

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Ingo Tobias Doser et al.
U.S. Patent No.: 9,185,268 Attorney Docket No.: 07314-0053IP1
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Title: METHODS AND SYSTEMS FOR DISPLAYS WITH
CHROMATIC CORRECTION WITH DIFFERING CHROMATIC
RANGES

DECLARATION OF DR. ELI SABER

I currently hold the opinions set expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

Dated: 2/9/2026

By: 

Dr. Eli Saber

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RELEVANT CLAIMS

Claim 1	
[1.pre]	A method for color correcting, comprising:
[1.1]	performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,
[1.1.1]	wherein said performing step comprises: mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and
[1.1.2]	generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,
[1.1.3]	wherein the source picture content is mastered only for the non-reference type displays having the non-reference color gamut.
Claim 2	
[2]	The method of claim 1, wherein the metadata is provided to the reference type displays for final consumption at least one of in-band and out-of-band with respect to the mastered color corrected picture content.
Claim 3	
[3]	The method of claim 1, wherein said step of performing the color correction further comprises performing the color gamut mapping using the metadata to verify a result of the color correction, when the display content is rendered on the reference type display.
Claim 4	
[4]	The method of claim 1, wherein the color gamut mapping is applied during the color correction and a subsequent consumer consumption.

Claim 5	
[5]	The method of claim 1, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 6	
[6.pre]	A method for color correcting, comprising:
[6.1]	performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,
[6.1.1]	wherein said performing step comprises: mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and
[6.1.2]	mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 7	
[7]	The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is used directly by a consumer device.
Claim 8	
[8]	The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before display by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

Claim 9	
[9]	The method of claim 6, wherein said step of mastering the source picture content comprises rendering the mastered color corrected picture content on the reference type display using a color gamut mapping that simulates the non-reference type display on the reference type display.
Claim 10	
[10]	The method of claim 6, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 11	
[11]	The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is a derivative of the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 12	
[12.pre]	A system for color correcting, comprising:
[12.1]	a color correction module for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut, to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and
[12.2]	a color gamut mapping module for performing a color gamut mapping to generate metadata for a subsequent color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,

[12.3]	wherein the source picture content is mastered only for the non-reference type displays having the non-reference color gamut.
Claim 13	
[13]	The system of claim 12, wherein the metadata is provided to the reference type displays for final consumption at least one of in-band and out-of-band with respect to the mastered color corrected picture content.
Claim 14	
[14]	The system of claim 12, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 15	
[15.pre]	A system for color correcting, comprising:
[15.1]	a color correction module for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut, to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and
[15.2]	a color gamut mapping module for performing a color gamut mapping with respect to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut.
Claim 16	
[16]	The system of claim 15, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is used directly by a consumer device.

Claim 17	
[17]	The system of claim 15, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before use by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 18	
[18]	The system of claim 15, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 19	
[19]	The system of claim 15, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is a derivative of the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 20	
[20.pre]	A system for color correcting, comprising:
[20.1]	means for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,
[20.1.1]	wherein said means for performing color correction comprises: means for mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

[20.1.2]	means for generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,
[20.1.3]	wherein the source picture content is mastered only for the non-reference type displays having the non-reference color gamut.
Claim 21	
[21]	The system of claim 20, wherein the metadata is provided to the reference type displays for final consumption at least one of in-band and out-of-band with respect to the mastered color corrected picture content.
Claim 22	
[22]	The system of claim 20, wherein said means for performing color correction further comprises means for performing the color gamut mapping using the metadata to verify a result of the color correction, when the display content is rendered on the reference type display.
Claim 23	
[23]	The system of claim 20, wherein the color gamut mapping is applied during the color correction and a subsequent consumer consumption.
Claim 24	
[24]	The system of claim 20, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 25	
[25.pre]	A system for color correcting, comprising:
[25.1]	means for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference

	color gamut and a reference type display having a reference color gamut,
[25.1.1]	wherein said means for performing color correction comprises: means for mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and
[25.1.2]	means for mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 26	
[26]	The system of claim 25, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is used directly by a consumer device.
Claim 27	
[27]	The system of claim 25, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before display by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.
Claim 28	
[28]	The system of claim 25, wherein said means for mastering the source picture content to provide the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut comprises means for rendering, the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut, on the reference type display using a color gamut mapping that simulates the non-reference type display on the reference type display.
Claim 29	

