

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CORETRONIC CORPORATION and
OPTOMA CORPORATION,

Petitioners,

- vs. -

MAXELL, LTD.,

Patent Owner

IPR2025-00942

**DECLARATION OF DR. DAN SCHONFELD
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 9,900,569**

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I, Dan Schonfeld, declare as follows:

I. Introduction

1. I am an independent consultant. I am over eighteen years of age, and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so.

2. I have prepared this Declaration for consideration by the Patent Trial and Appeal Board in the *Inter Partes* Review of U.S. Patent No. 9,900,569 (“the ’569 Patent”).

3. I provide this Declaration at the request of Coretronic Corporation and Optoma Corporation (collectively, “Petitioners”) in connection with the above-captioned *Inter Partes* Review. I have been informed and understand that Petitioners contend that claims 1-4 of the ’569 Patent (the “Challenged Claims”) are unpatentable.

4. I have been asked to provide my opinions regarding whether the Challenged Claims of the ’569 Patent are unpatentable because they would have been obvious to a person of ordinary skill in the art (“POSITA”) at the time of the alleged invention in light of the prior art. After careful analysis, it is my opinion that the subject matter of the Challenged Claims are unpatentable as they would have been obvious to a POSITA.

5. I am being compensated at my standard hourly rate of \$750 per hour. My

compensation is not dependent on the outcome of, or any issue in relation to, the above-captioned *Inter Partes* Review. I have no interest in any of the parties.

6. In forming my opinions, I relied on my knowledge and experience in the field and on documents and information referenced in this Declaration.

II. Qualifications

7. The details of my background and education, and a listing of all publications that I have authored, are provided in my *Curriculum Vitae*, a copy of which is submitted as EX1003. The following is a brief summary of my relevant qualifications and professional experience.

8. I received my B.S. degree in Electrical Engineering and Computer Science from the University of California, Berkeley, California, in 1986 with a concentration on Computer Engineering/Systems Engineering. I received my M.S. degree in Electrical and Computer Engineering from The Johns Hopkins University, Baltimore, Maryland, in 1988 with a concentration on Speech Processing/Biomedical Signal Processing. I received my Ph.D. degree in Electrical and Computer Engineering from The Johns Hopkins University, Baltimore, Maryland, in 1990 with a concentration on Nonlinear Signal Processing/Image Analysis.

9. In August 1990, I joined the Department of Electrical Engineering and Computer Science at the University of Illinois, Chicago, Illinois, where I am a Professor Emeritus in the Departments of Electrical and Computer Engineering,

Computer Science, and Biomedical Engineering. Before I joined the University of Illinois at Chicago, I served as an instructor in the Department of Electrical and Computer Engineering at The Johns Hopkins University, Baltimore, Maryland.

10. At the University of Illinois at Chicago, I have served as the Director of the University-Industry Engineering Research Center (UIERC), formerly the Manufacturing Research Center (MRC). I am also Co-Director of the Multimedia Communications Laboratory (MCL) and a member of the Signal and Image Research Laboratory (SIRL).

11. Over the past few decades, I have also served as a visiting professor in (a) the Advanced Analytics Institute (AAI) at the University of Technology, Sydney, Australia, (b) the Department of Information Engineering and Computer Science (DISI) at the University of Trento, Italy, (c) the School of Computer Engineering at the Nanyang Technological University, Singapore, and (d) the Department of Electrical Engineering—Systems at Tel-Aviv University, Israel.

12. I have been elected Fellow of the Institute of Electrical and Electronics Engineers (IEEE) “for contributions to image and video analysis” as well as Fellow of the International Society for Optics and Photonics (“SPIE”) “for specific achievements in morphological image processing and video analysis.” I have also been elected University Scholar of the University of Illinois.

13. I have previously served as Editor-in-Chief and Deputy Editor-in-Chief of

the IEEE Transactions on Circuits and Systems for Video Technology. I have also previously served as Area Editor for special issues of the IEEE Signal Processing Magazine. I have served as Associate Editor of the IEEE Transactions on Image Processing (on image and video storage, retrieval and analysis), Associate Editor of the IEEE Transactions on Circuits and Systems for Video Technology (on video analysis), Associate Editor of the IEEE Transactions on Signal Processing (on multidimensional signal processing and multimedia signal processing), and Associate Editor of the IEEE Transactions on Image Processing (on nonlinear filtering). I have also served on the editorial board of the IEEE Signal Processing Magazine, EURASIP Journal of Image and Video Processing, Research Letters in Signal Processing, and Bentham Science Publishers, Ltd.'s "Recent Patents on Computer Science" and "Recent Patents on Electrical Engineering" publications. I have served as guest editor of numerous special issues in various journal publications in the area of multimedia systems.

14. I have previously served on the Conference Board of the IEEE Signal Processing Society. I have previously served as Technical Program Chair of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2018 as well as Program Chair of the IEEE Conference on Visual Communications and Image Processing (VCIP) 2015. I have also previously served as General Co-Chair of the Workshop on Big Data in 3D Computer Vision 2013 and the IEEE International Conference on Multimedia and Expo (ICME) 2012. I have served as Chair of the IEEE

Workshop on Video Mining 2008 and the SPIE Conference on Visual Communications and Image Processing 2007. I have also served on the organizing committees of various conferences including the IEEE International Conference on Image Processing 1998, 2012, and 2020, IEEE/SPIE VCIP 2010, 2017, and IEEE Workshop on Nonlinear Signal and Image Processing (NSIP) 1997. I was an organizer of the Thematic Symposium on Multimedia Search and Retrieval at ICASSP 2009.

15. I have authored and co-authored over 250 technical papers for various journals and conferences. I was author of a book chapter, entitled: "Image and video communication networks," and later editions entitled: "Video communication networks." I was co-author (with Carlo Giulietti and Rashid Ansari) of a paper that won the Best Paper Award at the ACM Multimedia Workshop on Advanced Video Streaming Techniques for Peer-to-Peer Networks and Social Networking 2010. I was also co-author (with Junlan Yang) of a paper that won the Best Student Paper Award at the IEEE International Conference on Image Processing 2007. I was also co-author (with Wei Qu) of a paper that won the Best Student Paper Award at the IEEE International Conference on Image Processing 2006. I was also co-author (with Nidhal Bouaynaya) of a paper that won the Best Student Paper Award in Visual Communications and Image Processing 2006. In addition, many of my publications relate to the broad topic of multimedia systems, which includes audio, image, and video processing. My publications in the area of multimedia systems dates back to 1988.

16. I have been selected to be the keynote speaker at the IEEE International Conference on Computer, Electrical and Communication Engineering (ICCECE), Kolkata, India, in 2023. I was also the keynote speaker at the N-Brain Alliance Launch & Product Release Conference and the Think for Education Conference (TEC) AI+Education, both held in Beijing, China, in 2018. I was also the keynote speaker at the International Conference on Wireless Communications and Signal Processing (WCSP), Yangzhou, China, in 2016, and the International Conference on Intelligent Control and Information Processing (ICICIP) and International Conference on Brain Inspired Cognitive Systems (BICS), Beijing, China, in 2013. Further, I was a plenary speaker at the IEEE/IET International Conference on Audio, Language and Image Processing (ICALIP), Shanghai, China, in 2010, and at the IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS), Genoa, Italy, in 2009. I was also a plenary speaker at the INPT/ASME International Conference on Communications, Signals, and Systems (ICCSS), Rabat Morocco, in 1995 and 2001.

17. I have served as Representative of Regions 1-6 (North America) on the Chapters Committee of the IEEE Signal Processing Society. I have also served as Chairman of the IEEE Signal Processing Chicago Chapter. I have also served on the IEEE Image, Video, and Multidimensional Signal Processing (IVMSP) Technical Committee, formerly the IEEE Image and Multidimensional Signal Processing (IMDSP) Technical Committee, Visual Signal Processing and Communications

(VSPC) Technical Committee, IEEE Signal and Image Processing in Medicine Technical Committee, and the IEEE Multimedia Communications Technical Committee. I currently serve on the American National Standards Institute (ANSI)/Underwriters Laboratory (UL) Standards Technical Panel (“STP”) on Multimedia Systems.

18. I have also taught various courses that relate to multimedia systems. For example, since the late 1990s, I have introduced and taught an advanced undergraduate-level/first-year graduate-level course on multimedia systems (originally called multimedia communication networks), which focuses on audio, image, and video processing and communications.

19. I have also served as a consultant in various engagements related to multimedia systems. For example, over the past decade, I have served as an expert witness in several cases related to multimedia systems. In 1997, I served as a consultant for Prairiecomm Corp. where, among other tasks, I developed and deployed multimedia systems. Since 2002, I have also served as a member of the American National Standards Institute (ANSI)/Underwriters Laboratory (UL) Standards Technical Panel (STP) on various standards related to multimedia systems.

20. Additional details of my education and work experience, professional activities, awards and honors, and publications that may be relevant to opinions I have formed are set forth in my *curriculum vitae*, which is attached as EX1003 to this

Declaration. Additionally, I have consulted for several companies in the area of signal processing and multimedia systems.

III. Information Considered

21. I have considered the following documents:

- a. The '569 Patent (EX1001);
- b. The prosecution history of the '569 Patent (EX1002);
- c. US20100289429A1 ("Pollmann-Retsch") (EX1005);
- d. US20130215135A1 ("Hirabayashi") (EX1006);
- e. JP2008122746A ("Abe") (EX1007);
- f. JP2005241708A ("Ishitani") (EX1008);
- g. JP2001015276A ("Kambara") (EX1009);
- h. Hitachi YK No.0682E CP-DX250/CP-DX300 (DL1-X25/DL1-X30) Service Manual ("CP-DX300-SM") (EX1010);
- i. Hitachi Projector CP-DX250/CP-DX300 User Manual ("CP-DX300-UM") (EX1011);
- j. DE102010031523A1 ("Baier"); and
- k. BenQ MX823ST/MW824ST Digital Projector User Manual ("BenQ MX823ST User Manual").

22. In addition to the documents above, in forming the opinions expressed below, I have also considered:

- a. My own knowledge and experience, as described above and in my *Curriculum Vitae*; and

- b. The level of skill of a POSITA at the time of the alleged invention of the '569 Patent.

IV. Anticipation and Obviousness

23. I have been informed and understand that a claim is anticipated if each and every element of a claim is disclosed, either expressly or inherently, in a single prior art reference.

24. I have been informed and understand that a claim is obvious in light of the prior art if the difference or differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art. I have been informed and understand that the Supreme Court provided an outline for analyzing obviousness in which it rejected an earlier test in favor of an “expansive and flexible approach” using “common sense.”

25. I have also been informed and understand that the Supreme Court explained that under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed. I have also been informed and understand that the Supreme Court explained that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” I further have been informed and understand that the Court pointed to other

factors that may show obviousness. These factors include the following principles:

- a. combination that unites old elements with no change in their respective functions is unpatentable. As a result, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results,
- b. a predictable variation of a work in the same or a different field of endeavor is likely obvious if a person of ordinary skill would be able to implement the variation,
- c. an invention is obvious if it is the use of a known technique to improve a similar device in the same way, unless the actual application of the technique would have been beyond the skill of the person of ordinary skill in the art. In this case, a key inquiry is whether the improvement is more than the predictable use of prior art elements according to their established functions,
- d. an invention is obvious if there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims,
- e. inventions that were “obvious to try” — chosen from a finite number of identified, predictable solutions, with a reasonable expectation of success — are likely obvious,

- f. known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art, and
- g. an explicit teaching, suggestion, or motivation in the art to combine references, while not a requirement for a finding of obviousness, remains “a helpful insight” upon which a finding of obviousness may be based.

IV. Claim Construction

26. I have been informed and understand that, in an *inter partes* review, claim terms are construed according to their ordinary and customary meaning as understood by one of ordinary skill in the art in view of the specification and the prosecution history of the patent.

27. Independent claim 1 of the '569 Patent reads:

A projection-type image display device including a discharge lamp as a light source, comprising:

a lamp driving unit configured to drive the discharge lamp;

a lamp voltage detection unit configured to detect a voltage between electrodes (hereinafter, a lamp voltage) of the discharge lamp;

an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element;

a control unit configured to control an amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and

a menu screen creating unit,

wherein, via a menu screen created by the menu screen creating unit, both a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable,

the first setting item is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and

the second setting item is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit.

28. Claim 2 depends from claim 1. Claim 2 adds the limitation:

a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp, wherein

the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

29. Claim 3 depends from claim 2. Claim 3 adds the limitation:

a memory that stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp, wherein

the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

30. Claim 4 depends from claim 1. Claim 4 adds the limitation:

a memory, wherein:

the memory is capable of storing the amount of correction, and

the control unit uses the amount of correction stored in the memory for the image quality correction by the image correction processing unit when the discharge lamp is lit up, the control unit being configured to perform update processing of the amount of correction for the image quality correction by the image correction processing unit after an elapse of a predetermined time.

31. I have applied the ordinary and customary meanings in the art to the terms of the Challenged Claims of the '569 Patent. I reserve the right to supplement my opinions should either party propose a construction to any terms of the Challenged Claims of the '569 Patent.

V. Level of Skill in the Art

32. I have been informed that obviousness is considered from the perspective of a person of ordinary skill in the art (“POSITA”) at the time of the invention. I understand that several factors are considered in determining the level of ordinary skill in the art, including the educational level of active workers in the field, the types of problems encountered in the art, the nature of the prior art solutions to those problems, prior art patents and publications, the activities of others, the sophistication of the technology involved, and the rapidity of innovations in the field. I have been informed that the filing date of the PCT application to which the ’569 Patent claims priority is July 4, 2014.

33. In my opinion, a POSITA at the time of the invention of the ’569 Patent would have had (a) a bachelor’s degree in electrical engineering or computer engineering or an equivalent degree, and (b) at least 2 years of work experience in the field image processing. Additional education could substitute for some of the work experience, and vice versa.

34. I met and exceeded the above qualifications for a POSITA as of at least July 4, 2014 (and thereafter), and consider myself to be a person with at least ordinary skill in the art of the ’569 Patent. My experience working with undergraduate students, graduate students, postdoctoral fellows, industry professionals, and others in the relevant field provides me with significant insight on the knowledge of a POSITA.

VI. U.S. Patent No. 9,900,569 (the “’569 Patent”)

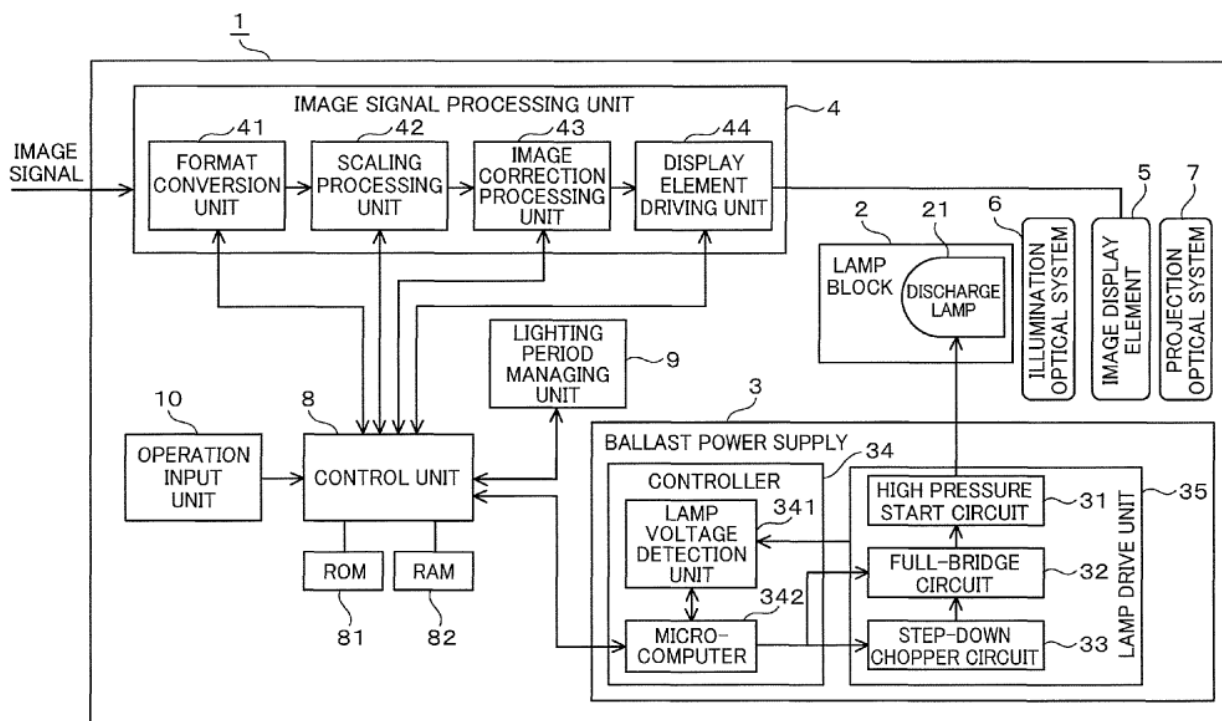
35. I have been informed and understand that the earliest priority date to which the Patent Owner may claim the ’569 Patent is entitled is July 4, 2014. For purposes of my analysis herein, I am assuming that the ’569 Patent is entitled to this priority date. I understand that all of the references discussed below qualify as prior art based on this assumed priority date of July 4, 2014.

36. The ’569 Patent describes a projection-type image display apparatus that employs a discharge lamp as a light source to project an image on an image display element. EX1001, abstract. That apparatus includes a lamp driving unit configured to drive the discharge lamp, a lamp voltage detection unit configured to detect a voltage between electrodes (hereinafter, a lamp voltage) of the discharge lamp, an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element, a control unit configured to control an amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and a menu screen creating unit. *Id.*

37. The ’569 Patent further discloses that both a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable through a menu screen created by the menu screen creating unit. EX1001, 20:22-33. The first setting item is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected

by the lamp voltage detection unit, and the second setting item is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit. *Id.*

38. The '569 Patent's Fig. 1 depicts a block diagram of an embodiment of the claimed projection-type image display apparatus.



39. The figure above shows a discharge lamp 21, a lamp driving unit 35, a lamp a micro-computer 342, a control unit 8, a lamp voltage detection unit 341, an image correction processing unit 43, and an image display element 5. EX1001, 3:28-52. The discharge lamp 21 is driven by the lamp driving unit 35. EX1001, abstract. The lamp voltage detection unit 341 detects the voltage of the discharge lamp 21 and transmits the lamp voltage information to the control unit 8 via a micro-computer 342. EX1001, 4:35-

39. Subsequently, the control unit 8 adjusts the correction parameters for the image correction processing unit 43 based on the lamp voltage information provided by the lamp voltage detection unit 341. EX1001, 4:39- 43. Further, the image correction processing unit 43 processes and corrects the image signal according to the instructions from the control unit 8. *Id.* Consequently, the processed and corrected image will be projected onto the image display element 5. EX1001, 4:19-20. The display element driving unit 44 supplies driving signals according to the image signals to the image display element 5. The image correction processing unit 43 performs an image quality correction to compensate a decrease in illuminance, such as a brightness correction, a contrast correction, a sharpness correction, and a gamma correction. *Id.*, 3:59-63.

40. The '569 Patent also discloses and claims a menu screen creating unit designed to generate a menu screen that includes a first setting item and a second setting item. EX1001, 20:21-25. While a menu screen creating unit is not depicted in the drawings, according to the specification, a POSITA understands that the menu screen creating unit could likely be disposed between the image correction processing unit 43 and a display element driving unit 44. EX1001, 15:47-49.

41. The '569 Patent further describes: 1) the first setting item adjusts the correction parameters for the image correction processing unit 43 based on the lamp voltage information provided by the lamp voltage detection unit 341; and 2) the second setting item enables a user to select correction parameters that are not based on the lamp

voltage information provided by the lamp voltage detection unit 341. EX1001, 20:26-33.

42. The '569 Patent issued on February 20, 2018, from U.S. Patent Application No. 15/322,980, filed December 29, 2016. The patent claims priority to PCT Application No. PCT/JP2014/067922, filed on July 4, 2014. EX1002. The Application was filed with a Preliminary Amendment including original claims 2-12 and a minor amendment to original claim 1. *Id.*

43. During prosecution, a single non-final Office Action was issued. *Id.* In that Office Action, original independent claim 12 was rejected under 35 U.S.C. § 102(a)(1) as being unpatentable over Kotani et al. (US 2010/0110395 A1) and original independent claim 1 and dependent claims 2-6 were rejected under 35 U.S.C. § 103 as being unpatentable over Terashima et al. (US 2013/0088693 A1) in view of Hiroshi (JP 2005-084075 A). *Id.* The Office Action did, however, indicate that original dependent claims 7-11 contained allowable subject matter because the “menu screen creating unit” of claim 7 and the “control unit” of claim 9 were not disclosed by the prior art. *Id.*

44. In response to the Office Action, applicant amended claim 1 to incorporate the limitation of claim 7 and cancelled claim 7. *Id.* Applicant also rewrote claim 9 as an independent claim, incorporating the limitations of claims 1 and 2, and cancelled claim 12. *Id.* A Notice of Allowance was issued on October 25, 2017, and an Amendment after Notice of Allowance was filed on December 14, 2017, to remove a minor discrepancy

in amended claim 9. *Id.*

45. As discussed below, the claims of the '569 Patent recite nothing more than an obvious combination of image and signal processing techniques, along with conventional electrical circuits that had been well known and used byPOSITAs for years prior to the filing of the '569 Patent.

VII. Prior Art

A. Pollmann-Retsch (EX1005)

46. Pollmann-Retsch was filed as U.S. Application No. 12/376,447 on May 6, 2010, and published on November 18, 2010. EX1005. Pollmann-Retsch qualifies as prior art under 35 U.S.C. § 102(a) at least because it was published before the priority date of the '569 Patent (July 4, 2014). *Id.* Pollmann-Retsch was neither cited nor considered by the Examiner during prosecution of the '569 Patent. *Id.*

47. Pollmann-Retsch discloses a projection system that includes a gas discharge lamp and associated driving units configured to determine the lamp voltage to regulate the lamp's power in order to maintain a consistent target light flux. EX1005, abstract. Further, the system includes an image correction unit that determines the necessary lamp power adjustment for the driving units to sustain the target light flux. *Id.*

48. FIG. 3 of Pollmann-Retsch, reproduced below, shows the overall arrangement of the projection system:

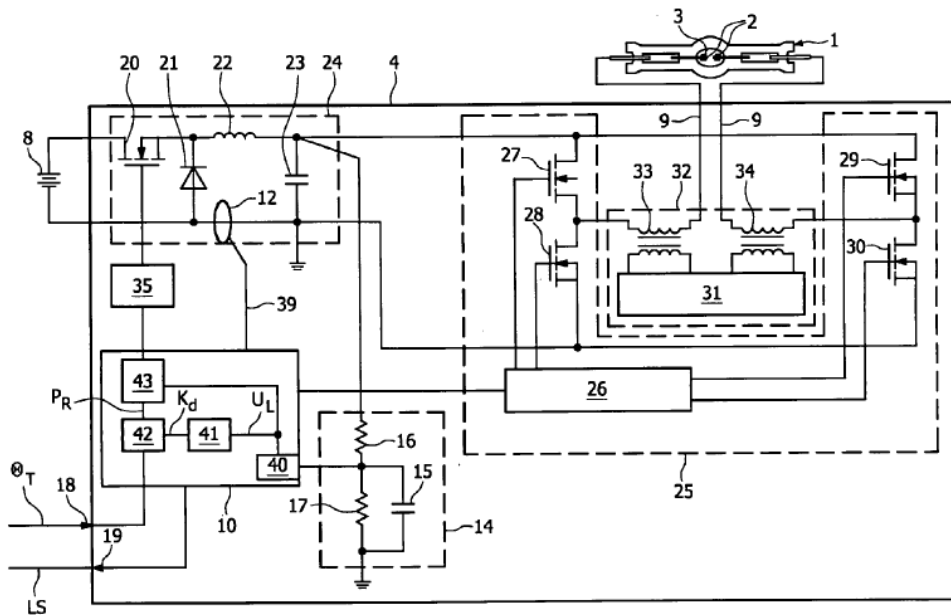


FIG. 3

49. The above projector system includes a gas discharge lamp 1, a driving unit 4, a voltage measuring unit 14, a voltage determination unit 40, a correction factor determination unit 41, a power calculation unit 42, and a power control unit 43. EX1005, [0053]-[0062]. The power calculation unit 42 determines the required lamp power to maintain a target light flux, using a correction factor derived by the correction factor determination unit 41. *Id.*, [0064]. The correction factor determination unit 41 determines the correction factor based on the lamp voltage obtained from the voltage determination unit 40. *Id.*, [0063]. Subsequently, the power control unit 43 regulates the power supplied to the gas discharge lamp accordingly. *Id.*, [0058], [0061], [0064], [0066].

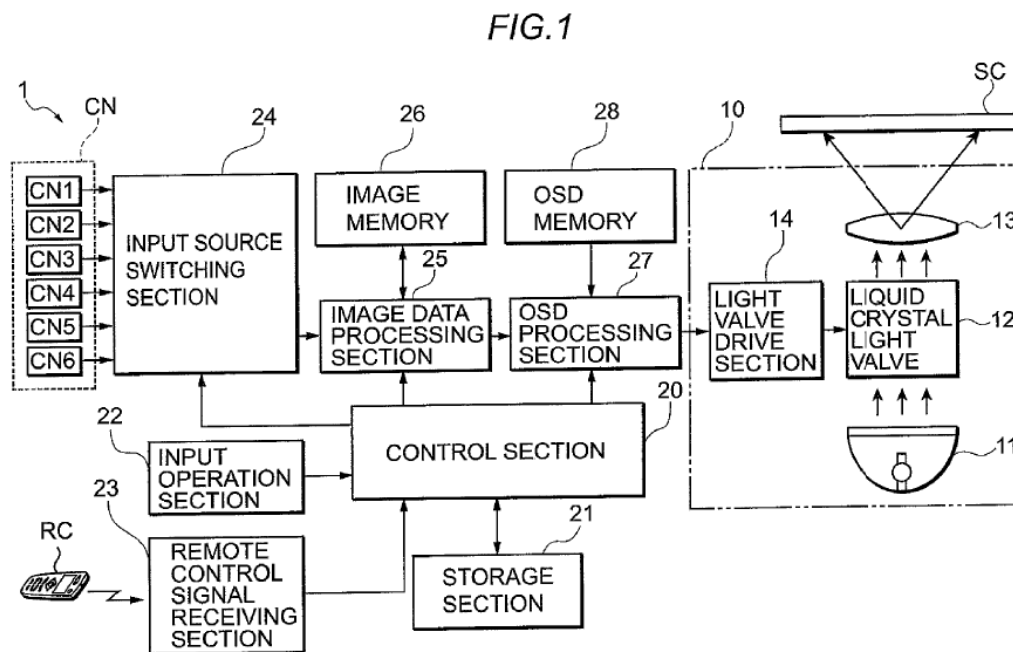
B. Hirabayashi (EX1006)

50. Hirabayashi was filed as U.S. Application No. 13/846,636 on March 18,

2013, and published on August 22, 2013. EX1006. Hirabayashi qualifies as prior art under 35 U.S.C. § 102(a) at least because it was published before the priority date of the '569 Patent (July 4, 2014). *Id.* Hirabayashi was neither cited nor considered by the Examiner during prosecution of the '569 Patent. *Id.*

51. Hirabayashi discloses a projector with an image processing section that performs image quality adjustment based on input parameters, allowing the user to adjust the display condition of an image to be displayed. EX1006, abstract, [0054].

