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Datasheet for the decision of 9 April 2019

Case Number: T 2045/15 - 3.4.03

Application Number: 10179819.7

Publication Number: 2312567

IPC: G09G3/34, G09G3/36

Language of the proceedings: EN

Title of invention:
Brightness correction for LCD displays with backlight modulation

Applicant:
Vestel Elektronik Sanayi ve Ticaret A.S.

Headword:

Relevant legal provisions:
EPC Art. 52(1), 54, 83, 123(2)
RPBA Art. 13(1), 13(3), 15(1), 15(6)

Keyword:
Late filed requests admitted (no)
Sufficiency of disclosure - (no)
Amendments - added subject-matter (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 2045/15 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 9 April 2019

Appellant: (Applicant)	Vestel Elektronik Sanayi ve Ticaret A.S. Organize Sanayi Bölgesi 45030 Manisa (TR)
Representative:	Cayli, Hülya Paragon Consultancy Inc. Koza Sokak No: 63/2 GOP 06540 Ankara (TR)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 11 May 2015 refusing European patent application No. 10179819.7 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	S. Ward
	C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing European patent application No. 10 179 819 on the grounds that the claimed subject-matter did not involve an inventive step within the meaning of Article 56 EPC.

II. At the end of the oral proceedings held before the Board the appellant confirmed its requests that the decision under appeal be set aside and that a patent be granted on the basis of:

- the main request, filed at oral proceedings before the Board; or
- auxiliary request 1 filed with the statement of grounds of appeal; or
- auxiliary requests 2 and 3 filed with the letter dated 11 March 2019; or
- auxiliary request 4 filed at oral proceedings before the Board.

III. The following documents are referred to:

D2: US 2008/180466 A1
D4: High Contrast LCD TV Using Active Dynamic LED Backlight; Peng et al; SID International Symposium Digest of Technical Papers; Society for Information Display, Los Angeles, USA; vol. 38, issue 1, May 2007, pages 1336-1338.

IV. (i) Claim 1 of the main request reads as follows:

"A method for providing backlight to a backside of a display panel in a backlighting system comprising:

- driving plurality of illuminating backlight elements of said backlight in different areas of said display
- updating intensity of said illuminating backlight elements of said backlight in accordance with the image content to increase image contrast,
- controlling areas of an LCD transmittance of the display panel,
characterized in that the LCD transmittance is varied to compensate the intensity variation of the pixel levels due to dimming in accordance with the values of the Point Spread Functions; location of illuminating backlight elements; and measured lookup tables of red, green and blue channels of the pixels."

(ii) Claim 1 of auxiliary request 1 reads as follows:

"A backlighting system for providing backlight to a backside of a display panel comprising:
- plurality of illuminating backlight elements,
- a backlight driving unit for driving said backlight,
- a dimming control unit to update intensity of said illuminating backlight elements in accordance with the image content to increase image contrast,
- an LCD control unit for controlling areas of an LCD transmittance of the display panel,
characterized in that said LCD control unit varies the LCD transmittance to compensate the intensity variation of the pixel levels due to dimming in accordance with the values of the Point Spread Function; location of illuminating backlight elements; and lookup tables of red, green and blue channels of the pixels and in that, in said dimming control unit, when the initial intensity of said illuminating backlight elements is above a predetermined threshold, said intensity levels are updated as follows:

intRefUpd=intRef(1-(intRef-thrHigh)/(maxInt-thrHigh))*

wherein intRef is the initial intensity level of an illuminating backlight element, thrHigh is a predetermined threshold value above which the intensity won't be perfectly recovered, intRefUpd is the updated intensity, maxInt is a highest intensity value."

(iii) Claim 1 of auxiliary request 2 reads as follows:

"A backlighting system for providing backlight to a backside of a display panel comprising:
- plurality of illuminating backlight elements,
- a backlight driving unit for driving said backlight,
- a dimming control unit to update intensity of said illuminating backlight elements in accordance with the image content to increase image contrast,
- a LCD control unit for controlling areas of an LCD transmittance of the display panel,
characterized in that said LCD control unit varies the LCD transmittance to compensate the intensity variation of the pixel levels due to dimming in accordance with the values of the Point Spread Function; location of illuminating backlight elements; and lookup tables of red, green and blue channels of the pixels,
wherein for each pixel an intensity measurement is combined with an original LCD value."

The appellant stated at oral proceedings that the former wording of the final feature ("*an original LED value*") was an error.