[29]	The system of claim 25, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.
Claim 30	
[30]	The system of claim 25, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is a derivative of the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

I, Eli Saber, declare that:

I. ASSIGNMENT

1. I have been retained on behalf of Dolby Laboratories, Inc. (“Dolby”) to offer technical opinions related to U.S. Patent No 9,185,268 (“the ’268 patent”) (DOLBY-1001). I understand that Dolby is requesting that the Patent Trial and Appeal Board (“PTAB” or “Board”) institute an *inter partes* review (“IPR”) proceeding of the ’268 patent.

2. I have been asked to provide my independent analysis of the ’268 patent based on the prior art publications cited in this declaration.

3. I am not and never have been, an employee of Dolby. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’268 patent, the prior art publications cited below, and issues related thereto, and I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the ’268 patent.

II. QUALIFICATIONS

4. I am over the age of 18 and am competent to write this declaration. I have personal knowledge, or have developed knowledge of these technologies based upon education, training, or experience, of the matters set forth herein.

5. I am a professor in the Electrical and Microelectronic Engineering Department and the Chester F. Carlson Center for Imaging Science at the Rochester

Institute of Technology (RIT) in Rochester, New York. I also serve as the Director of the Image, Video, and Computer Vision Laboratory. I joined RIT's full-time faculty in 2004. I have over thirty-five (35) years of industry and academic experience, thirty (30) of which are in the fields of Computer Vision, Digital Image/Video Processing, Pattern Recognition and Machine Learning.

6. I received a Ph.D. in Electrical Engineering from the University of Rochester in 1996. My concentration was on Signal/Image/Video Processing, Pattern Recognition, and Computer Vision. I received a Master's Degree in Electrical Engineering from the University of Rochester in 1992, and I received a Bachelor's Degree in Electrical and Computer Engineering, *summa cum laude*, from the State University of New York at Buffalo in 1988.

7. Before becoming a full-time professor, I worked for Xerox Corporation for 16 years, from 1988 to 2004. During my years at Xerox, I was responsible for delivering color management, image processing innovations, architectures, and algorithms; xerographic sub-systems for a variety of color products; and control systems for toner production facilities. One of several roles I held at Xerox was Advanced Development Scientist and Manager. In that capacity, I established the Advanced Design Laboratory—an Imaging/Xerographics lab—and provided technical and managerial leadership for the Electrical, Imaging and Xerographics Department. In another role, as Product Development Scientist and Manager, I led

the research and development of image quality metrics for various product platforms. I also led the Image Science, Analysis, and Evaluation area, with 12 to 15 direct reports and a budget of approximately \$2 million.

8. From 1997 until 2004, I was an adjunct faculty member in the Electrical Engineering Department of RIT and in the Electrical and Computer Engineering Department of the University of Rochester. I was responsible for teaching undergraduate and graduate coursework in signal, image, and video processing; pattern recognition; and communications. Additionally, I performed research in multimedia applications, pattern recognition, image understanding, and color engineering.

9. Since joining RIT full time, I have been responsible for teaching several undergraduate and graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Advanced Neural Networks and Deep Learning, Pattern Recognition, Engineering Analysis, Random Signal & Noise, Advanced Engineering Mathematics, Matrix Methods, Communication Systems, Digital Communications, Modern Control Theory, Color Engineering and Linear Systems.

10. I proposed, developed and introduced the “Digital Video Processing” and the “Advanced Neural Network and Deep Learning: Part 1” courses; and reestablished the Pattern Recognition course at the Electrical Engineering

Department at RIT. These graduate courses were instrumental in providing MS/PhD students with the proper foundation and knowledge in all aspects of the subject areas in order to perform in-depth research in the field and continue to advance the state of the art.