52. FIG. 1 of Hirabayashi, reproduced below, shows overall arrangement of the projector:



53. The above projector includes a control section 20, an image data processing section 25, a liquid crystal light valve 12, and an OSD processing section 27. EX1006,

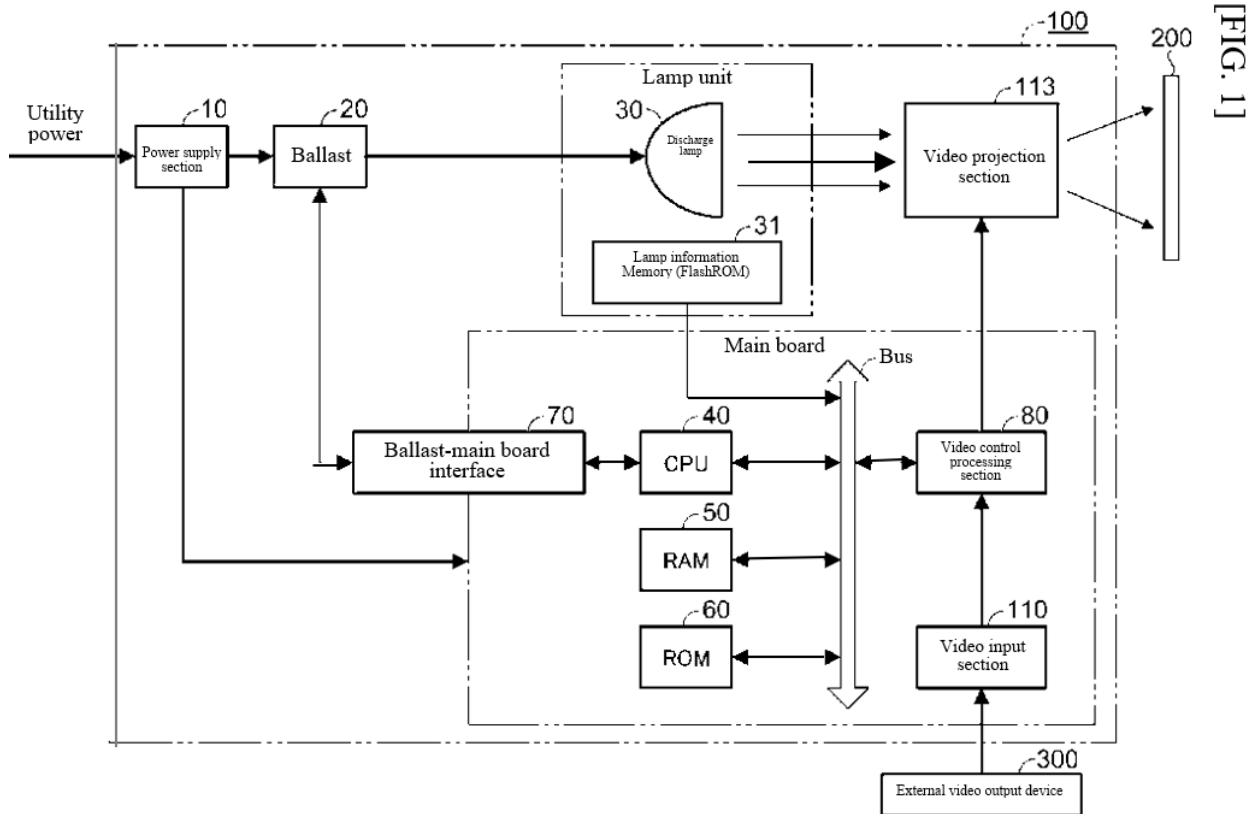
[0048], [0051]. The image data processing section 25 receives a set of image quality adjustment parameters from the control section 20 and applies various adjustments to optimize display conditions. *Id.*, [0057]. The processed image data is then output to the OSD processing section 27 and subsequently displayed on the screen via the liquid crystal light valve 12. *Id.*, [0058]-[0059]. Additionally, the liquid crystal light valve 12 displays a menu screen, allowing the user to select numerical values for image quality adjustments. *Id.*, [0063], [0065], [0067].

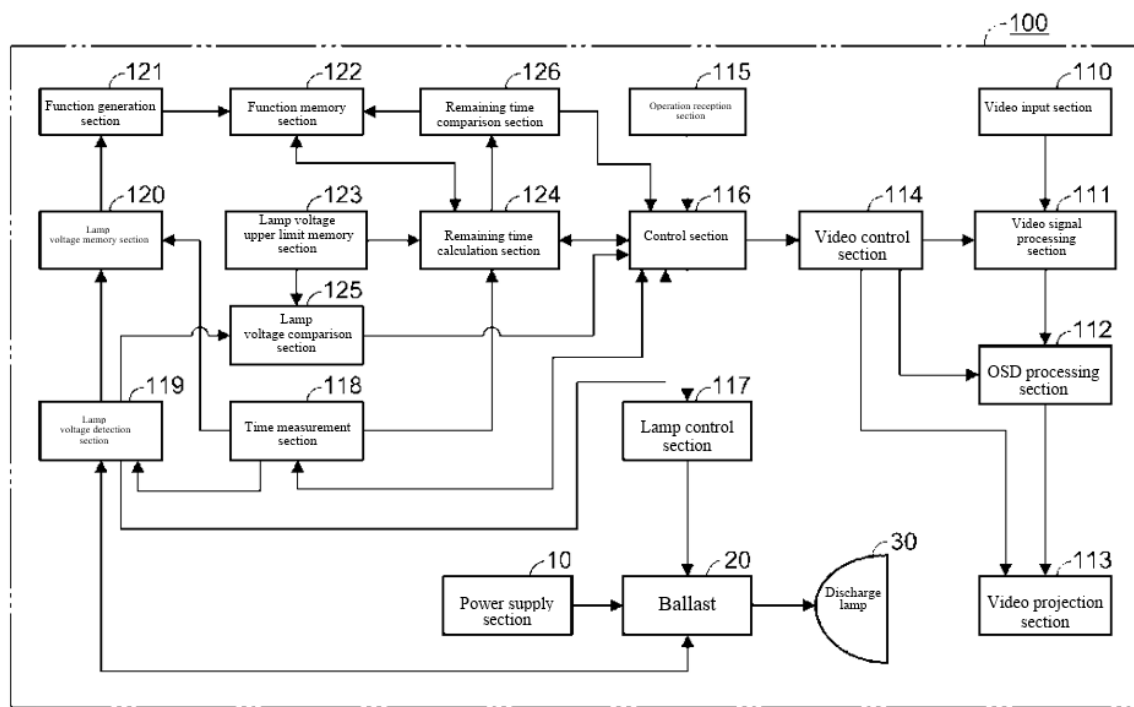
C. Abe (EX1007)

54. Abe was filed as Japan Application No. JP2006307544A on November 14, 2006, and published as Japan Publication No. JP2008122746A on May 29, 2008. EX1007. Accordingly, Abe qualifies as prior art under 35 U.S.C. § 102(a) at least because it was published before the priority date of the '569 Patent (July 4, 2014). *Id.* Abe was neither cited nor considered by the Examiner during prosecution of the '569 Patent. *Id.*

55. Abe relates to a projection-type image display device that uses a discharge lamp as its light source. EX1007, [0001]. The display device incorporates a time measuring unit to track the duration of the lamp's usage from the start of operation. *Id.*, [0007]-[0008]. Based on the lamp's characteristics, the estimated remaining lifespan can be calculated, ensuring appropriate maintenance and replacement timing to preserve optimal image quality. *Id.*

56. FIGS. 1 and 3, reproduced below, show the overall arrangement of Abe's projection-type image display device:





[FIG. 3]

57. Abe's display device includes "a time measurement section 118, a lamp voltage detection section 119, [and] a lamp voltage memory section 120." EX1007, [0035]. The time measurement section 118 functions as a lighting period managing unit by tracking the accumulated lighting period of the discharge lamp 30 (*i.e.*, the amount of time the discharge lamp has been used) under the control of the control section 116. *Id.*, [0039]. The time measurement section 118 also determines when to detect the lamp voltage and instructs the lamp voltage detection section 119 accordingly. *Id.* The lamp voltage memory section 120 then records the detected lamp voltage along with the corresponding lamp usage period from the time measurement section 118, storing both in the lamp information memory 31. *Id.*

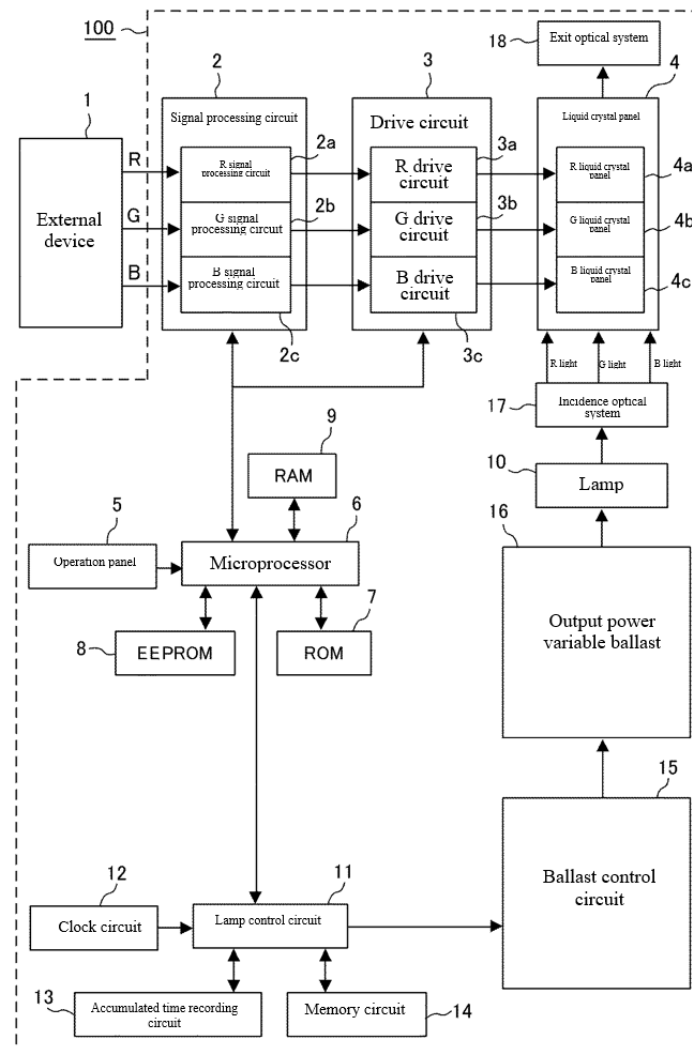
D. Ishitani (EX1008)

58. Ishitani was filed as Japan Application No. JP2004047674A on February 24, 2004, and was published as Japan Publication No. JP2005241708A on September 8, 2005. EX1008. Accordingly, Ishitani qualifies as prior art under 35 U.S.C. § 102(a) at least because it was published before the priority date of the '569 Patent (July 4, 2014). *Id.* Ishitani was neither cited nor considered by the Examiner during prosecution of the '569 Patent. *Id.*

59. Ishitani discloses a projection display device that can display an image with a constant brightness for an extended period of time without generating white or black gradation collapse, along with a memory that can store the image correction data. EX1008, [0006]-[0008].

60. FIG. 1, reproduced below, shows the overall configuration of Ishitani's projection display device:

[FIG. 1]



61. Ishitani's projection display device includes a lamp control circuit 11 that adjusts the brightness of the lamp 10 based on the cumulative lighting time recorded in the accumulated time recording circuit 13. EX1008, [0017]. The lamp control circuit 11 transmits brightness control information to the ballast control circuit 15, which regulates the output power of the variable ballast 16. *Id.*, [0018]. The adjustment compensates for brightness degradation caused by prolonged use, ensuring reliable correction at low cost without compromising image quality. *Id.*, [0026].

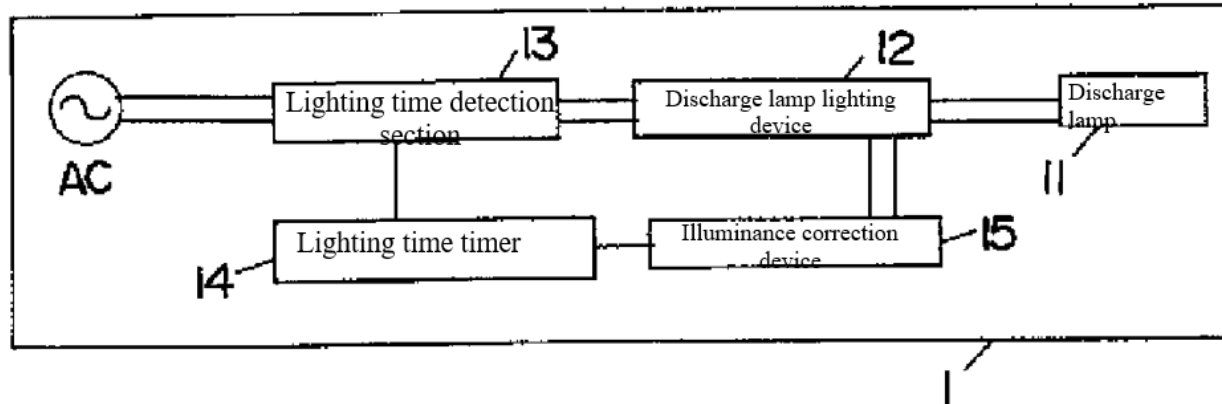
E. Kambara (EX1009)

62. Kambara was filed as Japan Application No. JP H11-180884A on June 25, 1999, and was published as Japan Publication No. JP2001015276A on January 19, 2001. EX1009. Kambara qualifies as prior art under 35 U.S.C. § 102(a) at least because it was published before the priority date of the '569 Patent (July 4, 2014). *Id.* Kambara was neither cited nor considered by the Examiner during prosecution of the '569 Patent. *Id.*

63. Kambara discloses a discharge lamp lighting device that can light the discharge lamp and control power supplied to the discharge lamp. This device includes a lighting time timer for measuring the usage time of the discharge lamp, and the measured data is used to adjust the image quality. EX1009, [0008].

64. As shown in FIG. 1 (reproduced below), the lighting device includes a discharge lamp 11, a lighting time detection section 13, a lighting time timer 14, and an illumination correction device 15. EX1009, [0021]-[0022]. The lighting time timer 14 tracks the usage time of the discharge lamp 11 and transmits this data to the illumination correction device 15. *Id.*, [0022]. In response, the illumination correction device 15 regulates the power supply to the discharge lamp 11, thereby compensating for light output degradation over time. *Id.*

[FIG. 1]



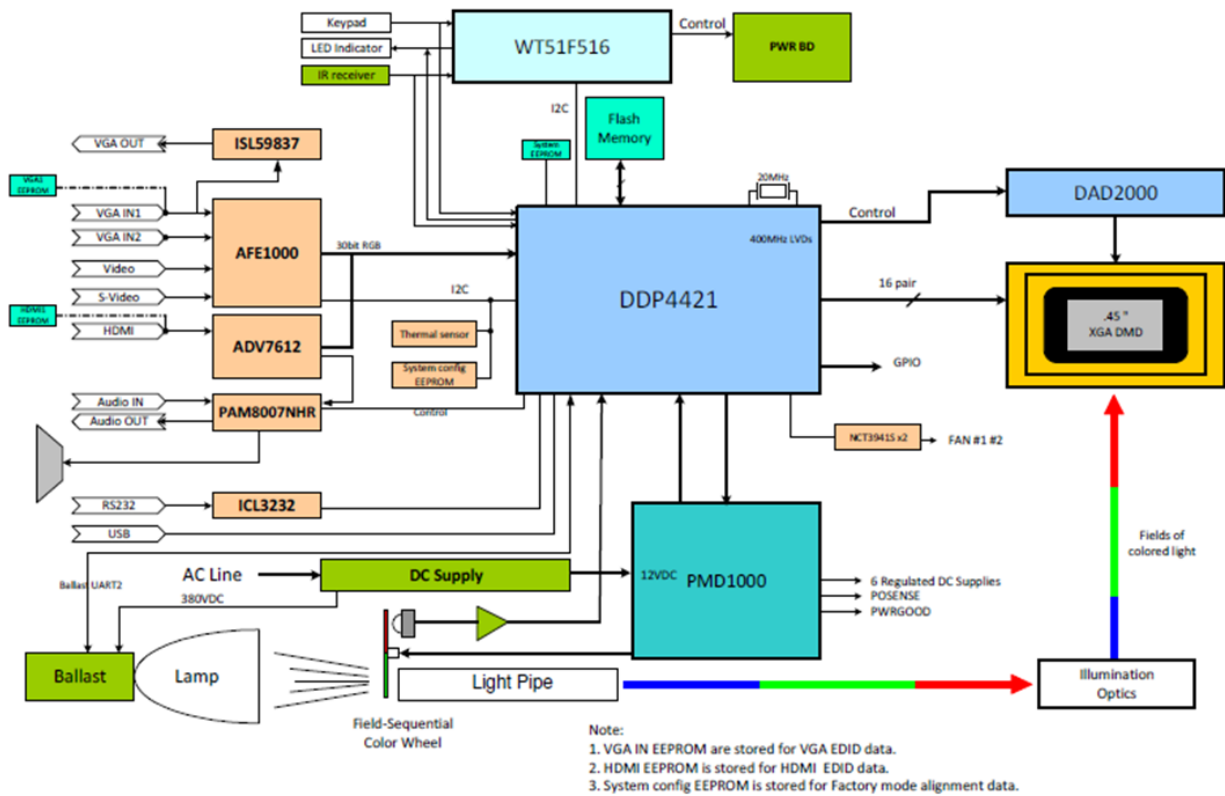
F. CP-DX300-SM (EX1011)

65. CP-DX300-SM qualifies as prior art under 35 U.S.C. § 102(a)(1) because it is a printed publication that was publicly accessible before the priority date of the '569 Patent. CP-DX300-SM was neither cited nor considered by the Examiner during prosecution of the '569 Patent.

66. CP-DX300-SM provides detailed instructions for the maintenance, troubleshooting, and repair of a Hitachi model CP-DX300 projector. It can reasonably be assumed that CP-DX300-SM, the service manual for that model, was available to the relevant public at least by the effective filing date of the '569 Patent in order to provide instructions on the maintenance, troubleshooting, and repair thereof.

67. The following block diagram found in CP-DX300-SM shows the overall configuration of the projector:

10. Block Diagram



Main board & Input board Block Diagram

EX1011 at 59.

68. CP-DX300-SM discloses that the Hitachi CP-DX300 projector is a projection-type image display device including a discharge lamp as a light source. EX1011 at 10, 32. As detailed in CP-DX300-SM, the projector includes a lamp driving unit (*i.e.*, Ballast), a lamp voltage detection unit (*i.e.*, one or more processors in the Ballast), an image correction processing unit (*i.e.*, DDP4421 and/or ADV7612), an image display element (*i.e.*, DMD), a control unit (*i.e.*, DDP4421), and a menu screen creating unit (*i.e.*, DDP4421). *Id.* at 26, 59.

G. CP-DX300-UM (EX1012)

69. CP-DX300-UM qualifies as prior art under 35 U.S.C. § 102(a)(1) because

it is a printed publication that was publicly accessible before the priority date of the '569 Patent. CP-DX300-UM was neither cited nor considered by the Examiner during prosecution of the '569 Patent.

70. CP-DX300-UM provides instructions to users on how to use and operate the Hitachi CP-DX300 projector. It can reasonably be assumed that CP-DX300-UM, the user manual for that model, was available to the relevant public at least by the effective filing date of the '569 Patent in order to provide the necessary instructions on how to use it.

71. CP-DX300-UM provides instructions on how to use and operate the Hitachi CP-DX300 projector. The following figure from CP-DX300-UM (annotation added) shows an example of the on-screen display (OSD) menu. EX1012 at 18. The setting item in the red square shows that the Hitachi CP-DX300 can perform image quality correction. *Id.*

Using the menus

The projector is equipped with On-Screen Display (OSD) menus for making various adjustments and settings.

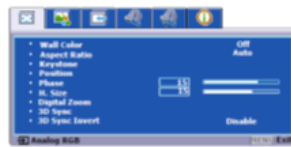
 The OSD screenshots below are for reference only, and may differ from the actual design.

Below is the overview of the OSD menu.

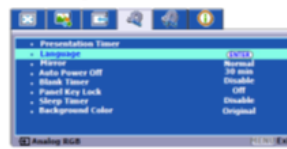


To use the OSD menus, please set them to your familiar language first.

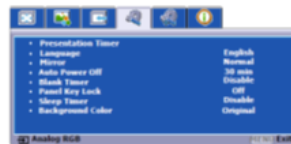
1. Press MENU on the projector or MENU/EXIT on the remote control to turn the OSD menu on.



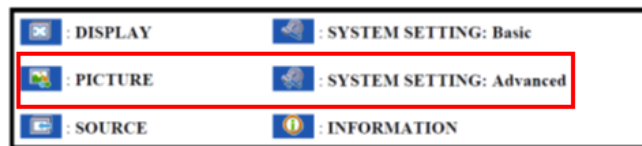
3. Press ▼ to highlight Language and press MODE/ENTER.



2. Use ◀▶ to highlight the SYSTEM SETTING: Basic menu.



4. Press ◀▲/▼▶ to select a preferred language.
5. Press MENU on the projector or MENU/EXIT on the remote control to leave and save the settings.



VIII. The Challenged Claims Are Unpatentable

A. Pollmann-Retsch in View of Hirabayashi Renders Claim 1 Obvious

72. In my opinion and for the reasons explained below, Pollmann-Retsch in view of Hirabayashi renders obvious the subject matter recited by claim 1 of the '569 Patent.

73. As a threshold matter, a POSITA would have been motivated to combine Pollmann-Retsch with Hirabayashi, and would have had a reasonable expectation of success in making the combination. Pollmann-Retsch is directed to a projection system

that includes a gas discharge lamp and associated driving units, in which the driving units driving the discharge lamp “maintain a desired target light flux [*i.e.*, light output] even if the length of the discharge arc is changing, and [] provide appropriate driving units which can be used, for example, in an image rendering system to avoid undesirable variations of the light flux.” EX1005, [0005].

74. In Pollamn-Retsch, the image rendering system is particularly a projector system. EX1005, [0001]. Pollmann-Retsch further teaches that if the driving unit is used in a system with a user interface, the user of that system would want to control the light flux delivered by the gas discharge lamp. *Id.*, [0064]. Pollmann-Retsch’s invention object therefore aligns with the stated purpose of the ’569 Patent, which is to perform brightness correction and maintain consistent illuminance of the discharge lamp over long-term usage.

75. Hirabayashi is directed to a projector that includes an image processing section configured to perform image quality corrections based on parameters entered into an image quality adjustment menu, thereby enabling a user to adjust the display conditions for an image. EX1006, abstract; [0063].

76. A POSITA would have recognized that the image quality adjustment menu disclosed by Hirabayashi therefore functions as a user interface that allows a user to select one or more display condition(s) to adjust. For example, the “color mode” in the image quality adjustment menu sets the brightness of an image based on the type or

content of that image, the audio-visual environment, *etc.* EX1006, [0066]. Hirabayashi also enables a user to select value(s) for settings such as brightness, contrast, color depth, color balance, and sharpness. *Id.*, [0057], [0063], [0065]. Hirabayashi's invention therefore provides a solution for achieving the '569 Patent's objective of adjusting image quality based on user preferences.

77. The BenQ MX823ST User Manual, which has been publicly available since at least 2013 (the year BenQ MX823ST was first sold or offered for sale), demonstrates the industry's established practice of incorporating both automatic brightness adjustment and user-controlled image quality adjustments within a single projection system. EX1013 at 66; EX1014; EX1015. The BenQ MX823ST User Manual explicitly shows a projector that includes an on-screen display (OSD) menu having a "LumenCare" function to maintain image brightness over time and also provides user-adjustable settings. EX1013 at 40, 50. The following annotated figures from the BenQ MX823ST User Manual show that the projector can keep the image brightness constant without losing too much brightness after long-term usage. *Id.*

Main menu	Sub-menu	Options
5. SYSTEM SETUP: Advanced	High Altitude Mode	On/Off
	Mute	On/Off
	Volume	
	Audio Settings	Power On/Off
	Ring Tone	On/Off
	Lamp Mode	Normal/Economic/SmartEco/ LampSave/LumenCare
	Lamp Settings	Reset Lamp Timer
	Equivalent Lamp	
	Change Password	
	Security Settings	Change Security Settings
	Baud Rate	2400/4800/9600/14400/19200/ 38400/57600/115200
	Test Pattern	On/Off
	Closed Caption	Closed Caption Enable
	Enable	On/Off
	Caption Version	CC1/CC2/CC3/CC4
	Network	On/Off
	Monitor Out	On/Off
	Standby Settings	Audio Pass Through
	MHL Charging	On/Off
6. INFORMATION	Network Settings	Status
		DHCP
		IP Address
		Subnet Mask
		Default Gateway
	Wired LAN	DNS Server
		Apply
		AMX Device Discovery
		On/Off
		MAC Address
	Reset All Settings	

Note that the menu items are available when the projector detects at least one valid signal. If there is no equipment connected to the projector or no signal detected, limited menu items are accessible.