(iv) Claim 1 of auxiliary request 3 reads:

"A backlighting system for providing backlight to a backside of a display panel comprising:

- plurality of illuminating backlight elements,
- a backlight driving unit for driving said backlight,
- a dimming control unit to update intensity of said illuminating backlight elements in accordance with the image content to increase image contrast,
- a LCD control unit for controlling areas of a LCD transmittance of the display panel,
characterized in that said LCD control unit varies the LCD transmittance to compensate the intensity variation of the pixel levels due to dimming in accordance with the values of the Point Spread Functions; location of illuminating backlight elements; and lookup tables of red, green and blue channels of the pixels,
wherein Point Spread Functions of LED groups in different parts of the display vary due to reflection differences in different display areas."

(v) Claim 1 of auxiliary request 4 comprises only one (method) claim reading as follows:

"A method for providing backlight to a backside of a display panel in a backlighting system comprising:
- driving plurality of illuminating backlight elements of said backlight in different areas of said display
- updating intensity of said illuminating backlight elements of said backlight in accordance with the image content to increase image contrast,
- controlling areas of an LCD transmittance of the display panel,
characterized in that the LCD transmittance is varied to compensate the intensity variation of the pixel levels due to dimming in accordance with the values of the Point Spread Function; location of illuminating backlight elements; and lookup tables of red, green and blue channels of the pixels,

wherein Point Spread Functions of LED groups in different parts of the display vary due to reflection differences in different display areas,
wherein the intensity distribution is not same for all Leds, corner Leds and the ones near the edges are treated differently, as they have different PSF,
wherein said backlighting is formed of a plurality of backlighting areas, each controlled by a backlighting driving unit and a dimming control unit and
wherein a LCD control unit varies the LCD transmittance to compensate the intensity variation of the pixels due to dimming."

Auxiliary requests 5-7, which were previously on file, were withdrawn at oral proceedings.

V. The appellant's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

Contrary to the findings of the Examining Division, the subject-matter of claim 1 of the main request was inventive over D2. It was also inventive over D4, in that the lookup tables of red, green and blue channels were defined as measured look up tables, whereas the look up tables of D4 were based on parametric data from gamma curves; the difference would be evident to a skilled person. The amendment to "measured" look up tables did not introduce any lack of clarity, a conclusion which found support in *Case Law of the Boards of Appeal of the European Patent Office, 8th Eighth Edition, 2016, II.A.6.3.6.*

Claim 1 of auxiliary request 1 comprised features which were not disclosed in the prior art, and which served to overcome the problem of clipping as set out on page 8, lines 4-19 of the description.

The independent claims of auxiliary requests 2 and 3 further distinguished the invention from the prior art.

Claim 1 of auxiliary request 4 defined *inter alia* that the intensity distribution was not same for all LEDs, so that corner LEDs and the ones near the edges were treated differently, as they had different PSFs. This was not disclosed in D4 and led to an improved method.

VI. With the summons to oral proceedings, the Board sent the appellant a communication under Article 15(1) RPBA setting out its provisional views that D4 appeared to disclose all features of claim 1 of the main request, and that the invention defined by claim 1 of auxiliary request 1 did not appear to be sufficiently disclosed within the meaning of Article 83 EPC.

Reasons for the Decision

1. The appeal is admissible.

2. *Main Request*

2.1 The main request was filed during oral proceedings before the Board, and the first question is whether the Board should exercise its discretion under Article 13(1) RPBA to admit it into the proceedings.

As a general rule, oral proceedings are scheduled with the aim of ensuring that a final decision can be taken at the end of the oral proceedings in accordance with Article 15(6) RPBA. Amendments filed after oral

proceedings have been arranged (for example, during the oral proceedings) shall not be admitted if they raise issues which the Board cannot reasonably be expected to deal with without adjournment of the oral proceedings (Article 13(3) RPBA).

2.2 The Boards therefore regularly apply the criterion that a new request filed at a late stage in the proceedings will only be admitted if it is clearly allowable, in the sense that it can be quickly ascertained that it overcomes all outstanding issues without raising new ones (*Case Law of the Boards of Appeal of the European Patent Office, 8th Eighth Edition, 2016, IV.E.4.2.5*).

2.3 The main request comprises a single claim directed to a method for providing backlight to a backside of a display. Apart from one word ("measured"), the subject-matter is identical to claim 5 of the previous main request, the features of which correspond closely to claim 1 of the previous main request (directed to a backlighting system).

2.4 In its communication, the Board set out at some length (points 2.5 to 2.9) why it considered that D4 disclosed all the features of claim 1 of the main request as then on file. The appellant has not challenged this conclusion, and the Board therefore maintains its view that this subject-matter lacks novelty over D4.

