurality of comparators each associated with a particular signal representing a color component of the color image, each comparator having associated therewith a pair of registers the contents of which are set by said control means to define a range of amplitude values for its associated signal, a gate connected to the outputs of the comparators so as to give an output when the color components of the color image data signals all fall within the ranges of values set in the registers, and selection means (8, 9, 10) operative either to pass unchanged color component values which do not simultaneously fall within the ranges defined by the values of said registers, or when triggered by said gate to select preset values set by said control means, and wherein said means for extracting black character data are adapted to extract the black character data from the image data which has been color converted by said color converting means."

IX. The appellant's arguments in support of patentability can be summarised as follows:

Although it was accepted that edge-emphasis making use of a black signal was a well-known procedure in the printing art, a problem arose when the colour in an image was changed selectively. If this colour conversion involved changing a colour to black it could happen that two forms of black were present in the same image, namely on the one hand black portions which had been subject to edge-emphasis and on the other hand black portions which corresponded to a changed colour and which were not edge-enhanced and therefore not as clear. Although the originally filed application disclosed at Figure 3 a system in which colour conversion was carried out after black extraction for edge emphasis, this system did not represent background art within the meaning of Rule 27(1)(b) EPC, but was rather an in-house system known to the appellant. Colour conversion as opposed to colour correction was not known in any of the prior art printing apparatus. Although it was well-known in colour copying to adapt the colours of a final image to bring them as close as possible to those of the original, this was merely colour correction and not colour conversion within the sense of the claims. D4 was not concerned with colour printing but disclosed telecine apparatus in which individual colours could be corrected before display. Claim 1 of the auxiliary request took a further step away from the disclosure of D4 in that it specified that by means of comparators associated with particular colour signals a specific colour component could be detected and replaced by a different colour, the component values of which were stored in respective registers. D4, on the other hand detected the phase of a composite colour signal and merely modified that

phase rather than replacing the existing signal by an entirely new signal. There was no suggestion of amplitude comparison.

### **Reasons for the Decision**

1. *Admissibility*

The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. The only issue to be decided is that of inventive step.

3. *The state of the art*

3.1 - The application is concerned with colour printing apparatus in which on the one hand colour processing is carried out to permit individual colours of the image to be replaced and on the other hand edge enhancement of black character information is performed. In the originally filed application it was suggested that in known apparatus employing colour conversion there was a problem if the colour conversion was carried out after black extraction for edge enhancement; two different kinds of black could be present in the final printed image, namely edge-enhanced black and colour-converted black. The object of the invention was seen as the provision of apparatus which provided edge enhancement only after colour conversion, see columns 1 and 2 of the originally published application. In the course of the appeal proceedings the appellant resiled from this understanding of the invention and now states that colour conversion per se is not acknowledged as forming part of the state of the art. Thus, although the originally filed application referred to Figure 3, which shows a colour conversion circuit, as being



"conventional", it is now stated that the Figure 3 circuit does not form prior art within the meaning of Rule 27(1)(b) and Article 54(2) EPC. As pointed out in this Board's decision T 654/92 (not published), the expression "background art" in the English version of Rule 27(1)(b) is to be interpreted as referring to prior art within the meaning of Article 54(2) EPC. The practice of starting out from art which is known to the appellant but which was not public at the claimed priority date is inconsistent with the requirements of the EPC.

- 3.2 The Board has accordingly given no weight to the Figure 3 example or the problem said to arise from it.
- 3.3 It is noted that the appellant has acknowledged in the revised introduction to the description at page 7 lines 4 to 9 that "the color correction section 2, black extraction section 5, a level determination section 6, and an edge emphasis section 4 are well-known". These are clearly the features to be expected of any colour printing apparatus at the priority date of the claim.
- 3.4 The single most relevant prior art document is considered to be D2, which discloses colour image processing apparatus in which colour image data is derived from an original and used to scan a film. Referring to Figure 1 of D2, colour image data in RGB component format is subjected to logarithmic processing 11 and thereafter supplied to a "colour calculator" (German: "Farbrechner") 12 which provides at its output YMC component signals, ie subtractive colour signals as used in printing. These signals are supplied sequentially by way of a "gradation stage" (German: "Gradationsstufe") to a scanner 20 on which a film 21 is mounted. It was common ground at the oral proceedings that this "gradation stage" represents

colour correction of the kind which is normally present in colour image processing apparatus in order to ensure colour fidelity.

