

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners

v.

MAXELL, LTD.,
Patent Owner

Inter Partes Review No. IPR2025-01312

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 7,952,645**

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Exhibit No.	Description
1001	U.S. Patent No. 7,952,645 (“the “ ’645 patent ”).
1002	File History of U.S. Patent No. 7,952,645.
1003	Declaration of Dr. Dan Schonfeld.
1004	U.S. Patent App. Pub. No. 2004/0156545 (“ Kim ”).
1005	U.S. Patent No. 5,808,697 (“ Fujimura ”).
1006	ITU “Recommendation ITU-R BT.1298*; Enhanced wide-screen NTSC TV transmission system” (1997) (retrieved from https://www.itu.int/dms_pubrec/itu-r/rec/bt/R-REC-BT.1298-0-199710-W!!PDF-E.pdf).
1007	Definition of “signal” from <i>Chambers Dictionary of Science & Technology</i> (2007).
1008	Definition of “according to” from <i>The New Oxford American Dictionary</i> (2nd ed. 2005).
1009	Definition of “according to” from <i>Webster’s New College Dictionary</i> (2005).
1010	Definition of “according to” from <i>The Chambers Dictionary</i> (10th ed. 2007).
1011	Patent Owner’s responsive claim construction brief from <i>Maxell, Ltd., v. Lenovo Group Ltd.</i> , No. 6:21-cv-01169 (W.D. Tex. Jun. 13, 2022).
1012	Patent Owner’s sur-reply claim construction brief from <i>Maxell, Ltd., v. Lenovo Group Ltd.</i> , No. 6:21-cv-01169 (W.D. Tex. Jul. 11, 2022).
1013	Patent Owner’s infringement contentions cover pleading from <i>Maxell, Ltd. v. Samsung Elecs. Co., Ltd.</i> , No. 5:25-cv-00052 (E.D. Tex.).
1014	Patent Owner’s ’645 patent infringement contentions claim chart from <i>Maxell, Ltd. v. Samsung Elecs. Co., Ltd.</i> , No. 5:25-cv-00052 (E.D. Tex.).

TABLE OF CLAIMS

[1.pre] A video processing apparatus comprising:
[1.a] an input unit to which a video signal containing contents is input;
[1.b] a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;
[1.c] a corrector which corrects the video signal input to the input unit; and
[1.d] a controller which controls the corrector to cause the corrector to correct the video signal input to the input unit when the pattern portions are not contained, and which controls the corrector to cause the corrector not to correct the video signal when the pattern portions are contained.
[2.pre] The video processing apparatus according to claim 1, comprising:
[2.a] a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal,
[2.b] wherein the corrector corrects the video signal according to the level or distribution detected by the characteristic point detector.
[3.pre] A video processing apparatus comprising:
[3.a] an input unit to which a video signal containing contents is input;
[3.b] a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;
[3.c] a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal input to the input unit;
[3.d] a corrector which changes correction characteristics according to a result of detection output from the characteristic point detector, and corrects the video signal input to the input unit; and
[3.e] a controller which controls the corrector to cause the corrector not to change the correction characteristics in the corrector when the pattern portions are contained.
[4] The video processing apparatus according to claim 1, wherein the pattern portions are wallpaper areas or no-picture areas having a single color added to left and right of the contents or above and below the contents and displayed.
[5.pre] A video processing apparatus comprising:
[5.a] an input unit to which a video signal containing contents is input;
[5.b] a pattern portion detector which detects whether a pattern portion other than contents is contained in the video signal input to the input unit;
[5.c] a no-picture area detector which detects whether the pattern portions are no-picture areas having a single color;
[5.d] a corrector which corrects the video signal input to the input unit; and

[5.e.i] a controller which controls the corrector to cause the corrector to correct the video signal input to the input unit when the pattern portions are not contained and when the pattern portions are the no-picture areas,
[5.e.ii] and which controls the corrector to cause the corrector not to correct the video signal when the pattern portions are not the no-picture areas.
[6.pre] The video processing apparatus according to claim 5, comprising:
[6.a] a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal,
[6.b] wherein when the no-picture area detector has detected that the pattern portions are no-picture areas, the characteristic point detector detects a level or distribution of at least one of luminance, hue and saturation of the video signal other than the no-picture areas.
[7] The video processing apparatus according to claim 5, wherein the pattern portions are portions added to left and right of the contents or above and below the contents and displayed.
[8] The video processing apparatus according to claim 5, wherein the no-picture areas have a black color or a white color.

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) petitions for *inter partes* review of U.S. Patent No. 7,952,645 (“’645 patent,” EX1001). As shown below, the claims of the ’645 patent were known in the art.

Petitioner certifies that the ’645 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this petition.

II. STATEMENT OF PRECISE RELIEF REQUESTED

Petitioner requests cancelation of claims 1-8 of the ’645 patent in view of the following grounds, which are based on, and substantial portions of which are adapted from, the declaration of Dr. Schonfeld (EX1003):

Ground	Claims	Statutory Basis	Prior Art
1	1-3	35 U.S.C. § 103	Kim
2	1-4	35 U.S.C. § 103	Fujimura
3	5-8	35 U.S.C. § 103	Fujimura and Kim

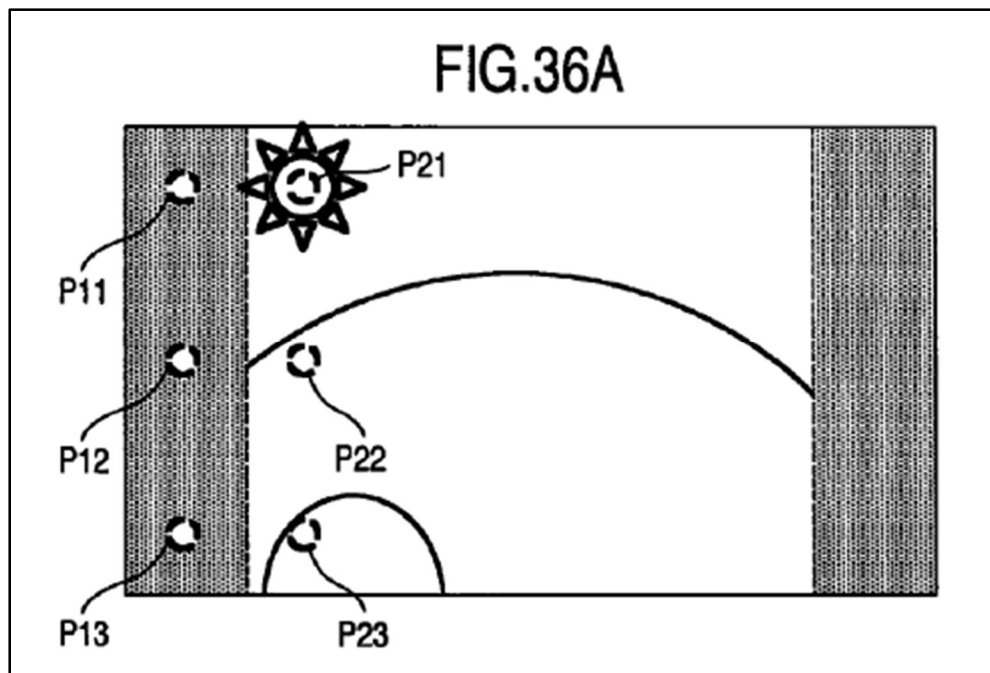
III. THE ’645 PATENT

A. Overview of the ’645 Patent

The ’645 patent issued from U.S. Patent Application No. 11/602,956, filed November 22, 2006, and it claims priority to Japanese Patent Application No.

2005-338000, filed on November 24, 2005.¹ EX1001, cover page. The '645 patent's earliest possible effective filing date therefore is November 24, 2005.

The '645 patent relates to a "video processing apparatus" that "corrects [a] video signal." EX1001, Abstract, 1:60-65. The patent states that, when converting a video signal with an aspect ratio of 4:3 to a video signal with an aspect ratio of 16:9 (for display on a screen with such an aspect ratio), "wallpapers are added to the left and right of the contents." *Id.*, 1:41-45, 16:7-12. The "wallpapers" may be "black no-picture areas." *Id.*, 1:41-45, 1:51-54. The patent's Figure 36A, shown below, shows an example of such a video signal.



¹ For the purpose of this petition only, and without waiving any rights in any parallel proceeding, Petitioner does not challenge the '645 patent's priority claim.

Id., 19:26-30; *see also id.*, Fig. 29 (same), 16:57-17:1; EX1003, ¶30.

The patent states that, when performing “picture quality correction,” “the luminance and colors of the wallpaper portions are changed,” which may make the video “rather hard to watch.” EX1001, 1:45-50. Also, “black no-picture areas” prevent the “average values of luminance and color of the 4:3 contents themselves” from being “calculated accurately.” *Id.*, 1:51-56, 16:16-21. Accordingly, the patent describes detecting whether the video signal includes “pattern portions,” such as “wallpaper portions having a pattern or the like or no-picture area portions having a single color.” *Id.*, Abstract, 1:60-65, 16:21-25; EX1003, ¶31.

In the patent’s “third embodiment,” if the apparatus detects that the video signal includes “pattern portions,” it does not correct the video signal. EX1001, 1:65-67, 16:21-25, 19:58-63, Fig. 34, 18:50-61 (when there is a pattern portion, correction data is set to zero). EX1003, ¶32.

Further, when “the pattern portions are formed of single color of black,” correction causes less of a change in the pattern portion compared to when the pattern portions “are formed of patterns or a single chromatic color.” EX1001, 20:14-17. In the patent’s “fourth embodiment,” the apparatus detects whether the pattern portions are “black no-picture areas.” *Id.*, 20:17-20. If they are, the video signal still is corrected. *Id.*, 20:20-22, Fig. 44, 23:4-12 (steps 4402 and 4405). If the pattern portions are “not a black no-picture area portion,” the video signal is

not corrected. *Id.*, 20:22-25, Fig. 44 (steps 4401 and 4403). EX1003, ¶33.

B. Overview of the '645 Patent's File History

The PTO issued the '645 patent on May 31, 2011 without having rejected the claims during prosecution. EX1002, 2. The examiner's reasons for allowance stated that "the prior art does not disclose or suggest applying correction processing to a video signal when non-content pattern data is not detected/contained, and not applying the correction when the pattern data is detected/contained, as is claimed." *Id.*, 21.

C. Person of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") at the time of the alleged invention of the '645 patent (November 24, 2005) would have had a bachelor's degree in computer science, electrical or computer engineering, or a comparable field of study, plus approximately two to three years of professional experience with image processing, video processing, or other relevant industry experience. Additional education could substitute for professional experience, and significant industry experience could substitute for formal education. EX1003, ¶35.

D. Patent Owner's Infringement Contentions

"[P]atent owners may not, like a 'nose of wax,' twist the meaning of patent claims one way to avoid a finding of unpatentability and in another way so as to find infringement." *Ericsson Inc. v. Intellectual Ventures II LLC*, IPR2014-00919, Paper 37 at 9 (PTAB Dec. 7, 2015). In this regard, Patent Owner's ("PO's")

infringement allegations are “probative” of whether PO is taking “inconsistent positions” between this proceeding and district court litigation, and are “relevant of the credibility” of PO’s “characterization of the [asserted] Patent in this proceeding.” *Id.* at 9-10; *Square, Inc. v. Unwired Planet LLC*, IPR2014-01164, Paper 28 at 37-38 (PTAB Nov. 19, 2015). Accordingly, Petitioner includes PO’s infringement contentions for the ’645 patent from the parties’ district court litigation. EX1013, 57-64; EX1014.

IV. CLAIM CONSTRUCTION

The challenged claims are interpreted using the same claim construction standard that is used to construe the claim in a civil action in federal district court. 37 C.F.R. § 42.100(b).

Petitioner does not contend that its proposed constructions are complete constructions of these limitations or the claims for any other purpose, including for issues in the related litigation. Because the prior art discloses the preferred embodiments within the indisputable scope of the claims, the Board need not construe the outer bounds of the claims as part of these proceedings. The district court may have to address other bounds of the claims in addressing infringement. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (only those terms that are in controversy need

be construed, and only to the extent necessary to resolve the controversy).

Any claim term not listed below should be construed according to its plain and ordinary meaning to a POSITA at the time of the '645 patent's priority date.

A. “video signal” (claims 1-3, 5-6)

The Board should construe “video signal” in accordance with its full scope such that it includes a logical unit of video. *Linear Tech. Corp. v. Int’l Trade Comm’n*, 566 F.3d 1049, 1055 (Fed. Cir. 2009) (“Absent a clear disavowal or contrary definition in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language.”). There is no clear disavowal or contrary definition otherwise in the intrinsic evidence. To the contrary, the '645 patent discloses operating on logical “unit[s]” of video such as a “frame” and a “scene.” EX1001, 6:67-7:5 (“taking a frame as the unit”), 7:61-65 (same), 8:25-29 (same), 16:16-21 (“taking a frame as the unit or a scene as the unit”); *see also* EX1007 (Chambers Dictionary of Science and Technology), 3 (defining “signal” to include “a conveyor of information”). The “video signal” may also be a series of frames, such as a movie, for the same reasons, as the '645 patent confirms. EX1001, 6:29-31 (the video contents can be “a drama, a movie, a sport or the like”), 6:24-27 (“a moving picture”), 12:39-42 (“video signal” includes a “number of frames”), 20:5-10 (“consecutive frames”), Fig. 35C (frames 1 and 2), Fig. 36C (same); EX1003, ¶¶39-41.

B. “a corrector which corrects the video signal input to the input unit” (claims 1 and 5) and “a corrector which changes correction characteristics according to a result of detection output from the characteristic point detector” (claim 3)

In the *Lenovo* case identified in Section X.B, PO argued that these limitations are means-plus-function limitations and that the corresponding structure is “CPU 7 or equivalents thereof.” EX1011 (responsive claim construction brief), 30-34; EX1012 (sur-reply claim construction brief), 16-17. If PO asserts in this IPR that these limitations are means-plus-function limitations, the Board should dismiss any argument by PO that the structure is anything but “CPU 7 or equivalents thereof,” in light of PO’s previous arguments. *Id.*

C. “correct[s] the video signal” (claims 1-3 and 5)

The Board should construe this limitation to include correcting *part of* the video signal. “[T]here is a strong presumption against a claim construction that excludes a disclosed embodiment.” *Nobel Biocare Servs. AG v. Intradent USA, Inc.*, 903 F.3d 1365, 1381 (Fed. Cir. 2018). “A claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct.” *Accent Packaging, Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013); *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1583-84 (Fed. Cir. 1996) (such an interpretation would require “highly persuasive evidentiary support”). The ’645 patent specification describes embodiments in which only part of the video signal is corrected. For example, the patent’s Figure 21 shows

“correction value[s]” of zero for certain “gradation areas” and non-zero correction values for other gradation areas. EX1001, Fig. 21, 13:38-49. Figures 23B and 23D likewise show correction to only certain gradation areas. EX1001, Figs. 23A-D, 14:3-30 (“the modulator 152 has corrected the output gradation relative to the input gradation in the range of 47 to 255”); *see also id.*, Figs. 24A-B, 14:53-67. There is no evidence that warrants excluding these embodiments from the claims’ scope. EX1003, ¶¶44-45.

D. “the pattern portions are contained” (claims 1 and 3); “the pattern portions are not contained” (claims 1 and 5)

In the context of the ’645 patent, the plain meaning of these claim limitations means the pattern portions are *included* in the video signal and the pattern portions are *not included* in the video signal, respectively. *See* EX1001, Abstract (“portions having a pattern ... are contained ... in a video signal;” “pattern portions are contained in the input video signal”), 1:60-67 (same), 19:58-61 (“it is detected whether the video signal includes a pattern portion. If a pattern portion is contained ...”), 24:26-28 (“pattern portions are contained above and below the image”).

Moreover, the full scope of these limitations include a video signal with some frames that contain pattern portions and some frames that do not. As established in Section IV.C, excluding a disclosed embodiment from a claim’s scope requires “highly persuasive evidentiary support.” In the ’645 patent’s “third

embodiment,” “enhancement processing” (correction) “is stopped” “at the time of display of [the] pattern portions.” EX1001, 19:52-57; *see also id.*, 19:59-61, 19:67-20:1 (“correction data may be stopped in response to the detection of the pattern portion”). In other words, the system was correcting the video but “stopped” upon detection of a pattern portion. *See also id.*, 18:62-19:25 (where the system determines the video frames have no pattern portion, the system “finishes” (*i.e.*, completes) “the [enhancement] processing”), Figs. 35A-C, 19:26-57 (where the system determines the video frames have a pattern portion, enhancement processing is “stopped”), Figs. 36A-C. There is no evidence that warrants excluding this embodiment from the claim’s scope. These limitations therefore include the video signal described above. EX1003, ¶¶46-47.

- E. “when the pattern portions are contained” (claims 1 and 3);
“when the pattern portions are not contained” (claims 1 and 5);
“when the pattern portions are not the no-picture areas” (claim 5)**

PO apparently construes “when” in these claim limitations to be broader than “*whenever*,” and to be satisfied by *certain instances* in which “the pattern portions are contained,” “the pattern portions are not contained,” and “the pattern portions are not the no-picture areas,” respectively. Specifically, in the litigation between PO and Petitioner, PO asserts infringement of claim 1 based on, for example, the selectable “Food mode” feature of a “Camera” app that “blur[s] the sides and background of your dish.” EX1013, 58. Because the Camera app blurs

the sides and background of a photographed dish only when the user taps “FOOD,” PO apparently construes “when” in these claim limitations as described above. *Id.* Likewise, PO also asserts infringement of claim 1 based on, for example, the selectable “Portrait mode” feature of the Camera app that “blur[s] the background around the subject.” *Id.*, 59. Because the Camera app does so only when the user taps “PORTRAIT,” PO again apparently construes “when” in these claim limitations as described above. *Id.*; *see also id.*, 60 (also accusing “Portrait video”).

Petitioner adopts this apparent construction for the purposes of this petition, but reserves the right to assert a different meaning in district court litigation.

Western Digital Corp. v. Spex Techs., Inc., IPR2018-00082, Paper 11, at *11-12 (PTAB Apr. 25, 2018) (petition based on claim constructions urged by PO satisfies the claim construction requirements, and Petitioner is not required to express its agreement with, or take ownership of, the offered construction); *General Electric v. Vestas*, IPR2018-00928, Paper 9, at *12-14 (PTAB Nov. 5, 2018) (no prohibition against offering PO’s expected interpretation); *Abbott Diabetes Care Inc. v. Dexcom, Inc.*, IPR2022-00913, Paper 14, at *12-14 (PTAB Nov. 3, 2022) (Petitioner is not required to advance the same claim interpretation in an IPR and related litigation).

F. “characteristic point detector” (claims 2-3, 6)

The Board should construe “characteristic point detector” to include a component that determines a histogram of luminance from an input video signal. As established in Section IV.C, excluding a disclosed embodiment from a claim’s scope requires “highly persuasive evidentiary support.” The ’645 patent specification describes the “characteristic point detector” as “calculat[ing] characteristic data such as ... a histogram of the input video signal on the basis of the luminance signal Y” EX1001, 5:41-46, Fig. 5 (luminance characteristic point detector calculating a luminance histogram), 6:64-7:51, Fig. 6 (example luminance histogram), 7:52-58, 24:43-44 (the specification embodiments are preferred embodiments). There is no evidence that warrants excluding this embodiment from the claims’ scope. This description also is consistent with the claim language, which recites that the characteristic point detector “detects a level or distribution of at least one of luminance, hue and saturation of the video signal.” *Id.*, 24:65-67, 25:10-12, 26:14-16; EX1003, ¶50.