40 Operation

Lamp mode	Description
Normal	Provides full lamp brightness
Economic	Lowers brightness to extend the lamp life and decreases the fan noise
SmartEco	Adjusts the lamp power automatically depending on the content brightness level
LampSave	Adjusts the lamp power automatically and lowers the brightness to extend the lamp life
LumenCare	Keeps the image brightness constant without losing too much brightness after long-term usage

• Setting Auto Power Off

This function allows the projector to turn off automatically if no input signal is detected after a set period of time to prevent unnecessary waste of lamp life.

To set **Auto Power Off**, go into the **SYSTEM SETUP: Basic > Operation Settings > Auto Power Off** menu and press ◀/▶. If the preset time lengths are not suitable for your presentation, select **Disable**. The projector will not automatically shut down in a certain time period.

78. The following figures from the BenQ MX823ST User Manual show that the projector is also capable of performing image quality adjustment(s) based on a user's preference and not the lamp voltage, *e.g.*, Adjusting Brightness, Adjusting Contrast, Adjusting Color, Adjusting Tint, Adjusting Sharpness, and Adjusting Brilliant Color. *Id.* at 30, 38.

Menu system

Please note that the on-screen display (OSD) menus vary according to the signal type selected and the projector model you are using.

Main menu	Sub-menu	Options
1. DISPLAY	Wall Color	Off/Light Yellow/Pink/Light Green/Blue/Blackboard
	Aspect Ratio	Auto/Real/4:3/16:9/16:10
	Keystone	
	Position	
	Phase	
	H. Size	
	Digital Zoom	
	3D Mode	Auto/Top Bottom/Frame Sequential/Frame Packing/Side by Side/Off
	3D Sync Invert	Disable/Invert
	3D Apply 3D Settings	3D Settings 1/3D Settings 2/3D Settings 3/Off
2. PICTURE	3D Save 3D Settings	3D Settings 1/3D Settings 2/3D Settings 3
	Teaching Template	Blackboard Off/Letter Formation/Worksheet/Coordinate Chart
		Whiteboard Off/Letter Formation/Worksheet/Coordinate Chart
	Picture Mode	Dynamic/Presentation/sRGB/Cinema/(3D)/User 1/User 2
	Reference Mode	Dynamic/Presentation/sRGB/Cinema/(3D)
	Brightness	
	Contrast	
	Color	
	Tint	
	Sharpness	
3. SOURCE	Brilliant Color	On/Off
	Color Temperature	Cool/Normal/Warm
	Color Temperature Fine Tuning	R Gain/G Gain/B Gain/R Offset/G Offset/B Offset
	3D Color Management	Primary Color R/G/B/C/M/Y
		Hue
		Saturation
		Gain
	Reset Picture Settings	Current/All/Cancel
	Quick Auto Search	On/Off
	Color Space Conversion	Auto/RGB/YUV

Fine-tuning the image quality in user modes

According to the detected signal type and selected picture mode, some of the below functions may not be available. Based on your needs, you can make adjustments to these functions by highlighting them and pressing ◀/▶ on the projector or remote control.

Adjusting Brightness

The higher the value, the brighter the image. And the lower the setting, the darker the image. Adjust this control so the black areas of the image appear just as black and that detail in the dark areas is visible.



Adjusting Contrast

The higher the value, the greater the contrast. Use this to set the peak white level after you have previously adjusted the Brightness setting to suit your selected input and viewing environment.



Adjusting Color

Lower setting produces less saturated colors. If the setting is too high, colors on the image will be overpowering, which makes the image unrealistic.

Adjusting Tint

The higher the value, the more reddish the picture becomes. The lower the value, the more greenish the picture becomes.

Adjusting Sharpness

The higher the value, the sharper the picture becomes. The lower the value, the softer the picture becomes.

Adjusting Brilliant Color

This feature utilizes a new color-processing algorithm and system level enhancements to enable higher brightness while providing truer, more vibrant colors in picture. It enables a greater than 50% brightness increase in mid-tone images, which are common in video and natural scenes, so the projector reproduces images in realistic and true colors. If you prefer images with that quality, select **On**. If you don't need it, select **Off**.

When **Off** is selected, the **Color Temperature** function is not available.

Selecting a Color Temperature

The options available for color temperature* settings vary according to the signal type selected.

1. **Cool**: Makes images appear bluish white.
2. **Normal**: Maintains normal colorings for white.
3. **Warm**: Makes images appear reddish white.

*About color temperatures:

There are many different shades that are considered to be "white" for various purposes. One of the common methods of representing white color is known as the "color temperature". A white color with a low color temperature appears to be reddish white. A white color with a high color temperature appears to have more blue in it.

79. Because Pollmann-Retsch and Hirabayashi each addresses an essential aspect of image quality correction—automatic brightness regulation and user-driven adjustments—the combination of their teachings is not just logical, but also consistent with established industry practices as shown, for example, by the BenQ MX823ST User Manual. A POSITA would therefore have been motivated to combine their teachings to achieve the benefits of having both automatic brightness stabilization and user-

adjustable image settings within a single projector system. Therefore, the combination of Pollmann-Retsch and Hirabayashi would have been an obvious choice for a POSITA seeking to enhance projector performance and user experience by ensuring consistent brightness and customizable image quality.

1. Independent Claim 1

[1.0] A projection-type image display device including a discharge lamp as a light source, comprising:

80. Pollmann-Retsch discloses a projection-type image display device including a discharge lamp as a light source, *e.g.*, “the invention relates to appropriate driving units for driving a gas discharge lamp and to an image rendering system, particularly a projector system, comprising gas discharge lamps and such driving units.” EX1005, abstract; [0001]-[0002].

[1.1] a lamp driving unit configured to drive the discharge lamp;

81. Pollmann-Retsch discloses a lamp driving unit configured to drive the discharge lamp, *e.g.*, “the invention relates to appropriate driving units for driving a gas discharge lamp.” EX1005, abstract. Moreover, as can be seen below, “FIG. 3 shows a gas discharge lamp 1 and a block diagram of a possible realization of a driving unit 4 according to the invention”:

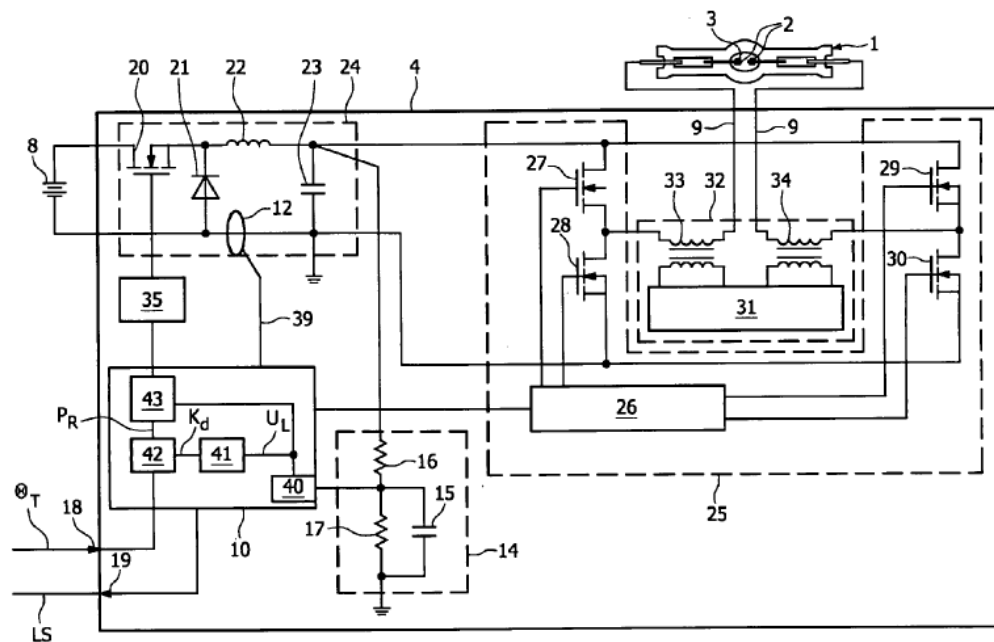


FIG. 3

EX1005, [0053].

[1.2] a lamp voltage detection unit configured to detect a voltage between electrodes (hereinafter, a lamp voltage) of the discharge lamp;

82. Pollmann-Retsch discloses a lamp voltage detection unit configured to detect a voltage between electrodes (hereinafter, a “lamp voltage”) of the discharge lamp, *e.g.*, “the voltage determination unit 40 would comprise an analogue/digital converter which measures the voltage across resistor 17 and generates a digital output value U_L , which represents the actual voltage across the gas discharge lamp.” EX1005, [0062]. The voltage determination unit 40 is also shown in FIG. 3:

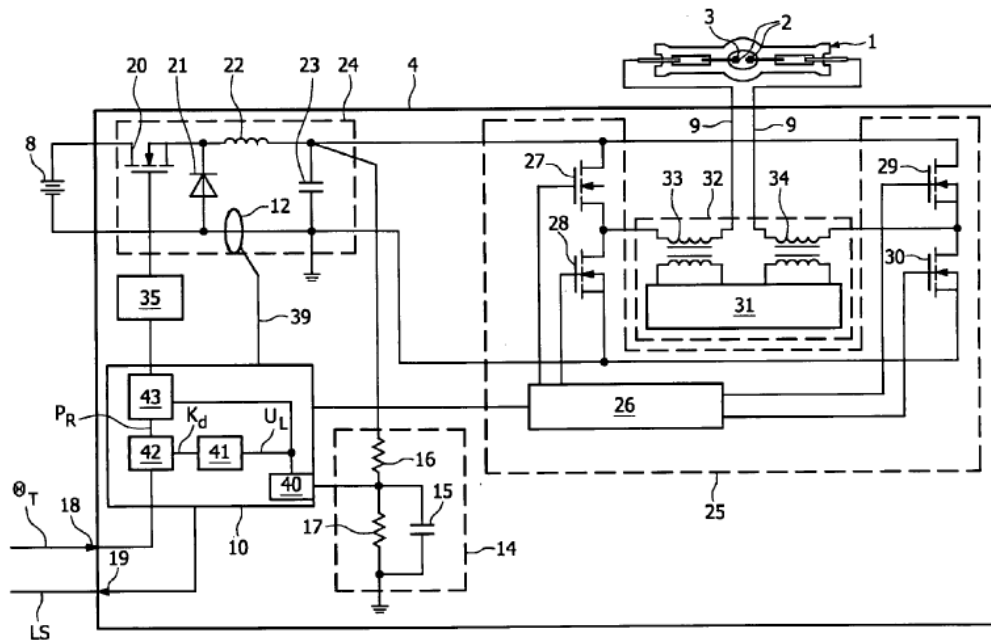


FIG. 3

[1.3] an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element;

83. The combination of Pollmann-Retsch and Hirabayashi teaches an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element.

84. Pollmann-Retsch discloses a correction function that adjusts lamp power to maintain a target light flux based on a measured voltage value across the gas discharge lamp, thereby performing image quality correction on an image signal. EX1005, [0005]. Pollmann-Retsch states that “it is an object of the present invention to provide methods of driving a gas discharge lamp to maintain a desired target light flux even if the length of the discharge arc is changing....” EX1005, [0005]. To achieve that object, Pollmann-

Retsch further teaches that “a correction function representing the dependency of light flux on a discharge arc length is applied to calculate a required lamp power value for a target light flux value by using the determined lamp voltage value.” *Id.*, [0006]. Pollmann-Retsch explains that “the methods according to the invention are controlling the operation of a gas discharge lamp such that a pre-defined target light flux is achieved. ... Such a requirement is typically given for image rendering systems, since they should be able to dim the light output for darker images or video scenes.” *Id.*, [0009].

85. Pollmann-Retsch provides additional details on these methods. First, “[t]he correction factor determination unit 41 receives a voltage value U_L from the voltage determination unit 40” and then “[b]ased on th[at] voltage value U_L , the correction factor determination unit 41 determines a correction factor K_d which represents the dependency of the light flux Φ on the length of the discharge arc d of lamp 1.” EX1005, [0062]-[0063]. Additionally, “the image rendering system might set a target light flux Φ_T via signal input 18 in accordance with the brightness of the image or video. For example, for darker scenes, the image rendering system would convey a lower target light flux value Φ_T to the control unit 10 via signal input 18.” *Id.*, [0064]. Finally, “[b]ased on the correction factor K_d and the target light flux value Φ_T , the power calculation unit calculates a required lamp power value P_R which is necessary to achieve the target light flux value Φ_T .” *Id.* The relevant components and variables are shown in FIG. 3:

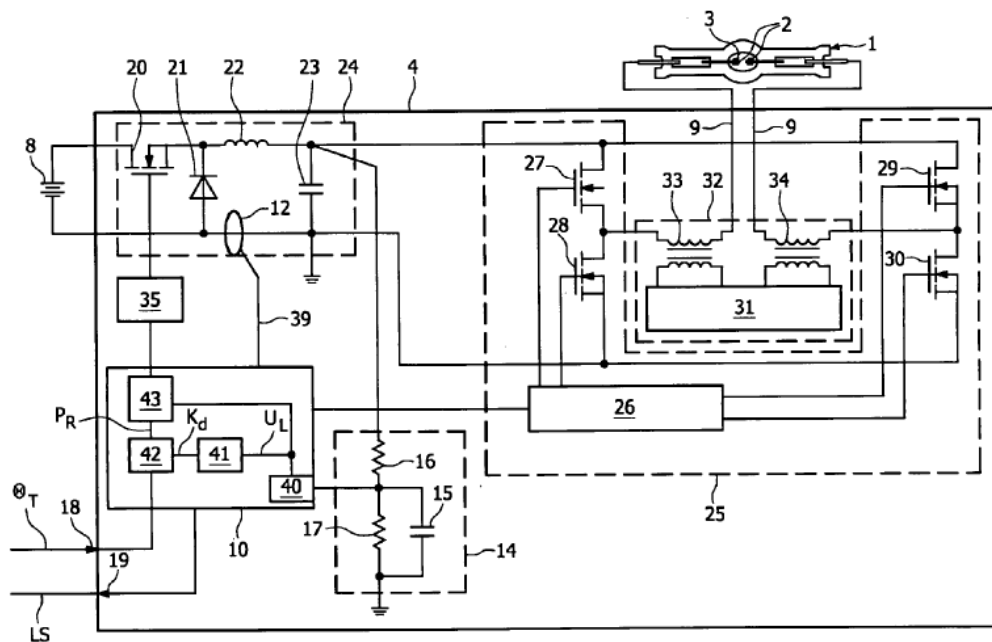


FIG. 3

86. Hirabayashi teaches that “the image data processing section 25 obtains a plurality of parameters (a parameter set) for adjusting the image quality from the control section 20, and performs various image quality adjustment for adjusting display conditions of the image, such as adjustment of brightness, contrast, sharpness, color, and so on, or the gamma correction on the image data thus converted in accordance with the parameter set.” EX1006, [0057]. Hirabayashi further teaches that “the image data output from the image data processing section 25 is directly supplied to the light valve drive section 14.” *Id.*, [0058]. Hirabayashi indicates that “[t]he liquid crystal light valve 12 is provided with a plurality of pixels...the light valve drive section 14 driving the liquid crystal light valve 12 according to the image signal.” *Id.*, [0049]. A POSITA would have recognized the liquid crystal light valve 12 is an image display element.

the gas discharge lamp according to the calculated required lamp power value. Since a typical state of the art [sic] lamp driving unit already comprises modules or units for obtaining a lamp voltage....” *Id.*, [0011].

89. Pollmann-Retsch further teaches that “control unit 10 comprises a correction factor determination unit 41, a power calculation unit 42, and a power control unit 43. The correction factor determination unit 41 receives a voltage value U_L from the voltage determination unit 40. In many cases, the voltage determination unit 40 would comprise an analogue/digital converter which measures the voltage across resistor 17 and generates a digital output value U_L , which represents the actual voltage across the gas discharge lamp.” EX1005, [0062]. Pollmann-Retsch also teaches that “the correction factor determination unit 41 determines a correction factor K_d , which represents the dependency of the light flux Φ” *Id.*, [0063].

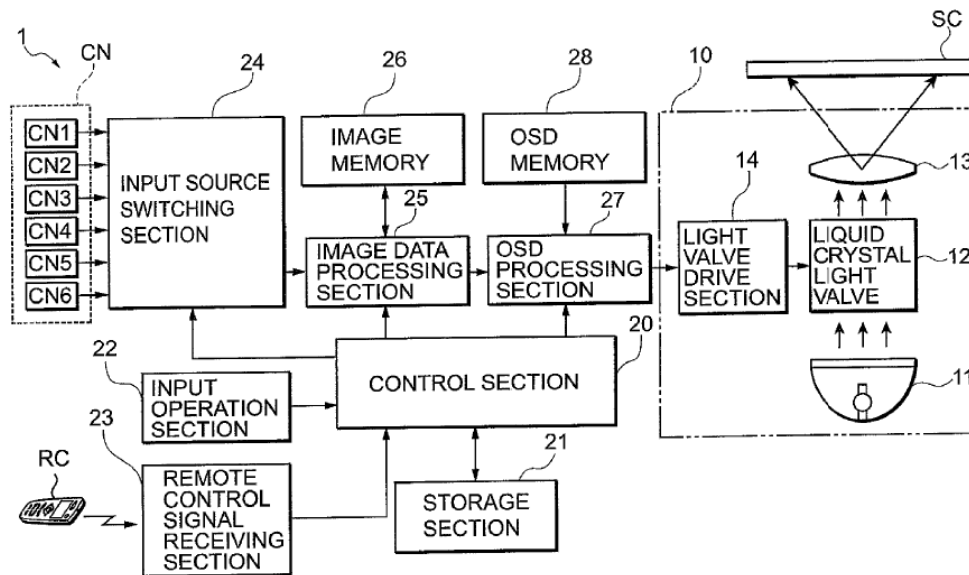
90. Finally, the power control unit 43 controls an amount of correction by controlling the level converter. Pollmann-Retsch explains that “[t]he required lamp power value P_R is submitted to the power control unit 43, which controls the level converter 35. Thereby, with the use of the voltage value U_L as derived by the voltage determination unit 40, [] the lamp is operated at a lamp power level that ensures that the light flux Φ delivered from the gas discharge lamp 1 meets the target light flux value Φ_T .” EX1005, [0066].

[1.5] a menu screen creating unit,

91. This element is disclosed by Pollmann-Retsch in view of Hirabayashi.

Hirabayashi discloses a menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27, as shown in FIG. 1:

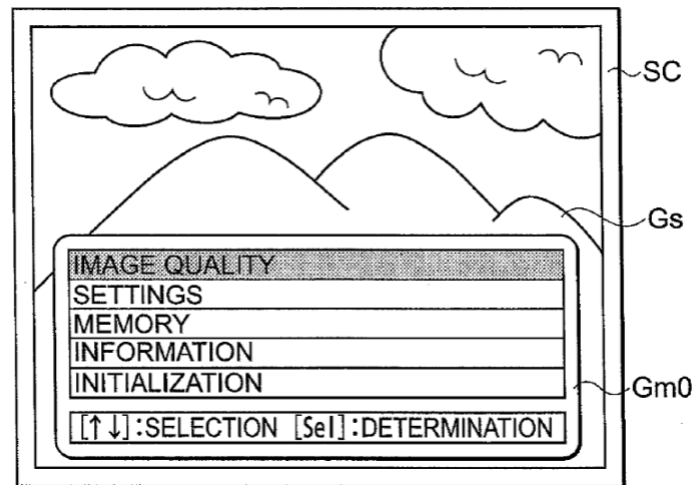
FIG. 1



92. Hirabayashi teaches that “[t]he projector 1 is further provided with...an OSD processing section 27....” EX1006, [0051]. “[T]he OSD processing section 27 performs a process for superimposing an on-screen display (OSD) image composed of a menu image or a message image onto an input image (an image based on the input image signal).” *Id.*, [0058].

93. Hirabayashi further teaches that “FIG. 2 [reproduced below] is an explanatory diagram for explaining a menu image to be superimposed by the OSD processing section 27....” EX1006, [0061].

FIG.2



[1.6] wherein, via a menu screen created by the menu screen creating unit, both a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable,

94. The combination of Pollmann-Retsch and Hirabayashi discloses that a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable via a menu screen created by the menu screen creating unit.

95. Pollmann-Retsch discloses a first setting item regarding an image quality adjustment. EX1005, [0005], [0064]. Hirabayashi discloses a second setting item regarding an image quality adjustment. EX1006, [0065]-[0066]. The combination of Pollmann-Retsch and Hirabayashi discloses a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable via a menu screen—a well-known type of user interface—created by the menu screen creating unit.

96. As discussed above, the BenQ MX823ST User Manual demonstrates that automatic brightness adjustment and user-controlled image quality adjustments within a single projection system were well-known industry practice. Therefore, it would have been obvious to a POSITA to combine Pollmann-Retsch with Hirabayashi to arrive at the claimed features.

97. Pollmann-Retsch discloses a first setting item regarding an image quality adjustment. A POSITA would have understood that Pollmann-Retsch discloses a first setting item regarding an image quality adjustment that is settable via a menu screen created by the menu screen creating unit, *e.g.*, the light flux can be adjusted to maintain a constant light flux via a user interface. EX1005, [0005], [0064]. Pollmann-Retsch teaches that a driving unit is configured to drive “a gas discharge lamp to maintain a desired target light flux even if the length of the discharge arc is changing.” EX1005, [0005]. “The driving unit 4 [] is used in a system with a user interface, the user of the system might want to control the light flux delivered by the gas discharge lamp.” *Id.*, [0064]. Alternatively, a POSITA would have recognized that the combination of Pollmann-Retsch and Hirabayashi discloses that the first setting item regarding an image quality adjustment is settable via a menu screen created by the menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27. EX1006, [0051].

98. Hirabayashi discloses that a second setting item regarding an image quality adjustment, *e.g.*, brightness, contrast, color depth, color, sharpness, and gamma

correction. For example, Hirabayashi teaches that “the image data processing section 25 obtains a plurality of parameters (a parameter set) for adjusting the image quality from the control section 20, and performs various image quality adjustment for adjusting display conditions of the image, such as adjustment of brightness, contrast, sharpness, color, and so on, or the gamma correction on the image data thus converted in accordance with the parameter set.” EX1006, [0057]. Hirabayashi further discloses that this image quality adjustment is settable via a menu screen created by the menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27, as shown in FIGS. 3 and 5 below.

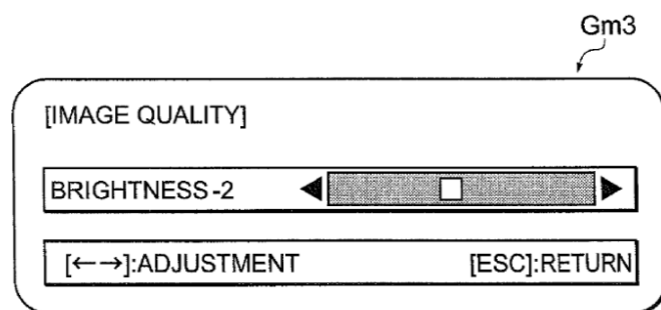
FIG.3

Gm1

COLOR MODE	NATURAL
BRIGHTNESS	-2□
CONTRAST	5□
COLOR DEPTH	3□
COLOR	0□
SHARPNESS	2

[↑↓]:SELECTION [Sel]:DETERMINATION [ESC]:RETURN

FIG.5



99. Hirabayashi teaches: As shown in FIG. 3, in the image quality adjustment menu image Gm1, there are displayed six adjustment item names of “color mode,” “brightness,” “contrast,” “color depth,” “color,” and “sharpness (edge enhancement)” arranged in the vertical direction...[and]...the degree thereof can be fine-adjusted by increasing and decreasing the parameter within a predetermined range.... EX1006, [0065]-[0066]. Hirabayashi also teaches that “[t]he user can increase and decrease the numerical value with the leftward/rightward keys (“←” and “→”).” *Id.*, [0067]. Alternatively, a POSITA would have recognized that Hirabayashi discloses that the second setting item regarding an image quality adjustment is settable via a menu screen created by the menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27. EX1006, [0051].

[1.7] the first setting item is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and

100. Pollmann-Retsch discloses that the first setting item, *e.g.*, setting the light flux to maintain a constant light flux via a user interface, is configured to control the

amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit.

101. Pollmann-Retsch teaches to control the amount of correction, *e.g.*, “a value of voltage across the gas discharge lamp is determined. Subsequently, a correction function...is applied...” EX1005, [0006]. Specifically, “[t]he power calculation unit calculates a required lamp power value for a target light flux value using the lamp voltage value and a correction function, whereby the correction function represents the dependency of light flux on a discharge arc length. The power control unit then operates the gas discharge lamp according to the calculated required lamp power value. Since a typical state of the art [sic] lamp driving unit already comprises modules or units for obtaining a lamp voltage....” *Id.*, [0011].

102. Pollmann-Retsch further teaches that “control unit 10 comprises a correction factor determination unit 41, a power calculation unit 42, and a power control unit 43. The correction factor determination unit 41 receives a voltage value U_L from the voltage determination unit 40. In many cases, the voltage determination unit 40 would comprise an analogue/digital converter which measures the voltage across resistor 17 and generates a digital output value U_L , which represents the actual voltage across the gas discharge lamp.” EX1005, [0062]. Pollmann-Retsch also teaches that “the correction factor determination unit 41 determines a correction factor K_d , which represents the dependency of the light flux Φ” *Id.*, [0063].

103. The power control unit controls the amount of correction by controlling the level converter. Pollmann-Retsch teaches that “[t]he required lamp power value P_R is submitted to the power control unit 43, which controls the level converter 35.” EX1005, [0066]. The relevant components and parameters are shown below in FIG. 3.