11. The Digital Video Processing course is designed to provide a thorough and comprehensive coverage of the field. Topics covered include the mathematical representation of digital video including motion and time-varying image formation models, spatio-temporal sampling/reconstruction, sampling structure conversions, motion estimation using optical flow, block-based, pel-recursive, Bayesian and point correspondence type methodologies, segmentation, motion tracking, filtering, restoration, super-resolution and compression.

12. The Pattern Recognition course, on the other hand, covers pertinent concepts in Bayes decision theory, linear and nonlinear classifiers, artificial neural networks, feature selection/generation/extraction and various methodologies of clustering.

13. The graduate course titled: “Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms: Part 1” is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in

the field. The course begins with an in-depth study of the mathematical methodologies for neural networks and optimization (zero-, first- and second-order) techniques. It then progresses to provide a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, regression, two- and multi-class classification, unsupervised learning, feature engineering/selection, backpropagation along with applications to a variety of engineering problems.

14. I am currently working to develop a follow-on course (Part 2) to the Advanced Neural Networks and Deep Learning course described above. This course is intended to cover convolutional and recurrent style neural networks, principles of feature engineering, kernel methods, tree-based learners, attention mechanisms/transformers, reinforcement learning and generative adversarial networks. This course is targeted to debut in Fall 2027.

15. I am also currently working to revamp the graduate course titled: “Image and Video Compression”. The updated version of this course will start by providing a brief history of video coding and video coding standards and then progress to discussing video basics, formats and fundamentals of video compression. It will then progress to cover JPEG, JPEG 2000, H.261, MPEG-1, MPEG-2, H.263, MPEG-4 visual, H.264 and H.265, AV-1 and H.266. The course is intended to debut in Fall 2028.

16. During my tenure at Xerox Corporation, I have developed/led the development of color characterization, calibration and management architectures, algorithms and techniques for multiple digital front ends designed to drive full process as well as highlight color print engines. I have also led the research and development of image quality metrics for various product platforms and their subsequent dissemination throughout the Print Engine Development Division at Xerox Corporation. I have also developed and conducted industrial training at Xerox Corporation in the areas of color engineering, digital image processing and control systems with a distinct focus on digital front ends and print engines and their underlying architectures.

17. My current research focuses on image/video processing for multimedia, military & biomedical applications; computer vision and three-dimensional scene reconstruction; and machine learning for object tracking/remote sensing applications. As a principal investigator or co-principal investigator, I have acquired almost \$6 million in research funding since joining RIT and have managed multiple government grants from the Department of Defense as well as several yearly corporate grants from Hewlett-Packard.

18. In 2012, I was awarded the Prestigious Trustees Scholarship, the highest award at RIT with regard to research recognition.

19. I am the author or co-author of forty (40) peer-reviewed journal publications.

20. I have also authored or co-authored one hundred and four (104) conference and workshop publications and a book entitled Advanced Linear Algebra for Engineers with MATLAB, published by CRC Press in February 2009, and am a named inventor on multiple U.S. and foreign patents.

21. I am a senior member of the Institute of Electrical and Electronic Engineers and a member of the IEEE Signal Processing Society, the Electrical Engineering Honor Society, Eta Kappa Nu.

III. SUMMARY OF CONCLUSIONS FORMED

22. This Declaration explains the conclusions that I have formed based on my analysis. To summarize those conclusions:

- **Ground 1:** Based upon my knowledge and experience and my review of the prior art publications in this declaration, I believe that claims 1-3, 5, 12-14, 20-22, and 24 of the '268 patent are made obvious by Jones, Ollivier, and Osaki
- **Ground 2:** Based upon my knowledge and experience and my review of the prior art publications in this declaration, I believe that claims 4 and 23 of the '268 patent are made obvious by Jones, Ollivier, Osaki, and Morovič

- **Ground 3:** I believe that claims 6, 7, 10, 11, 15, 16, 18, 19, 25, 26, 29, and 30 of the '268 patent are made obvious by Jones and Yeung
- **Ground 4:** Based upon my knowledge and experience and my review of the prior art publications in this declaration, I believe that claims 9 and 28 of the '268 patent are made obvious by Jones, Yeung, and Morović
- **Ground 5:** Based upon my knowledge and experience and my review of the prior art publications in this declaration, I believe that claims 8, 17, and 27 of the '268 patent are made obvious by Jones, Yeung, and Vetro