G. “a result of detection output from the characteristic point detector” (claim 3)

The plain meaning of this limitation includes a “result” that is not “from the characteristic point detector” but still is a result of “detection output” that is from the characteristic point detector. The last antecedent doctrine states that “a limiting clause or phrase ... should ordinarily be read as modifying only the noun or phrase

that it immediately follows.” *Anhydrides & Chem., Inc. v. United States*, 130 F.3d 1481, 1483 (Fed. Cir. 1997); *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1335- 36 (Fed. Cir. 2008). Thus, “from the characteristic point detector” is presumed to modify only “detection output” and not also modify “a result of.” There is no evidence that overcomes this presumption. The “result” therefore does not have to be “from the characteristic point detector.” EX1003, ¶51.

H. “a corrector which changes correction characteristics according to a result of detection output from the characteristic point detector” (claim 3)

The Board should give “according to” in this claim limitation its full scope such that the “corrector” can change “correction characteristics” *based in part on* “a result of [the] detection output” rather than accordingly *only* to the result of the detection output. There is no clear disavowal or contrary definition otherwise in the intrinsic evidence. *Linear Tech.*, 566 F.3d at 1055; EX1008 (The New Oxford American Dictionary), 3 (defining “according to” to include “in a manner corresponding or conforming to”); EX1009 (Webster’s New College Dictionary), 3 (defining “according to” to include “in agreement with”); EX1010 (The Chambers Dictionary), 3 (defining “according to” to include “in accordance with”); EX1003, ¶¶52-53.

I. “cause the corrector not to change the correction characteristics in the corrector when the pattern portions are contained” (claim 3)

The Board should construe the claim language “not to change the correction characteristics ... when the pattern portions are contained” to include setting the correction characteristics to a value that is constant (*i.e.*, does not change) every time “the pattern portions are contained.” As established in Section IV.C, excluding a disclosed embodiment from a claim’s scope requires “highly persuasive evidentiary support.” The ’645 patent discloses embodiments where, “when there is a pattern portion, the CPU 7 sets correction data=‘0,’” a constant value. EX1001, 18:50-61, Fig. 34 (step 3403); *see also id.*, 22:63-23:3 (if a black no-picture area is contained in the pattern portion, set correction data to 0), Fig. 44 (step 4403). There is no evidence that warrants excluding these embodiments from the claim’s scope. This limitation therefore includes setting the correction characteristics to a constant value such as zero. EX1003, ¶54.

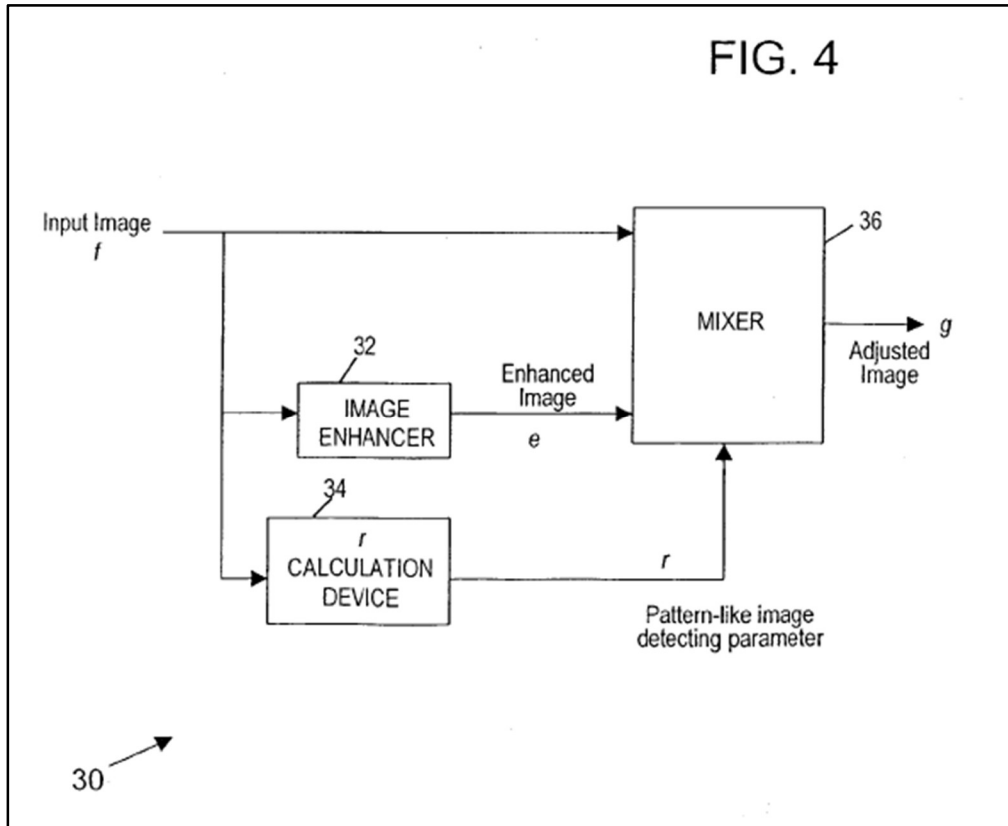
V. SUMMARY OF THE PRIOR ART

A. Kim

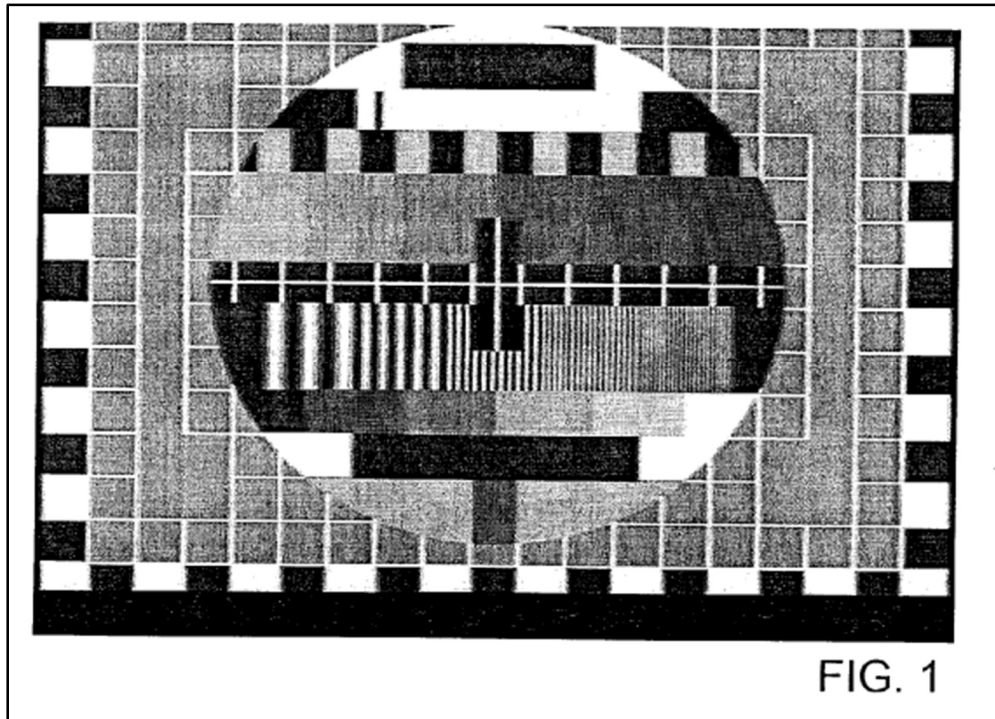
U.S. Patent Application Publication No. 2004/0156545 (“Kim”) was filed on February 7, 2003, and was published on August 12, 2004. EX1004, cover page. Kim is prior art to the ’645 patent under 35 U.S.C. §§ 102(a), (b), and (e) (pre-AIA).

Kim discloses a video processing system that performs, for example,

contrast enhancement and color enhancement. Kim's Figure 4, shown below, is a block diagram of such a system.



EX1004, ¶41. Image enhancer 32 enhances image f from the video to produce enhanced image e . *Id.*, ¶¶40-41. The system calculates parameter r , which ranges from 0 to 1. *Id.*, ¶39. If r equals 1, the image input is determined to be “a pattern-like image.” *Id.*, ¶43. Kim's Figure 1, shown below, shows an example of such an image. *Id.*, ¶1.



If the image is a pattern-like image, the system does not enhance the image. *Id.*,

¶43. Specifically, adjusted image *g* in Figure 4 is equal to image *f*. *Id.* If *r* equals 0, the image *f* is a normal image and is enhanced as normal. *Id.*, ¶¶39, 43.

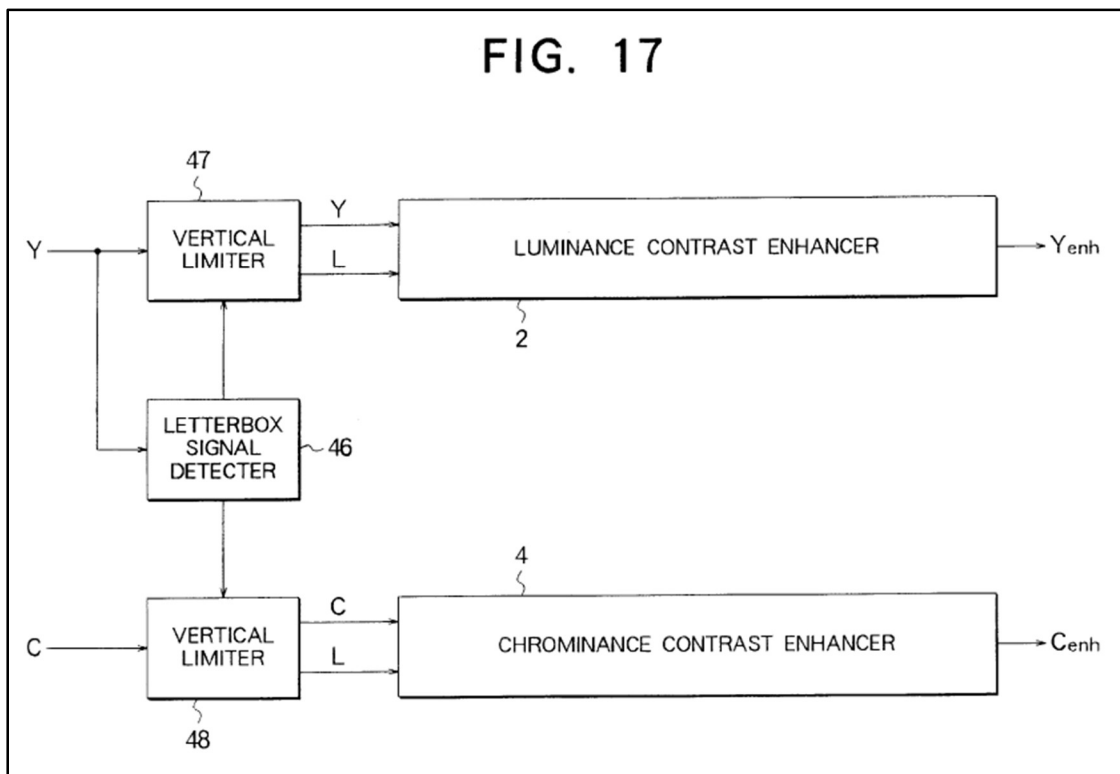
Specifically, the adjusted image *g* in Figure 4 is the enhanced image *e*. *Id.*, ¶43. If *r* is between 0 and 1, the adjusted image *g* is a proportional mix of image *f* and enhanced image *e*. *Id.*; EX1003, ¶56.

Kim is analogous art to the '645 patent because it relates to video processing and adjusting image enhancement based on whether a video image is a pattern-like image, as described above. The PTO did not consider Kim during prosecution of the '645 patent. EX1001, pp. 1-2; EX1003, ¶57.

B. Fujimura

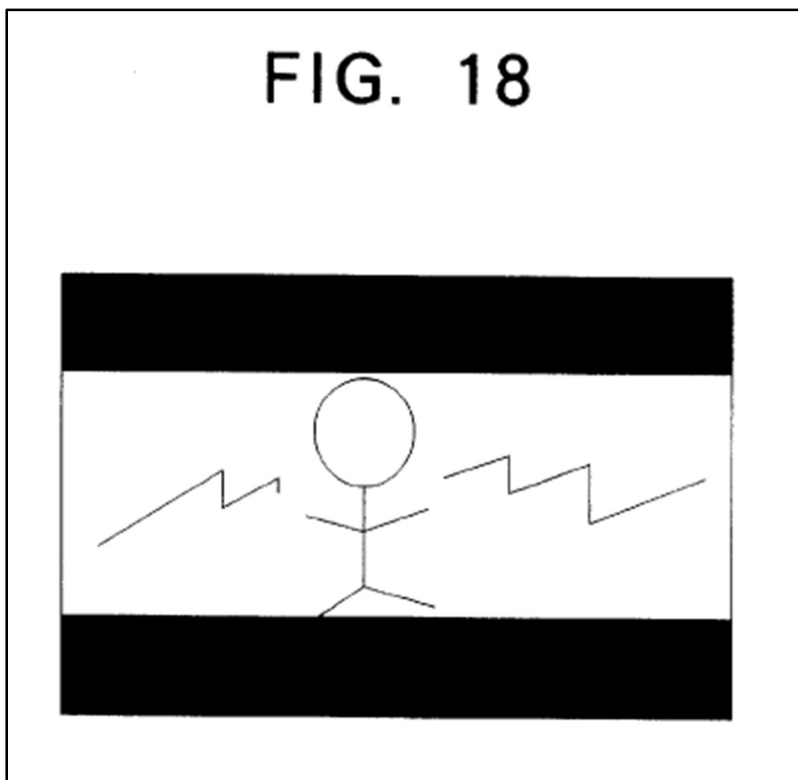
U.S. Patent No. 5,808,697 (“Fujimura”) was filed on June 14, 1996, and issued on September 15, 1998. EX1005, cover page. Fujimura is prior art to the ’645 patent under 35 U.S.C. §§ 102(a), (b), and (e) (pre-AIA).

Fujimura discloses a video processing system that enhances luminance contrast and chrominance contrast. EX1005, Abstract, 1:3-6, 1:57-2:7, 3:63-64. The system separates an input video signal into a luminance signal Y and a chrominance signal C, and processes each independently. *Id.*, 4:16-18, 7:36-40, 8:12-16. Each embodiment includes luminance contrast enhancer 2 for the luminance signal and chrominance contrast enhancer 4 for the chrominance signal. *Id.*, Fig. 1 (first embodiment), Fig. 8 (second embodiment), Fig. 17 (fourth embodiment), 13:30-33 (the fourth embodiment includes the luminance contrast enhancer of either the first or second embodiments). Figure 17 is shown below.



Luminance contrast enhancer 2 enhances contrast by applying one or more mapping functions. *Id.*, 2:28-32, 4:41-49, 6:19-28, 9:30-35, 9:56-60, Figs. 3A-B; EX1003, ¶59.

The video and the luminance signal may include black bands above and below the picture area, as shown below in Figure 18, which is referred to as a “letterbox” layout. EX1005, 2:49-52, 13:42-49.



“[L]etterbox signal detector 46” determines whether the video is in letterbox format. *Id.*, 13:50-58, Fig. 17. It also determines the line numbers of the horizontal scanning lines of the top and bottom of the picture area. *Id.*, 13:53-58, 14:46-50. Vertical limiter 47 then limits the luminance contrast enhancement to the picture area. *Id.*, 14:46-59, Fig. 17; EX1003, ¶60.

Fujimura is analogous art to the '645 patent because it relates to video processing and accounting for the presence of certain patterns in the video when performing luminance correction, as described above. The PTO did not consider Fujimura during prosecution of the '645 patent. EX1001, pp. 1-2; EX1003, ¶61.

VI. GROUND 1: CLAIMS 1-3 ARE OBVIOUS IN LIGHT OF KIM.

A. Claim 1

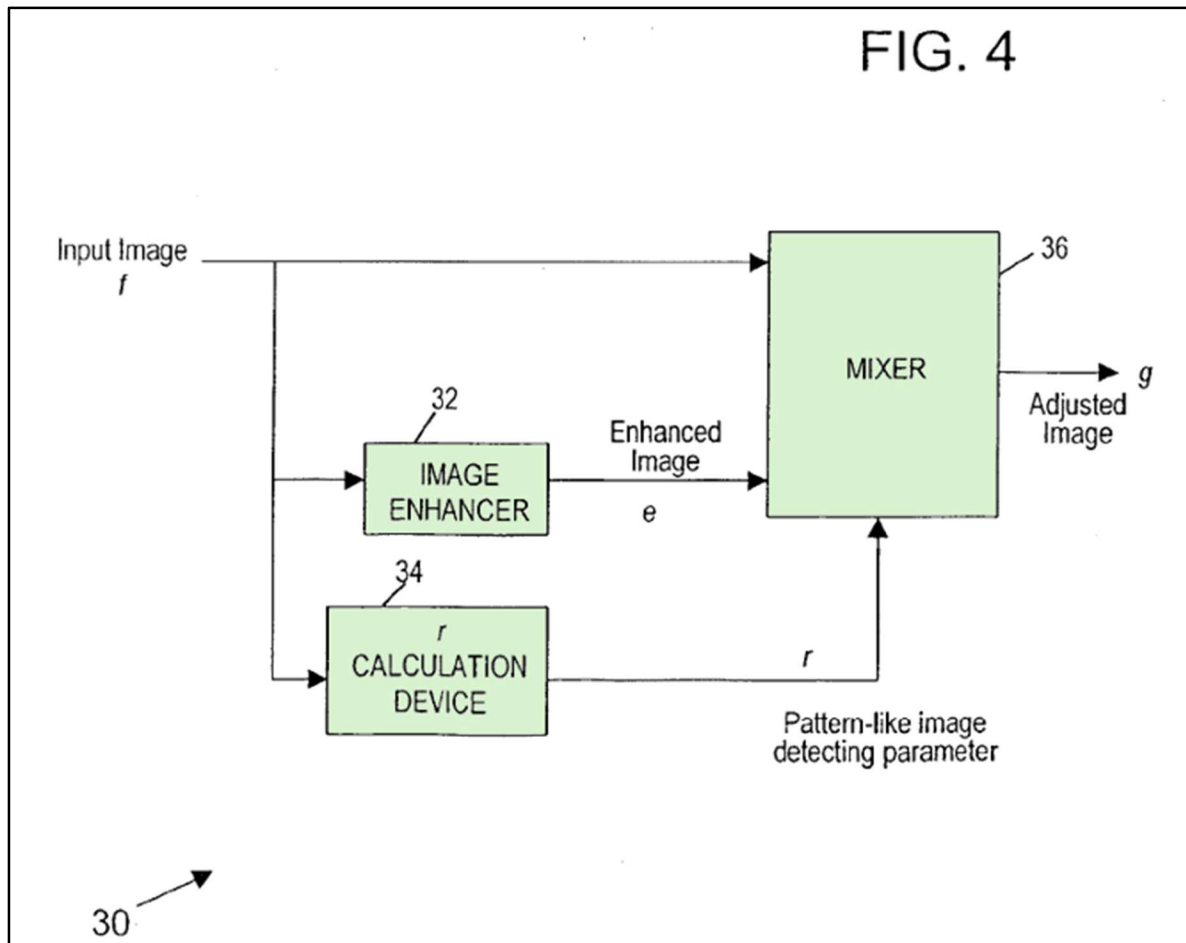
Kim discloses and renders obvious claim 1.