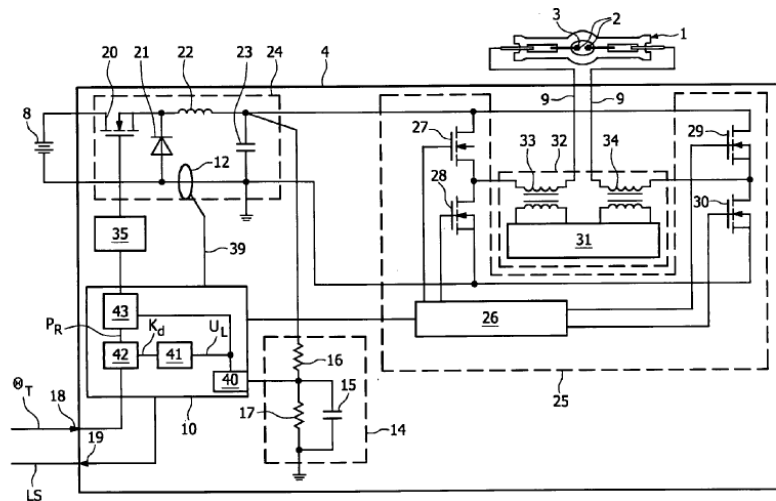


FIG. 3

104. Finally, as described above, Pollmann-Retsch teaches that “[t]he driving unit 4 [] is used in a system with a user interface, the user of the system might want to control the light flux delivered by the gas discharge lamp.” EX1005, [0064]. Alternatively, a POSITA would have recognized that the combination of Pollmann-Retsch and Hirabayashi discloses that the first setting item is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit via a menu screen created by the menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27. EX1006, [0051].

[1.8] the second setting item is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit.

105. This element is disclosed by Hirabayashi. More particularly, Hirabayashi discloses that the second setting item, brightness, contrast, color depth, color, sharpness, and gamma correction, is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit, *e.g.*, each of “brightness,” “contrast,” “color depth,” “color,” and “sharpness” has a value that can be set by the users, as shown in FIG. 3 below.

FIG.3

Gm1

COLOR MODE	NATURAL
BRIGHTNESS	-2□
CONTRAST	5□
COLOR DEPTH	3□
COLOR	0□
SHARPNESS	2

[↑↓]:SELECTION [Sel]:DETERMINATION [ESC]:RETURN

106. As described above with respect to the “via a menu screen” element, Hirabayashi teaches: As shown in FIG. 3, in the image quality adjustment menu image Gm1, there are displayed six adjustment item names of “color mode,” “brightness,” “contrast,” “color depth,” “color,” and “sharpness (edge enhancement)” arranged in the vertical direction....[and]...the degree thereof can be fine-adjusted by increasing and

decreasing the parameter within a predetermined range.... EX1006, [0065]-[0066]. Hirabayashi also teaches that “[t]he user can increase and decrease the numerical value with the leftward/rightward keys (“←” and “→”).” *Id.*, [0066]-[0067]. Alternatively, a POSITA would have recognized that Hirabayashi discloses that the second setting item is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit via a menu screen created by the menu screen creating unit, *e.g.*, an OSD (on-screen display) processing section 27. EX1006, [0051].

B. Pollmann-Retsch in view of Hirabayashi, Abe, and Ishitani Renders Claims 2-3 Obvious

107. In my opinion and for the reasons explained below, Pollmann-Retsch in view of Hirabayashi, Abe, and Ishitani, renders obvious the subject matter recited by claims 2-3 of the ’569 Patent.

108. As a threshold matter, a POSITA would have been motivated to combine Pollmann-Retsch with Hirabayashi, Abe, and Ishitani because such a combination is nothing more than the ordinary use of conventional prior art elements according to their well-known and established function(s).

109. As discussed above, Pollmann-Retsch and Hirabayashi disclose complementary methods for image quality adjustment in a projector. Abe and Ishitani operate within the same field of endeavor and provide additional teachings that reinforce this combination. Specifically, Pollmann-Retsch teaches an image correction unit that

determines the necessary lamp power adjustment to maintain target light flux. Abe discloses that lamp voltage increases as cumulative lamp usage time increases, and Ishitani further teaches that adjusting power output to the discharge lamp compensates for brightness degradation caused by prolonged use. The integration of these references is obvious for a POSITA as it is merely a combination of familiar elements according to known methods and does no more than yield predictable results.

110. Baier, published on January 19, 2012—before the '569 Patent's priority date (July 4, 2014)—further supports this motivation by providing background evidence that adjusting lamp brightness should be based on the detected lamp voltage and cumulative usage time. EX1010. Baier discloses that: [T]he lamp voltage and the cumulative burning time are measured and, using the lamp voltage and the cumulative burning time, the power at the gas discharge lamp is increased with increasing cumulative burning time and with increasing lamp voltage up to a maximum value of the burning voltage, the power at the gas discharge lamp being reduced again after a maximum value of the burning voltage has been reached. *Id.*, [0005]. Baier exemplifies the well-established understanding in the field that lamp voltage and cumulative usage time serve as critical parameters for adjusting brightness, reinforcing the predictability of the proposed combination.

111. Therefore, the combination of Pollmann-Retsch, Hirabayashi, Abe, and Ishitani merely applies known elements and techniques to achieve predictable results,

making it an obvious modification rather than an inventive step.

1. Dependent Claim 2

[2.0] The projection-type image display device according to claim 1, comprising

112. This element is disclosed by Pollmann-Retsch in view of Hirabayashi, as analyzed for claim 1 in Section VIII.A.1, *supra*.

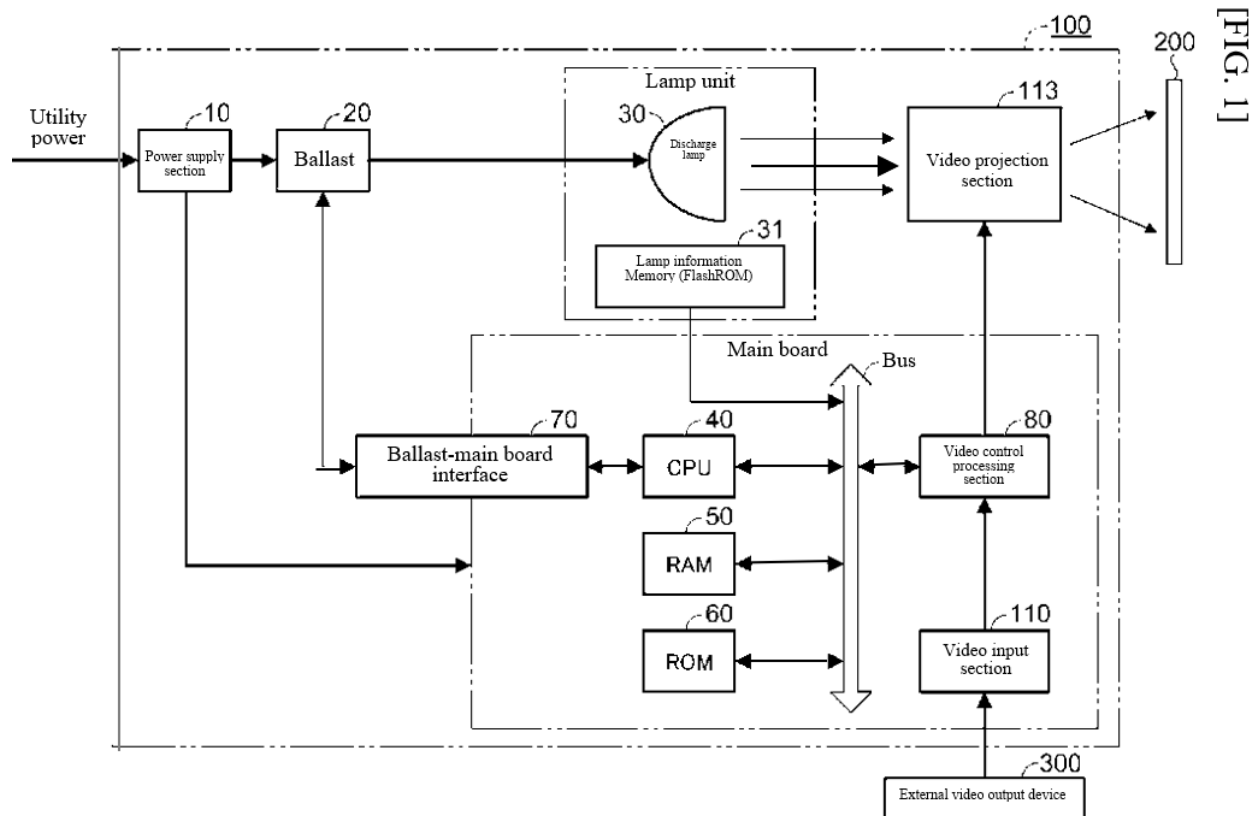
[2.1] a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp, wherein

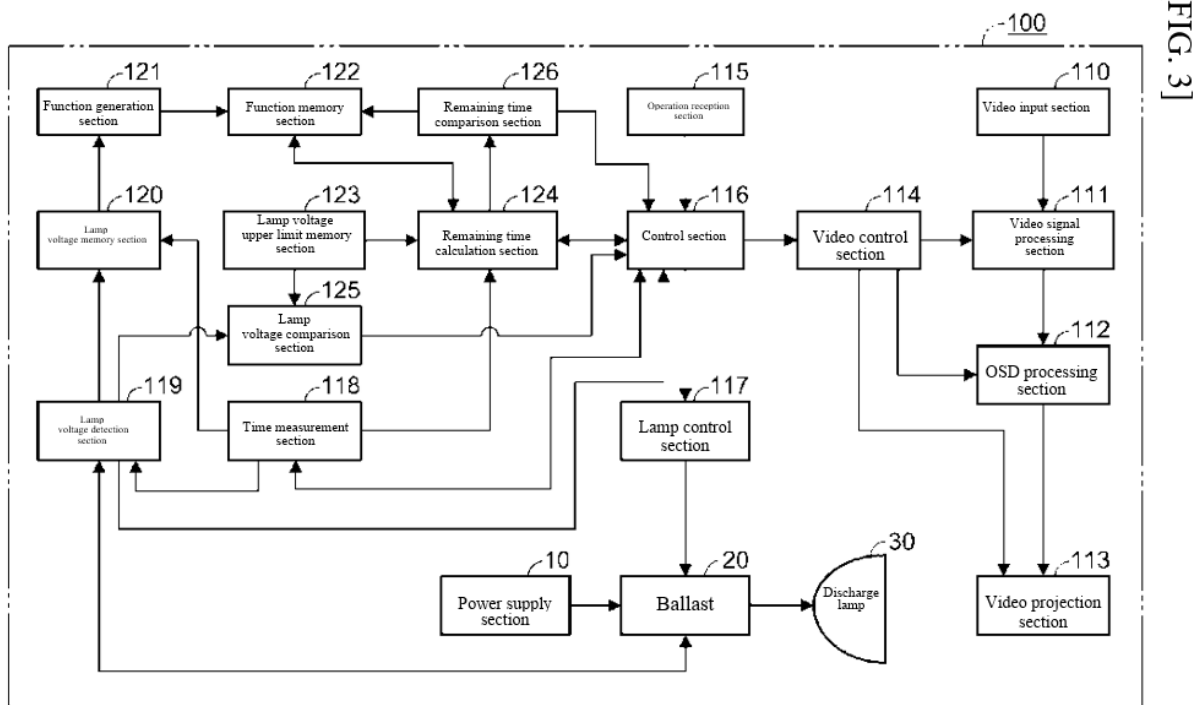
113. This element is disclosed by Pollmann-Retsch in view of Abe. Particularly, Abe discloses a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp, *e.g.*, a time measurement unit measures the usage time and instructs the lamp voltage detection unit on the timing of lamp voltage detection.

114. Abe teaches that “[d]ischarge lamps are known to wear electrodes due to long-term lighting...resulting in an increase in lamp voltage.” EX1007, [0005]. As shown in FIGS. 1 and 3 (reproduced below), “[t]he projector 100 comprises...a time measurement section 118, a lamp voltage detection section 119, a lamp voltage memory section 120.” *Id.*, [0035].

115. Abe further explains that “[t]he time measurement section 118 measures the usage time (cumulative lighting time) of the discharge lamp 30 according to the instructions of the control section 116. In addition, the time measurement section 118

performs periodic time measurement to detect the lamp voltage, and instructs the lamp voltage detection section 119 when to detect the lamp voltage. At the instruction from the time measurement section 118, ... The lamp voltage memory section 120 inputs the lamp voltage from the lamp voltage detection section 119 and stores it in the lamp information memory 31 (See FIG. 1). Furthermore, the lamp voltage memory section 120 inputs the usage time when the lamp voltage is detected from the time measurement section 118 and stores it in the lamp information memory 31 in conjunction with the lamp voltage.” EX1007, [0039].





[2.2] the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

116. The element is disclosed by Pollmann-Retsch in view of Ishitani and Abe.

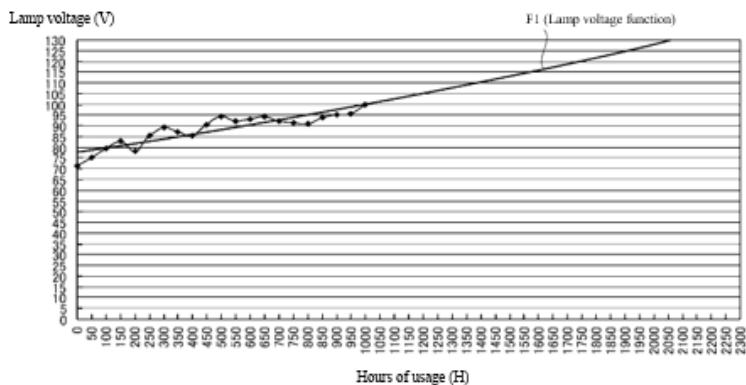
As discussed above, Pollmann-Retsch discloses a control unit that controls the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit. *See* VIII.A.1.1.4. Abe combined with Ishitani disclose mechanisms for obtaining lamp condition information, *e.g.*, lamp voltage and lamp usage period, used in image correction control.

117. Specifically, Abe teaches that the lamp voltage consistently correlates with the lamp usage period. EX1007, [0051]. This intrinsic relationship establishes that any data or signal derived from the lamp usage period inherently reflects the lamp voltage

as its foundation. For example, Abe teaches that “the lamp information memory 31 stores the usage time and lamp voltage as data, as shown in FIG. 6.” EX1007, [0048]. Additionally, Abe explains that “[i]n the graph of FIG. 7, the x-axis indicates the time of use and the y-axis indicates the lamp voltage. The points plotted on the graph show data for the usage time and lamp voltage of the sequence H1 in FIG. 6.” *Id.*, [0051].

[FIG. 6]

Lamp information memory	
$y = a * e^{bx}$	
(Lamp voltage function)	
0(H)	71.5(V)
50(H)	75.2(V)
100(H)	79.6(V)
150(H)	83.0(V)
200(H)	78.0(V)
250(H)	85.4(V)
300(H)	89.4(V)



[FIG. 7]

118. Ishitani discloses that the lamp control circuit controls the amount of correction for the image correction processing unit, *e.g.*, obtains brightness control information for controlling the brightness of the lamp and sends that information to the ballast control circuit, based on the cumulative lighting time (lamp usage period) recorded in the cumulative time recording circuit. EX1008, [0017].

119. Ishitani teaches that “[t]he lamp control circuit 11 obtains brightness control information to control the brightness of the lamp 10 based on...the cumulative lighting time recorded in the accumulated time recording circuit 13. This brightness control information is sent to the ballast control circuit 15.” EX1008, [0017]. Because “[b]allast control circuit 15 controls output power variable ballast 16,” the input power to the lamp can be adjusted and “it is possible to correct the brightness of the lamp 10 according to the accumulated lighting time. As a result, brightness degradation due to the long-term emission characteristics of the lamp 10 can be reliably corrected in an inexpensive manner without the accompanying degradation of image quality.” *Id.*, [0018], [0026].

120. As discussed above, Baier demonstrates the well-established understanding in the field that lamp voltage and cumulative usage time serve as critical parameters for adjusting brightness. Therefore, a POSITA would have been motivated to combine Pollmann-Retsch's voltage-based correction with Ishitani's usage-based correction and Abe's voltage-time correlation to implement a control unit that uses both the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit to control the amount of correction for the image correction processing unit.

2. Dependent Claim 3

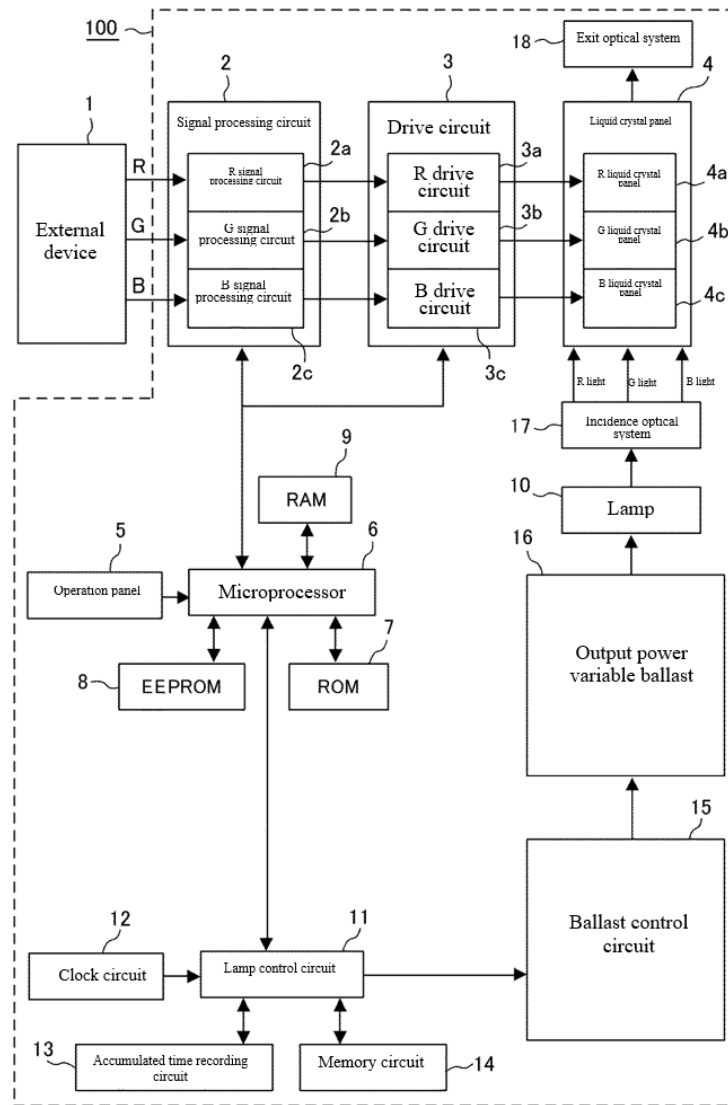
[3.0] The projection-type image display device according to claim 2, comprising

121. This element is disclosed by Pollmann-Retsch in view of Hirabayashi, Abe, and Ishitani, as analyzed for claim 2 in Section VIII.B.1, *supra*.

[3.1] a memory that stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp, wherein

122. This element is disclosed by Pollmann-Retsch in view of Ishitani. Ishitani discloses a memory (shown in FIG. 1 below) that stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp, *e.g.*, the light emission characteristic data is stored in the memory circuit.

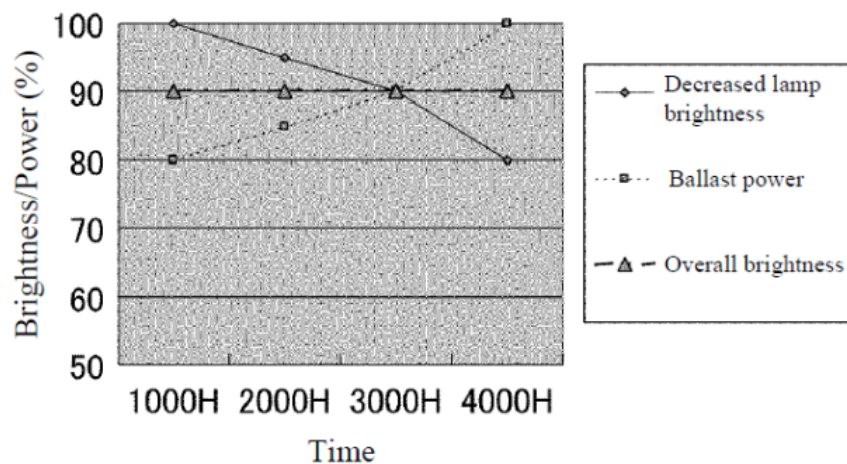
[FIG. 1]



123. Ishitani teaches that the brightness degradation of the lamp due to long-term light emission is corrected by comparing the accumulated lighting time with light emission characteristic data stored in the memory circuit. EX1008, [0026]. This light emission characteristic data is used to calculate the reduction in illuminance by comparing the accumulated lighting time with the stored degradation trends, enabling the correction necessary to maintain constant brightness over time.

124. Ishitani teaches that “[i]t is possible to correct the brightness of the lamp 10 according to the accumulated lighting time. As a result, brightness degradation due to the long-term emission characteristics of the lamp 10 can be reliably corrected in an inexpensive manner without the accompanying degradation of image quality. ...[T]he lamp brightness reduction curve and overall brightness curve in FIG. 3 show the change in brightness over time on the horizontal axis as a percentage of the initial brightness when turned on at the specified standard power (hereinafter referred to as “standard mode”), which is set to 100%. ...FIG. 3 shows that by varying the output power of the output power variable ballast 16 according to the brightness due to the long-term emission characteristics of the lamp 10, the total brightness, which is the corrected brightness of the lamp 10, is kept constant.” EX1008, [0026].

[FIG. 3]

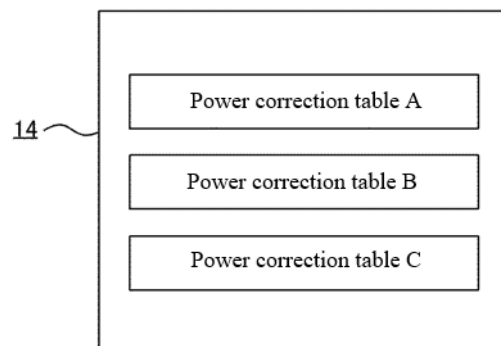


125. Ishitani also discloses that the emission characteristics of the lamp depends on the type of the lamp. Ishitani teaches that “if the lamp 10 type is different, the reference emission characteristics for each lamp 10 will be different, but if the lamp type

is the same, it will be almost the same reference emission characteristics.” EX1008, [0028]. Therefore, “the ballast control circuit 15 is provided with lighting identification means that identifies the type of lamp 10, and by reading light emission characteristics data corresponding to the type of lamp 10 from the memory circuit 14 based on information from the lighting identification means, it is possible to control corresponding to the type of lamp 10.” *Id.*, [0029].

126. Ishitani further teaches that “as a table value stored in the memory circuit 14, the luminescence characteristic data for the plurality of types of lamps 10 are stored as respective power correction tables A, B, and C as shown in FIG. 5 [reproduced below],...switching the power correction tables A, B, and C depending on the type of lamp 10, optimal control can be achieved for the various types of lamps 10.” EX1008, [0030].

[FIG. 5]



[3.2] the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

127. This element is disclosed by Pollmann-Retsch in view of Abe and Ishitani.

As described above, Pollmann-Retsch discloses the power calculation unit 42 of the driving unit 4 used in a projector determines the required lamp power to maintain a target light flux, using a correction factor derived by the correction factor determination unit 41 based on the lamp voltage obtained from the voltage determination unit 40. *See* Section VIII.A.1.1.4.

128. Abe discloses “[d]ischarge lamps are known to wear electrodes due to long-term lighting, and wear increases the distance between electrodes, resulting in an increase in lamp voltage.” EX1007, [0005]. Abe further discloses “the characteristics of the lamp voltage increase and change over time vary depending on the type of discharge lamp and the individual difference.” *Id.* A POSITA would have recognized that the brightness of a discharge lamp would reduce over long term use due to the increase of the lamp voltage, and based on teaching from Abe, the increase of the lamp voltage would vary depending on the type of discharge lamp and the individual difference.

129. Ishitani discloses that the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured

to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

130. Ishitani discloses that a lamp control circuit calculates or derives a rate of the reduction in illuminance, *i.e.*, brightness control information, based on the stored light emission characteristic data and cumulative usage time, and sends the brightness control information to the image correction processing unit, *i.e.*, the ballast control unit. EX1008, [0017].

131. Ishitani teaches that “[t]he lamp control circuit 11 obtains brightness control information to control the brightness of the lamp 10 based on the light emission characteristic data and/or calculation data and the cumulative lighting time recorded in the accumulated time recording circuit 13. This brightness control information is sent to the ballast control circuit 15.” EX1008, [0017]. Ishitani further explains that “the long-term emission characteristics...are derived from the results of calculation performed on the reference light emission characteristics for a particular type of lamp 10 using parameters obtained from the characteristic differences due to the type of lamp 10 and the differences in modes.” *Id.*, [0031].

132. Because the reference light emission characteristics stored in memory inherently include data on how the lamp’s illuminance changes over time, Ishitani further teaches that “the lamp 10 is controlled using calculation data obtained as a result of performing a calculation using the parameters on a table corresponding to the

reference light emission characteristics for a specific type of lamp 10 read from the memory circuit 14, thereby making it possible to control the lamp 10 according to the type and mode of the lamp 10.” *Id.*, [0032]. Accordingly, the control mechanism ensures that the brightness maintains constant over time.

C. Pollmann-Retsch in view of Hirabayashi and Ishitani Renders Claim 4 Obvious

133. In my opinion and for the reasons explained below, Pollmann-Retsch in view of Hirabayashi and Ishitani renders obvious the subject matter recited by claim 4 of the ’569 Patent.

134. As a threshold matter, a POSITA would have been motivated to combine Pollmann-Retsch with Hirabayashi and Ishitani because such a combination is nothing more than the ordinary use of conventional prior art elements according to their well-known and established function(s). *See* Section VIII.B, *supra*.

1. Dependent Claim 4

[4.0] The projection-type image display device according to claim 1, comprising

135. This element is disclosed by Pollmann-Retsch in view of Hirabayashi, as analyzed for claim 1 in Section VIII.A.1, *supra*.