IV. LEVEL OF ORDINARY SKILL IN THE ART

23. I have been informed that a person of ordinary skill in the art ("POSITA") is a hypothetical person who is presumed to have the skill and experience of an ordinary worker in the field at the time of the alleged invention. The '268 patent claims priority to PCT Application no. PCT/FR2007/052523, which claims priority to U.S. Provisional Application No. 60/921,579, filed 4/3/2007 ("Critical Date"). DOLBY-1001, Cover. Because I do not know at what date the invention as claimed was made, if ever, I have used the Critical Date of the '268

patent as the point in time for claim interpretation purposes. My opinion does not change if the invention date is earlier.

24. Based on my knowledge and experience in the field and my review of the '268 patent and file history, I believe that a person of ordinary skill in the art in this matter would have had a had (1) a bachelor's degree in electrical engineering, computer engineering, computer science, image science, color science, or a related field, and (2) two to five years of industry experience in digital image/video processing and color management, including creation-side color correction/color grading workflows and LUT-based color transformation and gamut mapping for different display devices (e.g., projectors, CRT/Rec.709-class displays). A greater amount of education, i.e., a doctorate in an academic area emphasizing electrical engineering, computer engineering, computer science, or a related technical field, would compensate for fewer years of work experience. Based on my experiences, I have a good understanding of the capabilities of a POSITA. Indeed, I have taught, mentored, advised, and collaborated closely with many such individuals over the course of my career.

V. LEGAL PRINCIPLES

25. I am not a lawyer and I will not provide any legal opinions in this IPR. Although not a lawyer, I have been advised that certain legal standards are to be

applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

A. Claim Interpretation

26. I understand that claim terms are generally given their plain and ordinary meaning based on the patent's specification and file history as understood by a person of ordinary skill in the art at the time of the purported invention. In that regard, I understand that the best indicator of claim meaning is its usage in the context of the patent specification as understood by a POSITA. I further understand that the words of the claims should be given their plain meaning unless that meaning is inconsistent with the patent specification or the patent's history of examination before the Patent Office. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSITA at the time of the invention was made (not today).

B. Priority

27. I understand that a continuation application is a later-filed application that has the same disclosure (specification and figures) as an earlier filed application to which the later-filed application claims priority. A continuation is generally entitled to the same priority date as the later-filed application to which it claims priority.

C. Anticipation

28. I understand that a patent claim is invalid as anticipated if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. I also understand that, to anticipate, the reference must teach all of the limitations arranged or combined in the same way as described in the claim.

29. With respect to inherency, I understand that the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. Instead, the inherent characteristic must necessarily flow from the teaching of the prior art.

D. Obviousness

30. I understand that a patent claim is invalid if the claimed invention would have been obvious to a person of ordinary skill in the field at the time of the purported invention, which is often considered the time the application was filed. Even if all of the claim limitations are not found in a single prior art reference that anticipates the claim, the claim can still be invalid.

31. To obtain a patent, a claimed invention must have, as of the priority date, been nonobvious in view of the prior art in the field. I understand that an invention is obvious when the differences between the subject matter sought to be patented 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.

32. I understand that, to prove that prior art or a combination of prior art makes a patent obvious it is necessary to: (1) identify the particular references that, singly or in combination, make the patent obvious; (2) specifically identify which elements of the patent claim appear in each of the asserted references; and (3) explain a motivation, teaching, need, market pressure or other legitimate reason that would have inspired a person of ordinary skill in the art to combine prior art references to solve a problem.

33. I also understand that certain objective indicia can be important evidence regarding whether a patent is obvious or nonobvious. Such indicia include:

- Commercial success of products covered by the patent claims;
- A long-felt need for the invention;
- Failed attempts by others to make the invention;
- Copying of the invention by others in the field;
- Unexpected results achieved by the invention as compared to the closest prior art;
- Praise of the invention by the infringer or others in the field;
- The taking of licenses under the patent by others;

- Expressions of surprise by experts and those skilled in the art at the making of the invention; and
- The patentee proceeded contrary to the accepted wisdom of the prior art.