2.5 In the Board's view, this conclusion would apply equally to the subject-matter of the corresponding method claim 5 of the main request as then on file, and hence to claim 1 of the present main request, to the extent that it is based on this subject-matter, and the appellant has not argued the contrary. Instead the appellant argues that the subject-matter of claim 1 of

the present main request is novel over D4 by virtue of the amendment made during oral proceedings, namely that the term "lookup tables" has been amended to "measured look up tables".

Hence, the decision whether the main request can be admitted into the proceedings boils down to deciding whether it can be quickly ascertained that the introduction of the word "measured" into claim 1 overcomes the novelty objection based on D4, and does not give rise to any new objections.

2.6 The lookup tables of D4 are tabulations of the gamma correction curves for the red, green and blue channels (page 1337, left-hand column, second paragraph), as represented by the equations (1)-(5) on page 1336 (c.f. equations (1)-(4) on page 3 of the description), which model the response of the LCD as a simple power law. As stated in the description, "empirical measurements show that this rough estimate deviates from the real values". The gamma curve is therefore an approximation to the empirical values on the basis of the best fit to a simple power law relationship.

It was suggested by the Board - and not denied by the appellant - that at some point during the establishment of the gamma curve, reference must have been made to empirical, i.e. measured, data, making it questionable whether merely inserting "measured" into claim 1 would be sufficient to overcome the novelty objection based on D4.

2.7 A separate issue in relation to novelty was whether a lookup table based on measured values would be recognisably different to a skilled person to one based on entries derived from a gamma curve. A lookup table

is a product, and a "measured lookup table" presumably represents a "product-by-process" feature, i.e. a lookup table obtained by measurement. According to the usual interpretation of product-by-process features, this merely means a lookup table *obtainable* by measurement. The question is then whether the lookup table of D4 would be *obtainable* (even if not obtained) by measurement. If this is the case, the amendment would not appear to differentiate the claimed subject-matter from the prior art.

2.8 The question whether the amendment actually represents a limitation on the claimed subject-matter might also be seen as an issue of clarity. In addition, the amendment arguably introduces a lack of clarity into the claim in relation to what is actually measured. The claimed method employs "measured lookup tables of red, green and blue channels of the pixels". This raises a doubt whether the claim is only intended to cover methods employing lookup tables which are tabulations of the results of measurements made on the particular display panel to which backlight is being provided, or whether it is supposed to extend to methods where the lookup tables have been derived from measurements made on one specimen display, and then applied to other displays of the same type.

2.9 The appellant argued at oral proceedings that the amended subject-matter would establish novelty over D4, since the skilled person would be able to distinguish measured data, which would not follow a smooth curve, from parametric data derived from mathematical functions (such as that of the lookup tables of D4), which would. The appellant also argued that the claim was clear, citing *Case Law of the Boards of Appeal of*

the European Patent Office, 8th Eighth Edition, 2016, II.A.6.3.6.

2.10 The Board does not dismiss these arguments, nor does it exclude the possibility that a full analysis of these matters might result in a finding in favour of the appellant. However, the above issues relating to both novelty and clarity would require careful consideration, and hence the request fails the test set out above (point 2.2) in that it cannot be quickly ascertained that it overcomes all outstanding issues, nor is it immediately apparent that it does not raise new ones.

For this reason, and since no explanation was given why this amendment and the arguments supporting it could not have been introduced prior to oral proceedings before the Board of Appeal, the main request is not admitted into the proceedings.

3. *Auxiliary Request 1*

3.1 Claim 1 of auxiliary request 1 defines a "soft thresholding idea" to solve the problem of clipping, as disclosed in the description on page 8, lines 4-25.

3.2 In particular, a formula is defined in which the parameter "intRef" represents the initial intensity level of an illuminating backlight element, and the description (page 8, lines 6-7) refers to "the initial intensity with all Leds at full brightness" (page 8, lines 6-7). The parameter "maxInt" in auxiliary request 1 "is a highest intensity value". Thus "intRef" and "maxInt" appear to refer to the same thing: the intensity with the Leds fully on. However, if these parameters are equal, the updated intensity level

"intRefUpd" would always be identically zero, which presumably cannot be the intention.

3.3 The Board therefore expressed the provisional view that it "does not believe that the claimed 'thresholding' scheme, or even the terminology employed to describe it, is sufficiently clearly explained in the description to satisfy the requirements of Article 83 EPC." As the appellant offered no further explanation of this matter in writing or at oral proceedings, the Board sees no reason to deviate from this view.