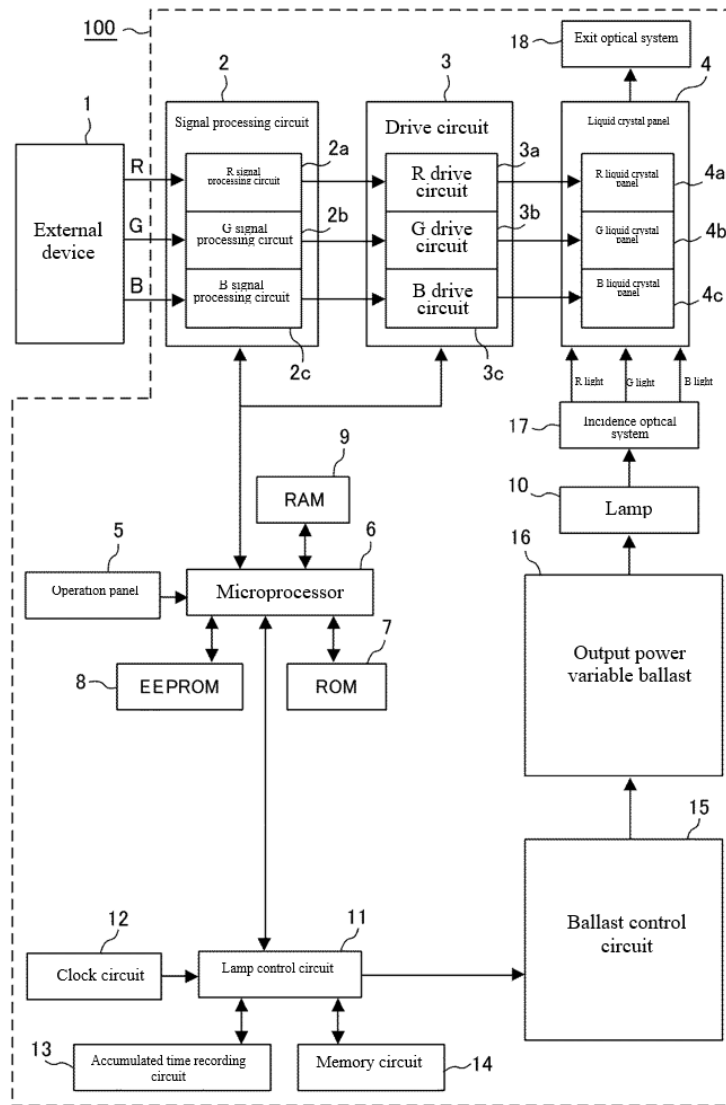
[4.1] a memory, wherein: the memory is capable of storing the amount of correction, and

136. This element is disclosed by Pollmann-Retsch in view of Ishitani. Pollmann-Retsch discloses that “the correction function K_d ..., might be stored in a

table-like format. For example, for a given set of lamp voltage values UL, such a table—often called ‘look-up table’ or LUT—would provide a required lamp power value PR for each of the values within the given set of lamp voltage values.” EX1005, [0031]. “The look-up table might be stored in a memory means, like a read-only memory (ROM) device or a re-writeable memory, for example a so-called flash memory.” *Id.*, [0063]. Because the lamp performance degrades due to wear and aging over time, it is known that periodic adjustments must be made to maintain consistent a desired target light flux. Pollmann-Retsch therefore inherently discloses a process of updating correction values after a certain period of time. Ishitani discloses a memory, wherein: the memory can store the amount of correction.

137. Ishitani discloses a memory circuit that stores the calculation data, as shown in FIG. 1 reproduced below. EX1008, [0017]. Ishitani teaches that “the brightness of the lamp is controlled based on the pre-stored light emission characteristic data.” EX1008, summary. Ishitani further explains that “memory circuit 14, which is composed of a non-volatile memory such as an EEPROM or flash memory stores, as table values” and “calculation data [is] obtained by performing calculations on the light emission characteristic data.” EX1008, [0017].

[FIG. 1]



[4.2] the control unit uses the amount of correction stored in the memory for the image quality correction by the image correction processing unit when the discharge lamp is lit up, the control unit being configured to perform update processing of the amount of correction for the image quality correction by the image correction processing unit after an elapse of a predetermined time.

138. This element is disclosed by Pollmann-Retsch in view of Ishitani.

Pollmann-Retsch is discussed above and Ishitani discloses that correction stored in the memory for the image quality correction by the image correction processing unit when

the discharge lamp is lit, the control unit being configured to perform update processing of the amount of correction for the image quality correction by the image correction processing unit after an elapse of a predetermined time.

139. Ishitani discloses “memory circuit 14 [] stores, as table values, data on the light emission characteristics of lamp 10 due to changes over time, that is, data on the light emission characteristics due to changes over a long period of time from the beginning to the end of use of lamp 10 [] and/or calculation data [] obtained by performing calculations on the light emission characteristic data.” EX1008, [0017].

140. Ishitani further discloses that a lamp control circuit calculates or derives a rate of the reduction in illuminance, *i.e.*, brightness control information, based on the stored light emission characteristic data and/or calculation data obtained by calculating the light emission characteristic data and cumulative usage time, and sends the brightness control information to the image correction processing unit, *i.e.*, the ballast control unit. EX1008, [0017].

141. The lamp control unit performs periodic updates to the brightness control information as the lamp continues to degrade based on the cumulative lighting time. These periodic updates indicate that the control unit performs update processing of the amount of correction for the image quality correction by the image correction processing unit after an elapsed of a predetermined time. EX1008, [0017]. Ishitani further teaches that “[t]he lamp control circuit 11 obtains brightness control information to control the

brightness of the lamp 10 based on the light emission characteristic data and/or calculation data and the cumulative lighting time recorded in the accumulated time recording circuit 13.” *Id.*

D. Pollmann-Retsch in view of Hirabayashi, Kambara, and Ishitani Renders Claims 2-3 Obvious

142. In my opinion and for the reasons explained below, Pollmann-Retsch in view of Hirabayashi, Kambara, and Ishitani renders obvious the subject matter recited by claims 2-3 of the '569 Patent.

143. As a threshold matter, a POSITA would have been motivated to combine Pollmann-Retsch with Hirabayashi, Kambara, and Ishitani because such a combination is nothing more than the ordinary use of conventional prior art elements according to their well-known and established function(s).

144. Kambara discloses that luminous flux of a lamp decreases as cumulative lamp usage time increases and employs an illuminance correction device to suppress this decrease by adjusting the power supply to the lamp. Baier demonstrates it was well known and established in the field that lamp voltage and cumulative usage time serve as critical parameters for adjusting brightness. *See* Section VIII.B, *supra*. Therefore, the combination of Pollmann-Retsch, Hirabayashi, Kambara, and Ishitani merely applies known elements and techniques to achieve predictable results, making it an obvious modification rather than an inventive step. *See* Section VIII.A, *supra* and Section VIII.B, *supra*.

1. Dependent Claim 2

[2.0] The projection-type image display device according to claim 1, comprising

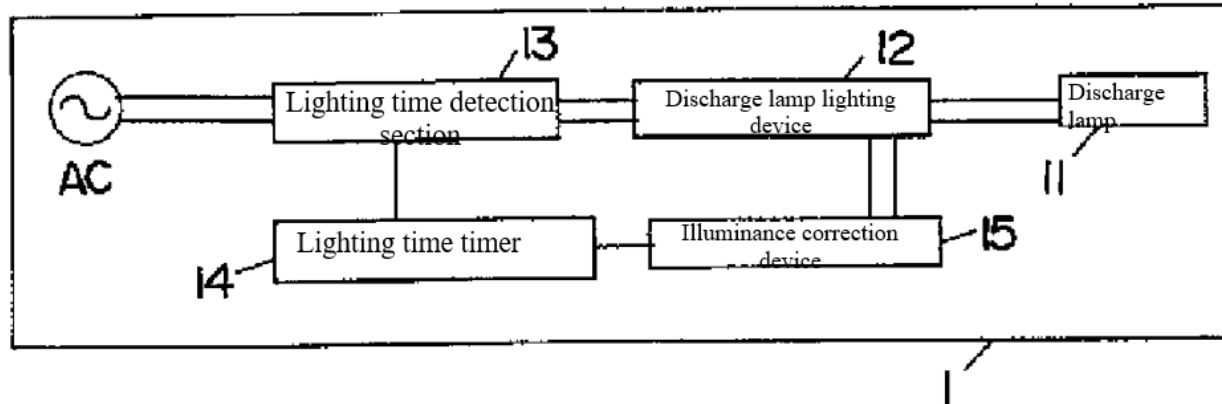
145. This element is disclosed by Pollmann-Retsch in view of Hirabayashi, as analyzed for claim 1 in Section VIII.A.1, *supra*.

[2.1] a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp, wherein

146. This element is disclosed by Pollmann-Retsch in view of Kambara. Kambara discloses a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp, *i.e.*, the usage time of the discharge lamp is timed by the lighting time timer.

147. As shown in FIG. 1 (reproduced below), Kambara teaches that “[a] lighting time detection section 13 is provided...and the power application period detected by the lighting time detection section 13 is timed by a lighting time timer 14. ...[T]he duration of energization is regarded as the duration of use of the discharge lamp 11, and the duration of use of the discharge lamp 11 is measured by the lighting time timer 14.” EX1009, [0021].

[FIG. 1]



[2.2] the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

148. This element is disclosed by Pollmann-Retsch in view of Ishitani and Kambara. Pollmann-Retsch in view of Ishitani and Kambara discloses that the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp usage period obtained from the lighting period managing unit. Baier demonstrates it was well known and established in the field that lamp voltage and cumulative usage time serve as critical parameters for adjusting brightness, reinforcing the predictability of the proposed combination. *See* Section VIII.B.

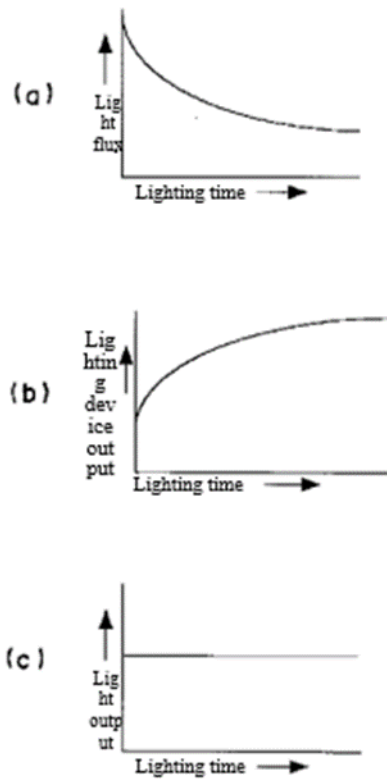
149. As described above, Pollmann-Retsch discloses the power calculation unit 42 of the driving unit 4 used in a projector determines the required lamp power to maintain a target light flux, using a correction factor derived by the correction factor determination unit 41 based on the lamp voltage obtained from the voltage determination

unit 40. *See* Section VIII.A.

150. Ishitani discloses that the lamp control circuit controls the amount of correction for image correction processing unit as discussed above in Section VIII.B.1.2.2.

151. Kambara teaches that “[a]s shown in FIG. 2(a), the luminous flux of the lamp decreases with the usage time...so the lighting device 1 is provided with an illuminance correction device 15 to suppress the decrease in light quantity over time. ...The illuminance correction device 15 is basically configured to compensate for the decrease in the luminous flux over the passage of the usage time of the discharge lamp 11. As shown in FIG. 2(b), immediately after replacing the discharge lamp 11, the discharge lamp 11 is dimmed, and the power supplied to the discharge lamp 11 is controlled via the discharge lamp lighting device 12 so that the discharge lamp 11 approaches full lighting (rated lighting) as the time of use of the discharge lamp 11 passes. ...[Therefore,] the output of the discharge lamp lighting device 12 increases over the course of the use time of the discharge lamp 11. Thus, by increasing the supply power to the discharge lamp 11 over time, while the luminous flux of the discharge lamp 11 decreases over time, the light output of the discharge lamp 11 can be kept generally constant as in FIG. 2(c).” EX1009, [0022].

[FIG. 2]



152. Therefore, Pollmann-Retsch in view of Ishitani and Kambara discloses a control unit that is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

2. Dependent Claim 3

[3.0] The projection-type image display device according to claim 2, comprising

153. This element is disclosed by Pollmann-Retsch in view of Hirabayashi, Kambara, and Ishitani, as analyzed for claim 2 in Section VIII.D.1, *supra*.

[3.1] a memory that stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp, wherein

154. This element is disclosed by Pollmann-Retsch in view of Ishitani, as analyzed for claim 2 in Section VIII.B.2, *supra*.

[3.2] the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

155. This element is disclosed by Pollmann-Retsch in view of Ishitani. As described above, Pollmann-Retsch discloses the power calculation unit 42 of the driving unit 4 used in a projector determines the required lamp power to maintain a target light flux, using a correction factor derived by the correction factor determination unit 41 based on the lamp voltage obtained from the voltage determination unit 40. *See* Section VIII.A.1.1.4.

156. A POSITA would have recognized that the brightness of a discharge lamp would reduce over long term use due to the increase of the lamp voltage, and the increase of the lamp voltage would vary depending on the type of discharge lamp and the individual difference.

157. As analyzed below, Ishitani discloses that the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction

processing unit according to the rate of decrease in illuminance.

158. Ishitani teaches that a lamp control circuit calculates or derives a rate of the reduction in illuminance, *i.e.*, brightness control information, based on the stored light emission characteristic data and cumulative usage time, and sends the brightness control information to the image correction processing unit, *i.e.*, the ballast control unit. EX1008, [0017].

159. Ishitani further teaches that “[t]he lamp control circuit 11 obtains brightness control information to control the brightness of the lamp 10 based on the light emission characteristic data and/or calculation data and the cumulative lighting time recorded in the accumulated time recording circuit 13. This brightness control information is sent to the ballast control circuit 15.” EX1008, [0017]. Ishitani further explains that “the long-term emission characteristics...are derived from the results of calculation performed on the reference light emission characteristics for a particular type of lamp 10 using parameters obtained from the characteristic differences due to the type of lamp 10 and the differences in modes.” *Id.*, [0031].

160. Because the reference light emission characteristics stored in memory inherently include data on how the lamp’s illuminance changes over time, Ishitani teaches that “the lamp 10 is controlled using calculation data obtained as a result of performing a calculation using the parameters on a table corresponding to the reference light emission characteristics for a specific type of lamp 10 read from the memory circuit

14, thereby making it possible to control the lamp 10 according to the type and mode of the lamp 10.” EX1008, [0032]. Accordingly, the control mechanism ensures that the brightness maintains constant over time.

E. Pollmann-Retsch in view of the CP-DX Service Manual and the CP-DX300 User Manual Renders Claims 1-4 Obvious

161. In my opinion and for the reasons explained below, Pollmann-Retsch in view of the CP-DX300 Service Manual (CP-DX300-SM) and the CP-DX300 User Manual (CP-DX300-UM) renders obvious the subject matter recited by claims 1-4 of the ’569 Patent.

162. As a threshold matter, a POSITA would have been motivated to combine the teachings of Pollmann-Retsch with the teachings of CP-DX300-SM and CP-DX300-UM.

163. Pollmann-Retsch teaches a projection system that includes a gas discharge lamp and associated driving units, in which the driving units driving the discharge lamp “maintain a desired target light flux [*i.e.*, light output] even if the length of the discharge arc is changing, and [] provide appropriate driving units which can be used, for example, in an image rendering system to avoid undesirable variations of the light flux.” EX1005, [0005].

164. Pollmann-Retsch further teaches that if the driving unit is used in a system with a user interface, the user of that system would want to control the light flux delivered by the gas discharge lamp. EX1005, [0064]. Pollmann-Retsch’s invention

object therefore aligns with the stated purpose of the '569 Patent, which is to perform brightness correction and maintain consistent illuminance of the discharge lamp over long-term usage.

165. CP-DX300-SM and CP-DX300-UM are technical documents relating to the same product—the Hitachi model CP-DX300 Projector—with each disclosing certain aspects and/or features of that projector. CP-DX300-SM discloses the internal configuration and structure of each component within the Hitachi CP-DX300 Projector, and CP-DX300-UM describes the functions performed by those components. Collectively, they show that the Hitachi CP-DX300 Projector was capable of performing an image correction based on the user preference, thereby achieving another objective of the '569 Patent, *viz.*, enabling user-driven image quality adjustments.

166. As discussed in detail above, the BenQ MX823ST User Manual provides additional evidence of the industry's established practice of incorporating both automatic brightness adjustment and user-controlled image quality adjustments within a single projection system. *See* Section VIII. A.

167. Because Pollmann-Retsch addresses automatic brightness regulation and the manuals of the Hitachi CP-DX300 Projector address user-driven image correction, a POSITA seeking to enhance projector performance and user experience would have combined their teachings with a reasonable expectation of success. Moreover, the BenQ MX823ST projector provides strong additional evidence that such a combination was

not only technically feasible, but also reflective of established practices in the relevant field prior to the '569 Patent's priority date.

168. A POSITA would therefore have been motivated to combine Pollmann-Retsch with the CP-DX300 Service Manual and the CP-DX300 User Manual in order to achieve the benefits of both stable long-term brightness and customizable image settings within a projection system. The resulting combination would have been an obvious and predictable improvement in view of the known capabilities of, and industry trends exemplified by, prior commercial products.

1. Independent Claim 1

[1.0] A projection-type image display device including a discharge lamp as a light source, comprising:

169. This element is disclosed by Pollmann-Retsch, as analyzed for claim 1 in Section VIII.A.1.1.0, *supra*.

[1.1] a lamp driving unit configured to drive the discharge lamp;

170. This element is disclosed by Pollmann-Retsch, as analyzed for claim 1 in Section VIII.A.1.1.1, *supra*.

[1.2] a lamp voltage detection unit configured to detect a voltage between electrodes (hereinafter, a lamp voltage) of the discharge lamp;

171. This element is disclosed by Pollmann-Retsch, as analyzed for claim 1 in Section VIII.A.1.1.2, *supra*.

[1.3] an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element;

172. Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM disclose an image correction processing unit configured to perform an image quality correction of an image signal supplied to an image display element.

173. As discussed in detail above, Pollmann-Retsch teaches a correction function that adjusts lamp power to maintain a target light flux based on a measured voltage value across the gas discharge lamp, thereby performing image quality correction on an image signal. *See* Section VIII.A.1.1.3, *supra*.

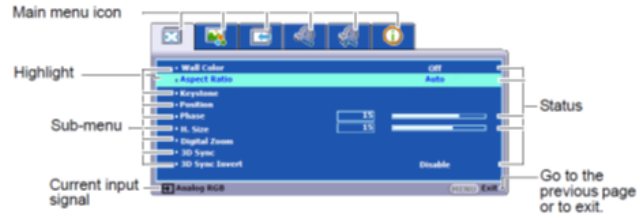
174. CP-DX300-UM discloses that an image quality correction includes settings contained under “Picture” in the projector’s on-screen menu, such as Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature, and 3D Color Management adjusting, and “Lamp Mode” settings contained under “Lamp Settings” in the menu, *viz.*, Normal, Economic, and Intelligent Eco. These features are illustrated in the annotated figures below from CP-DX300-UM. EX1012 at 18, 26, 27, 28, 32, 34, 42.

Using the menus

The projector is equipped with On-Screen Display (OSD) menus for making various adjustments and settings.

 The OSD screenshots below are for reference only, and may differ from the actual design.

Below is the overview of the OSD menu.

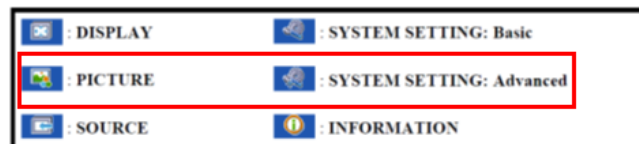
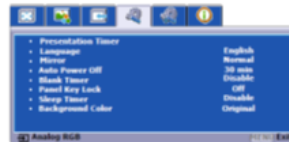


To use the OSD menus, please set them to your familiar language first.

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control to turn the OSD menu on.
3. Press **▼** to highlight **Language** and press **MODE/ENTER**.



2. Use **◀▶** to highlight the **SYSTEM SETTING: Basic** menu.
4. Press **◀▲/▼▶** to select a preferred language.
5. Press **MENU** on the projector or **MENU/EXIT** on the remote control to leave and save the settings.



Menu operation

Menu system

Please note that the on-screen display (OSD) menus vary according to the signal type selected.

The menu items are available when the projector detects at least one valid signal. If there is no equipment connected to the projector or no signal detected, limited menu items are accessible.

Main menu	Sub-menu		Options
1. DISPLAY	Wall Color		Off/Light Yellow/Pink/Light Green/Blue/Blackboard
	Aspect Ratio		Auto/Real/4:3/16:9
	Keystone		
	Position		
	Phase		
	H. Size		
	Magnify		
	3D Sync	Auto/Frame Sequential/Frame Packing/Top-Bottom/Side-by-Side/Off	
	3D Sync Invert	Disable/Invert	
2. PICTURE	Preset Mode	Bright/Presentation/sRGB/Cinema/Game/User	
	Brightness		
	Contrast		
	Color		
	Tint		
	Sharpness		
	Brilliant Color	On/Off	
	Color Temperature	Cool/Normal/Warm	
	3D Color Management	Primary Color	R/G/B/C/M/Y
		Hue	
		Saturation	
		Gain	

Fine-tuning the image quality in user modes

According to the detected signal type, there are some user-definable functions available when User mode is selected. You can make adjustments to these functions based on your needs.

Adjusting Brightness

Highlight the **PICTURE > Brightness** menu and press ◀▶.

The higher the value, the brighter the image. And the lower the setting, the darker the image. Adjust this control so the black areas of the image appear just as black and that detail in the dark areas is visible.



Adjusting Contrast

Highlight the **PICTURE > Contrast** menu and press ◀▶.

The higher the value, the greater the contrast. Use this to set the peak white level after you have previously adjusted the Brightness setting to suit your selected input and viewing environment.



Adjusting Color

Highlight the **PICTURE > Color** menu and press ◀▶.

Lower setting produces less saturated colors. If the setting is too high, colors on the image will be overpowering, which makes the image unrealistic.

ⓘ This function is only available when a Video, S-Video or Component Video signal is selected.

Adjusting Tint

Highlight the **PICTURE > Tint** menu and press ◀▶.

The higher the value, the more reddish the picture becomes. The lower the value, the more greenish the picture becomes.

ⓘ This function is only available when a Video, S-Video with NTSC signal is selected.

Adjusting Sharpness

Highlight the **PICTURE > Sharpness** menu and press ◀▶.

The higher the value, the sharper the picture becomes. The lower the value, the softer the picture becomes.

ⓘ This function is only available when a Video, S-Video or Component Video signal is selected.

Adjusting Brilliant Color

Highlight the **PICTURE > Brilliant Color** menu and press ◀▶.

This feature utilizes a new color-processing algorithm and system level enhancements to enable higher brightness while providing truer, more vibrant colors in the projected picture. It enables a greater than 50% brightness increase in mid-tone images, which are common in video and natural scenes, so the projector reproduces images in realistic and true colors. If you prefer images with that quality, select **On**. If you don't need it, select **Off**.

When **Off** is selected, the **Color Temperature** and **3D Color Management** functions are not available.

Selecting a Color Temperature

Highlight the **PICTURE > Color Temperature** menu and press ◀▶.

The options available for color temperature* settings vary according to the signal type selected.

1. **Cool:** Makes images appear bluish white.
2. **Normal:** Maintains normal colorings for white.
3. **Warm:** Makes images appear reddish white.

*About color temperatures:

There are many different shades that are considered to be "white" for various purposes. One of the common methods of representing white color is known as the "color temperature". A white color with a low color temperature appears to be reddish white. A white color with a high color temperature appears to have more blue in it.

Color Management

Only in permanent installations with controlled lighting levels such as boardrooms, lecture theaters, or home theaters, should color management be considered. Color management provides fine color control adjustment to allow for more accurate color reproduction, should you require it.

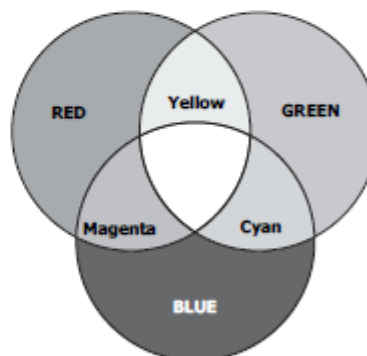
If you have purchased a test disc which contains various color test patterns and can be used to test the color presentation on monitors, TVs, projectors, etc., you can project any image from the disc on the screen and enter the **3D Color Management** menu to make adjustments.

To adjust the settings:

1. Go to the **DISPLAY** menu and highlight **3D Color Management**.
2. Press **MODE/ENTER** on the projector or remote control and the **3D Color Management** page is displayed.
3. Highlight **Primary Color** and press ◀▶ to select a color from among Red, Yellow, Green, Cyan, Blue, or Magenta.
4. Press ▼ to highlight **Hue** and press ◀▶ to select its range. Increase in the range will include colors consisted of more proportions of its two adjacent colors.

Please refer to the illustration to the right for how the colors relate to each other.

For example, if you select Red and set its range at 0, only pure red in the projected picture will be selected. Increasing its range will include red close to yellow and red close to magenta.



5. Press ▼ to highlight **Saturation** and adjust its values to your preference by pressing ◀▶. Every adjustment made will reflect to the image immediately.

For example, if you select Red and set its value at 0, only the saturation of pure red will be affected.

 Saturation is the amount of that color in a video picture. Lower settings produce less saturated colors; a setting of "0" removes that color from the image entirely. If the saturation is too high, that color will be overpowering and unrealistic.

6. Press ▼ to highlight **Gain** and adjust its values to your preference by pressing ◀▶. The contrast level of the primary color you select will be affected. Every adjustment made will reflect to the image immediately.
7. Repeat steps 3 to 6 for other color adjustments.
8. Make sure you have made all of the desired adjustments.
9. Press **MENU** on the projector or **MENU/EXIT** on the remote control to exit and save the settings.