34. To the extent these factors have been brought to my attention, if at all, I have taken them into consideration in providing my opinions and conclusions.

E. Means-Plus-Function (MPF)

35. I understand that analysis for any terms with means-plus-function (MPF) limitations involves identifying the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. I also understand that claims that use the term “means” are presumed to invoke a means-plus-function claim construction of such a claim term.

36. I also understand that satisfaction of MPF limitations by prior art involves identifying the corresponding structure (or an equivalent) was present in the prior art and performing the same claimed function.

37. I understand that the standard for determining whether the prior art discloses the corresponding structure or an equivalent is whether there are insubstantial differences, which means that if the assertedly equivalent structure performs the claimed function in substantially the same way to achieve substantially

the same result as the corresponding structure described in the specification, it is equivalent.

38. I understand that proving structural equivalence does not require a component-by-component analysis, but rather that it is sufficient to show structure, materials, or acts that perform the claimed function in substantially the same way to achieve substantially the same result because the claim limitation is the overall structure corresponding to the claimed function and not individual components.

VI. MATERIALS CONSIDERED

39. My analysis and conclusions set forth in this declaration are based on my educational background and experiences in the field (*see* Section II). Based on my knowledge and experience, I believe that I am considered to be an expert in the field. Also, based on my knowledge and experience, I understand and know of the capabilities of persons of ordinary skill in the field during the early 2000s, and I taught, participated in organizations, and worked closely with many such persons in the field during that time frame.

40. As part of my independent analysis for this declaration, I have considered the following: the background knowledge/technologies that were commonly known to persons of ordinary skill in this art during the time before the earliest claimed priority date for the '268 patent; my own knowledge and experiences gained from my work experience in the field of the '268 patent and

related disciplines; and my experience in working with others involved in this field and related disciplines.

41. In addition, I have analyzed the following publications and materials:

- U.S. Patent No. 9,185,268 to Doser et al. (“the ’268 Patent”) (DOLBY-1001)
- Excerpts from the Prosecution History of the ’268 Patent (“the Prosecution History”) (DOLBY-1002)
- U.S. Pat. No. 7,053,927 (“Jones”) (DOLBY-1004)
- International Pat. Pub. No. WO 2007/050091 (“Ollivier”) (DOLBY-1005)
- U.S. Pat. App. Pub. No. 2007/0058183 (“Osaki”) (DOLBY-1006)
- U.S. Pat. App. Pub. No. 2007/0211074 (“Yeung”) (DOLBY-1007)
- Bancroft, Dave, “Emulating the Film Color Model in Digital Movie Production,” Color and Imaging Conference. Vol. 11. Society of Imaging Science and Technology, 2003 (DOLBY-1008)
- Digital Cinema Initiatives, LLC, “Digital Cinema System Specification (V1.0),” 2005 (DOLBY-1009)
- Morovič, Ján & Johan Lammens, “Color Management,” *Colorimetry: Understanding the CIE System*, John Wiley & Sons, Ch. 7 (pp. 159-203) (2007) (“Morovič”) (DOLBY-1010)

- Vetro, Anthony, “MPEG-21 Digital Item Adaptation: Enabling Universal Multimedia Access,” IEEE MultiMedia, vol. 11, no. 1, Jan-Mar. 2004, pp. 84-87 (“Vetro”) (DOLBY-1011)
- U.S. Pat. No. 5,140,414 to Mowry et. al. (“Mowry414”) (DOLBY-1013)
- U.S. Pat. No. 5,687,011 to Mowry et. al. (“Mowry011”) (DOLBY-1014)
- U.S. Pat. No. 5,255,083 (“Capitant”) (DOLBY-1015)

42. My analysis and conclusions set forth in this declaration are based on the perspective of a POSITA.

VII. TECHNOLOGY OVERVIEW

43. Color management, color engineering, and color systems relate to the generation, representation, transformation, and reproduction of color information in imaging and video systems. These technologies enable consistent and predictable color reproduction across devices having different physical characteristics, including cameras, displays, printers, and video processing systems.