3.4 The invention defined by claim 1 of auxiliary request 1 therefore fails to meet the requirements of Article 83 EPC.

4. *Auxiliary Request 2*

4.1 Claim 1 of auxiliary request 2 comprises the feature:

"wherein for each pixel an intensity measurement is combined with an original LCD value."

The basis cited by the appellant is paragraph [0028], the last sentence of which reads:

"For each pixel on the screen the Led intensity measurement is combined with the original LCD value."

No reason was given for the change of wording. The Board finds that "an intensity measurement" encompasses more possibilities than "the Led intensity measurement", and hence this request fails to meet the requirements of Article 123(2) EPC.

4.2 In the oral proceedings, the Board also expressed a negative opinion of this additional feature in relation to the requirements of Articles 83 and 84 EPC. However, in view of the conclusion of the previous paragraph, it is unnecessary to enter into the details.

5. *Auxiliary Request 3*

5.1 Claim 1 of auxiliary request 3 defines subject-matter which, apart from one additional feature, is essentially identical to that of claim 1 of the main request on which the Board's communication was based, and which has been found to be entirely disclosed in D4 (see point 2.4, above). The additional feature is:

"wherein Point Spread Functions of LED groups in different parts of the display vary due to reflection differences in different display areas."

5.2 In any LCD display panel backlighting system in which the LEDs are divided into groups (for example the arrangement shown in Fig. 3 of D4), the point spread functions of LED groups at an edge will differ from those near the centre due to reflections from the side walls. This feature is therefore implicitly disclosed in D4, and so the subject-matter of claim 1 of auxiliary request 3 is not new within the meaning of Articles 52(1) and 54 EPC.

6. *Auxiliary Request 4*

6.1 Claim 1 of auxiliary request 4 differs in four respects from claim 5 of the main request on which the Board's communication was based, and which has been found to lack novelty over D4 (see points 2.4 and 2.5, above). The additional features are:

(a) wherein Point Spread Functions of LED groups in different parts of the display vary due to reflection differences in different display areas,
(b) wherein the intensity distribution is not same for all Leds, corner Leds and the ones near the edges are treated differently, as they have different PSF,
(c) wherein said backlighting is formed of a plurality of backlighting areas, each controlled by a backlighting driving unit and a dimming control unit, and
(d) wherein a LCD control unit varies the LCD transmittance to compensate the intensity variation of the pixels due to dimming.

6.2 Auxiliary request 4 was filed in oral proceedings before the Board, and so the considerations set out above under points 2.1 and 2.2 apply.

6.3 Given, firstly, the conclusions drawn above under point 5.2 (in relation to features (a) and (b)), secondly, the plurality of backlighting areas disclosed in Fig. 3 of D4 (in relation to feature (c)), and thirdly, the LCD control unit disclosed in Fig. 2 of D4 (in relation to feature (d)), it is not immediately apparent that this request overcomes the outstanding novelty issue.

6.4 It is also not immediately apparent that this request does not raise any new issues. For example, the basis given by the appellant for feature (b) is page 4, lines 2-4 of the published application, i.e. the comment describing Fig. 3. However, this comment also comprises the following first sentence: "Fig. 3 shows the Led PSF distribution for one Led Block, namely the intensity distribution of one led Block (a group of Leds all

assigned to the same value)." The importation into the claim of the second sentence without the corresponding information of the first sentence leads to a doubt whether the requirements of Article 123(2) EPC are met.

6.5 As with the main request, auxiliary request 4 fails the test set out above under point 2.2, in that it cannot be quickly ascertained that it overcomes all outstanding issues, nor is it immediately apparent that it does not raise new ones. Again, the Board sees no good reason why this request and the arguments supporting it could not have been introduced prior to oral proceedings before the Board of Appeal. Auxiliary request 4 is therefore not admitted into the proceedings.

7. *Conclusions*

The main request is not admitted into the proceedings. The invention defined by claim 1 of auxiliary request 1 fails to meet the requirements of Article 83 EPC. Claim 1 of auxiliary request 2 fails to meet the requirements of Article 123(2) EPC. The subject-matter of claim 1 of auxiliary request 3 is not new within the meaning of Articles 52(1) and 54 EPC. Auxiliary request 4 is not admitted into the proceedings. The other requests previously on file (auxiliary requests 5-7) have been withdrawn.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Canueto Carbajo G. Eliasson

Decision electronically authenticated