Main menu	Sub-menu		Options
5. SYSTEM SETTING: Advanced	Quick Cooling		On/Off
	High Altitude Mode		1 (High) Equal or higher than 1500 m 2 (Normal) Lower than 1500 m
	Audio Settings	Mute	On/Off
		Volume	
	Menu Settings	Menu Display Time	5 sec/10 sec/15 sec/20 sec/25 sec/30 sec
		Menu Position	Center/Top-Left/Top-Right/Bottom-Left/Bottom-Right
	Standby Mode		Normal/Saving
	Lamp Settings	Lamp Mode	Normal/Economic/Intelligent Eco
		Reset Lamp Timer	
		Equivalent Lamp Hour	
	Security Settings	Change Password	
		Power on Lock	On/Off
6. INFORMATION	Closed Caption	Closed Caption Enable	On/Off
		Caption Version	CC1/CC2/CC3/CC4
	Reset All Settings	Reset/Cancel	
			• Current System Status • Source • Preset Mode • Color System • Resolution • Equivalent Lamp Hour • Serial Number

Extending lamp life

The projection lamp is a consumable item. To keep the lamp life as long as possible, you can do the following settings via the OSD menu.

Setting Lamp Mode as Economic or Intelligent Eco

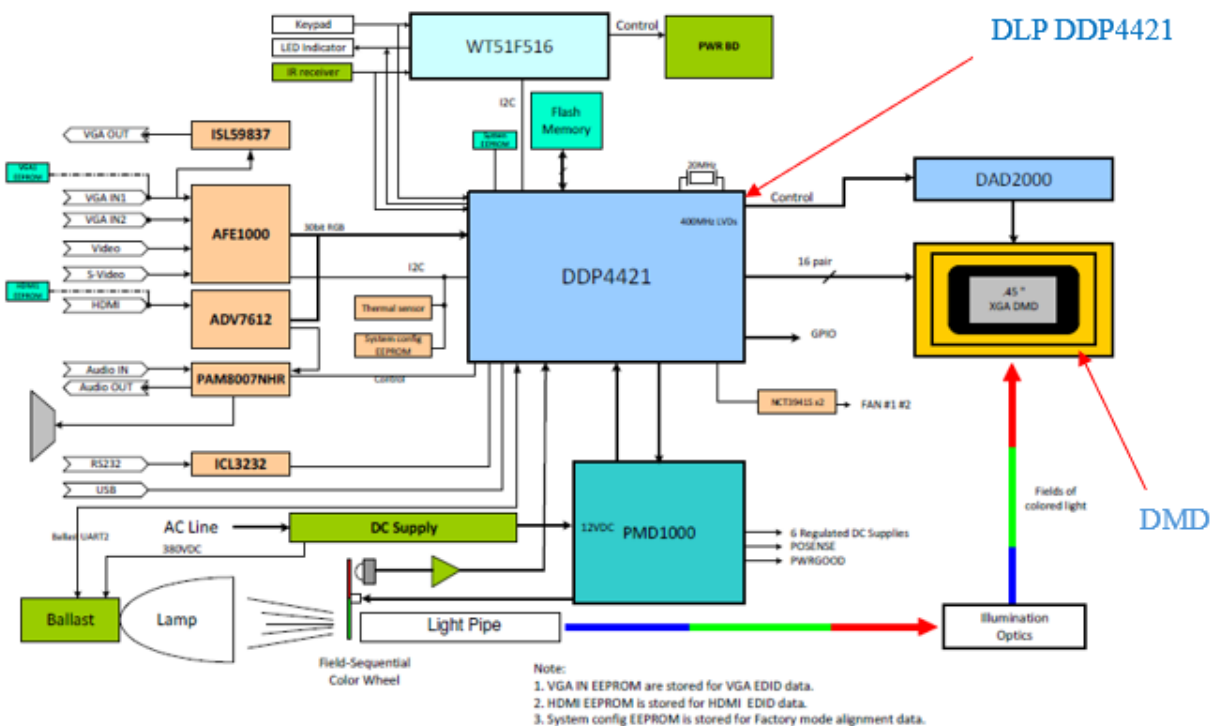
Using **Economic/Intelligent Eco** mode reduces system noise and power consumption. If the **Economic/Intelligent Eco** mode is selected, the light output will be reduced and result in darker projected pictures.

Setting the projector in **Economic/Intelligent Eco** mode also extends the lamp operation life. To set **Intelligent Eco** mode, go into the **SYSTEM SETTING: ADVANCED > Lamp Settings > Lamp Mode** menu and press ◀▶.

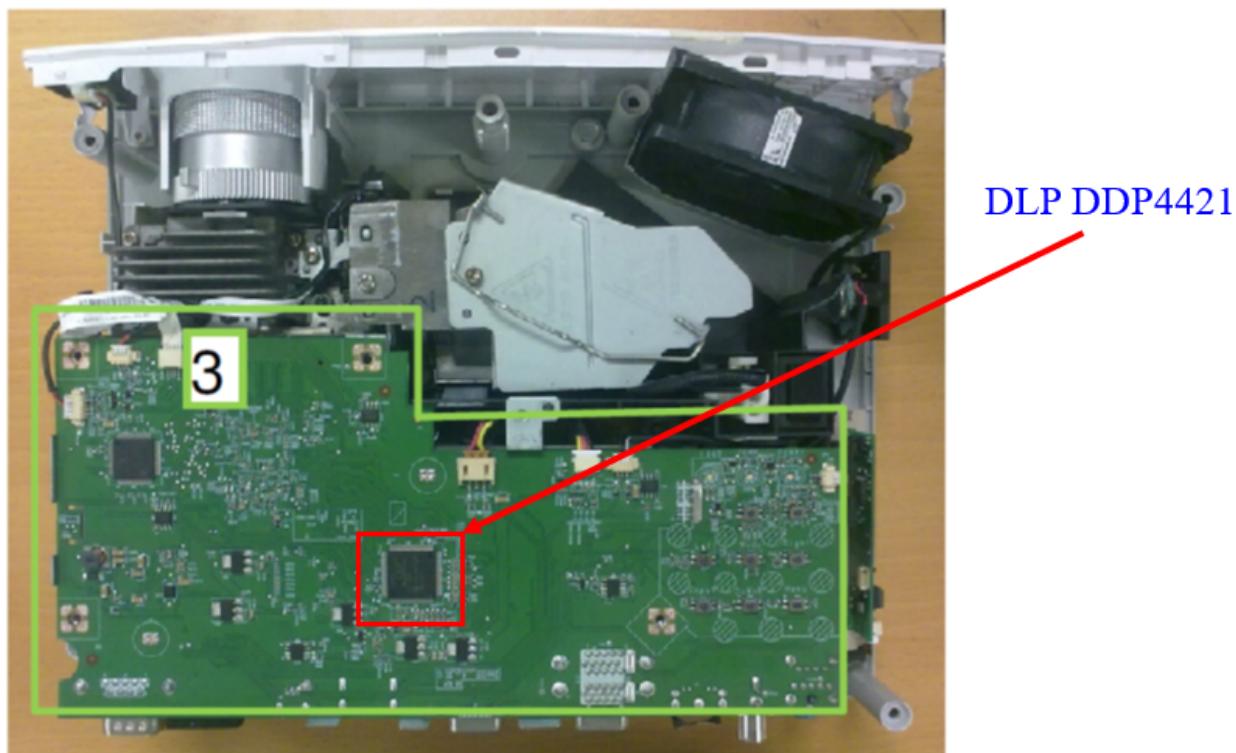
175. CP-DX300-SM discloses that at least a portion of one or more processors, *e.g.*, the DLP DDP4421 in the projector, includes or acts as an image correction

processing unit. These processors/controllers are configured to perform an image quality correction of an image signal supplied to the projector's image display element, *i.e.*, DMD, shown in the following annotated figures from CP-DX300-SM. EX1011 at 26, 43, 59. A POSITA would have recognized that the DLP DDP4421—the main processor disclosed in the Hitachi model CP-DX300 projector—has functionality of performing essential image processing functions required for proper operation of the projector, including image quality correction. A POSITA would have recognized that such functionality must be performed by the DLP DDP4421 itself, either through internal processing capabilities or through firmware executed by the chip.

10. Block Diagram



Main board & Input board Block Diagram



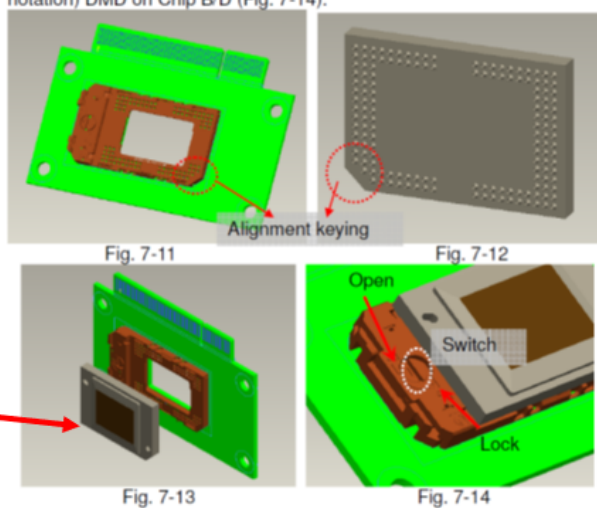
176. The image display element is also evidenced by the following annotated figure from CP-DX300-SM. EX1011 at 43.

7.1.3 DMD and Chip B/D Module:

7.1.3.1 Judge Chip B/D and DMD alignment keying first (Fig. 7-11, 7-12).

7.1.3.2 Align keying and Assemble DMD to Chip B/D (Fig. 7-13).

7.1.3.3 Push DMD slightly and use screwdriver rotate clockwise Switch to lock (close notation) DMD on Chip B/D (Fig. 7-14).



DMD image
display element

[1.4] a control unit configured to control an amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and

177. This element is disclosed by Pollmann-Retsch, as analyzed for claim 1 in Section VIII.A.1.1.4, *supra*.

[1.5] a menu screen creating unit,

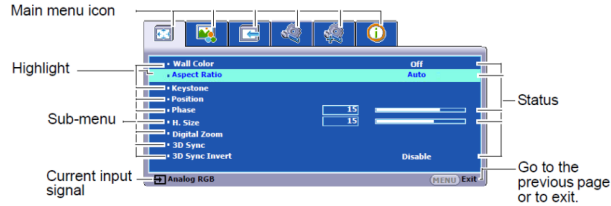
178. This element is disclosed by Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM. CP-DX300-SM and CP-DX300-UM collectively disclose a menu screen creating unit composed of at least a portion of one or more processors, *e.g.*, the DLP DDP4421. A POSITA would have recognized that the DLP DDP4421—the main processor disclosed in the Hitachi model CP-DX300 projector—is responsible for generating the on-screen display (OSD), including the menu screen unit. Because the generation and rendering of the menu screen requires coordination with the image display system and integration with input controls, a POSITA would have understood that this functionality would logically be performed by the same chip that manages image processing and display output. The ability of the processing unit(s) to create an on-screen display (OSD) menu screen is shown by the menu features illustrated in the following figure from CP-DX300-UM. EX1012 at 18.

Using the menus

The projector is equipped with On-Screen Display (OSD) menus for making various adjustments and settings.

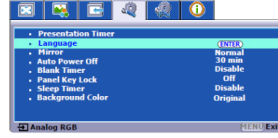
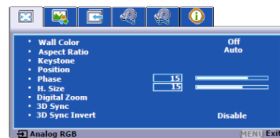
 The OSD screenshots below are for reference only, and may differ from the actual design.

Below is the overview of the OSD menu.

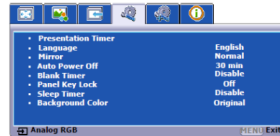


To use the OSD menus, please set them to your familiar language first.

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control to turn the OSD menu on.
3. Press **▼** to highlight **Language** and press **MODE/ENTER**.



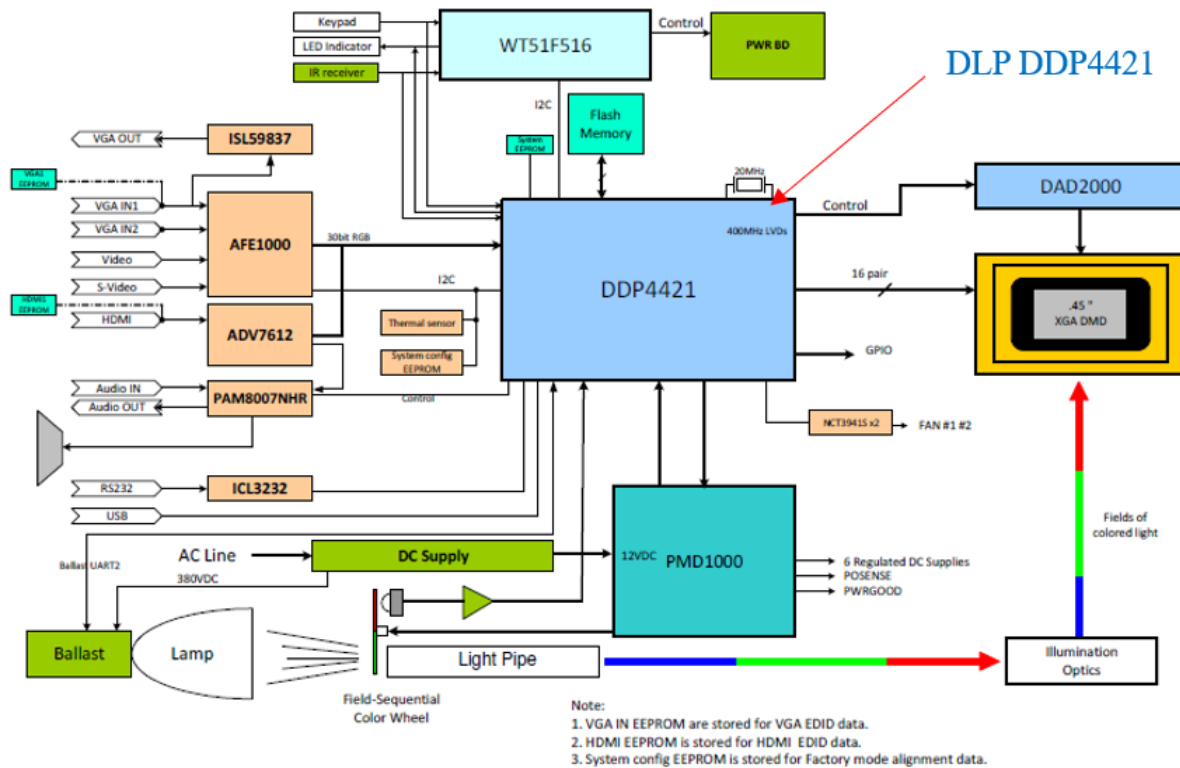
2. Use **◀▶** to highlight the **SYSTEM SETTING: Basic** menu.
4. Press **◀▲/▼▶** to select a preferred language.
5. Press **MENU** on the projector or **MENU/EXIT** on the remote control to leave and save the settings.



	: DISPLAY		: SYSTEM SETTING: Basic
	: PICTURE		: SYSTEM SETTING: Advanced
	: SOURCE		: INFORMATION

179. At least a portion of one or more processors, including the DLP DDP4421, is configured to create OSD menu screens as shown by the following annotated block diagram from CP-DX300-SM. EX1011 at 59.

10. Block Diagram



Main board & Input board Block Diagram

[1.6] wherein, via a menu screen created by the menu screen creating unit, both a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable,

180. As analyzed below, Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM disclose that a first setting item regarding an image quality adjustment and a second setting item regarding an image quality adjustment are settable via a menu screen created by the menu screen creating unit.

181. Pollmann-Retsch discloses a first setting item regarding an image quality adjustment. A POSITA would have understood that Pollmann-Retsch discloses a first setting item regarding an image quality adjustment that is settable via a menu screen created by the menu screen creating unit, *e.g.*, the light flux can be adjusted to maintain

a constant light flux via a user interface. Pollmann-Retsch teaches that a driving unit is configured to drive “a gas discharge lamp to maintain a desired target light flux even if the length of the discharge arc is changing.” EX1005, [0005]. “The driving unit 4 [] is used in a system with a user interface, the user of the system might want to control the light flux delivered by the gas discharge lamp.” *Id.*, [0064].

182. Alternatively, a POSITA would have recognized that the combination of Pollmann-Retsch and CP-DX300-SM and CP-DX300-UM discloses that the first setting item regarding an image quality adjustment is settable via a menu screen created by the menu screen creating unit, *e.g.*, an on-screen display (OSD) menu screen. EX1012 at 18. A POSITA would have been motivated to combine the teachings of Pollmann-Retsch with CP-DX300-SM and CP-DX300-UM to obtain a menu screen, created by a menu screen creating unit, for selecting a first setting item regarding an image quality adjustment.

183. In addition, CP-DX300-SM and CP-DX300-UM disclose a menu screen, created by a menu screen creating unit, for selecting a second setting item regarding an image quality adjustment. In particular, CP-DX300-SM and CP-DX300-UM disclose that the projector has a menu screen that serves as a user interface for setting a second setting item regarding an image quality adjustment, which is user-adjustable and created by the menu screen creating unit, *e.g.*, a portion of the DLP DDP4421 display controller and/or other processors. EX1012 at 32.

184. The following annotated figure from CP-DX300-UM confirms that the Hitachi CP-DX300 has a menu screen for “Lamp Mode” settings, *i.e.*, Normal, Economic, Intelligent Eco, under “Lamp Settings.” EX1012 at 34.

Main menu	Sub-menu		Options
5. SYSTEM SETTING: Advanced	Quick Cooling		On/Off
	High Altitude Mode		1 (High) Equal or higher than 1500 m 2 (Normal) Lower than 1500 m
	Audio Settings	Mute	On/Off
		Volume	
	Menu Settings	Menu Display Time	5 sec/10 sec/15 sec/20 sec/25 sec/30 sec
		Menu Position	Center/Top-Left/Top-Right/Bottom-Left/Bottom-Right
	Standby Mode		Normal/Saving
	Lamp Settings	Lamp Mode	Normal/Economic/Intelligent Eco
		Reset Lamp Timer	
		Equivalent Lamp Hour	
	Security Settings	Change Password	
		Power on Lock	On/Off
6. INFORMATION	Closed Caption	Closed Caption Enable	On/Off
		Caption Version	CC1/CC2/CC3/CC4
	Reset All Settings		Reset/Cancel
			• Current System Status • Source • Preset Mode • Color System • Resolution • Equivalent Lamp Hour • Serial Number

185. The following annotated figure from CP-DX300-UM confirms that the Hitachi CP-DX300 has a menu screen for setting Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature, and 3D Color Management in the “Picture” setting item. EX1012, at 32.

Menu operation

Menu system

Please note that the on-screen display (OSD) menus vary according to the signal type selected.

The menu items are available when the projector detects at least one valid signal. If there is no equipment connected to the projector or no signal detected, limited menu items are accessible.

Main menu	Sub-menu		Options
1. DISPLAY	Wall Color		Off/Light Yellow/Pink/Light Green/Blue/Blackboard
	Aspect Ratio		Auto/Real/4:3/16:9
	Keystone		
	Position		
	Phase		
	H. Size		
	Magnify		
	3D Sync		Auto/Frame Sequential/Frame Packing/Top-Bottom/Side-by-Side/Off
	3D Sync Invert		Disable/Invert
2. PICTURE	Preset Mode	Bright/Presentation/sRGB/Cinema/Game/User	
	Brightness		
	Contrast		
	Color		
	Tint		
	Sharpness		
	Brilliant Color		On/Off
	Color Temperature		Cool/Normal/Warm
	3D Color Management	Primary Color	R/G/B/C/M/Y
		Hue	
		Saturation	
		Gain	

[1.7] the first setting item is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit, and

186. This element is disclosed by Pollmann-Retsch, as analyzed for claim 1 in Section VIII.A.1.1.7, *supra*.

[1.8] the second setting item is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit.

187. This element is disclosed by DX300-SM and CP-DX300-UM. DX300-SM and CP-DX300-UM disclose that the second setting item, Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature, and 3D Color Management, is configured to allow a user to select a parameter regarding the amount of correction not based on the lamp voltage detected by the lamp voltage detection unit, *e.g.*, each of Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature, and 3D Color Management has a value that can be set by the users, as shown by the following figures from CP-DX300-UM. EX1012, at 26, 28, 32.

Fine-tuning the image quality in user modes

According to the detected signal type, there are some user-definable functions available when User mode is selected. You can make adjustments to these functions based on your needs.

Adjusting Brightness

Highlight the PICTURE > Brightness menu and press ◀▶.

The higher the value, the brighter the image. And the lower the setting, the darker the image. Adjust this control so the black areas of the image appear just as black and that detail in the dark areas is visible.



Adjusting Contrast

Highlight the **PICTURE > Contrast** menu and press ◀▶.

The higher the value, the greater the contrast. Use this to set the peak white level after you have previously adjusted the **Brightness** setting to suit your selected input and viewing environment.



Adjusting Color

Highlight the **PICTURE > Color** menu and press ◀▶.

Lower setting produces less saturated colors. If the setting is too high, colors on the image will be overpowering, which makes the image unrealistic.

 This function is only available when a Video, S-Video or Component Video signal is selected.

Adjusting Tint

Highlight the **PICTURE > Tint** menu and press ◀▶.

The higher the value, the more reddish the picture becomes. The lower the value, the more greenish the picture becomes.

 This function is only available when a Video, S-Video with NTSC signal is selected.

Adjusting Sharpness

Highlight the **PICTURE > Sharpness** menu and press ◀▶.

The higher the value, the sharper the picture becomes. The lower the value, the softer the picture becomes.

 This function is only available when a Video, S-Video or Component Video signal is selected.

Adjusting Brilliant Color

Highlight the **PICTURE > Brilliant Color** menu and press ◀▶.

This feature utilizes a new color-processing algorithm and system level enhancements to enable higher brightness while providing truer, more vibrant colors in the projected picture. It enables a greater than 50% brightness increase in mid-tone images, which are common in video and natural scenes, so the projector reproduces images in realistic and true colors. If you prefer images with that quality, select **On**. If you don't need it, select **Off**.

When **Off** is selected, the **Color Temperature** and **3D Color Management** functions are not available.

Selecting a Color Temperature

Highlight the **PICTURE > Color Temperature** menu and press ◀▶.

The options available for color temperature* settings vary according to the signal type selected.

1. **Cool:** Makes images appear bluish white.
2. **Normal:** Maintains normal colorings for white.
3. **Warm:** Makes images appear reddish white.

*About color temperatures:

There are many different shades that are considered to be "white" for various purposes. One of the common methods of representing white color is known as the "color temperature". A white color with a low color temperature appears to be reddish white. A white color with a high color temperature appears to have more blue in it.

Color Management

Only in permanent installations with controlled lighting levels such as boardrooms, lecture theaters, or home theaters, should color management be considered. Color management provides fine color control adjustment to allow for more accurate color reproduction, should you require it.

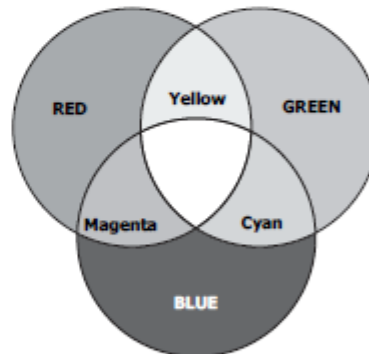
If you have purchased a test disc which contains various color test patterns and can be used to test the color presentation on monitors, TVs, projectors, etc., you can project any image from the disc on the screen and enter the **3D Color Management** menu to make adjustments.

To adjust the settings:

1. Go to the **DISPLAY** menu and highlight **3D Color Management**.
2. Press **MODE/ENTER** on the projector or remote control and the **3D Color Management** page is displayed.
3. Highlight **Primary Color** and press ◀▶ to select a color from among Red, Yellow, Green, Cyan, Blue, or Magenta.
4. Press ▼ to highlight **Hue** and press ◀▶ to select its range. Increase in the range will include colors consisted of more proportions of its two adjacent colors.

Please refer to the illustration to the right for how the colors relate to each other.

For example, if you select Red and set its range at 0, only pure red in the projected picture will be selected. Increasing its range will include red close to yellow and red close to magenta.



5. Press ▼ to highlight **Saturation** and adjust its values to your preference by pressing ◀▶. Every adjustment made will reflect to the image immediately.

For example, if you select Red and set its value at 0, only the saturation of pure red will be affected.

 Saturation is the amount of that color in a video picture. Lower settings produce less saturated colors; a setting of "0" removes that color from the image entirely. If the saturation is too high, that color will be overpowering and unrealistic.

6. Press ▼ to highlight **Gain** and adjust its values to your preference by pressing ◀▶. The contrast level of the primary color you select will be affected. Every adjustment made will reflect to the image immediately.
7. Repeat steps 3 to 6 for other color adjustments.
8. Make sure you have made all of the desired adjustments.
9. Press **MENU** on the projector or **MENU/EXIT** on the remote control to exit and save the settings.

2. Dependent Claim 2

[2.0] The projection-type display device according to claim 1, comprising

188. This element is disclosed by Pollmann-Retsch in view of the CP-DX300 Service Manual and the CP-DX300 User Manual, as analyzed for claim 1 in Section VIII.E.1, *supra*.