44. Because imaging devices have different spectral responses, color primaries, and luminance capabilities, the same digital color signal may produce different perceived colors on different devices unless appropriate color transformations are applied. Color management systems and color engineering

techniques address these differences by providing standardized methods for characterizing devices, representing color in device-independent terms, and transforming color data between device-specific and device-independent representations.

45. Before the earliest claimed priority date for the '268 patent (including the late 1990s through mid-2000s), color management and color engineering were well-established fields with standardized color spaces, device characterization techniques, and color transformation methods.

46. Device-dependent color refers to color representations that are defined relative to the specific physical characteristics of a particular device, such as a camera, display, or printer. In device-dependent color spaces, the same numerical color values may produce different perceived colors on different devices because each device has its own color primaries, white point, transfer function, and gamut. Common examples of device-dependent color spaces include RGB spaces (such as sRGB and Rec.709) and CMYK used in printing. These color spaces are directly tied to the signal generation or reproduction properties of the device.

47. On the other hand, Device-independent color refers to color representations that are defined independently of any specific device and are based on standardized models of human color perception. Device-independent color spaces provide a consistent reference for representing color regardless of how it is captured

or displayed. Examples include CIE XYZ and CIE L*a*b*. These color spaces enable accurate conversion of color information between different devices by serving as an intermediate reference. Color management systems use device-independent color spaces to ensure consistent and predictable color reproduction across devices with different characteristics.

48. Device-independent color spaces provide a standardized framework for representing colors in a manner that is independent of the physical characteristics of any particular device. By defining colors based on human visual perception rather than device-specific primaries or signal values, these spaces enable consistent comparison and transformation of color information across different imaging systems. However, although device-independent color spaces can represent the full range of human-visible colors, individual devices such as cameras, displays, and printers are limited in the range of colors they can capture or reproduce. This limitation is described by the device's color gamut which refers to the range of colors that can be represented, captured, or reproduced by a device, color space, or imaging system. It is typically defined by the chromaticity coordinates of the system's primaries and its luminance limits. Different devices, such as cameras, displays, and printers, have different gamuts due to physical and technological constraints. For example, a wide-gamut display such as one conforming to ITU-R Rec.2020 can reproduce a larger range of colors than a standard-gamut display

conforming to Rec.709. A gamut may be represented mathematically in a device-independent color space, such as CIE XYZ or CIE Lab*, to enable comparison between devices.

49. Color gamut mapping is the process of transforming color values from a source device gamut to a destination device gamut. This occurs when transferring image or video content between devices with different color reproduction capabilities. Gamut mapping techniques adjust color values to fit within the destination gamut while attempting to preserve perceptual attributes such as hue, lightness, and relative color relationships. Common gamut mapping methods include clipping, in which out-of-gamut colors are mapped to the nearest reproducible color; compression in which the source gamut is scaled to fit within the destination gamut; or expansion in which the source color gamut is expanded in order to take full advantage of the destination device gamut. Gamut mapping is a fundamental component of color management systems and ensures consistent and perceptually acceptable color reproduction across different devices and color spaces.