1. [1.pre] (“A video processing apparatus comprising:”)

Kim discloses this preamble. Kim discloses a “video enhancement system” that performs “video signal processing” (*a video processing apparatus*). EX1004, Abstract, ¶1. As described above, Kim’s Figure 4 shows such a system. *Id.*, ¶¶41-43. The “image f” in Figure 4 can be one frame of a video. *Id.*, ¶40 (“for the incoming video or image input, a histogram of one frame f of the picture”); EX1003, ¶63.

2. [1.a] (“an input unit to which a video signal containing contents is input;”)

Kim discloses this limitation. Kim discloses “image enhancement system” 30 (*an input unit*), annotated in green below in its Figure 4:



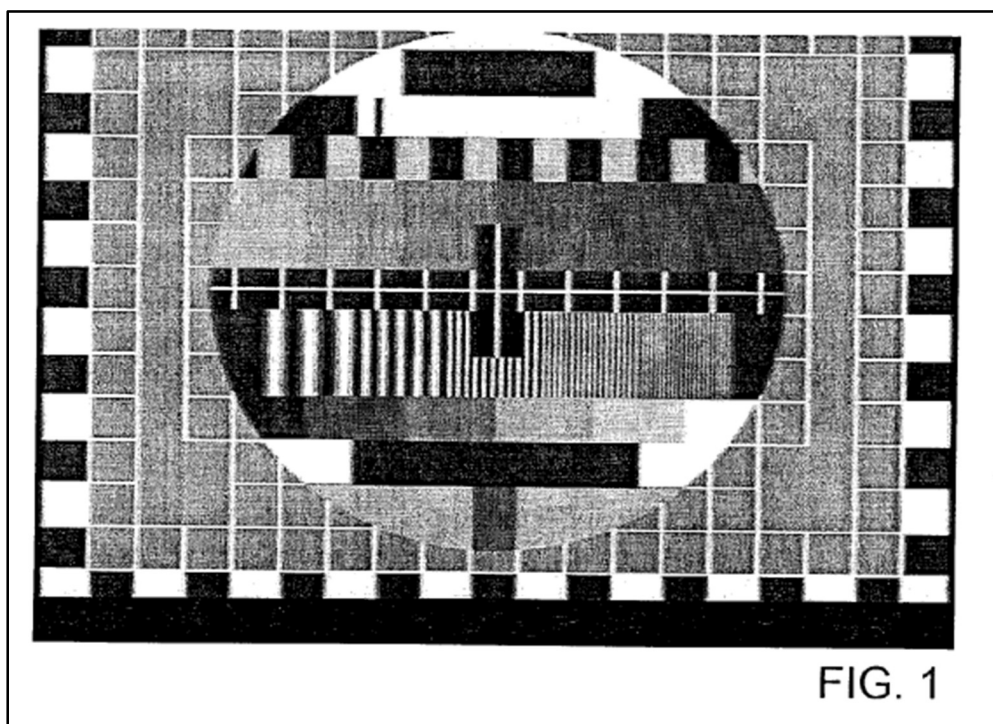
EX1004, ¶41. The system enhances an “incoming video” (*a video signal that is input*). *Id.*, ¶40; *see also id.*, ¶1 (“video signal processing,” “video signal,” “video enhancement”); § IV.A (construction of “video signal”). The system processes the “incoming video” one “frame” or “image” at a time. *Id.*, ¶40 (“one frame f ”), ¶42 (“image f ”), Fig. 4. The “incoming video” can *contain[] contents* such as “a normal image,” as opposed to a “pattern-like image.” *Id.*, ¶39, ¶1 (“normal images (not pattern-like images)”); EX1003, ¶64.

Alternately, each of image enhancer 32, calculation device 34, and mixer 36 individually also is an *input unit to which* the “incoming video” (*a video signal*)

containing contents) is *input* for the same reasons that system 30 is such an *input unit*. Figure 4 shows that the video is *input* into each module, one “image f” at a time. EX1003, ¶65.

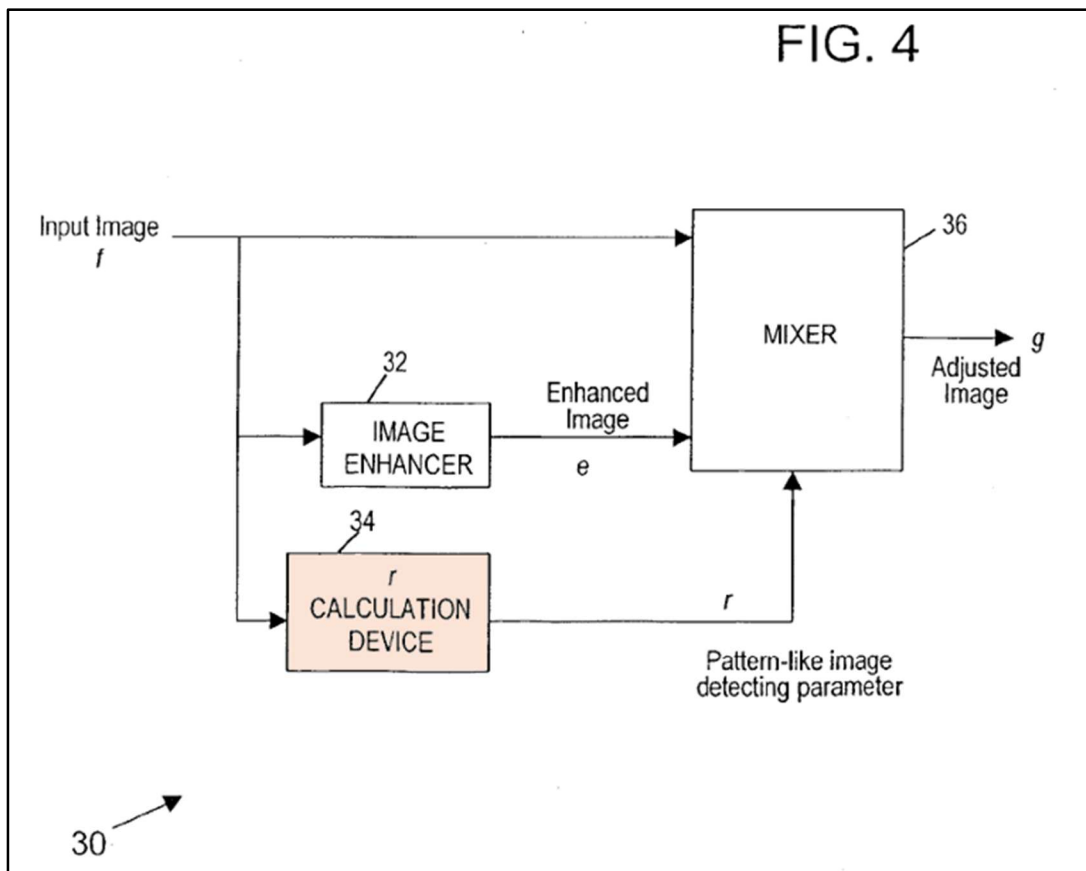
3. [1.b] (“a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;”)

Kim discloses this limitation. Kim discloses that an “incoming video” is a *video signal input to the input unit*. See limitation 1.a. An image f from the video can include a “pattern-like image,” such as the “pattern-like image” shown in Figure 1 (*pattern portions ... in the video signal*). EX1004, ¶39, ¶1.



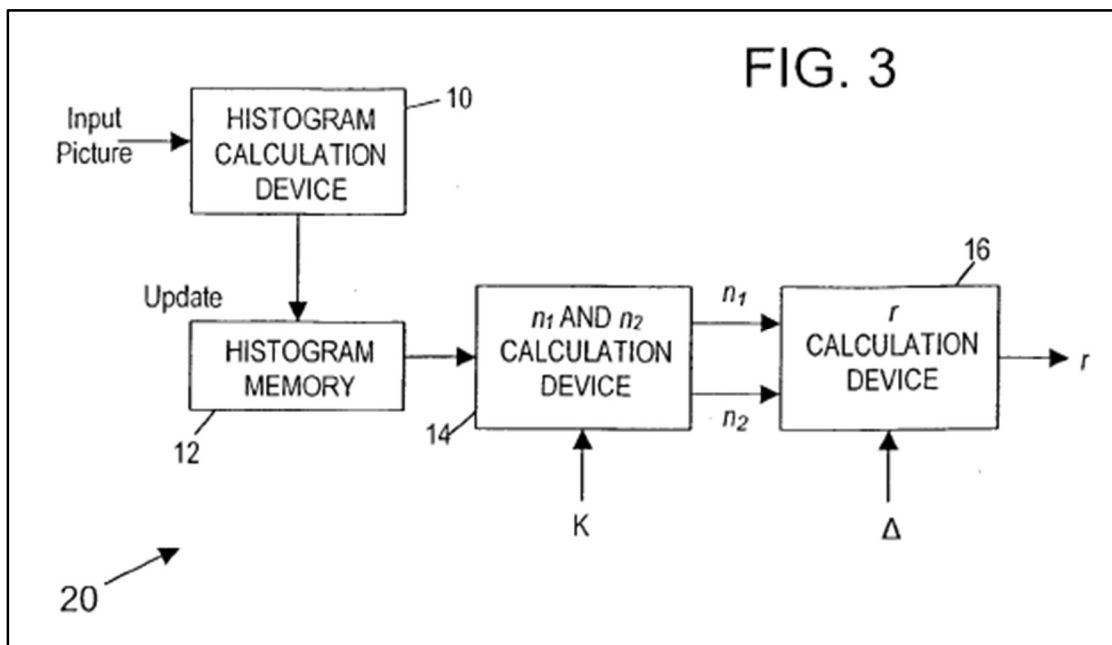
The pattern-like image is different than “a normal image,” and therefore is *pattern portions other than contents*. See limitation 1.a; EX1003, ¶66.

Kim also discloses “r calculation device 34” (*a detector*, annotated in orange below) that calculates r , “a pattern-like image detection parameter.” EX1004, ¶43, Fig. 4. The parameter r ranges from 0 to 1 and “one can conclude that the input image is most likely a pattern-like image as the value of the pattern-like image detection parameter r approaches 1.” *Id.*, ¶39. Thus, when r equals 1, the image from the incoming video is “a pattern-like image.” *Id.*, ¶43. In that case, “r calculation device 34” has detected that a pattern portion is included in image f , and therefore also is included in the incoming video (*whether pattern portions other than contents are contained in the video signal*). EX1003, ¶67.



Kim also discloses details of how r may be calculated, as shown below in

Figure 3.



First, histogram calculation device 10 determines the histogram of frame f , and the histogram is stored in memory. EX1004, ¶40. Calculation device 14 calculates n_1 and n_2 , which represent the number of samples in the histogram that are greater than constant K and less than or equal to K , respectively. *Id.*, ¶40, ¶35, ¶¶26-31. Calculation device 16 calculates r using equation 5 or a similar equation. *Id.*, ¶40, ¶37 (equation 5), ¶36 (similar equations). Thus, apparatus 20 of Figure 3 also is the *detector* of this limitation for the same reasons that “ r calculation device 34” of Figure 4 is. A POSITA also would have understood that “ r calculation device 34” of Figure 4 includes the functionality shown in Figure 3 because it calculates r . *Id.*, ¶43, Fig. 4; EX1003, ¶68.

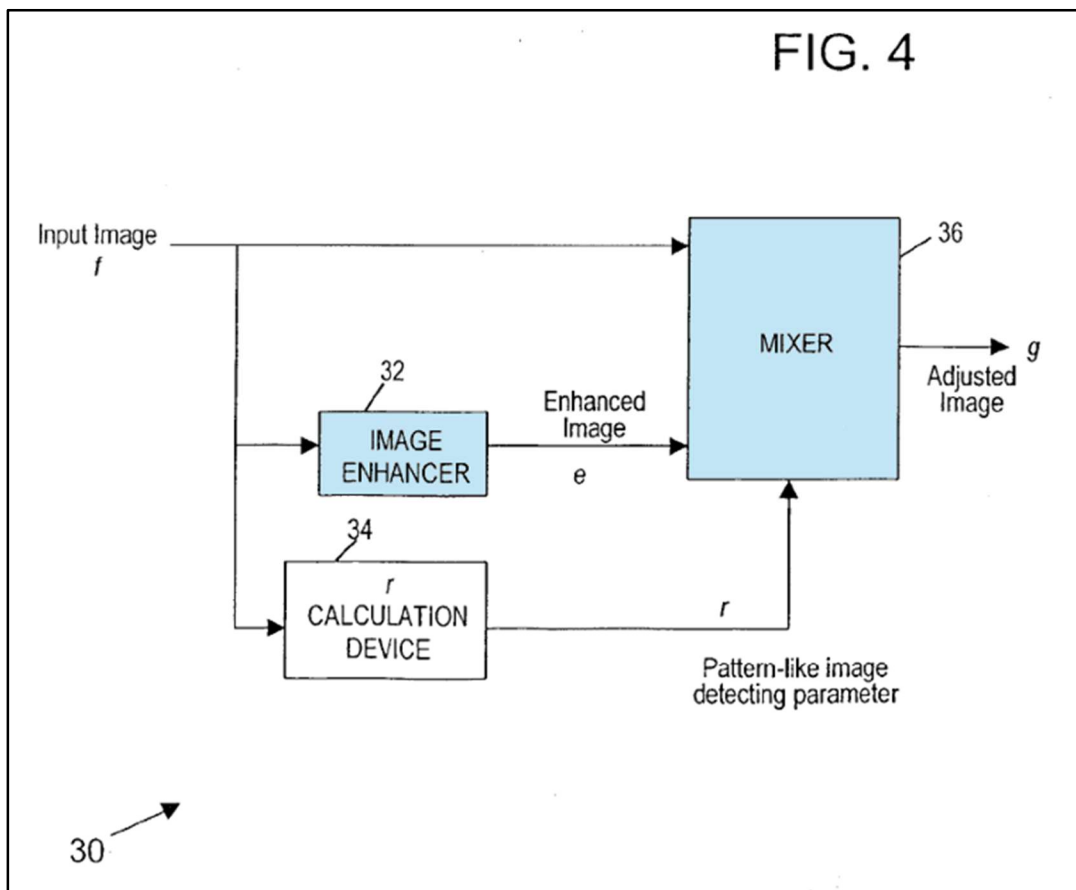
If PO argues that the recited *detector* must be separate from the *input unit* of limitation 1.a, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other. EX1003, ¶69.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a CPU and its equivalents, Kim discloses this structure for the reasons set forth below for limitation 1.c. Kim implicitly and inherently discloses that the functions of “r calculation device 34” of Figure 4 are performed in a CPU or equivalent, and it would have been obvious to a POSITA to implement them in a CPU or equivalent, for the reasons set forth for limitation 1.c. EX1003, ¶70.

4. [1.c] (“a corrector which corrects the video signal input to the input unit; and”)

Kim discloses this limitation. Kim discloses “image enhancer 32” that enhances image *f* using “any one of a number of known enhancement methods.” EX1004, ¶41, Fig. 4 (it outputs “Enhanced Image *e*”). Mixer 36 outputs an “adjusted image *g*” by “mix[ing] the input image *f* and the enhanced image *e* according to equation (6),” which is $g = r \cdot f + (1 - r) \cdot e$. *Id.*, ¶42, Fig. 4. In equation 6, if *r* equals 1, no enhancement is performed and the adjusted image *g* output by mixer 36 is the image *f*. *Id.*, ¶43. If *r* equals 0, the adjusted image *g* is the enhanced image *e*. *Id.* If *r* is between 0 and 1, the adjusted image *g* is a

proportional mix of image f and enhanced image e . *Id.* Image enhancer 32 and mixer 36 (annotated in blue below) collectively therefore are a *corrector* that *corrects* image f from the “incoming video” (*the video signal input to the input unit*). § IV.C (construction of “corrects the video signal”); EX1003, ¶71.



In addition, mixer 36 by itself also is a *corrector* that *corrects* image f from the “incoming video” (*the video signal*) because it receives image f from the video and outputs adjusted image g , which has a level of correction that is inversely proportional to r , as described above. EX1003, ¶72.

If PO argues that the recited *corrector* must be separate from the *input unit*

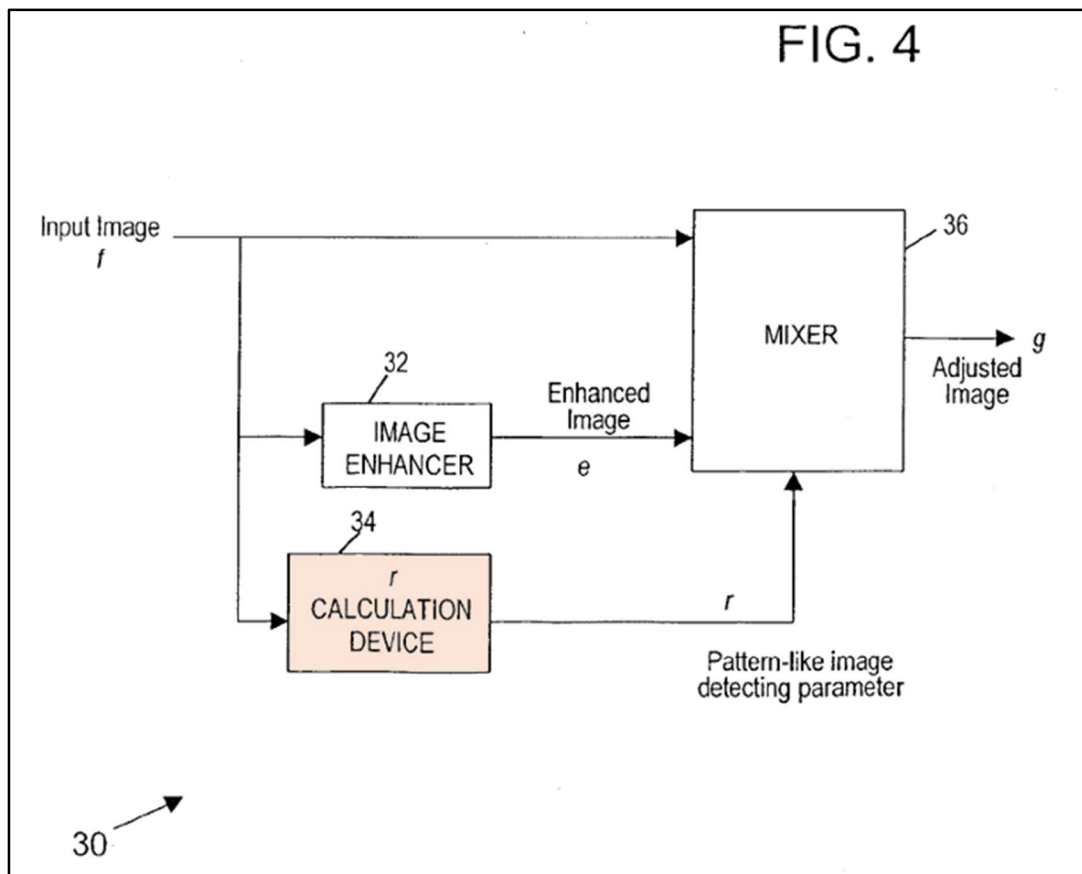
of limitation 1.a, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other. EX1003, ¶73.