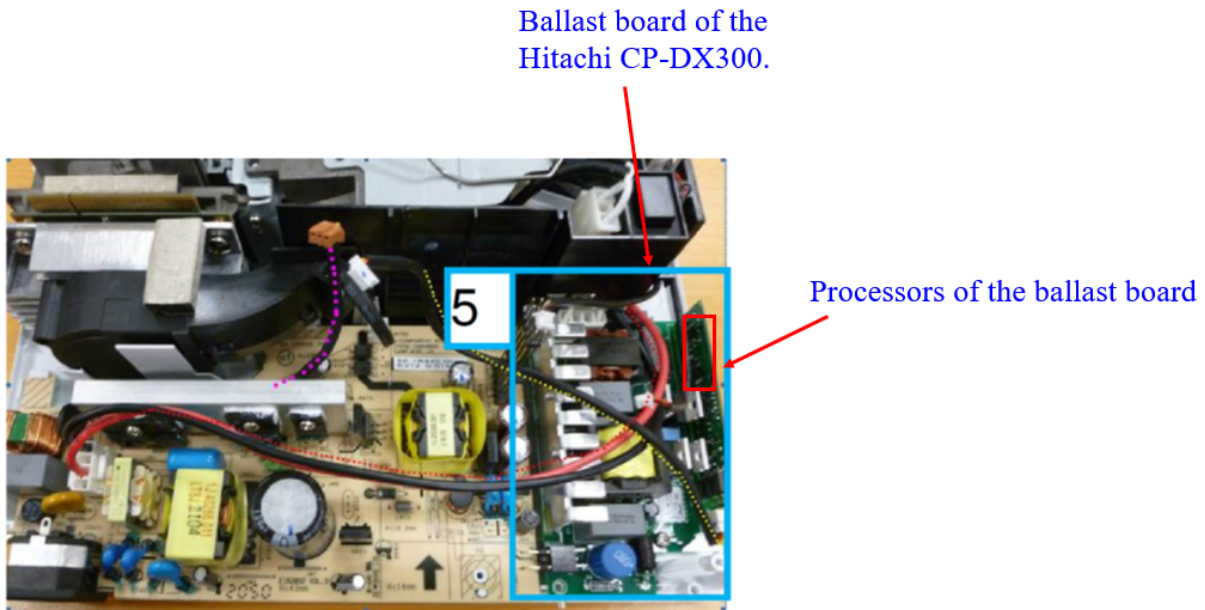
[2.1] a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp,

189. This limitation is disclosed by Pollmann-Retsch in view of the CP-DX300 Service Manual and the CP-DX300 User Manual. Particularly, the CP-DX300 Service Manual and the CP-DX300 User Manual collectively disclose a lighting period managing unit configured to manage an accumulated lighting period (hereinafter, a lamp usage period) of the discharge lamp.

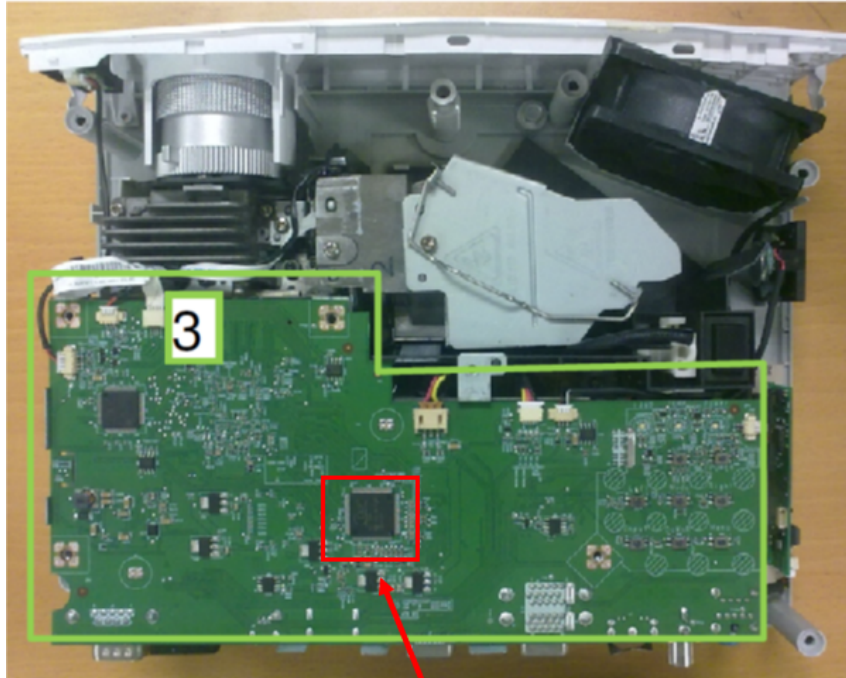
190. The ballast board of the Hitachi CP-DX300 includes one or more processors and/or controllers that manage the lamp usage period. Furthermore, the one or more processors may operate separately or in combination with other components and/or chips incorporated in the display controller or distributed among several components and/or chips within the CP-DX300.

191. The processors of the ballast board, separately or in combination with other components and/or chips, are configured to manage the lamp usage period of the discharge lamp by collecting the number of hours the projector operates in each lamp mode.

192. The following annotated figure in the CP-DX300 Service Manual shows that the ballast board includes one or more processors mounted on a circuit board. EX1011, at 26.

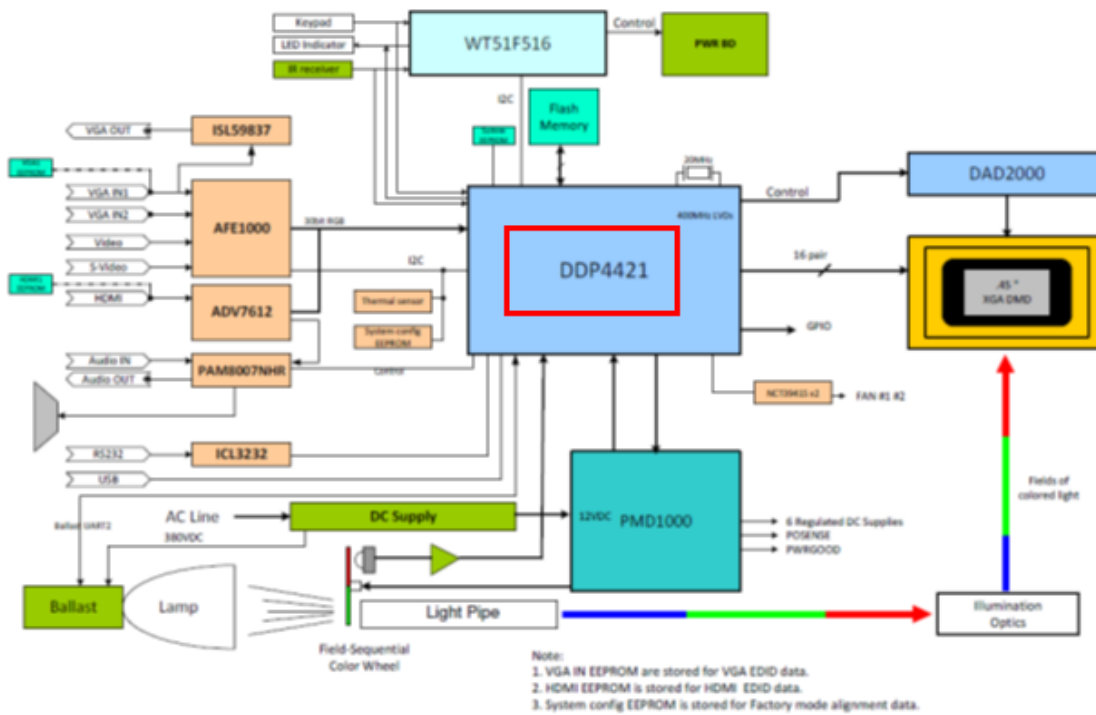


193. At least a portion of one or more processors, including the DLP DDP4421 display controller, as shown in the following annotated figures in the CP-DX300 Service Manual, separately or in combination with other components and/or chips are configured to manage a lamp usage period of the discharge lamp. EX1011, at 26, 59.



DLP DDP4421

10. Block Diagram



Main board & Input board Block Diagram

194. The following annotated figure in the CP-DX300 Service Manual shows the connection between the DLP DDP4421 display controller and the ballast board with the control of Read for Lamp Hour and Lamp Mode Status, indicating the controller's capability to manage and monitor the projector's lamp usage period. EX1011, at 61, 62.

Control	Read	Lamp Hour	<CR>(ltim=?)<CR>
	Write	Normal mode	<CR>(lampm=nor)<CR>
	Write	Eco mode	<CR>(lampm=eco)<CR>
	Write	Intelligent Eco mode	<CR>(lampm=leco)<CR>
Control (continued)	Read	Lamp Mode Status	<CR>(lampm=?)<CR>
	Write	Blank On	<CR>(blank=on)<CR>
	Write	Blank Off	<CR>(blank=off)<CR>
	Read	Blank Status	<CR>(blank=?)<CR>
	Write	Freeze On	<CR>(freeze=on)<CR>
	Write	Freeze Off	<CR>(freeze=off)<CR>
	Read	Freeze Status	<CR>(freeze=?)<CR>
	Write	Menu On	<CR>(menu=on)<CR>
	Write	Menu Off	<CR>(menu=off)<CR>
	Write	Up	<CR>(up)<CR>
	Write	Down	<CR>(down)<CR>
	Write	Right	<CR>(right)<CR>
	Write	Left	<CR>(left)<CR>
	Write	Enter	<CR>(enter)<CR>
	Write	High Altitude mode 1	<CR>(Highaltitude=1)<CR>
	Write	High Altitude mode 2	<CR>(Highaltitude=2)<CR>
	Read	High Altitude mode status	<CR>(Highaltitude=?)<CR>

195. The following annotated figures in the CP-DX300 User Manual show that the CP-DX300 projector includes an option to view lamp hours used. EX1012, at 34, 40, 42.

Lamp information

Getting to know the lamp hour

When the projector is in operation, the duration (in hours) of lamp usage is automatically calculated by the built-in timer. The method of calculating the equivalent lamp hour is as follows:

Total lamp hour = (hours used in **Normal** mode) + (hours used in **Economic** mode) + (hours used in **Intelligent Eco** mode)

To obtain the lamp hour information:

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control and then press **◀▶** until the **SYSTEM SETTING: ADVANCED** menu is highlighted.
2. Press **▼** to highlight **Lamp Settings** and press **MODE/ENTER** on the projector or remote control. The **Lamp Settings** page is displayed.
3. You will see the **Equivalent lamp hour** information on the menu.
4. To leave the menu, press **MENU** on the projector or **MENU/EXIT** on the remote control.

You can also get the lamp hour information on the **INFORMATION** menu.

Main menu	Sub-menu		Options
5. SYSTEM SETTING: Advanced	Quick Cooling		On/Off
	High Altitude Mode		1 (High) Equal or higher than 1500 m 2 (Normal) Lower than 1500 m
	Audio Settings	Mute	On/Off
		Volume	
	Menu Settings	Menu Display Time	5 sec/10 sec/15 sec/20 sec/25 sec/30 sec
		Menu Position	Center/Top-Left/Top-Right/Bottom-Left/Bottom-Right
	Standby Mode		Normal/Saving
	Lamp Settings	Lamp Mode	Normal/Economic/Intelligent Eco
		Reset Lamp Timer	
		Equivalent Lamp Hour	
	Security Settings	Change Password	
		Power on Lock	On/Off
6. INFORMATION	Closed Caption	Closed Caption Enable	On/Off
		Caption Version	CC1/CC2/CC3/CC4
	Reset All Settings	Reset/Cancel	
			• Current System Status • Source • Preset Mode • Color System • Resolution • Equivalent Lamp Hour • Serial Number

Function	Description
6. INFORMATION menu	Current System Status Shows current system status.
	Source Shows the current signal source.
	Preset Mode Shows the selected mode in the PICTURE menu.
	Color System Shows input system format, NTSC, PAL, SECAM, or RGB.
	Resolution Shows the native resolution of the input signal.
	Equivalent Lamp Hour Displays the number of hours the lamp has been used.
	Serial Number Shows the serial number of the projector.

[2.2] wherein the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

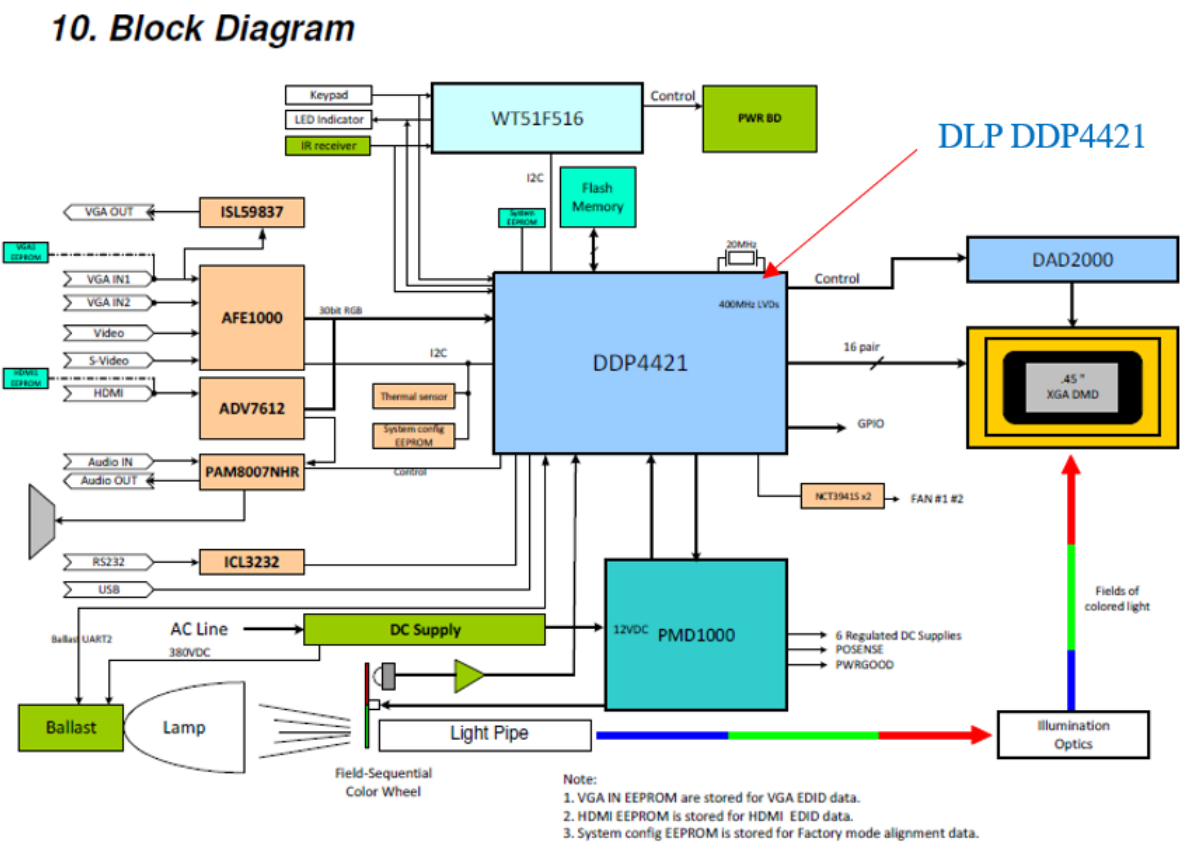
196. This element is disclosed by Pollmann-Retsch in view of CP-DX300-SM.

As discussed above, Pollmann-Retsch discloses a control unit that controls the amount of correction for the image correction processing unit based on the lamp voltage detected by the lamp voltage detection unit. *See* VIII.A.1.1.4. CP-DX300-SM discloses that the control unit is configured to control the amount of correction for the image correction processing unit based on the lamp usage period obtained from the lighting period managing unit.

197. According to CP-DX300-SM, the ballast board of the CP-DX300 includes one or more processors. *See* Section VIII.E.2.2.1, *supra*. These one or more processors may operate separately or in combination with other components incorporated either in

the DLP DDP4421 display controller or distributed among several components within the CP-DX300. The control unit is configured to account for the end of the lamp’s life and to alert the user to replace the lamp. See Section VIII.E.2.2.1, *supra*.

198. The processor(s) on the ballast board, separately or in combination with other components, are configured to manage the lamp usage period of the discharge lamp by collecting the number of hours the projector operates in each brightness mode. EX1011, at 59. The DLP DDP442—the main processor disclosed in the Hitachi model CP-DX300 projector—is shown below in the following annotated block diagram from CP-DX300-SM. *Id.*

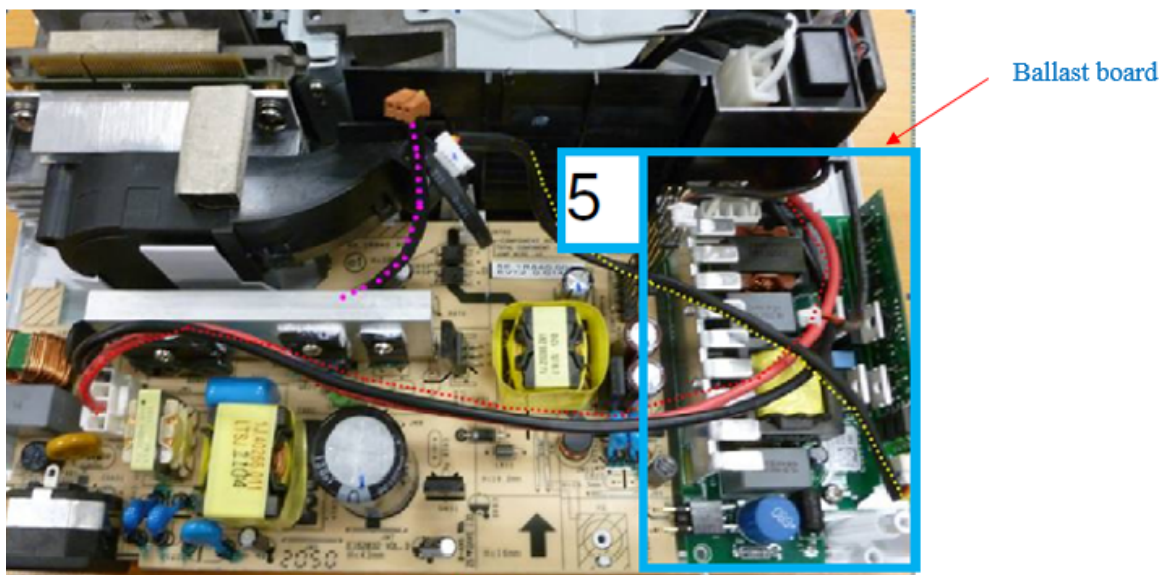


Main board & Input board Block Diagram

199. The following annotated figure from CP-DX300-SM also shows that the

105

ballast board includes one or more processors mounted on a circuit board. EX1011, at 26.



200. There is a well-known and predictable relationship between lamp voltage and lamp usage period, *i.e.*, as the usage period increases, the internal components of the lamp degrade, which results in an increased voltage being required to maintain illumination and image quality. Therefore, the control unit, *i.e.*, the DLP DDP4421, determines the appropriate amount of image correction based on the lamp usage period.

201. Pollmann-Retsch discloses a correction function that adjusts lamp power to maintain a target light flux based on the measured voltage value across the gas discharge lamp, thereby performing image quality correction on the image signal. *See* Section VIII.A.1.1.3, *supra*.

202. Therefore, Pollmann-Retsch in view of CP-DX300-SM discloses a control unit that is configured to control the amount of correction for the image correction

processing unit based on the lamp voltage detected by the lamp voltage detection unit and the lamp usage period obtained from the lighting period managing unit.

3. Dependent Claim 3

[3.0] The projection-type image display device according to claim 2, comprising

203. This element is disclosed by Pollmann-Retsch in view of the CP-DX300 Service Manual and the CP-DX300 User Manual, as analyzed for claim 1 in Section VIII.E.1, *supra*.

[3.1] a memory that stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp,

204. This element is disclosed by Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM. Pollmann-Retsch is discussed above and CP-DX300-SM and CP-DX300-UM disclose that the CP-DX300 projector includes a memory, *i.e.*, Flash Memory, that stores deterioration characteristic data, *e.g.*, lamp hours, for calculating the reduction in illuminance of the discharge lamp. EX1012, at 34, 42; EX1011, at 59.

205. The following annotated figures from CP-DX300-UM show that the projector includes an option to view lamp hours used. EX1012, at 34, 42.

Lamp information

Getting to know the lamp hour

When the projector is in operation, the duration (in hours) of lamp usage is automatically calculated by the built-in timer. The method of calculating the equivalent lamp hour is as follows:

Total lamp hour = (hours used in **Normal** mode) + (hours used in **Economic** mode) + (hours used in **Intelligent Eco** mode)

To obtain the lamp hour information:

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control and then press **◀▶** until the **SYSTEM SETTING: ADVANCED** menu is highlighted.
2. Press **▼** to highlight **Lamp Settings** and press **MODE/ENTER** on the projector or remote control. The **Lamp Settings** page is displayed.
3. You will see the **Equivalent lamp hour** information on the menu.
4. To leave the menu, press **MENU** on the projector or **MENU/EXIT** on the remote control.

You can also get the lamp hour information on the **INFORMATION** menu.

Main menu	Sub-menu	Options
5. SYSTEM SETTING: Advanced	Quick Cooling	On/Off
	High Altitude Mode	1 (High) Equal or higher than 1500 m 2 (Normal) Lower than 1500 m
	Audio Settings	Mute On/Off Volume
	Menu Settings	Menu Display Time 5 sec/10 sec/15 sec/20 sec/25 sec/30 sec
		Menu Position Center/Top-Left/Top-Right/Bottom-Left/Bottom-Right
	Standby Mode	Normal/Saving
	Lamp Settings	Lamp Mode Normal/Economic/Intelligent Eco
		Reset Lamp Timer
		Equivalent Lamp Hour
	Security Settings	Change Password
		Power on Lock On/Off
	Closed Caption	Closed Caption Enable On/Off
		Caption Version CC1/CC2/CC3/CC4
	Reset All Settings	Reset/Cancel
6. INFORMATION		• Current System Status • Source • Preset Mode • Color System • Resolution • Equivalent Lamp Hour • Serial Number

206. A memory of the CP-DX300—separately or in combination with other

components, *e.g.*, the DLP DDP4421 display controller—stores deterioration characteristic data for calculating the reduction in illuminance of the discharge lamp. The following annotated figures from CP-DX300-UM show that the projector includes a memory capable of storing information such as the “User mode.” EX1012, at 26, 32.

The preset modes available for different types of signals are listed below.

1. **Bright mode:** Maximizes the brightness of the projected image. This mode is suitable for environments where extra-high brightness is required, such as using the projector in well lit rooms.
2. **Presentation mode:** Is designed for presentations under daylight environment to match computer and notebook computer coloring.
3. **sRGB mode:** Maximizes the purity of RGB colors to provide true-to-life images regardless of brightness setting. It is most suitable for viewing photos taken with an sRGB compatible and properly calibrated camera, and for viewing computer graphic and drawing applications.
4. **Cinema mode:** Is appropriate for playing colorful movies, video clips from digital cameras or DVs through the computer input for best viewing in a blackened (little light) environment.
5. **Game mode:** Suitable for all types of entertainment media, including gaming and movies.
6. **User mode:** Recalls the settings customized based on the current available preset modes. See “Setting the User mode” on page 26 for details.

Setting the User mode

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control to open the On-Screen Display (OSD) menu.
2. Go to the **PICTURE > Preset Mode** menu.
3. Press **◀▶** to select **User**. The adjustments you make in the **Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature** and **3D Color Management** will automatically be saved as the **User mode**.

Fine-tuning the image quality in user modes

According to the detected signal type, there are some user-definable functions available when **User mode** is selected. You can make adjustments to these functions based on your needs.

Menu operation

Menu system

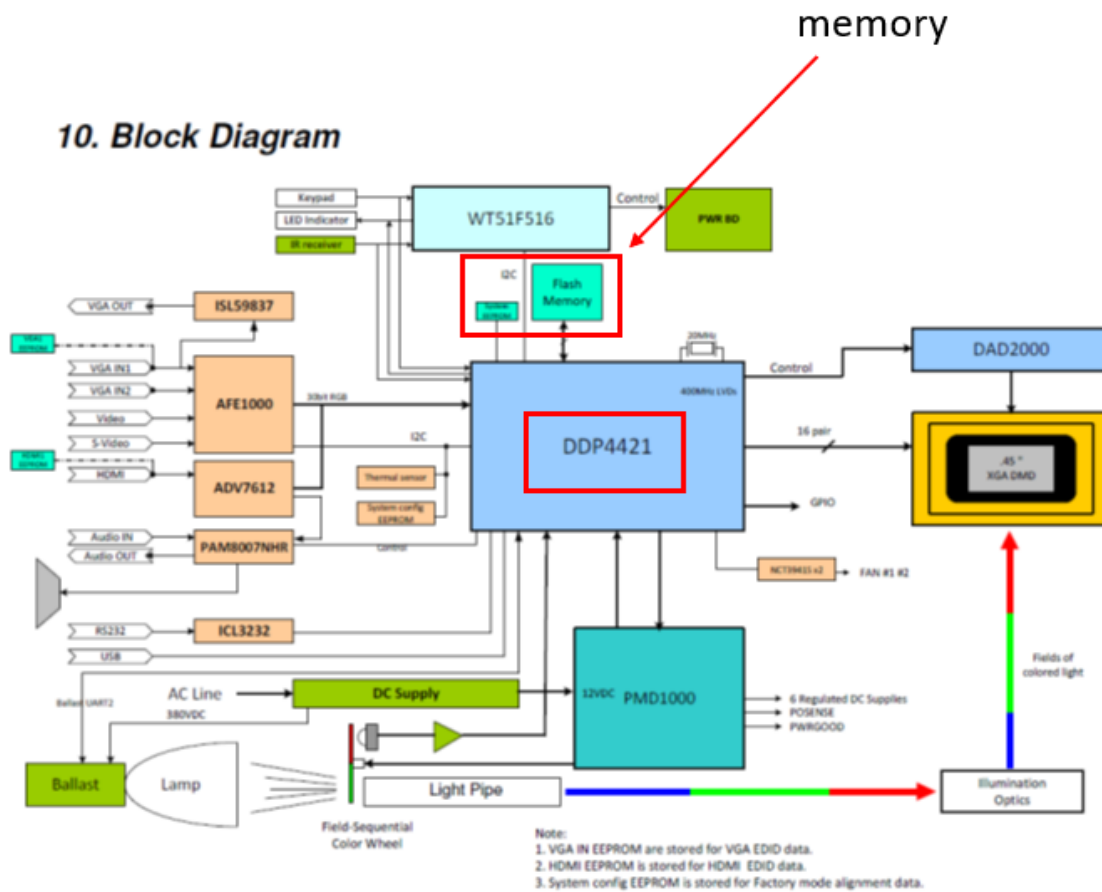
Please note that the on-screen display (OSD) menus vary according to the signal type selected.

The menu items are available when the projector detects at least one valid signal. If there is no equipment connected to the projector or no signal detected, limited menu items are accessible.