3.5 D2 does not disclose edge enhancement. It is however clear that this is a well-known procedure in printing, D1 being an example of a document in which a black signal is derived from the colour signal and edge-enhanced. The disclosure of D4, published in 1982, makes clear that this was common technical knowledge at the claimed priority date. D4 refers at page 779, left hand column, to a black image as being "necessary for the subtractive colour set" and states that "a modern electronic scanner can compute an almost perfect black image". Image enhancement to improve sharpness is referred to, and since image enhancement is performed on the black signal the passage is clearly referring to edge emphasis. D4 also indicates that the process referred to by the appellant as "colour correction" was common technical knowledge in the art.

3.6 In the course of the appeal proceedings the Board drew attention to a document known to the rapporteur, document D3. This document discloses a telecine scanner in which colour information is derived in RGB component format and subjected to preliminary processing before being modulated to form an NTSC colour television signal. The modulated signal is subjected to colour processing in a manner which permits ten separate colours to be corrected as to their hue, saturation and luminance. This is done by measuring the phase angle of the signal, the colour information being phase-encoded, and performing colour correction as necessary. The document thus shows that colour "conversion" of a kind was known before the claimed priority date.

4. *Inventive step (main request)*

4.1 Claim 1 of the main request is directed to a colour image processing apparatus for processing image data for output by an output apparatus. The claim is characterised by colour converting means for converting a selected colour of the original into a different preselected colour in the output; the selected colour is replaced by the preselected colour by detecting whether or not the original colour data lies within a predetermined range and, if it does, replacing it with pre-set colour data.

4.2 D2 discloses colour printing apparatus in which, as noted above, RGB component signals are derived from an original and converted to YMC component signals for printing. This known arrangement differs from the claimed arrangement in that it does not provide for black character extraction and subsequent edge emphasis, or for colour conversion of the kind set forth in the claim. In the Board's view however these two features relate to separate, independent problems. Once the Figure 3 arrangement of the application and the problem said to arise from it are removed from consideration it is clear that no true link exists between colour conversion and black edge enhancement. The problem of black edge enhancement is, as noted above, admitted as being known, D1 exemplifying a known process for providing edge enhancement. The provision of colour conversion is, as noted above, also known per se from D3. In the Board's view it would be obvious for the skilled person, starting out from the disclosure of document D2, to solve the problem of edge enhancement by the provision of the means disclosed in document D1 and to solve the problem of colour conversion by means based on those disclosed in document D3. Although D3 is concerned with composite as opposed to component colour signals, the skilled person is nevertheless taught that

individual colours can be selected and modified; no invention would be involved in applying this knowledge to an RGB or YMC component signal arrangement as is used in D2.

4.3 Finally, the claim is characterised by extracting the black character data from the colour converted data, ie black extraction is carried out after colour conversion. In the Board's view this is the procedure the skilled person would adopt as a matter of course. The artificial problem stated in the originally filed application will only occur if black extraction takes place before colour conversion, but no convincing reason was given by the appellant as to why the skilled person faced with the choice of carrying out black extraction either before or after colour conversion should ever consider carrying it out before conversion, given that one of the possible choices of modified colour is black. The obvious point at which the black extraction would take place is after any colour conversion.

4.4 The subject-matter of claim 1 of the main request accordingly lacks an inventive step.

5. *Inventive step (auxiliary request)*

5.1 Claim 1 of the auxiliary request in essence includes all the features of claim 1 of the main request and specifies that the colour converting means includes a plurality of comparators associated with respective colour component signals. The colour signals are compared with stored values and when the values corresponding, within a preset range, to a specific colour are detected a gate is opened to replace the detected colour component values with preset values, thereby changing the specific colour.

5.2 However, once the skilled person has understood from D3 that for composite colour signals it is possible to detect and alter specific colours, no inventive step is involved in applying this principle to colour component signals. When colour information is encoded in phase - as in D3 - it is necessary to provide phase detection, whereas for component signals, for which the colour information is encoded in amplitude, it is necessary to provide amplitude detection. Claim 1 merely specifies the simplest manner in which colour detection and replacement can be carried out for component signals. In the Board's view no inventive step is required to derive the claimed arrangement once this principle has been appreciated.

5.3 The appellant argued that D3, being concerned with telecine, would not be taken seriously by the skilled person in the field of printing apparatus. The claims of the present application are not however limited to printing apparatus and merely refer to "image processing". Telecine conversion is clearly a form of image processing. It was further argued that even if the skilled person applied the disclosure of D3 to image processing apparatus of the kind known from D2 the resulting arrangement would allow individual colours to be modified rather than replaced. In the Board's view however this is merely a matter of degree, there being no essential difference between the modification of a colour by modification of an existing quantity, ie making use of relative values, and the replacement of an existing quantity by a new quantity, ie using absolute values.

5.4 The subject-matter of claim 1 of the auxiliary request accordingly lacks an inventive step.

6. There being no other requests, it follows that the appeal must be dismissed.

**Order**

**for these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehl

P. K. J. van den Berg