If PO argues that this limitation is a means-plus-function limitation, Kim discloses PO's proposed corresponding structure from litigation ("CPU 7 or equivalents thereof"). § IV.B. Kim implicitly discloses that the functions of the "image enhancement system" of Figure 4, including the functions of image enhancer 32 and mixer 36, are performed in a CPU or equivalent. EX1004, ¶41. A POSITA would have understood that the disclosed functionality is performed by executing instructions in a CPU or equivalent, or performed by a hardware equivalent to such a CPU, because without such a component, there would be no apparatus to implement the disclosed functionality. Kim also inherently (necessarily) discloses such a CPU or equivalent for the same reasons. It also would have been obvious to a POSITA to implement the functionality of Figure 4 in a CPU or equivalent as a well-known way of implementing such functionality. Such a CPU would have been well-known to a POSITA. *E.g.*, EX1005 (Fujimura), 4:6-11 (image processing system can be implemented in a "general-purpose processor"). Motivation to do so arises from common sense and Fujimura, which discloses implementing any component of an image processing system in a "general-purpose processor." *See* Ground 2, limitation 1.c; EX1003, ¶74.

5. [1.d] (“a controller which controls the corrector to cause the corrector to correct the video signal input to the input unit when the pattern portions are not contained, and which controls the corrector to cause the corrector not to correct the video signal when the pattern portions are contained.”)

Kim discloses this limitation. As described for limitation 1.c, Kim discloses that mixer 36 corrects image *f* from the incoming video using input *r* and according to equation 6. *Id.*, ¶42. If *r* equals 0, image *f* is “a normal input image.” *Id.*, ¶43. In that case (*when the pattern portions are not contained*), equation 6 becomes $g=e$ and mixer 36 outputs adjusted image *g* that is enhanced image *e* (*the corrector correct[s] the video signal input when the pattern portions are not contained*). *Id.*, ¶¶42-43; §§ IV.C-E (constructions of this limitation). If *r* equals 1, image *f* is “a pattern-like image.” *Id.*, ¶43. In that case (*when the pattern portions are contained*), equation 6 becomes $g=f$ and mixer 36 outputs adjusted image *g* that is image *f* (*the corrector [does not] correct the video signal when the pattern portions are contained*). See also §§ IV.D-E; EX1003, ¶75.

Kim also discloses that “*r* calculation device 34” calculates *r*, which is input to mixer 36. EX1004, ¶43, Fig. 4 (annotated orange below). Calculation device 34 therefore is the recited *controller* that *controls* mixer 36 (at least part of *the corrector*) to correct or not correct image *f* from the incoming video, as described above.



This *controller* plus the portion of mixer 36 that applies equation 6 is the recited *controller* for the same reasons. EX1003, ¶76.

If PO argues that the recited *controller* must be separate from the *detector* of limitation 1.b, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other. It also would have been obvious to a POSITA to implement calculation device 34 as separate *detector* and *controller* modules, where the *detector* would calculate r and the *controller* would apply r via equation 6, as a mere design choice. Motivation to do so arises at least from a

desire to compartmentalize functionality in different modules for organizational purposes. EX1003, ¶77.

B. Claim 2

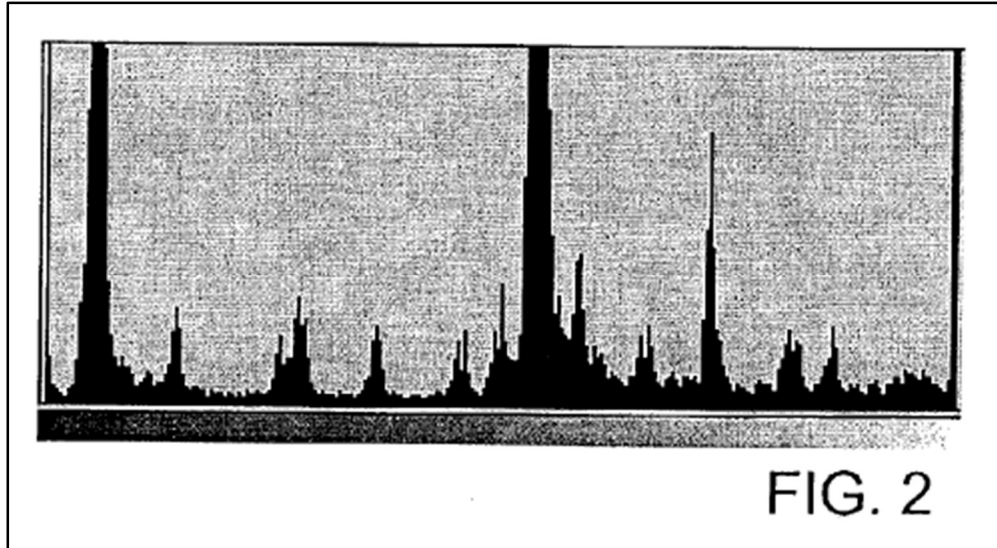
Kim discloses claim 2.

1. **[2.pre] (“The video processing apparatus according to claim 1, comprising:”)**.

Kim discloses this preamble. *See* claim 1. EX1003, ¶79.

2. **[2.a] (“a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal,”)**

Kim discloses this limitation. Kim discloses generating a histogram of the image f from the incoming video that indicates “the number of pixels [in the image] that have a specific gradation level x ... where x varies from 0 (black) to L (white),” where “ L equals 255 in a typical video system.” EX1004, ¶22. Kim’s Figure 2 shows an example of such a histogram that shows large values at certain gradation levels. *Id.*, ¶32.



In the histogram, the horizontal axis represents “gradation,” which ranges from 0 (black) to 255 (white), and the vertical axis represents the “number of pixels that have a specific gradation level x .” *Id.*, ¶22. A POSITA would have understood that this “gradation” that ranges from 0 (black) to 255 (white) is *luminance* because it represents the intensity of light for a given pixel. *Id.*, ¶22. The ’645 patent specification confirms this understanding of “luminance.” EX1001, 7:5-8 (luminance level ranges from 0 to 255), 7:52-58 (the luminance histogram shows whether an image is “simply [a] dark picture” or “a picture having a bright place such as a moon or star in a dark picture”). EX1003, ¶80.

Kim discloses that “histogram calculation device 10” determines such a histogram for each frame f of the incoming video, and module 10 therefore is a *characteristic point detector that detects a level and a distribution of luminance of the video signal*. EX1004, ¶40, Fig. 3; § IV.F (construction of “characteristic point

detector”); EX1003, ¶81.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a picture quality enhancement circuit and its equivalents (EX1001, Figs. 1-2, 5:23-24), Kim discloses this structure for the reasons set forth above for limitation 1.c. Kim implicitly and inherently discloses that the functions of calculation device 34 are performed in a processor, circuit, or equivalent that performs picture quality enhancement, and it would have been obvious to a POSITA to implement them in such a processor, circuit, or equivalent, for the reasons set forth for limitation 1.c. EX1003, ¶82.

3. [2.b] (“wherein the corrector corrects the video signal according to the level or distribution detected by the characteristic point detector.”)

Kim discloses this limitation. As described for limitation 2.a, Kim discloses a luminance histogram (a *level* and *distribution detected by the characteristic point detector*). As described for limitations 1.c and 1.d, mixer 36 corrects image *f* of the incoming video based in part on parameter *r*. EX1004, ¶¶42-43, Fig. 4. Parameter *r* is calculated from the luminance histogram using equations (1) through (5). *Id.*, ¶¶22-35, ¶¶37-38, ¶40, Fig. 3. Mixer 36 (a *corrector*) therefore *corrects the video signal according to* the luminance histogram. Mixer 36 combined with image enhancer 32 (collectively, also a *corrector*) *corrects the video signal according to* the luminance histogram for the same reasons. EX1003,

¶84.

C. Claim 3

Kim discloses claim 3.

1. **[3.pre] (“A video processing apparatus comprising:”)**

Kim discloses this preamble. *See* claim 1, preamble. EX1003, ¶86.

2. **[3.a] (“an input unit to which a video signal containing contents is input;”)**

Kim discloses this limitation. *See* limitation 1.a. EX1003, ¶87.

3. **[3.b] (“a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;”)**

Kim discloses this limitation. *See* limitation 1.b. EX1003, ¶88.

4. **[3.c] (“a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal input to the input unit;”)**

Kim discloses this limitation. *See* limitation 2.a. EX1003, ¶89.

5. **[3.d] (“a corrector which changes correction characteristics according to a result of detection output from the characteristic point detector, and corrects the video signal input to the input unit; and”)**

Kim discloses this limitation. *See* limitation 1.c (a *corrector* that *corrects the video signal input to the input unit*). As described for claim 2, “histogram calculation device 10” (*characteristic point detector*) detects luminance levels and distributions and outputs a luminance histogram (*detection output*), from which the system calculates parameter *r* (*a result of detection output*). As described for

limitations 1.c and 1.d, mixer 36 (at least part of the *corrector*) corrects image f according to parameter r (*changes correction characteristics according to a result of detection output*). EX1004, ¶¶42-43, Fig. 4. Specifically, the extent to which mixer 36 will apply the pixels of enhanced image e to the pixels of image f to obtain adjusted image g (*the correction characteristics*) will *change* proportionately with the value of r (*a result of detection output*). *Id.*, ¶42 (equation 6); *see also* §§ IV.B, G-H (constructions of this limitation). EX1003, ¶90.

6. [3.e] (“a controller which controls the corrector to cause the corrector not to change the correction characteristics in the corrector when the pattern portions are contained.”).

Kim discloses this limitation. As described for limitation 1.d, calculation device 34 is a *controller* that *controls* mixer 36 (at least part of *the corrector*) to not correct the image f *when the pattern portions are contained*. Specifically, when r (provided by *the controller*) equals 1 (*the pattern portions are contained*), the extent to which mixer 36 applies the pixels of enhanced image e to the pixels of image f to obtain adjusted image g (*the correction characteristics*) always is zero, *i.e.*, does *not change*. EX1004, ¶42 (in equation 6, “(1-r)” becomes zero when r equals 1); § IV.I (this limitation includes such a use case); §§ IV.D-E (additional constructions of this limitation). EX1003, ¶91.

* * *

If PO argues the portions of Kim cited above relate to different,

incompatible embodiments (which they do not), it would have been obvious to a POSITA to combine such embodiments into a single system at least because such embodiments are described in the same prior art reference, are fully compatible with each other, and could be combined with minimal effort to achieve predictable results. EX1003, ¶92.

If PO argues that Kim does not disclose any limitation of the challenged claims, such limitation would have nonetheless been obvious to a POSITA in light of Kim. Practicing any limitation of the challenged claims in light of Kim would have been within the knowledge and skill of a POSITA, would have required minimal effort, would have yielded predictable results, would have been fully compatible with Kim, and would have been a mere design choice. Motivation to do so arises from at least common sense and the disclosures of Kim set forth above. EX1003, ¶93.

VII. GROUND 2: CLAIMS 1-4 ARE OBVIOUS IN LIGHT OF FUJIMURA.

A. Claim 1

Fujimura discloses claim 1.

1. [1.pre] (“A video processing apparatus comprising:”)

Fujimura discloses this preamble. Fujimura discloses a “video contrast enhancer” (*video processing apparatus*) that “processes a video signal representing a moving picture made up of a sequence of images.” EX1005, Abstract, 2:12-13.

The contrast enhancer includes a luminance contrast enhancer 2 and chrominance contrast enhancer 4, as shown in Figure 17. *Id.*, 13:34-41.

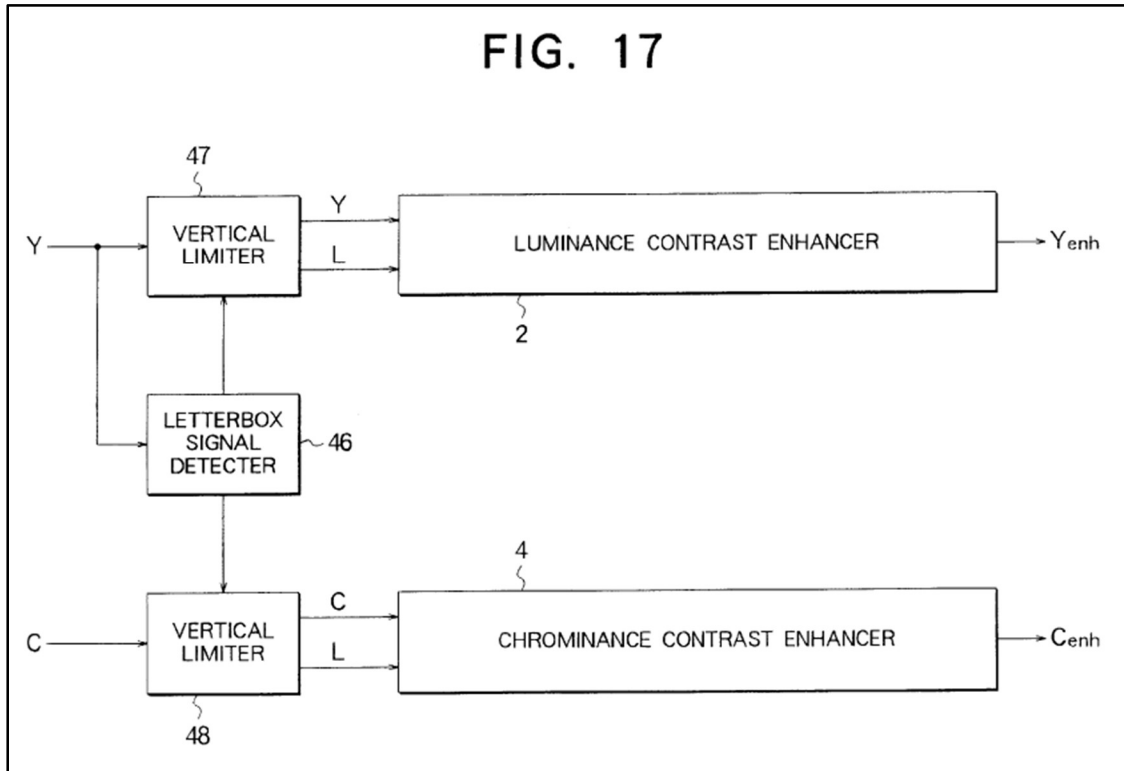


Figure 8 shows details of enhancers 2 and 4 in the second embodiment. *Id.*, 13:30-41, 8:56-60, 3:63-4:5.

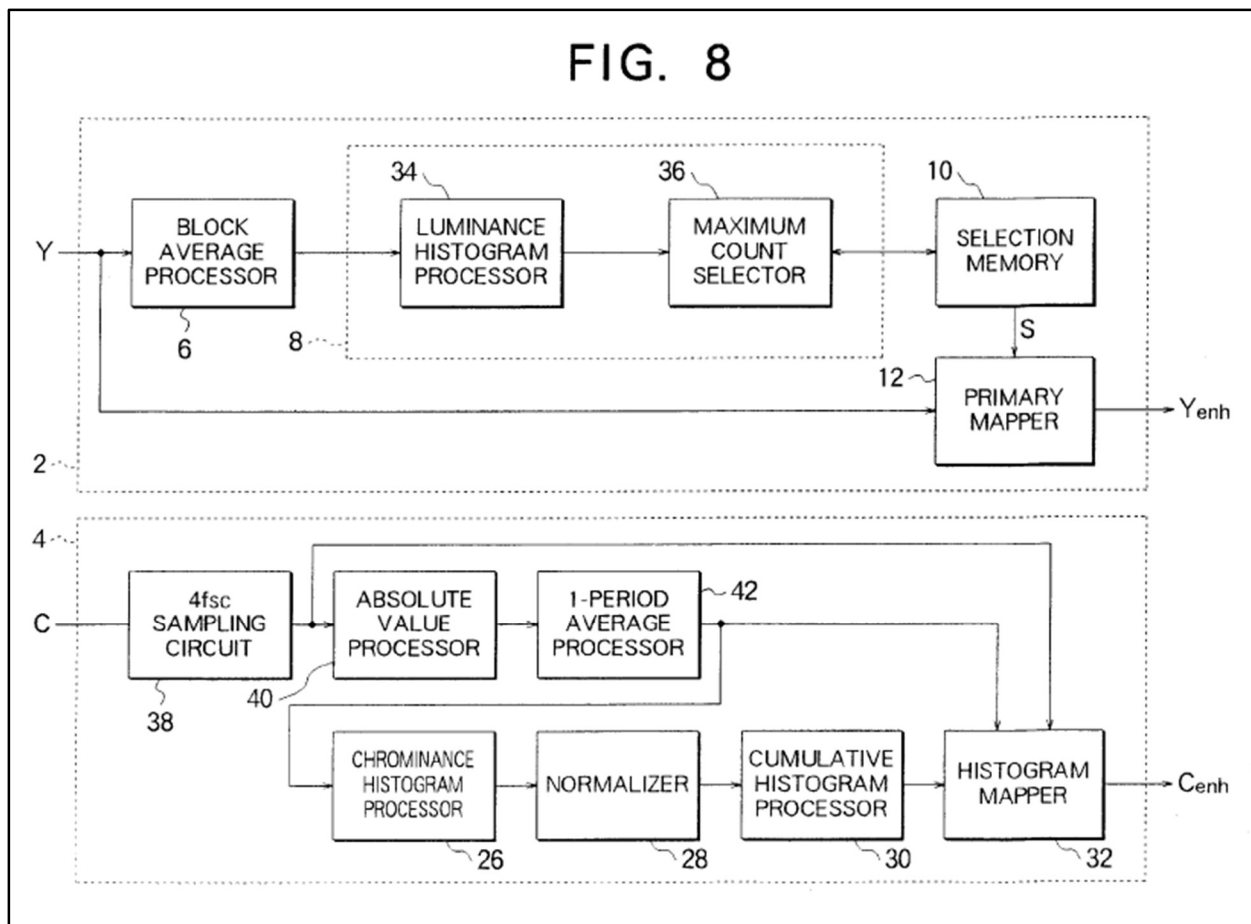
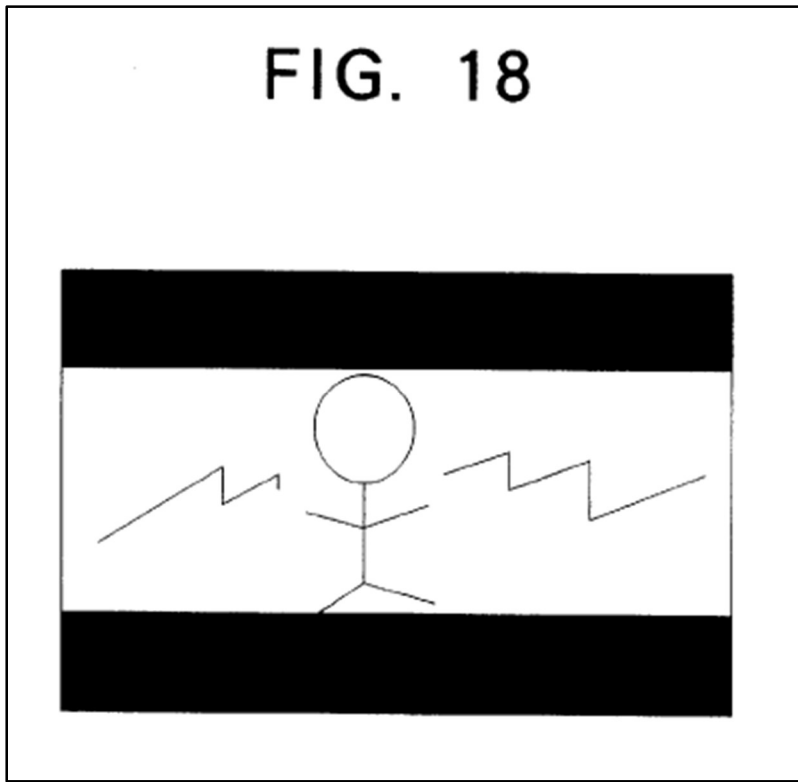


Figure 1 likewise shows details of enhancers 2 and 4 in the first embodiment. *Id.*, 3:63-64. Petitioner’s citations to the luminance enhancer 2 and its primary mapper 12 of Figure 8 apply equally to the same components of Figure 1. *Id.*, 8:56-60; EX1003, ¶96.