Main menu	Sub-menu		Options
1. DISPLAY	Wall Color		Off/Light Yellow/Pink/Light Green/Blue/Blackboard
	Aspect Ratio		Auto/Real/4:3/16:9
	Keystone		
	Position		
	Phase		
	H. Size		
	Magnify		
	3D Sync		Auto/Frame Sequential/Frame Packing/Top-Bottom/Side-by-Side/Off
	3D Sync Invert		Disable/Invert
2. PICTURE	Preset Mode	Bright/Presentation/sRGB/Cinema/Game	User
	Brightness		
	Contrast		
	Color		
	Tint		
	Sharpness		
	Brilliant Color		On/Off
	Color Temperature		Cool/Normal/Warm
	3D Color Management	Primary Color	R/G/B/C/M/Y
		Hue	
		Saturation	
		Gain	

207. The memory in the CP-DX300 stores information, such as deterioration characteristic data, which is processed by the DLP DDP4421 display controller (shown below in an annotated block diagram from CP-DX300-SM). EX1011, at 59.

10. Block Diagram



Main board & Input board Block Diagram

208. The following annotated figures from CP-DX300-SM show the controller can manage and monitor the projector's lamp usage period. EX 1011 at 61, 62.

Control	Read	Lamp Hour	<CR>(ltim=?)<CR>
	Write	Normal mode	<CR>(lampm=nor)<CR>
	Write	Eco mode	<CR>(lampm=eco)<CR>
	Write	Intelligent Eco mode	<CR>(lampm=leco)<CR>

Control (continued)	Read	Lamp Mode Status	<CR>(lampm=?)<CR>
	Write	Blank On	<CR>(blank=on)<CR>
	Write	Blank Off	<CR>(blank=off)<CR>
	Read	Blank Status	<CR>(blank=?)<CR>
	Write	Freeze On	<CR>(freeze=on)<CR>
	Write	Freeze Off	<CR>(freeze=off)<CR>
	Read	Freeze Status	<CR>(freeze=?)<CR>
	Write	Menu On	<CR>(menu=on)<CR>
	Write	Menu Off	<CR>(menu=off)<CR>
	Write	Up	<CR>(up)<CR>
	Write	Down	<CR>(down)<CR>
	Write	Right	<CR>(right)<CR>
	Write	Left	<CR>(left)<CR>
	Write	Enter	<CR>(enter)<CR>
	Write	High Altitude mode 1	<CR>(Highaltitude=1)<CR>
	Write	High Altitude mode 2	<CR>(Highaltitude=2)<CR>
	Read	High Altitude mode status	<CR>(Highaltitude=?)<CR>

[3.2] wherein the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

209. This element is disclosed by Pollmann-Retsch, discussed above, in view of CP-DX300-SM. CP-DX300-SM discloses that the control unit is configured to calculate a rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using the deterioration characteristic data stored in the memory, the control unit being configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance.

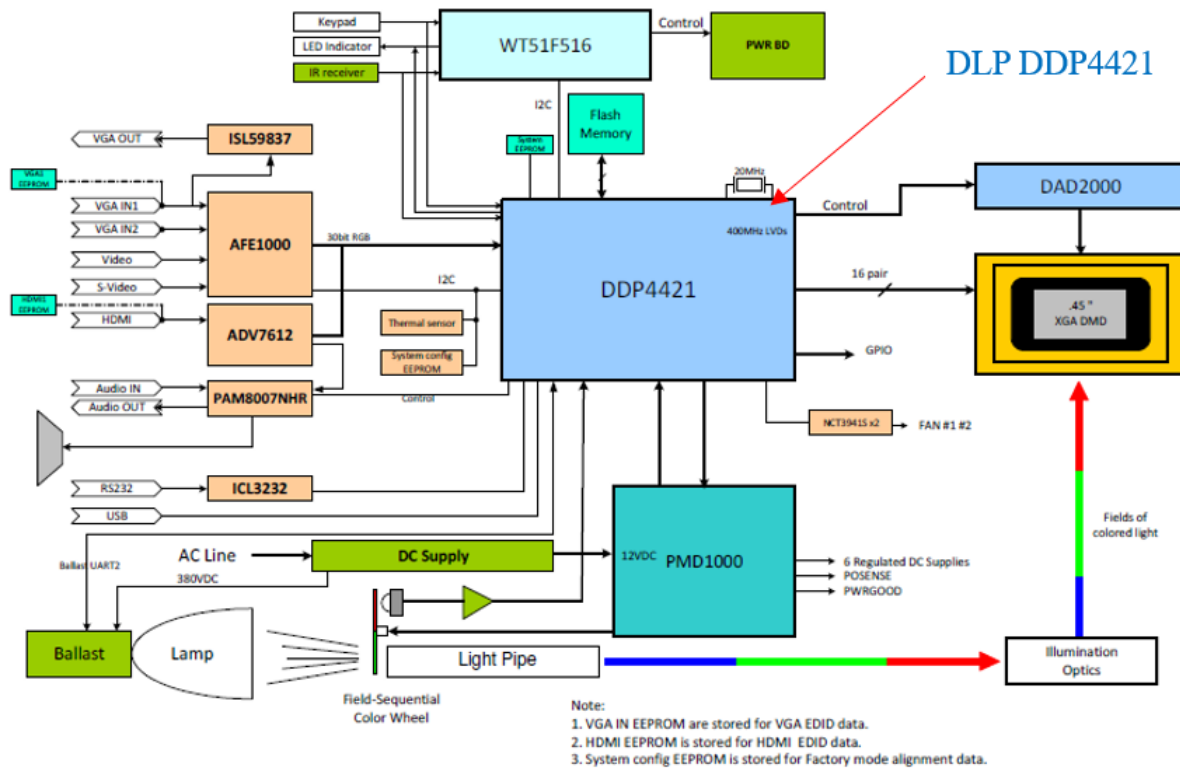
210. CP-DX300-SM also discloses that the control unit is configured to calculate the rate of the reduction in illuminance of the discharge lamp from the lamp voltage and the lamp usage period using deterioration characteristic data, *e.g.*, used lamp

hours stored in the memory. The control unit is also configured to control the amount of correction for the image correction processing unit according to the calculated rate of decrease in illuminance.

211. CP-DX300 uses the control unit to calculate the rate of the reduction in illuminance of the discharge lamp during the lamp usage period using deterioration characteristic data stored in the memory. The DLP DDP4421 display controller (*i.e.*, the control unit) is configured to control the amount of correction for the image correction processing unit according to the rate of decrease in illuminance. The following annotated figures from CP-DX300-SM show the DLP DDP4421 display controller in CP-DX300 can control the illuminance of the discharge lamp. EX1011, at 59, 61, 62.

Control	Read	Lamp Hour	<CR>(ltim=?)<CR>
	Write	Normal mode	<CR>(lampm=nor)<CR>
	Write	Eco mode	<CR>(lampm=eco)<CR>
	Write	Intelligent Eco mode	<CR>(lampm=leco)<CR>
Control (continued)	Read	Lamp Mode Status	<CR>(lampm=?)<CR>
	Write	Blank On	<CR>(blank=on)<CR>
	Write	Blank Off	<CR>(blank=off)<CR>
	Read	Blank Status	<CR>(blank=?)<CR>
	Write	Freeze On	<CR>(freeze=on)<CR>
	Write	Freeze Off	<CR>(freeze=off)<CR>
	Read	Freeze Status	<CR>(freeze=?)<CR>
	Write	Menu On	<CR>(menu=on)<CR>
	Write	Menu Off	<CR>(menu=off)<CR>
	Write	Up	<CR>(up)<CR>
	Write	Down	<CR>(down)<CR>
	Write	Right	<CR>(right)<CR>
	Write	Left	<CR>(left)<CR>
	Write	Enter	<CR>(enter)<CR>
	Write	High Altitude mode 1	<CR>(Highaltitude=1)<CR>
	Write	High Altitude mode 2	<CR>(Highaltitude=2)<CR>
	Read	High Altitude mode status	<CR>(Highaltitude=?)<CR>

10. Block Diagram



Main board & Input board Block Diagram

212. There is a well-known and predictable relationship between lamp voltage and lamp usage period, *i.e.*, as the usage period increases, the internal components of the lamp degrade, which results in an increased voltage being required to maintain illumination and image quality. Therefore, the control unit, *i.e.*, the DLP DDP4421, determines the appropriate amount of image correction based on both the detected lamp voltage and the lamp usage period.

4. Dependent Claim 4

[4.0] The projection-type image display device according to claim 1, comprising a memory, wherein:

213. This element is disclosed by Pollmann-Retsch in view of the CP-DX300

Service Manual and the CP-DX300 User Manual, as analyzed for claim 1 in Section VIII.E.1, *supra*.

[4.1] a memory, wherein: the memory is capable of storing the amount of correction, and

214. This element is disclosed by Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM. Pollmann-Retsch is discussed above and CP-DX300-SM and CP-DX300-UM disclose a memory that can store the amount of correction.

215. The projector includes a memory capable of storing information, such as user settings like “User mode.” EX1011 at 59; EX1012, at 26, 32. This memory stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp. The following annotated figures from CP-DX300-UM illustrate this accordingly. EX1012, at 26.

The preset modes available for different types of signals are listed below.

1. **Bright mode:** Maximizes the brightness of the projected image. This mode is suitable for environments where extra-high brightness is required, such as using the projector in well lit rooms.
2. **Presentation mode:** Is designed for presentations under daylight environment to match computer and notebook computer coloring.
3. **sRGB mode:** Maximizes the purity of RGB colors to provide true-to-life images regardless of brightness setting. It is most suitable for viewing photos taken with an sRGB compatible and properly calibrated camera, and for viewing computer graphic and drawing applications.
4. **Cinema mode:** Is appropriate for playing colorful movies, video clips from digital cameras or DVs through the computer input for best viewing in a blackened (little light) environment.
5. **Game mode:** Suitable for all types of entertainment media, including gaming and movies.
6. **User mode:** Recalls the settings customized based on the current available preset modes. See "Setting the User mode" on page 26 for details.

Setting the User mode

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control to open the On-Screen Display (OSD) menu.
2. Go to the **PICTURE > Preset Mode** menu.
3. Press **◀▶** to select **User**. The adjustments you make in the **Brightness, Contrast, Color, Tint, Sharpness, Brilliant Color, Color Temperature** and **3D Color Management** will automatically be saved as the **User mode**.

Fine-tuning the image quality in user modes

According to the detected signal type, there are some user-definable functions available when **User mode** is selected. You can make adjustments to these functions based on your needs.

Menu operation

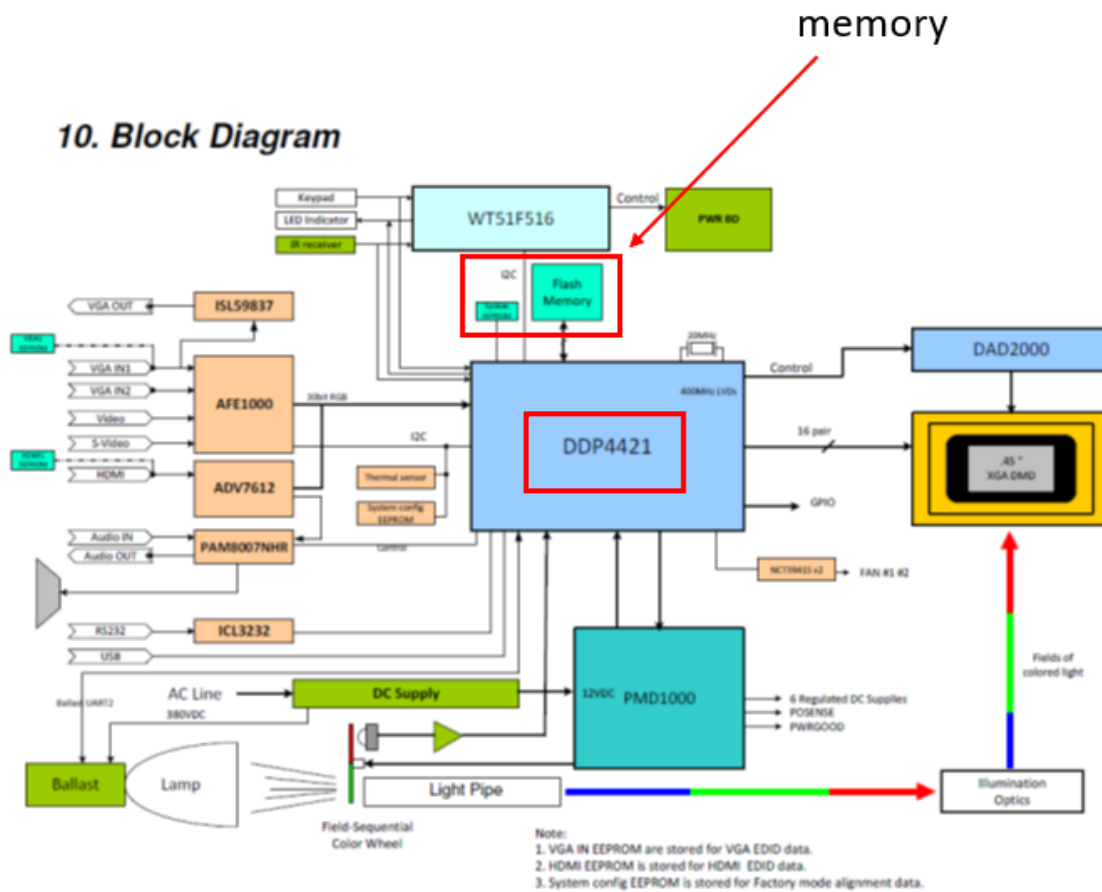
Menu system

Please note that the on-screen display (OSD) menus vary according to the signal type selected.

The menu items are available when the projector detects at least one valid signal. If there is no equipment connected to the projector or no signal detected, limited menu items are accessible.

Main menu	Sub-menu		Options
1. DISPLAY	Wall Color		Off/Light Yellow/Pink/Light Green/Blue/Blackboard
	Aspect Ratio		Auto/Real/4:3/16:9
	Keystone		
	Position		
	Phase		
	H. Size		
	Magnify		
	3D Sync		Auto/Frame Sequential/Frame Packing/Top-Bottom/Side-by-Side/Off
	3D Sync Invert		Disable/Invert
2. PICTURE	Preset Mode	Bright/Presentation/sRGB/Cinema/Game	User
	Brightness		
	Contrast		
	Color		
	Tint		
	Sharpness		
	Brilliant Color		On/Off
	Color Temperature		Cool/Normal/Warm
	3D Color Management	Primary Color	R/G/B/C/M/Y
		Hue	
		Saturation	
		Gain	

216. The memory in the CP-DX300, shown below in an annotated block diagram from CP-DX300-SM, stores deterioration characteristic data for a calculation of a reduction in illuminance of the discharge lamp. *Id.*



Main board & Input board Block Diagram

[4.2] the control unit uses the amount of correction stored in the memory for the image quality correction by the image correction processing unit when the discharge lamp is lit up, the control unit being configured to perform update processing of the amount of correction for the image quality correction by the image correction processing unit after an elapse of a predetermined time.

217. This element is disclosed by Pollmann-Retsch in view of CP-DX300-SM and CP-DX300-UM. Pollmann-Retsch discloses that the control unit is configured to perform update processing of the amount of correction for the image quality correction after passage of a predetermined time. CP-DX300-SM and CP-DX300-UM disclose that the control unit uses the amount of correction stored in the memory for the image quality

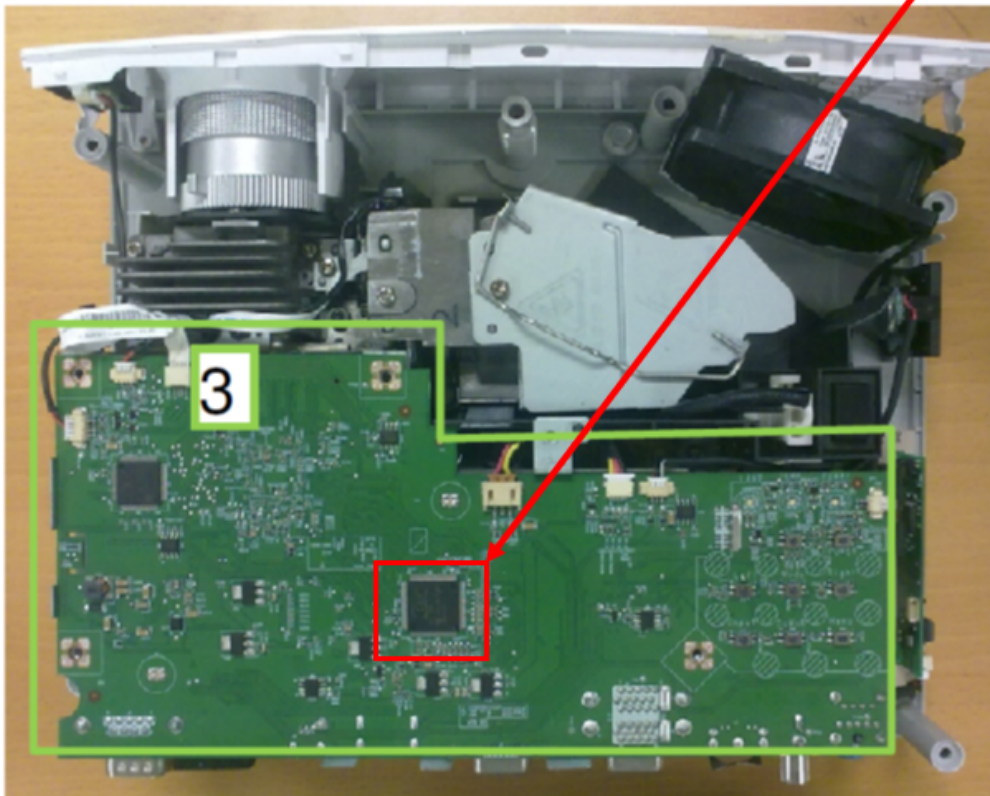
correction when the discharge lamp is lit, the control unit being configured to perform update processing of the amount of correction for the image quality correction after a predetermined time period.

218. Pollmann-Retsch discloses that the light flux can be adjusted to maintain a constant light flux. Pollmann-Retsch teaches that a driving unit is configured to drive “a gas discharge lamp to maintain a desired target light flux even if the length of the discharge arc is changing.” EX1005, [0005]. Because the lamp performance degrades due to wear and aging over time, it is known that periodic adjustments must be made to maintain consistent a desired target light flux. Pollmann-Retsch therefore inherently discloses a process of updating correction values after a certain period of time.

219. According to CP-DX300-SM, the CP-DX300 projector includes a control unit that uses the amount of correction stored in the memory for the image quality correction by the image correction processing unit when the discharge lamp is lit, wherein the amount of correction is updated periodically.

220. At least a portion of one or more processors, including the DLP DDP4421 display controller, are configured to manage a lamp usage period, *i.e.*, the predetermined period during which the lamp is lit, as shown in the following annotated figures from CP-DX300-SM. EX1011 at 26, 61.

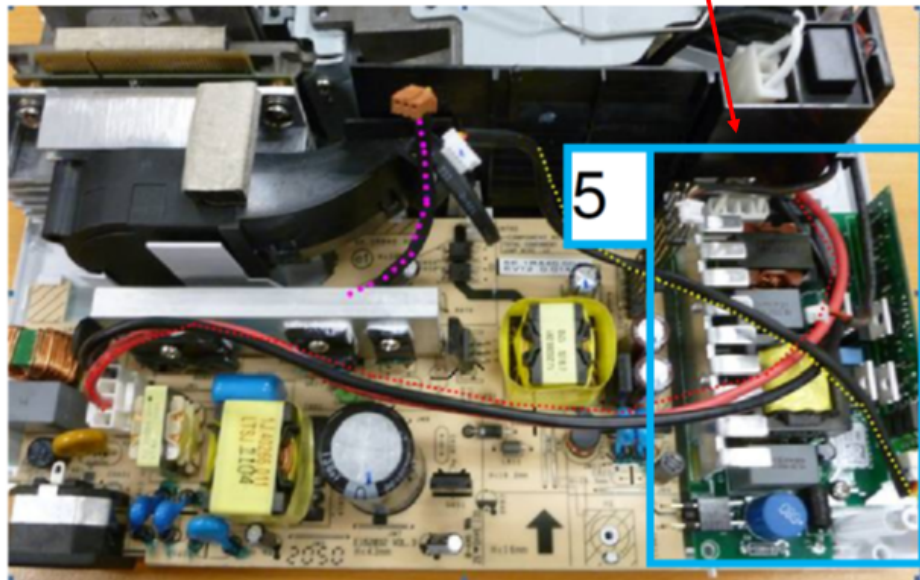
DLP DDP4421



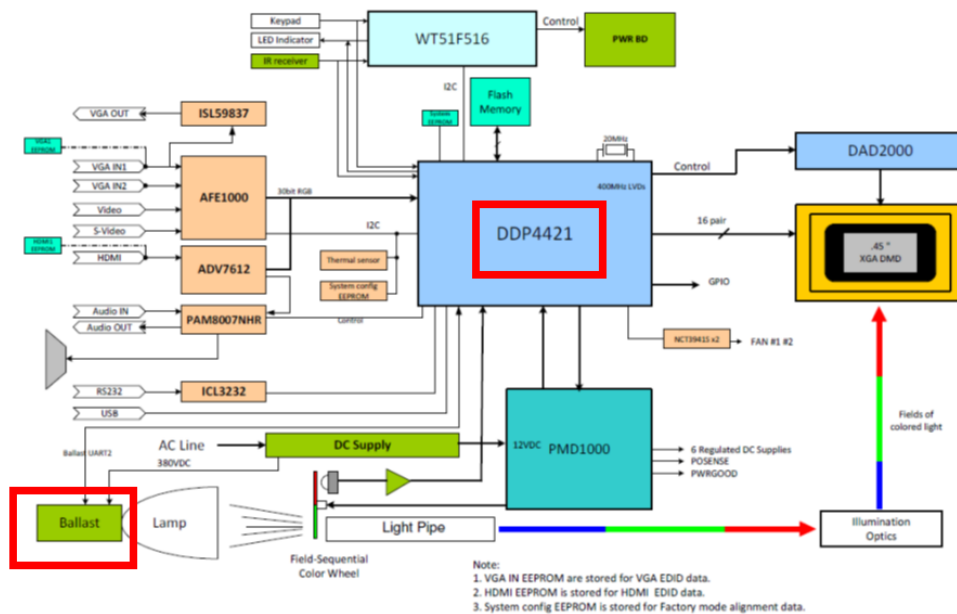
Control	Read	Lamp Hour	<CR>(ltime=?)<CR>
	Write	Normal mode	<CR>(lampm=nor)<CR>
	Write	Eco mode	<CR>(lampm=eco)<CR>
	Write	Intelligent Eco mode	<CR>(lampm=leco)<CR>

221. CP-DX300 includes a ballast board having one or more processors mounted on a circuit board that are configured to manage a lamp usage period based on the amount of correction stored in the memory as shown in the following annotated figures from CP-DX300-SM. EX1011, at 26, 59.

Ballast board of the Hitachi CP-DX300



10. Block Diagram



Main board & Input board Block Diagram

222. CP-DX300 includes an option to view lamp hours used, as shown in the annotated figures below from CP-DX300-UM. EX1012, at 34, 40, 42. The recorded lamp hours act an indicator for lamp wear, allowing the system to anticipate and

compensate for image degradation before it becomes perceptible to a user. The recorded lamp hours enable the projector to predictively determine when and how to update the correction amount applied by the image correction processing unit.

Lamp information

Getting to know the lamp hour

When the projector is in operation, the duration (in hours) of lamp usage is automatically calculated by the built-in timer. The method of calculating the equivalent lamp hour is as follows:

Total lamp hour = (hours used in **Normal** mode) + (hours used in **Economic** mode) + (hours used in **Intelligent Eco** mode)

To obtain the lamp hour information:

1. Press **MENU** on the projector or **MENU/EXIT** on the remote control and then press **◀▶** until the **SYSTEM SETTING: ADVANCED** menu is highlighted.
2. Press **▼** to highlight **Lamp Settings** and press **MODE/ENTER** on the projector or remote control. The **Lamp Settings** page is displayed.
3. You will see the **Equivalent lamp hour** information on the menu.
4. To leave the menu, press **MENU** on the projector or **MENU/EXIT** on the remote control.

You can also get the lamp hour information on the **INFORMATION** menu.

Main menu	Sub-menu	Options
5. SYSTEM SETTING: Advanced	Quick Cooling	On/Off
	High Altitude Mode	1 (High) Equal or higher than 1500 m 2 (Normal) Lower than 1500 m
	Audio Settings	Mute On/Off Volume
	Menu Settings	Menu Display Time 5 sec/10 sec/15 sec/20 sec/25 sec/30 sec
		Menu Position Center/Top-Left/Top-Right/Bottom-Left/Bottom-Right
	Standby Mode	Normal/Saving
	Lamp Settings	Lamp Mode Normal/Economic/Intelligent Eco
		Reset Lamp Timer
	Security Settings	Equivalent Lamp Hour
		Change Password
	Closed Caption	Power on Lock On/Off
		Closed Caption Enable On/Off
6. INFORMATION	Reset All Settings	CC1/CC2/CC3/CC4
	Reset/Cancel	
		• Current System Status • Source • Preset Mode • Color System • Resolution • Equivalent Lamp Hour • Serial Number

Function	Description
6. INFORMATION menu	Current System Status Shows current system status.
	Source Shows the current signal source.
	Preset Mode Shows the selected mode in the PICTURE menu.
	Color System Shows input system format, NTSC, PAL, SECAM, or RGB.
	Resolution Shows the native resolution of the input signal.
	Equivalent Lamp Hour Displays the number of hours the lamp has been used.
	Serial Number Shows the serial number of the projector.

IX. Secondary Considerations

223. I have been informed and understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of the invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a connection between any such secondary considerations and the alleged invention. I also understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

224. I am not aware of any secondary considerations that would make the Challenged Claims of the '569 Patent nonobvious over the prior art considered herein. Regardless, any possible secondary considerations would not overcome the above-cited prior art, which clearly demonstrates the subject matter of the Challenged Claims of the '569 Patent.

I hereby declare that statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. Should further information become available to me as this matter proceeds, I may revise my opinions accordingly as necessary. I declare under penalty of perjury that the foregoing Declaration is true and correct.

Executed on May 13, 2025.

By: Dan Schoups 