2. [1.a] (“an input unit to which a video signal containing contents is input”)

Fujimura discloses this limitation. Fujimura discloses video that contains a “series of frames or fields,” each of which is an “image.” EX1005, Abstract, 3:55-61. Figure 18 shows an example frame with a picture area and black bands above

and below the picture area. *Id.*, 13:42-49.



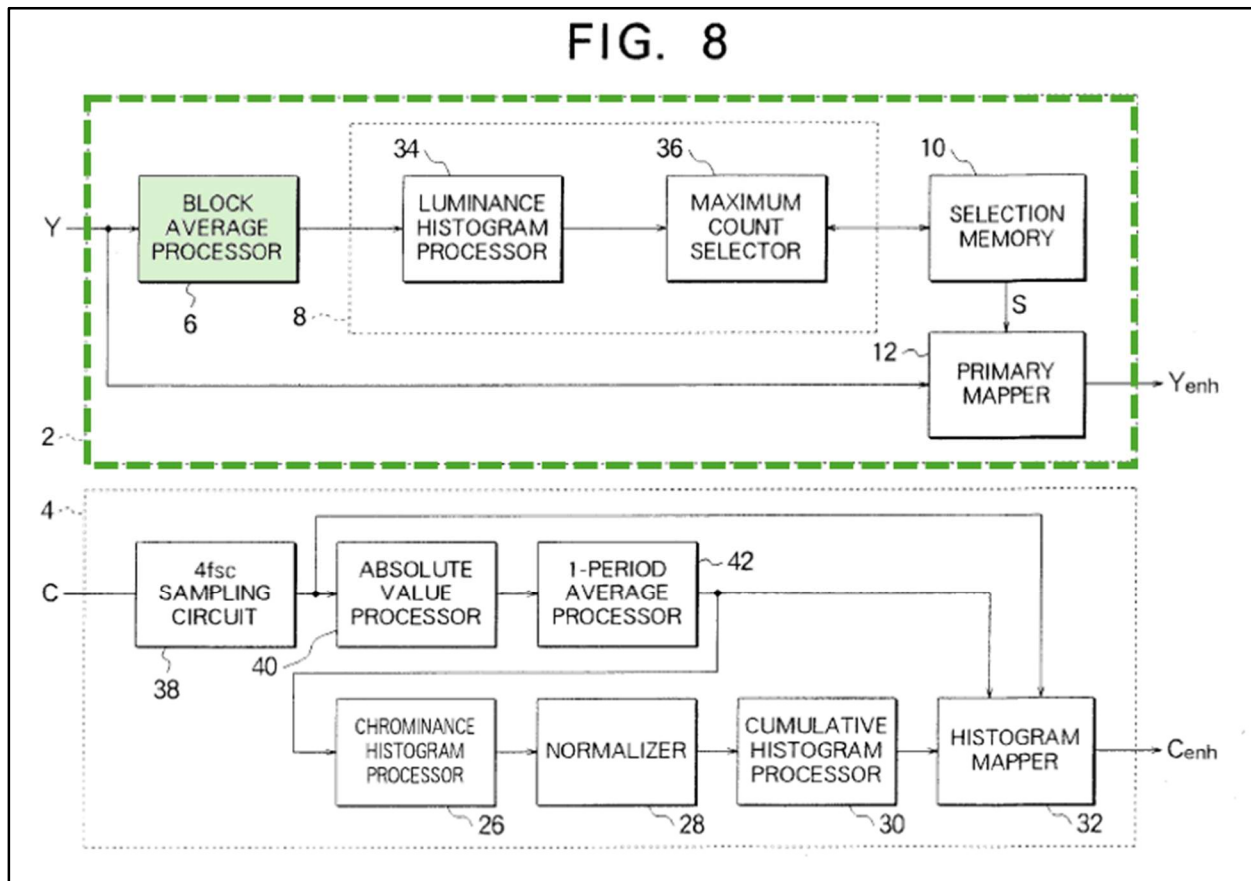
Each frame or image is made up of “horizontal scanning lines,” each of which is a row of pixels (a *video signal*). *Id.*, 13:53-58, 14:12-45 (analyzing pixels in each scanning line). A scanning line is a *video signal* because it contains video data and is part of a video input. *Id.*; § IV.A (construction of “video signal”). It also makes sense for a scanning line in Fujimura to be a *video signal* because Fujimura treats a scanning line as a logical unit of video. EX1005, 13:53-58 (outputting the line numbers of the scanning lines at the top and bottom of the picture area), 14:12-17 (counting the number of bright pixels in a scanning line), 14:27-29 (counting the number of dark pixels in a scanning line). A scanning line may *contain* part of a “picture area” (*contents*). *Id.*, Abstract, 2:49-52, 13:42-49, 14:19-22 (the “starting

line of the picture area”), Fig. 18; EX1003, ¶97.

Fujimura also discloses that video data can be “separated into luminance and chrominance components,” namely, “luminance signal Y” and “chrominance signal C.” EX1005, 4:16-18, 7:38-40. Luminance refers to a pixel’s brightness or darkness, and chrominance refers to color saturation and hue. *Id.*, 14:8-12, 7:38-42. The module that separates the video data into its components is an *input unit to which* a composite scanning line (*video signal*) is *input*. Fujimura implicitly discloses such a separator module, and a POSITA would have understood that such a module is necessary (inherent) in Fujimura in order to separate the composite video data into its component parts, as disclosed. Such a module may be part of a “digital signal processor,” which therefore also is an *input unit to which* the composite scanning line (*video signal*) is *input*. EX1005, 4:6-11; EX1003, ¶98.

Luminance signal Y indicates “the luminance levels of individual pixels in a sequence of video images constituting a moving picture.” EX1005, 4:13-16. A scanning line in luminance signal Y therefore also is a *video signal*. A scanning line in luminance signal Y also contains *contents* that are the luminance levels for the pixels in a scanning line of the “picture area” described above. *Id.* A scanning line of luminance signal Y is input into “block average processor 6” (*an input unit to which this video signal is input*), colored green below. *Id.*, 4:13-16, 8:56-65, Fig. 8. A scanning line of luminance signal Y also is input into luminance contrast

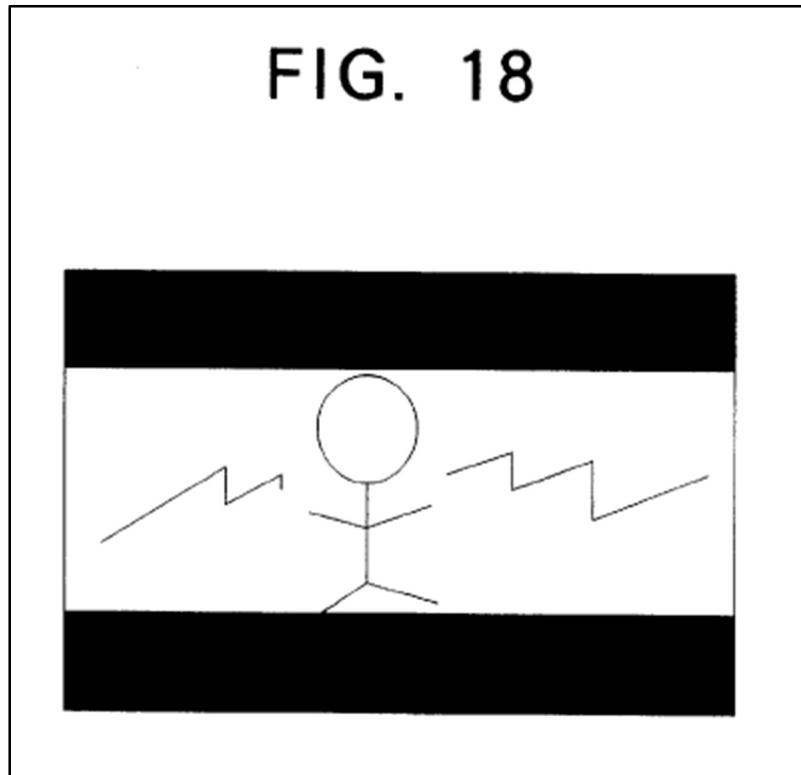
enhancer 2 (also *an input unit to which this video signal is input*), outlined in green below. *Id.*, 4:11-16, 8:56-65, Fig. 8. These modules may be implemented in a “digital signal processor,” which also is *an input unit to which this video signal is input* for the same reasons. *Id.*, 4:6-11; EX1003, ¶99.



3. [1.b] (“a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;”)

Fujimura discloses this limitation. As described for limitation 1.a, Fujimura discloses scanning lines of a composite video signal and of a luminance signal Y (each scanning line a *video signal input to an input unit*). Fujimura also discloses

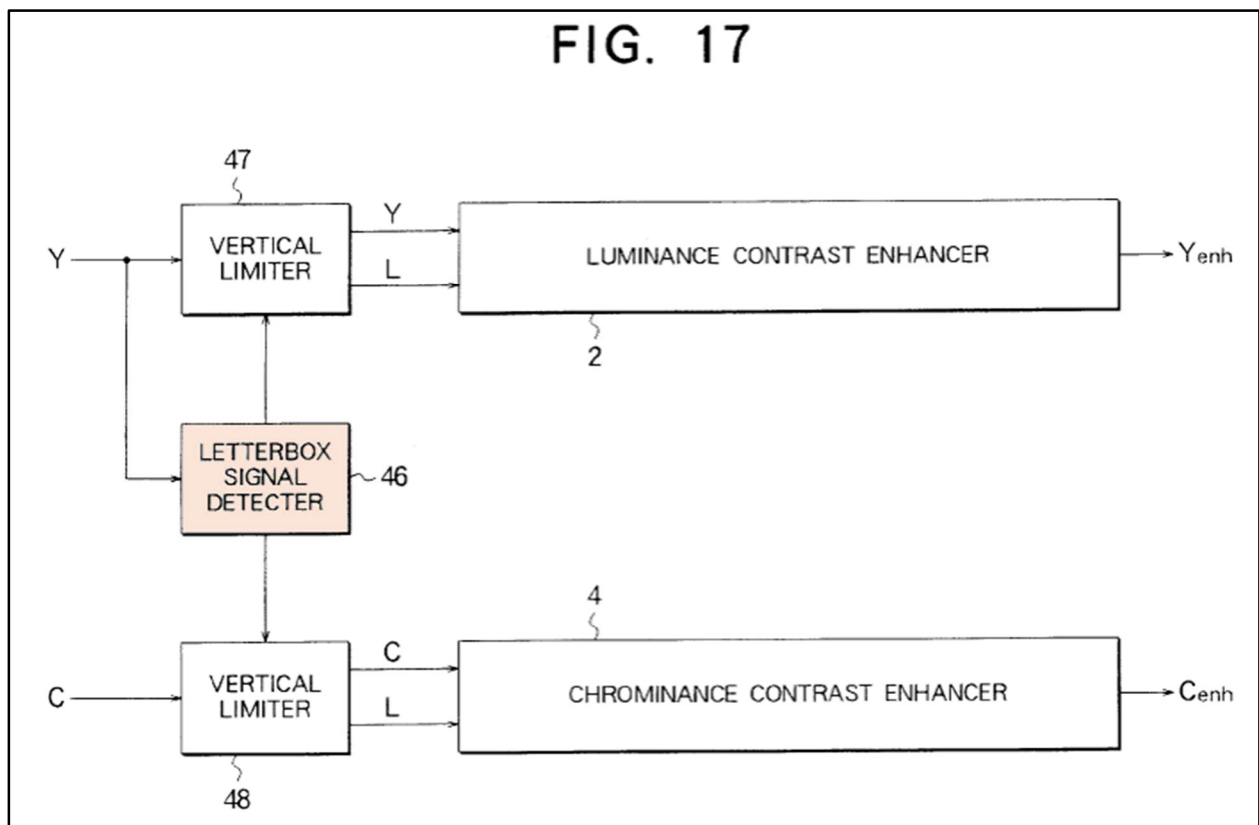
that a video image may contain “black non-picture bands above and below” the “picture area.” EX1005, 13:42-49, 1:51-55 (“the video signal has non-picture bands at the top and bottom”), 2:5-8 (same). Figure 18 shows an example image with such “letterbox” bands. *Id.*, 13:42-49.



Because these black bands are “non-picture” bands and are “above and below” the “picture area” (*contents*) they are *pattern portions other than contents*. A scanning line (*video signal*) that includes part of such a blank band therefore *contain[s]* a *pattern portion other than contents*. EX1003, ¶100.

Letterbox signal detector 46 (*a detector*), annotated in orange below, “determines whether the luminance signal Y is a letterbox signal,” which a POSITA would have understood means that it determines whether the image is in

letterbox format. EX1005, 13:50-58, 15:5-12, Fig. 17. If the signal is a letterbox signal, for each image, letterbox signal detector 46 “outputs a pair of line numbers specifying the starting and ending lines of the picture area in the image.” *Id.*, 14:46-50, 13:53-58, Fig. 19. Any scanning line (*video signal*) before or after the picture area contains part of the black band and therefore *contain[s] a pattern portion other than contents*. *Id.*, Fig. 18. Letterbox signal detector 46 therefore *detects whether pattern portions other than contents are contained in the video signal*. EX1003, ¶101.



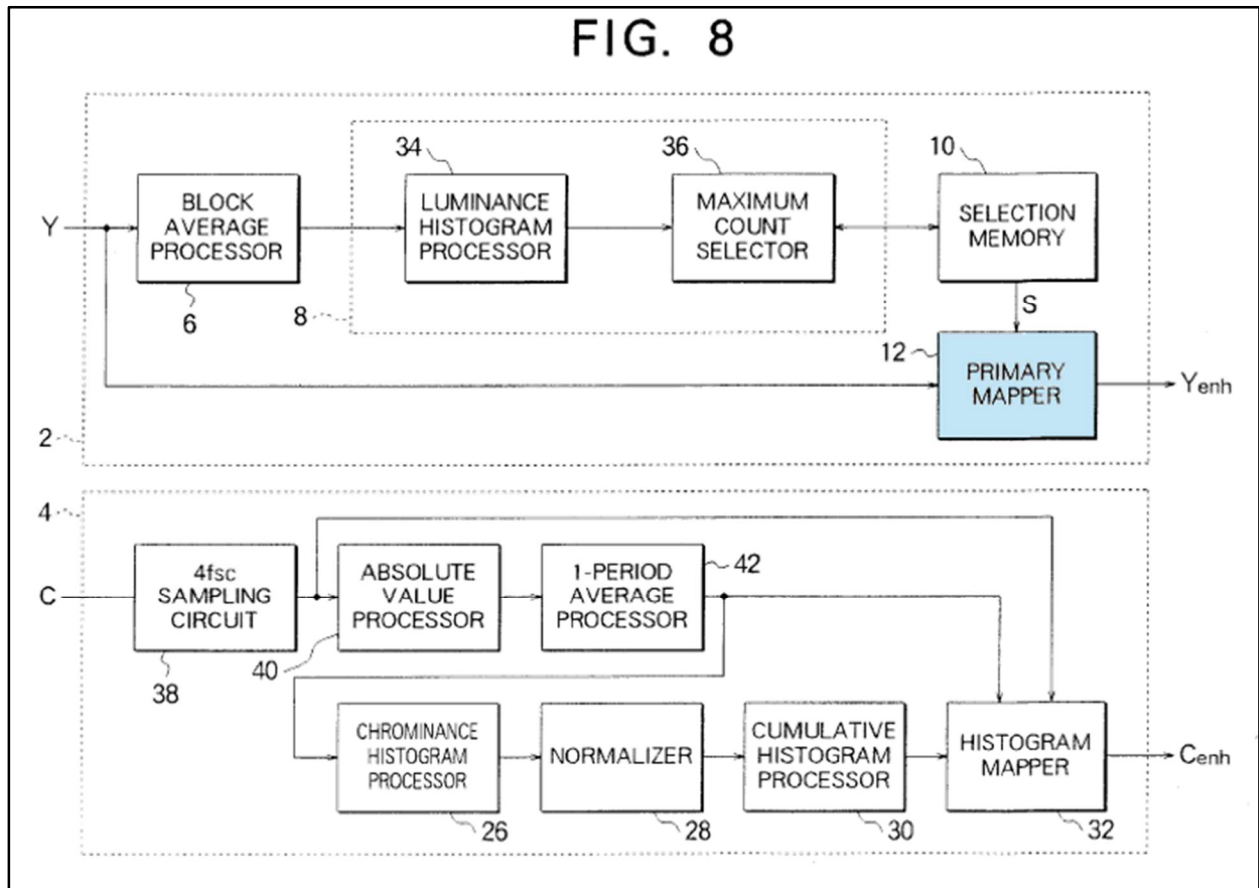
Fujimura also discloses this limitation in an additional way. Fujimura discloses that letterbox signal detector 46 determines whether each scanning line’s

number of “bright pixels” or “dark pixels” is above a certain bright-pixel threshold or dark-pixel threshold. EX1005, 14:13-36. Because each pixel is classified as either bright or dark (*id.*, 14:7-12), Fujimura effectively determines whether each scanning line has dark pixels beyond a threshold. Scanning lines with a sufficient number of dark pixels are classified as part of either the upper or lower non-picture black bands. *Id.*, 14:13-36. Letterbox signal detector 46 (a *detector*) therefore also determines whether a scanning line (*video signal*) includes a sufficient number of dark pixels (*a pattern portion*) rather than bright pixels (*other than content*). EX1003, ¶102.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a CPU and its equivalents, Fujimura discloses such a structure. Fujimura discloses that any circuits of luminance contrast enhancer may be implemented in “a general-purpose processor such as a digital signal processor” (a CPU or its equivalent), and it would have been obvious to a POSITA to also implement letterbox signal detector 46 in such a processor. EX1005, 3:63-4:11. Motivation to do so arises from the fact that the detector 46 would have to be implemented using at least some hardware, and from Fujimura’s disclosure above of implementing effectively any circuit of its system in a processor. EX1003, ¶103.

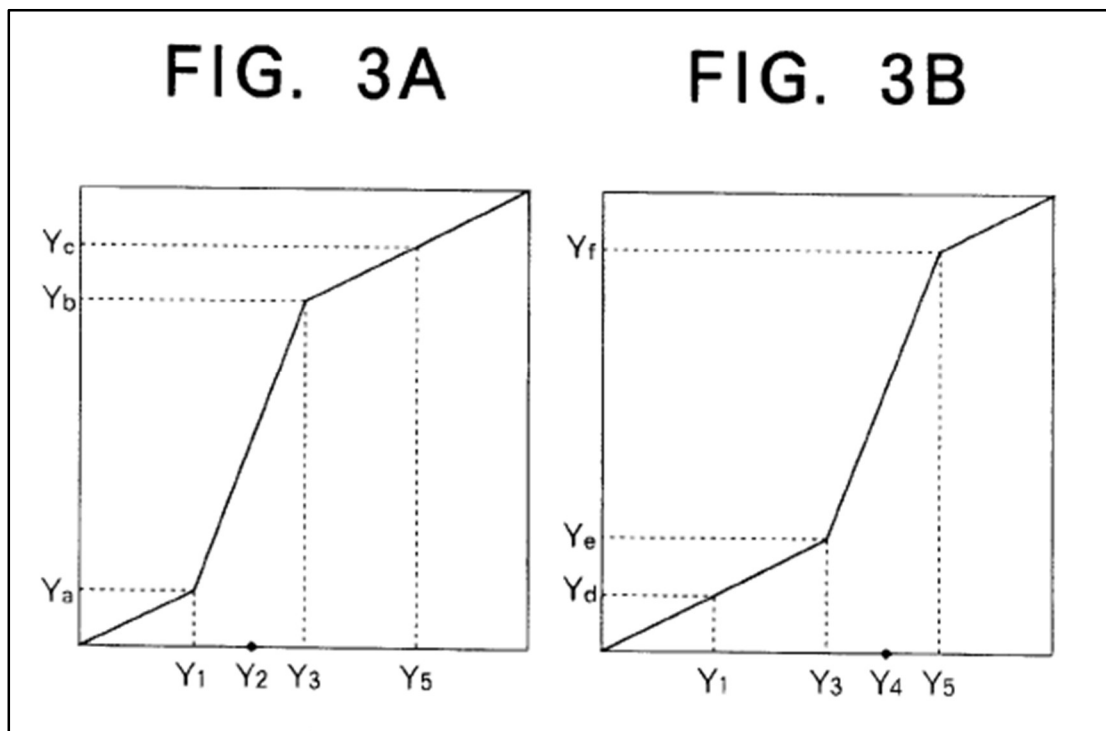
4. [1.c] (“a corrector which corrects the video signal input to the input unit; and”)

Fujimura discloses this limitation. Fujimura discloses that “luminance contrast enhancer 2” includes a “primary mapper 12” (*a corrector*), annotated in blue below. EX1005, 3:65-4:2, 8:56-65, Fig. 8, Fig. 1.



Primary mapper 12 uses a “mapping function” to enhance (*correct*) the luminance levels of the video pixels. *Id.*, 2:30-32 (“The primary mapper maps the luminance levels of the video signal according to the selected mapping function.”), 9:56-60 (in Figure 8, “[t]he primary mapper 12 maps all pixels according to the single mapping function”). Each mapping function “enhanc[es] contrast.” *Id.*, 6:23-

28, 4:41-49 (the “mapping functions ... enhance contrast in different, but overlapping, luminance ranges”), 9:30-35 (“the mapping function ... enhances contrast in [a] luminance range”). For example, Figures 3A-B show two examples of the type of mapping functions used in mapper 12. *Id.*, 6:19-21, 6:29-32.



In each figure, “the horizontal axis represents the input luminance value, and the vertical axis represents the output value.” *Id.*, 6:21-23. Thus, primary mapper 12 *corrects the* luminance of the pixels of the scanning lines (*video signals*). § IV.C (construction of “corrects the video signal”); EX1003, ¶104.

Luminance contrast enhancer 2 (also a *corrector*) contains primary mapper 12 and therefore *corrects the video signals* for the same reasons. EX1005, 3:65-4:2, 8:56-65, Fig. 8, Fig. 1; EX1003, ¶105.

If PO argues that the recited *corrector* must be separate from the *input unit* of limitation 1.a, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other. Moreover, the implicit separator module (an *input unit*) described for limitation 1.a that extracts luminance signal Y is separate from luminance contrast enhancer 2 and primary mapper 12 (each a *corrector*) because those components receive Y as an input. EX1003, ¶106.

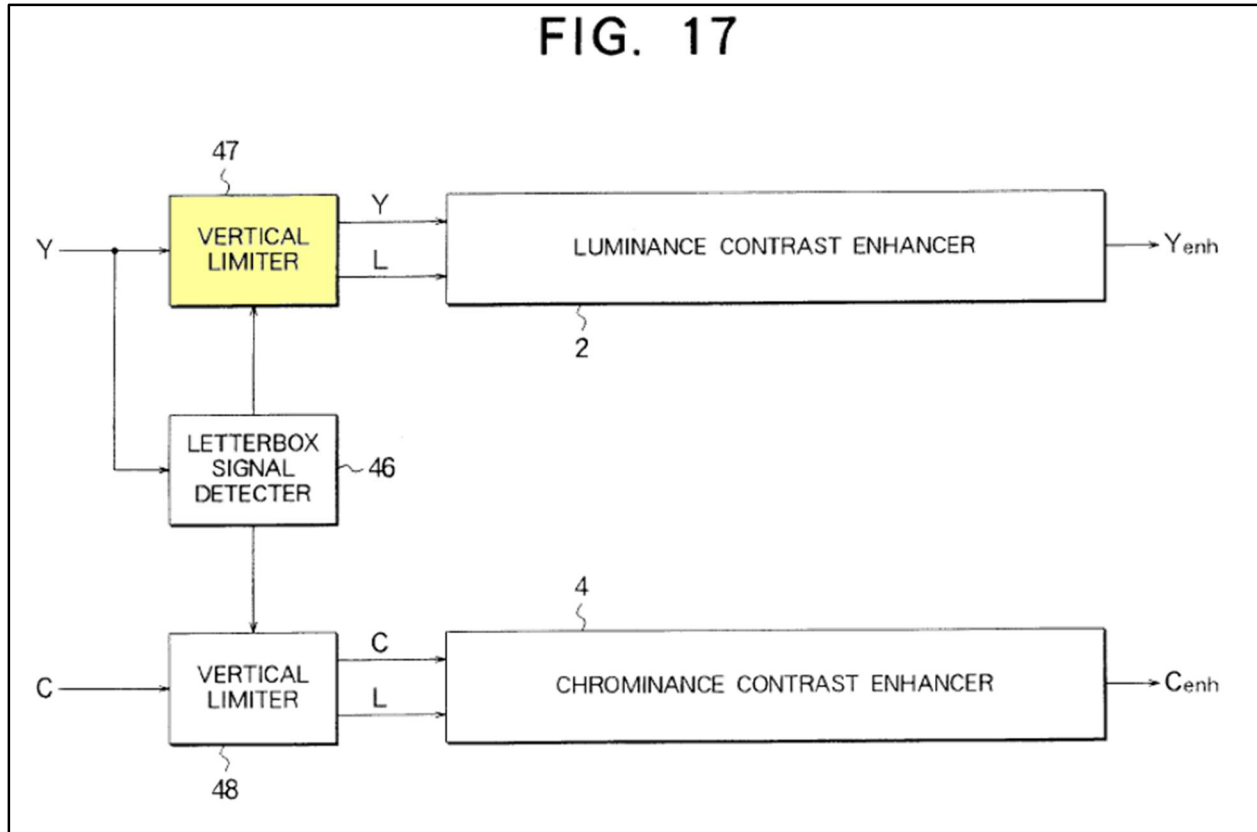
If PO argues that this limitation is a means-plus-function limitation, Fujimura discloses PO's proposed corresponding structure from litigation ("CPU 7 or equivalents thereof"). § IV.B. Fujimura discloses that primary mapper 12 and luminance contrast enhancer 2 (each a *corrector*) may be implemented in "a general-purpose processor such as a digital signal processor." EX1005, 3:63-4:11; EX1003, ¶107.

5. **[1.d] ("a controller which controls the corrector to cause the corrector to correct the video signal input to the input unit when the pattern portions are not contained, and which controls the corrector to cause the corrector not to correct the video signal when the pattern portions are contained.")**

Fujimura discloses this limitation. As described for limitation 1.b, letterbox signal detector 46 determines whether a scanning line (*video signal*) contains part of black non-picture bands (*pattern portions*) by determining the starting and ending line of the picture area. EX1005, 13:50-58. Letterbox signal detector 46

provides the result of this determination to vertical limiter 47. *Id.*, 13:52-60, Fig. 17; EX1003, ¶108.

Vertical limiter 47, annotated yellow below, converts this information to “letter box control signal L,” which it provides to luminance contrast enhancer 2. EX1005, 13:60-63, 14:46-56, Fig. 17. When the image includes black non-picture bands, letterbox control signal L “restrict[s] the luminance and chrominance contrast enhancement processing described in the first three embodiments to the picture area between the non-picture bands.” *Id.*, 13:64-14:1, Abstract (“[f]or video signals with non-picture bands, these enhancements are preferably restricted to the picture area”), 2:49-52 (“contrast enhancement processing can be limited to the picture area”); EX1003, ¶109.



Specifically, the “contrast enhancement operations described in the first three embodiments are restricted to the area between the starting and ending lines of the picture area, including the starting line but not the ending line.” EX1005, 14:50-59. The “starting line” of this passage is the line “where the picture area starts.” *Id.*, 14:12-24. The “ending line” of this passage is the first line of the bottom black band. *Id.*, 14:25-36 (“The first line in which the dark-pixel count exceeds the third threshold is regarded as the end of the picture area, i.e. the first line of the lower non-picture band.”). The luminance contrast enhancer therefore enhances each scanning line of the picture area, but not the scanning lines of the black non-picture bands. EX1003, ¶110.

Thus, vertical limiter 47 is a *controller* that *controls* luminance contrast enhancer 2 (a *corrector* of limitation 1.c) and its primary mapper 12 (an additional *corrector* of limitation 1.c) by limiting their luminance contrast enhancement to the scanning lines of the picture area. Specifically, vertical limiter 47 causes the *correctors* to enhance (*correct*) the luminance of the pixels of a scanning line (*video signal*) when the scanning line does not contain *pattern portions* (*i.e.*, the scanning line is part of the picture area) and *not to* enhance (*correct*) the luminance of the pixels of a scanning line (*video signal*) when the scanning line contains *pattern portions* (*i.e.*, the scanning line is part of the black non-picture bands). See also §§ IV.C-E (constructions of this limitation); EX1003, ¶111.

B. Claim 2

Fujimura discloses claim 2.

1. [2.pre] (“**The video processing apparatus according to claim 1, comprising:**”).

Fujimura discloses this preamble. See claim 1. EX1003, ¶113.

2. [2.a] (“**a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal,**”)

Fujimura discloses this limitation. As described for limitation 1.b, Fujimura discloses “letterbox signal detector 46.” EX1005, 13:50-58, Fig. 17. Letterbox signal detector 46 “determines whether the luminance signal Y is a letterbox signal.” *Id.*, 13:50-58, Fig. 18 (letterbox format). To do so, its comparator 50

classifies each pixel in a scanning line (*video signal*) as “bright” or “dark” depending on the pixel’s “luminance level.” *Id.*, 14:7-12, Fig. 19 (example internal structure of the letterbox signal detector). Doing so *detects a level of luminance* for each pixel in a scanning line (*video signal*) and therefore *detects a level of luminance* of the scanning line (*video signal*). Detector 46 also includes “bright-pixel counter 52,” which “counts the number of bright pixels in each horizontal scanning line.” *Id.*, 14:13-17. Counting the number of bright pixels in a scanning line (*video signal*) also *detects a level of luminance* of the scanning line (*video signal*) because a greater count indicates a scanning line with higher level of luminance. Detector 46 also includes “dark-pixel counter 56,” which, upon activation, “count[s] the number of dark pixels in each horizontal scanning line” (*video signal*). *Id.*, 14:25-29. Counting the number of dark pixels in a scanning line (*video signal*) also *detects a level of luminance* of the scanning line (*video signal*) because a greater count indicates a scanning line with a lower level of luminance. Counting the number of bright pixels or dark pixels in a scanning line (*video signal*) also *detects a distribution of luminance* in the scanning line (*video signal*) because it determines how many bright or dark pixels are distributed in the scanning line. Thus, letterbox signal detector 46 is a *characteristic point detector* that *detects a level and distribution of luminance of the video signal*. See also § IV.F (construction of “characteristic point detector”); EX1003, ¶114.

If PO argues that the recited *characteristic point detector* must be separate from the recited *detector*, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping, being nested, or being the same. EX1003, ¶115.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a picture quality enhancement circuit and its equivalents (EX1001, Figs. 1-2, 5:23-24), Fujimura discloses and renders obvious such a structure. Fujimura discloses that the circuits of its luminance contrast enhancer 2 may be implemented in “a general-purpose processor such as a digital signal processor,” which would be a picture quality enhancement circuit because it would enhance luminance contrast. EX1005, 3:63-4:11. It would have been obvious to a POSITA to also implement letterbox signal detector 46 in such a processor, circuit, or equivalent. Motivation to do so arises from the fact that the detector 46 would have to be implemented using at least some hardware, and from Fujimura’s disclosure above of implementing effectively any circuit of its system in a processor. EX1003, ¶116.

3. [2.b] (“wherein the corrector corrects the video signal according to the level or distribution detected by the characteristic point detector.”)

Fujimura discloses this limitation. As described for limitation 2.a, Fujimura discloses that letterbox signal detector 46 (a *characteristic point detector*) detects

bright pixels and dark pixels, and detects the number of bright or dark pixels in each scanning line (*detects a level and distribution*). Letterbox signal detector 46 uses this information to detect the starting line of the picture area and the first line of the lower non-picture black band. EX1005, 14:7-50, Fig. 19; *see also* limitations 1.b and 1.d. In turn, and as described for limitation 1.d, primary mapper 12 (a *corrector*) uses this information to restrict luminance contrast enhancement “to the picture area between the non-picture bands.” *Id.*, 13:60-14:1, 14:46-56, Fig. 17. Thus, primary mapper 12 *corrects the video signal according to the level and distribution detected by the characteristic point detector*. EX1003, ¶117.

Luminance contrast enhancer 2 (also a *corrector*) contains primary mapper 12 and therefore *corrects the video signal according to the level and distribution detected by the characteristic point detector* described above for the same reason that primary mapper 12 does. If PO argues that the recited *characteristic point detector* must be separate from the recited *corrector*, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other. EX1003, ¶118.

C. Claim 3

Fujimura discloses and renders obvious claim 3.

1. **[3.pre] (“A video processing apparatus comprising:”)**

Fujimura discloses this preamble. *See* claim 1, preamble. EX1003, ¶120.

1. **[3.a] (“an input unit to which a video signal containing contents is input;”)**

Fujimura discloses this limitation. *See* limitation 1.a. EX1003, ¶121.

2. **[3.b] (“a detector which detects whether pattern portions other than contents are contained in the video signal input to the input unit;”)**

Fujimura discloses this limitation. *See* limitation 1.b. EX1003, ¶122.

3. **[3.c] (“a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal input to the input unit;”)**

Fujimura discloses this limitation. *See* limitation 2.a (letterbox signal detector 46 is a *characteristic point detector*). EX1003, ¶123.

In addition, letterbox signal detector 46 combined with luminance histogram processor 34 also is a *characteristic point detector* for the same reasons that letterbox signal detector 46 alone is a *characteristic point detector*. EX1005, 8:56-67, Fig. 8; EX1003, ¶124.

4. **[3.d] (“a corrector which changes correction characteristics according to a result of detection output from the characteristic point detector, and corrects the video signal input to the input unit; and”)**

Fujimura discloses this limitation. As described for limitation 1.c, Fujimura discloses luminance contrast enhancer 2 and its primary mapper 12 (each a *corrector*) that *corrects the scanning line (video signal input to the input unit)*.

EX1003, ¶125.

As described for claim 2, letterbox signal detector 46 is a *characteristic point detector*. It outputs “a pair of line numbers specifying the starting and ending lines of the picture area” (*detection output*). EX1005, 14:46-50, 13:53-58, Fig. 19; *see also* limitations 1.b and 1.d. Vertical limiter 47 “convert[s] this information to the necessary letterbox control signal[] L” (*a result of detection output*). *Id.*, 14:50-56, 13:59-60, Fig. 17. As described for limitation 1.d, vertical limiter 47 provides letterbox control signal L to luminance contrast enhancer 2 (*a corrector*) and its primary mapper 12 (also *a corrector*) so that luminance contrast enhancement is restricted “to the picture area between the non-picture bands.” *Id.*, 13:60-14:1, 14:46-56, Fig. 17. In other words, no luminance contrast enhancement is performed on scanning lines of the black non-picture bands. *See* limitation 1.d. And, as described for limitation 1.c, primary mapper 12 (and luminance contrast enhancer 2) enhances a scanning line’s luminance using a particular “mapping function.” Each mapping function defines a mapping of each input luminance value to an output luminance value (*correction characteristics*), as described for limitation 1.c. *Id.*, 6:19-28, Figs. 3A-B. In the embodiment of Figure 8, “[o]ne mapping function is selected for each image,” and the mapping function therefore would change between scanning lines of different images. *Id.*, 9:38-39. In the embodiment of Figure 1, the applicable mapping functions likewise change from

image to image and from block to block within an image. *Id.*, 6:16-18, 4:40-43 (a mapping function for each block), 6:11-16 (the selection signal changes “for a particular block”); EX1003, ¶126.

Thus, each *corrector* applies different (*changes*) mapping functions (that include *correction characteristics*) to scanning lines within the picture area based in part on (*according to*) letterbox control signal L (*a result of detection output from the characteristic point detector*) indicating that the scanning line is within the picture area and therefore should undergo luminance contrast enhancement. §§ IV.C, G-H (constructions of this limitation); EX1003, ¶127.

Moreover, primary mapper 12 combined with “maximum count selector 36” is a *corrector* for the same reason that primary mapper 12 is a *corrector*, and also because maximum count selector 36 generates a mapping function number corresponding to the mapping function to use for luminance contrast enhancement. EX1005, 9:25-35. This *corrector* (primary mapper 12 combined with maximum count selector 36) also *changes* the mapping functions (that include *correction characteristics*) by generating the mapping function number of the applicable mapping function. EX1003, ¶128.

* * *

In addition, as described for limitation 3.c, letterbox signal detector 46 combined with luminance histogram processor 34 also is a *characteristic point*

detector. Luminance histogram processor 34 receives from “block average processor 6” the “mean luminance level of all the pixels” in the image. EX1005, 9:10-13, 4:13-39, Fig. 2. It uses this data to “construct[] a histogram of the mean [luminance] values” (*detection output*) for each image. *Id.*, 9:10-13, Fig. 9 (example histogram). It then passes the histogram to “maximum count selector 36,” which analyzes the histogram to identify a “mapping-function number” (*a result of detection output*) for the image. *Id.*, 9:25-30, Fig. 8. The mapping-function number is used to apply the appropriate mapping function (that includes *correction characteristics*) for luminance contrast enhancement. *Id.*, 9:30-35. Thus, each *corrector* described above applies different (*changes*) mapping functions (that include *correction characteristics*) based in part on (*according to*) the mapping-function number (*a result of detection output from the characteristic point detector*). §§ IV.C, G-H (constructions of this limitation). Fujimura therefore discloses this limitation in this additional way. EX1003, ¶129.

* * *

If PO argues that this limitation is a means-plus-function limitation, Fujimura discloses PO’s proposed corresponding structure from litigation (“CPU 7 or equivalents thereof”). § IV.B. Fujimura discloses that primary mapper 12 and luminance contrast enhancer 2 (each a *corrector*) may be implemented in “a general-purpose processor such as a digital signal processor.” EX1005, 3:63-4:11.

Maximum count selector 36 also may be implemented in such a processor because it is part of mapping function selector 8 and luminance contrast enhancer 2, each which may be implemented in such a processor. *Id.*, Fig. 8, 8:56-67, 3:63-4:11, Fig. 1; EX1003, ¶130.

5. [3.e] (“a controller which controls the corrector to cause the corrector not to change the correction characteristics in the corrector when the pattern portions are contained.”).

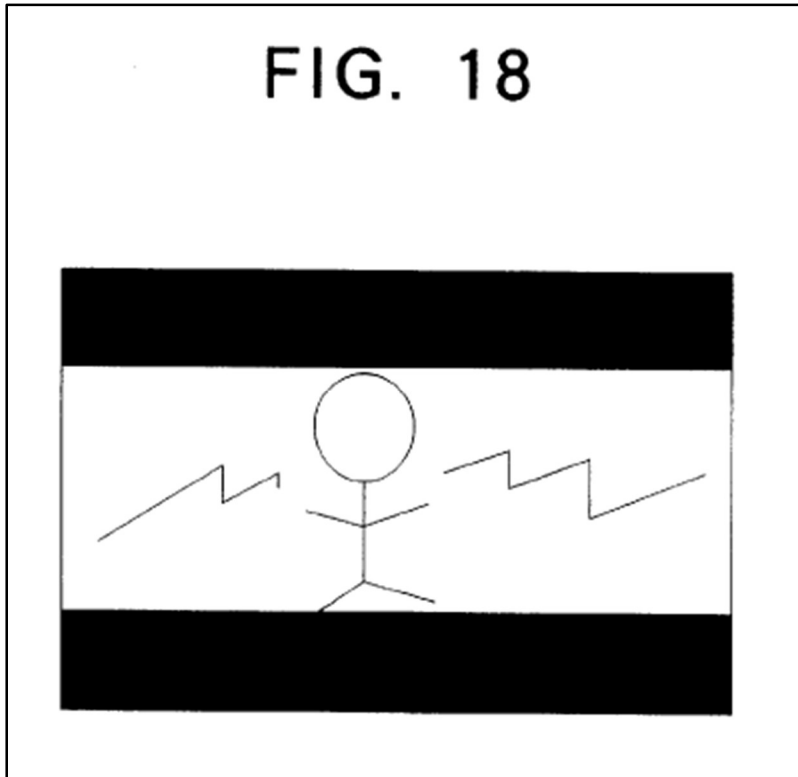
Fujimura discloses this limitation. As described for limitation 1.d, Fujimura discloses vertical limiter 47 (*a controller*) that provides letterbox control signal L to luminance contrast enhancer 2 (*a corrector*) and its primary mapper 12 (also *a corrector*) so that luminance contrast enhancement is restricted “to the picture area between the non-picture bands.” EX1005, 13:60-14:1, 14:46-56, Fig. 17. In other words, no luminance contrast enhancement is performed on scanning lines that contain part of a black non-picture band (*when the pattern portions are contained* in the scanning line). *See* limitation 1.d; §§ IV.D-E (constructions of this limitation). In that case, no mapping function (that includes *correction characteristics*) is selected or applied because no luminance contrast enhancement is performed. Luminance contrast enhancer 2 instead would apply no function to the scanning line or apply an “identity function, which leaves the luminance ... unchanged,” and which Fujimura distinguishes from a mapping function. EX1005, 14:1-6. Thus, each *corrector* does not select or apply, and therefore does *not*

change, a mapping function (that includes *correction characteristics*) when the scanning line contains part of a black non-picture band (a *pattern portion* is *contained*). And such behavior is *control[ed]* by letterbox control signal L from vertical limiter 47 (a *controller*), as described above. EX1003, ¶131.

In addition, in the case where the *corrector* applies the “identity function” to “leave[] the luminance ... unchanged,” the *corrector* also does *not change* the *correction characteristics* because it applies a function that is constant (does not change) every time *the pattern portions are contained*. See § IV.I (this limitation includes such a use case). Fujimura therefore discloses this limitation in this additional way. Also, it would have been obvious to a POSITA to apply the disclosed identity function to leave the luminance unchanged. Motivation to do so arises from Fujimura’s disclosure that the identity function can be used for that purpose. EX1003, ¶132.

D. Claim 4 (“The video processing apparatus according to claim 1, wherein the pattern portions are wallpaper areas or no-picture areas having a single color added to left and right of the contents or above and below the contents and displayed.”)

Fujimura discloses this limitation. As described for limitation 1.b, Fujimura discloses that an image in each of the *video signals* of limitation 1.a may contain *pattern portions* that are “black non-picture bands above and below” the “picture area.” EX1005, 13:42-49, Fig. 18, 1:51-55, 2:5-8. Figure 18 shows an example image with such “letterbox” bands. *Id.*, 13:42-49.



Such bands *hav[e]* a single color because they are black. *Id.* Such bands also are *added* to account for different aspect ratios between the screen and the original image. *Id.*, 13:44-49. The bands also are *above and below the* “picture area” (*contents*), as described above. *See also* limitation 1.a (the picture area *contents*). The bands are “non-picture bands” (*no-picture areas*). EX1005, Abstract, 1:51-55, 2:5-8, 13:53-58, 13:64-14:1, 14:56-59, Fig. 18. The bands also are *wallpaper areas* because they are rectangular patterns that are a result of the screen having a different aspect ratio than the image. *Id.*, 13:44-49; EX1001, 1:41-50 (“wallpaper” portions are added to account for differing aspect ratios), 1:51-54 (they may be “black no-picture areas”). The black bands also [*are*] *displayed*, as shown in Figure 18. EX1003, ¶133.

* * *

If PO argues the portions of Fujimura cited above relate to different, incompatible embodiments (which they do not), it would have been obvious to a POSITA to combine such embodiments into a single system at least because such embodiments are described in the same prior art reference, are fully compatible with each other, and could be combined with minimal effort to achieve predictable results. EX1003, ¶134.

If PO argues that Fujimura does not disclose any limitation of the challenged claims, such limitation would have nonetheless been obvious to a POSITA in light of Fujimura. Practicing any limitation of the challenged claims in light of Fujimura would have been within the knowledge and skill of a POSITA, would have required minimal effort, would have yielded predictable results, would have been fully compatible with Fujimura, and would have been a mere design choice. Motivation to do so arises from at least common sense and the disclosures of Fujimura set forth above. EX1003, ¶135.

VIII. GROUND 3: CLAIMS 5-8 ARE OBVIOUS IN LIGHT OF FUJIMURA AND KIM

A. Claim 5

Fujimura combined with Kim discloses claim 5.

1. [5.pre] (“A video processing apparatus comprising:”)

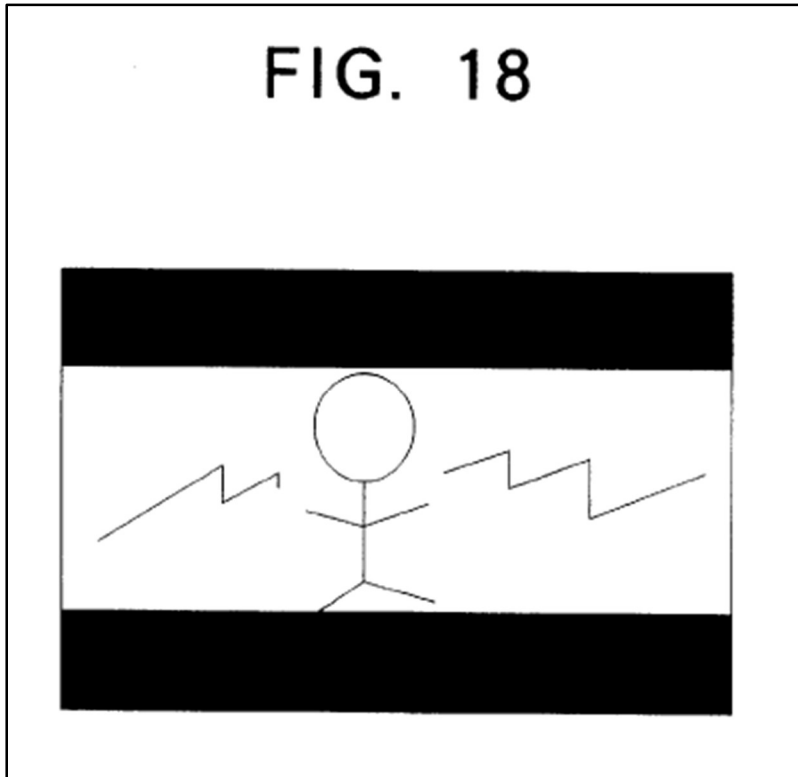
Fujimura discloses this preamble. *See* the preamble of claim 1 in Ground 2.

EX1003, ¶137.

2. [5.a] (“an input unit to which a video signal containing contents is input;”)

Fujimura discloses this limitation. As described for limitation 1.a in Ground 2, Fujimura discloses video that contains a “series of frames or fields,” each of which is an “image.” EX1005, Abstract, 3:55-61. Each such frame or image is a *video signal* because it contains video data and is part of a video input. *Id.*, Fig. 18, 13:42-49; § IV.A (construction of “video signal”).² It also makes sense for an image in Fujimura to be a *video signal* because Fujimura treats an image as a logical unit of video. EX1005, 9:13 (one histogram is constructed per image), 9:38-39 (one mapping function can be selected per image), 13:12-15 (same), 14:46-50 (letterbox signal detector operates on “each image”), Fig. 18. Each image may *contain* a “picture area” (*contents*). Abstract, 2:49-52, 13:42-49, 14:12-34. Figure 18 shows an example frame with a picture area and black bands above and below the picture area. *Id.*, 13:42-49; EX1003, ¶138.

² Petitioner’s mapping of “video signal” to different video signals in Fujimura for different claims is proper. *Trend Micro Inc. v. CUPP Computing AS*, IPR2021-01236, Paper 16 at 20 (PTAB Jan. 19, 2022) (approving of reading different claims differently on the same prior art references, “as long as the language of those claims and the disclosure of the reference support those readings”).



As described for limitation 1.a in Ground 2, the module that separates each composite image (*video signal*) into its component “luminance signal Y” and “chrominance signal C” is an *input unit* to which the composite image (*video signal*) is input. An image of luminance signal Y is input into “block average processor 6” (also an *input unit* to which this *video signal* is input). See limitation 1.a in Ground 2. An image of luminance signal Y also is input into luminance contrast enhancer 2, which also is an *input unit* to which this *video signal* is input. These modules may be implemented in a “digital signal processor,” which also is an *input unit* to which this *video signal* is input for the same reasons. *Id.*; EX1003, ¶139.

3. [5.b] (“a pattern portion detector which detects whether a pattern portion other than contents is contained in the video signal input to the input unit;”)

Fujimura discloses this limitation. *See* limitation 1.a in Ground 2 (a *video signal input to an input unit*). As described for limitation 1.b in Ground 2, letterbox signal detector 46 is a *pattern portion detector* because it detects the *pattern portions* described for limitation 1.b in Ground 2 (black non-picture bands above and below the picture area). Such pattern portions may be contained in each image (*the video signal*). EX1005, 13:42-49, 1:51-55, Fig. 18; EX1003, ¶140.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a CPU and its equivalents, Fujimura discloses such a structure for the reasons set forth for limitation 1.b in Ground 2. EX1003, ¶141.

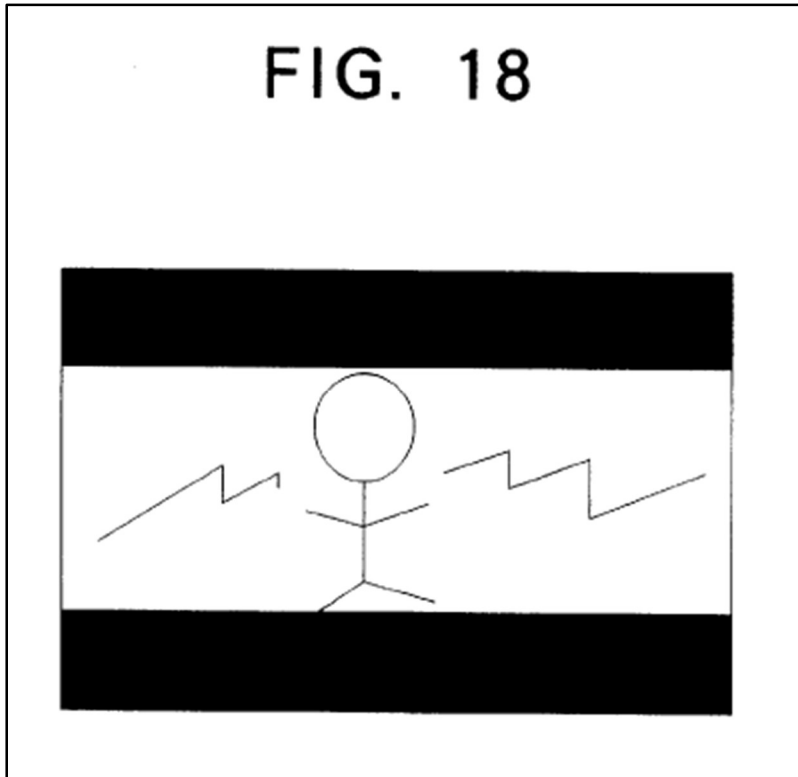
4. [5.c] (“a no-picture area detector which detects whether the pattern portions are no-picture areas having a single color;”)

Fujimura discloses this limitation. *See* limitation 1.b in Ground 2. EX1003, ¶142.

As described for limitation 1.b in Ground 2, Fujimura discloses that each image (each composite image and each image in the luminance signal Y) may be a “letterbox signal.” EX1005, 13:44-49 (luminance signal Y may be a letterbox signal), 2:49-52 (video signal that is a letter box signal), Fig. 18 (image in letterbox format). A POSITA also would have understood that if an image of luminance

signal Y has letterbox format (*i.e.*, has non-picture black bands on the top and bottom of the image), then the corresponding composite image from which an image of luminance signal Y is separated also has a letterbox format. *Id.*, 4:16-18. Otherwise (if the composite image were not a letter box signal), the image of luminance signal Y would not be a letterbox signal because luminance signal Y indicates each pixel's brightness or darkness. *Id.*, 14:8-12, 7:38-42; EX1003, ¶143.

“Letterbox signals are produced for the purpose of reproducing a picture having one aspect ratio on a screen having a different aspect ratio, as when an extended-definition television (EDTV) signal having a 16:9 aspect ratio is to be reproduced on a screen having a 4:3 aspect ratio.” EX1005, 13:44-49. Figure 18 shows an example of such letterbox bands, which is consistent with how a POSITA would have understood letterbox signal or letterbox format—one that includes non-picture black bands on the top and bottom of the image. *Id.*, 13:42-49, 1:51-55, 2:5-8.



The “black non-picture bands above and below” the “picture area” are *pattern portions* that are *no-picture areas having a single color* (black). *Id.*, 13:42-49; see also claim 4 (*no-picture areas having a single color*);³ EX1003, ¶144.

Fujimura discloses that “the letterbox signal detector 46 determines whether the luminance signal Y is a letterbox signal.” EX1005, 13:52-53. Thus, letterbox signal detector 46 detects whether the video signals include letterbox bands (*pattern portions* that are *no-picture areas having a single color*) and is a *no-*

³ Although Fujimura discloses that the bottom black band may include captions, in the disclosed case where it does not, it is a single color (black). EX1005, 13:53-58, 14:1-6, Fig. 18.

picture area detector. EX1003, ¶145.

Specifically, Fujimura discloses that letterbox signal detector 46 can identify a letterbox signal by, for example, “decod[ing] the ID code” of the video signal to determine that it is of type “type-II extended definition television (EDTV-II).” *Id.*, 15:5-12. Detector 46 can then “set the starting and ending lines [of the picture area] as specified in the standards for the identified signal type.” The EDTV-II type video signal included letterbox bands. *See* EX1006, 3 (EDTV-II included a “mandatory” “[I]etterbox” format”); EX1003, ¶146.

If PO argues that the recited *no-picture area detector* must be separate from the *pattern portion detector* of limitation 5.b, it is incorrect. The claim recites these limitations functionally rather than structurally, and no intrinsic evidence prohibits them from overlapping or from one being a subpart of the other.

EX1003, ¶147.

5. [5.d] (“a corrector which corrects the video signal input to the input unit; and”)

Fujimura discloses this limitation. As described for limitation 1.c in Ground 2, luminance contrast enhancer 2 (a *corrector*) and its primary mapper 12 (a *corrector*) enhance (*correct*) the luminance of pixels of a scanning line. Because each image (*video signal input to the input unit*) is a series of scanning lines, as described for limitation 1.a in Ground 2, they also do so for an image (*video signal*). EX1005, 13:53-58, 14:12-45; *see also id.*, 9:38-39 (mapping function for

an image), 6:11-18 (mapping functions for blocks in an image); § IV.C

(construction of “corrects the video signal”); EX1003, ¶148.

6. [5.e.i] (“a controller which controls the corrector to cause the corrector to correct the video signal input to the input unit when the pattern portions are not contained and when the pattern portions are the no-picture areas,”)

Fujimura discloses this limitation. As described for limitation 5.d, luminance contrast enhancer 2 (a *corrector*) and its primary mapper 12 (a *corrector*) enhance (*correct*) the luminance of an image (*video signal input to the input unit*). EX1003, ¶149.

As described for limitation 1.d in Ground 2, vertical limiter 47 is a *controller* which controls each *corrector* by providing letterbox control signal L to cause each *corrector* to correct scanning lines when the scanning line does not contain the *pattern portions* (i.e., when the scanning line contains part of a picture area). Because each image (*video signal input to the input unit*) is a series of scanning lines, as described for limitation 1.a in Ground 2, the *controller* also does so for an image (*video signal*). In other words, when an image (*video signal*) does not contain the black non-picture bands or other pattern portion (*when the pattern portions are not contained*), and is purely a picture area, luminance contrast enhancer 2 (a *corrector*) and its primary mapper 12 (also a *corrector*) enhance (*correct*) the luminance of pixels of the image (*video signal*). See limitation 1.c in Ground 2 (each *corrector* corrects luminance contrast), limitation 1.d in Ground 2

(each *corrector* does so for picture areas); EX1005, 2:30-32, 9:56-60 (in Figure 8, the primary mapper 12 applies a mapping function to all pixels); *see also* §§ IV.D-E (constructions of this limitation); EX1003, ¶150.

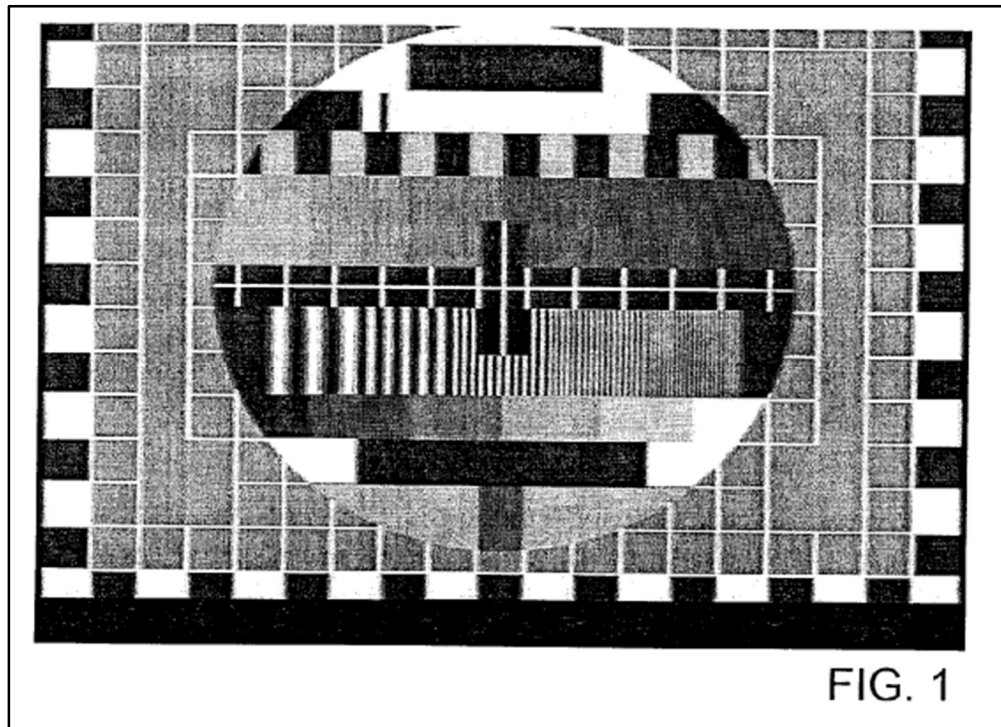
Next, as described for limitation 5.c, an image (*video signal*) may contain “non-picture bands above and below” the “picture area” of a single color (black) (*the pattern portions are the no-picture areas*). EX1005, 13:42-49. In that case (*when the pattern portions are the no-picture areas*), each *corrector* enhances the picture area portion of the image (*i.e.*, the picture area part of the *video signal*) and therefore still *corrects* the image (*video signal*). As described for limitation 1.d in Ground 2, such enhancement (*correct[ing]*) is controlled by vertical limiter 47 (*a controller*), which provides letterbox control signal L to the *correctors* to indicate which portions of the image (*video signal*) are picture areas and therefore should be enhanced (*controls the correctors to cause the correctors to correct the video signal*). *Id.*, 13:64-14:1; *see also* §§ IV.C-E (constructions of this limitation); EX1003, ¶151.

7. [5.e.ii] (“and which controls the corrector to cause the corrector not to correct the video signal when the pattern portions are not the no-picture areas.”)

Fujimura combined with Kim discloses this limitation.

“The no-picture areas” of this limitation refers to the “no-picture areas having a single color” of limitation 5.c. Thus, when *pattern portions* include more

than a single color, *the pattern portions are not the no-picture areas*. Kim discloses such *pattern portions*. Kim discloses that a video image can include a “pattern-like image,” such as the “pattern-like image” shown in its Figure 1 (below). EX1004, ¶39, ¶1.



Kim distinguishes a “pattern-like image” from “a normal image,” and its pattern-like images therefore each are a *pattern portion other than contents* (as required by limitation 5.b). *Id.*, ¶39, ¶1 (“normal images (not pattern-like images)”). Kim’s “pattern-like image” of Figure 1 includes more than a single color because it includes at least two colors (black and white), as shown above. Kim likewise discloses a “pattern-like image” that results in the histogram of Figure 2, which indicates at least two colors. *Id.*, ¶32, Fig. 2 (large histogram values at certain

gradation levels), ¶22 (gradation varies from 0 (black) to L (white)). Because these pattern-like images include more than a single color, they are *pattern portions [that] are not the no-picture areas*. EX1003, ¶153.

Kim further discloses detecting such pattern-like images using its “calculation device 34” which calculates the parameter “r,” as described for limitation 1.b in Ground 1. If r equals 1, the image is a “pattern-like image.” EX1004, ¶43. In that case, Kim’s mixer 36 (a *corrector*) and its mixer 36 combined with image enhancer 32 (also a *corrector*) do not correct the video image (*video signal*), as described for limitations 1.c and 1.d in Ground 1. Kim’s calculation device 34 and the communication channel that provides r to mixer 36 therefore collectively are a *controller* (recited in limitation 5.e.i) that *controls* mixer 36 (at least part of a *corrector*) to *cause the corrector not to correct* the video image (the *video signal* of this claim) when the image is one of the pattern-like images described above (*when the pattern portions are not the no-picture areas*). See also limitation 1.d in Ground 1; §§ IV.D-E (constructions of this limitation); EX1003, ¶154.

a. Combining Fujimura and Kim.

It would have been obvious to a POSITA to combine with Fujimura the Kim functionality cited above. A POSITA could have done so by, for example, adding to Fujimura Kim’s “calculation device 34” (described for limitation 1.b in Ground

1) and “mixer 36” (described for limitations 1.c and 1.d in Ground 1). A POSITA could have incorporated them into Fujimura by, for example, using mixer 36 to not correct the video image if calculation device 34 detects a pattern portion (as Kim discloses and as described above), except when the pattern portion is detected to be a no-picture area having a single color (as Fujimura discloses and as described for limitation 5.e.i), in which case Fujimura would correct the picture area (as Fujimura discloses and as described for limitation 5.e.i). EX1003, ¶155.

Doing so would have been within the skill and knowledge of a POSITA, as confirmed by Kim and Fujimura. Doing so also would have led to predictable results, would have created a reasonable expectation of success, and would have been compatible with Fujimura. For example, Fujimura’s disclosed functionality of correcting only the picture area when the video image includes black non-picture bands (letterbox bands) (described for limitation 5.e.i) would be unchanged. Doing so also would have been a mere design choice, consisting of adding Kim’s video processing design (described above) to Fujimura’s video processing design in a straightforward manner. EX1003, ¶156.

Motivation to do so arises from various places. Motivation first arises from Kim’s disclosure that “pattern-like images,” such as the one shown in its Figure 1, “will introduce unwanted or undesirable results,” such as “unnatural and undesirable artifacts.” EX1004, ¶1. This disclosure would have led a POSITA to

add Kim's functionality cited above to Fujimura to account for such pattern images. Although Fujimura discloses detecting letterbox video signals such as by decoding the video signal's "ID code," as described for limitation 5.c, the pattern image of Kim's ¶1 (and similar patterns) are not letterbox patterns and therefore would not be detected by Fujimura's letterbox signal detector. *Compare* EX1004, Fig. 1 *with* EX1005, Fig. 18. Thus, a POSITA would have been motivated to add Kim's functionality to Fujimura to account for such patterns for which Fujimura does not account. EX1003, ¶157.

Additional motivation arises from Fujimura, which discloses accounting for pattern portions in video when performing contrast enhancement and not performing such enhancement on the pattern portions. EX1005, 1:51-55, 14:50-59. This would have encouraged a POSITA to add Kim's functionality to Fujimura to further implement this teaching by accounting for additional pattern portions in a video and not performing contrast enhancement on them, as Kim discloses, and as described above. EX1003, ¶158.

B. Claim 6

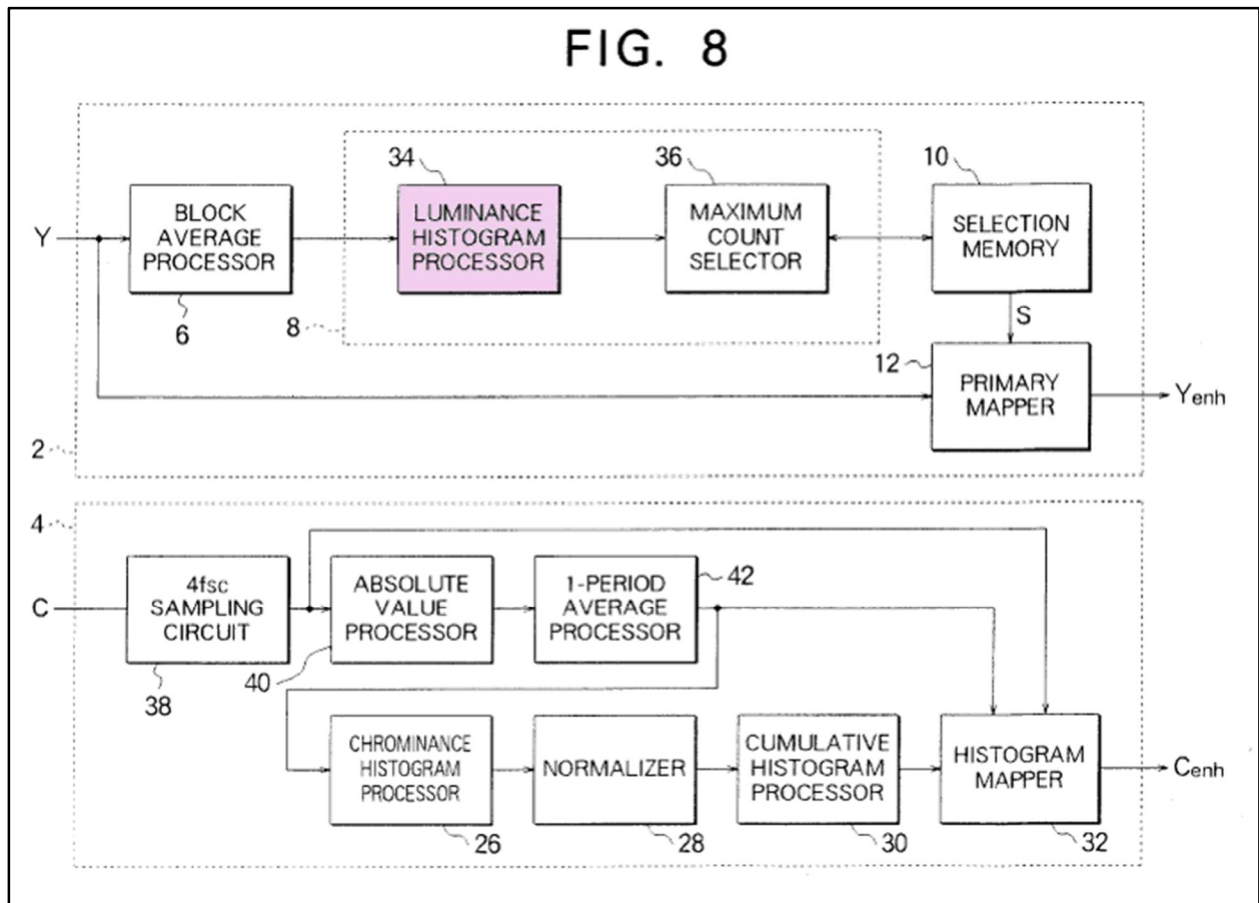
Fujimura combined with Kim discloses claim 6.

1. [6.pre] ("The video processing apparatus according to claim 5, comprising:")

Fujimura combined with Kim discloses this preamble. *See* claim 5; EX1003, ¶160.

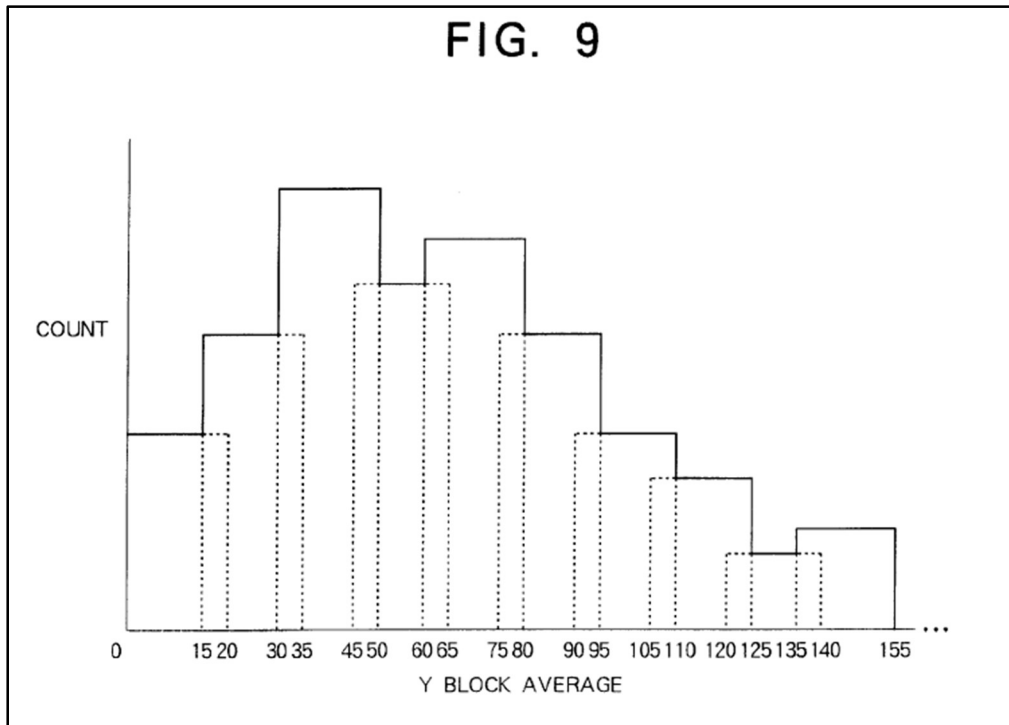
2. [6.a] (“a characteristic point detector which detects a level or distribution of at least one of luminance, hue and saturation of the video signal,”)

Fujimura discloses this limitation. Fujimura discloses that luminance contrast enhancer 2 includes a “luminance histogram processor 34” (*a characteristic point detector*), annotated below in purple. EX1005, 8:56-67, Fig. 8.



Luminance histogram processor 34 receives from “block average processor 6” the “mean luminance level of all the pixels” in the image. *Id.*, 9:10-13, 4:13-39, Fig. 2 (example blocks in an image). It uses this data to “construct[] a histogram of the mean [luminance] values” for each image (*video signal*). *Id.*, 9:10-13. Figure 9

shows an example of such a histogram. *Id.*, 9:13-14.



The histogram's horizontal axis represents "a plurality of overlapping luminance ranges in which the mean levels may fall," and the vertical axis represents "the number of blocks with mean luminance levels in each range." *Id.*, 9:13-17, 4:26-27 (all images are divided into blocks), Fig. 2 (example blocks). The count for each range in the histogram therefore *detects a level of luminance of the image (video signal)*, and the histogram as a whole *detects a distribution of luminance of the image (video signal)*. Luminance histogram processor 34 therefore also is a *characteristic point detector that detects a level and distribution of luminance of the video signal*. See also § IV.F (construction of "characteristic point detector"); EX1003, ¶161.

If this limitation is construed as a means-plus-function limitation with corresponding structure of a picture quality enhancement circuit and its equivalents (EX1001, Figs. 1-2, 5:23-24), Fujimura discloses and renders obvious such a structure. Fujimura discloses that luminance histogram processor 34 is a processor, which would be a picture quality enhancement circuit or its equivalent because its disclosed purpose is for use in picture quality enhancement (*i.e.*, luminance contrast enhancement and chrominance contrast enhancement). EX1005, 9:10-17. It also would have been obvious to a POSITA to implement luminance histogram processor 34 in such a circuit or its equivalent. Motivation to do so arises from Fujimura's disclosure that luminance contrast enhancer (of which luminance histogram processor is part) may be implemented in "a general-purpose processor such as a digital signal processor." EX1005, 3:63-4:11, Fig. 8, 8:56-60; EX1003, ¶162.

3. **[6.b] ("wherein when the no-picture area detector has detected that the pattern portions are no-picture areas, the characteristic point detector detects a level or distribution of at least one of luminance, hue and saturation of the video signal other than the no-picture areas.")**

Fujimura discloses this limitation. As described for limitation 5.c, Fujimura discloses that letterbox signal detector 46 (a *no-picture area detector*) detects that *the pattern portions are* black non-picture bands (*no-picture areas*) above and below the picture area. EX1003, ¶163.

Fujimura also discloses that, after letterbox signal detector 46 outputs a pair of line numbers specifying the starting and ending lines of the picture area in the image (*the no-picture area detector has detected that the pattern portions are no-picture areas*), the “construction of histograms [is] restricted to the area between the starting and ending lines of the picture area, including the starting line but not the ending line.” EX1005, 14:46-56. The “ending line” of this passage is the first line of the bottom black band. *Id.*, 14:25-36. Thus, the construction of the histogram by the luminance histogram processor 34 (*a characteristic point detector*) considers only the image’s picture area and not its black bands (*the video signal other than the no-picture areas*). And, as described for limitation 6.a, the histogram *detects a level and distribution of luminance of this area*. EX1003, ¶164.

C. Claim 7 (“The video processing apparatus according to claim 5, wherein the pattern portions are portions added to left and right of the contents or above and below the contents and displayed.”)

Fujimura discloses claim 7. *See* claim 4 in Ground 2. EX1003, ¶165.

D. Claim 8 (“The video processing apparatus according to claim 5, wherein the no-picture areas have a black color or a white color.”)

Fujimura discloses claim 8. *See* limitation 1.b in Ground 2, claim 4 in Ground 2 (*the no-picture areas have a black color*). EX1003, ¶166.

* * *

If PO argues the portions of Fujimura or Kim cited above relate to different, incompatible embodiments (which they do not), it would have been obvious to a

POSITA to combine such embodiments into a single system at least because such embodiments are described in the same prior art reference, are fully compatible with each other, and could be combined with minimal effort to achieve predictable results. EX1003, ¶167.

If PO argues that Fujimura or Kim does not disclose any limitation of the challenged claims, such limitation would have nonetheless been obvious to a POSITA in light of Fujimura and Kim. Practicing any limitation of the challenged claims in light of Fujimura and Kim would have been within the knowledge and skill of a POSITA, would have required minimal effort, would have yielded predictable results, would have been fully compatible with Fujimura, and would have been a mere design choice. Motivation to do so arises from at least common sense and the disclosures of Fujimura and Kim set forth above. EX1003, ¶168.

IX. DISCRETIONARY DENIAL IS NOT WARRANTED

Pursuant to Acting Director Coke M. Stewart's March 26, 2025, Memorandum regarding Interim Processes for PTAB Workload Management, Petitioner understands that discretionary denial issues, if any, will be raised in a separate brief to be filed by PO. If PO files such a brief, Petitioner intends to respond in an opposition brief consistent with the memorandum. Accordingly, Petitioner will not address discretionary denial issues in this Petition.

X. MANDATORY NOTICES UNDER 37 C.F.R. §§ 42.8(B)(1)-(4)

A. Real Party-In-Interest

Petitioner is the real party-in-interest.

B. Related Matters

The '645 patent is subject to the following action: *Maxell, Ltd. v. Samsung Elecs. Co., Ltd.*, No. 5:25-cv-00052 (E.D. Tex.).

The '645 patent was subject to the following terminated actions: *Maxell, Ltd. v. Lenovo Group Ltd.*, No. 6:21-cv-01169 (W.D. Tex.) and *Motorola Mobility LLC v. Maxell, Ltd.*, No. 1:22-cv-00256 (N.D. Ill.).

C. Lead and Backup Counsel

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D. Service Information

Service information for lead and backup counsel is provided above.

Petitioner consents to electronic service to lead and backup counsel, and to DLA-
Maxell-2-IPRs@us.dlapiper.com and the email addresses listed above.

XI. CONCLUSION

The Board should find the claims of the '645 patent to be unpatentable for the reasons set forth in this petition.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this petition includes 13,908 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificate of service, word count, claim listing, and exhibits.

Date: August 29, 2025

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CERTIFICATE OF SERVICE

The undersigned certifies pursuant to 37 C.F.R. §§ 42.6(e) and 42.105 that on August 29, 2025, a true and correct copy of this petition for *inter partes* review of U.S. Patent No. 7,952,645 was served was served by emailing a copy of the same (by agreement) to the following attorneys for the Patent Owner:

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