VIII. OVERVIEW OF THE '268 PATENT

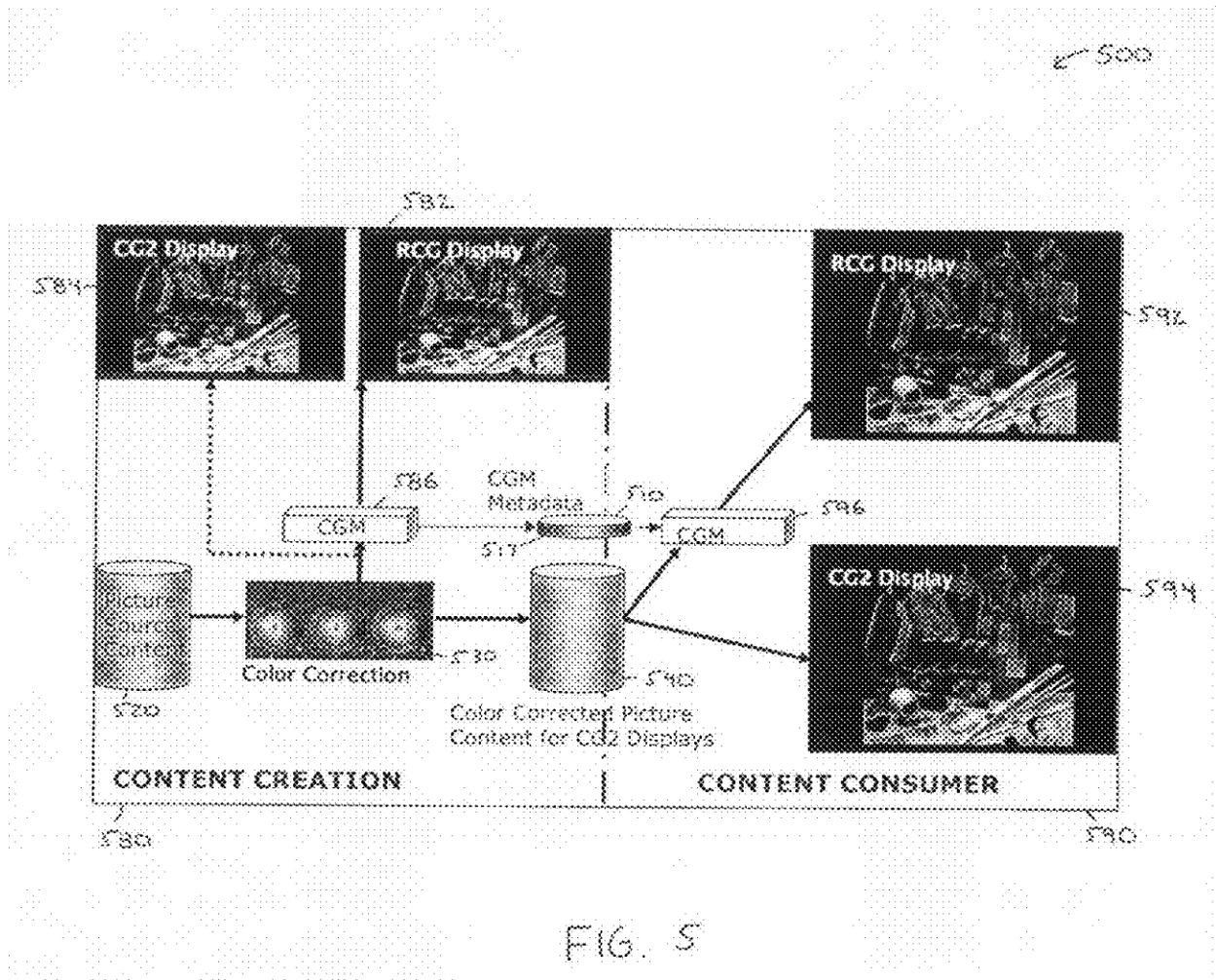
A. Specification

50. The '268 patent is focused on methods and systems for color correcting (e.g., color grading) picture content to provide more predictable visual results across different types of display devices that have different color gamuts. DOLBY-1001,

Abstract, 1:10-14. The '268 patent specification distinguishes a “reference color gamut” (RCG) and “reference type” displays (“RCG displays”) that use the RCG from a different, non-reference gamut (e.g., “CG2”) and corresponding “non-reference type” displays (“CG2 displays”). *Id.*, 7:7-18. As noted in the '268 patent specification, while content was often mastered on a “reference” display associated with a standardized reference color gamut (e.g., based on CRT phosphors and standards such as EBU, SMPTE-C, or ITU-709), many consumer displays implemented “non-standard” or otherwise different gamuts, which can cause the content (when displayed on such devices) to appear visually different than intended. *Id.*, 1:15-30. To address this, the specification describes performing color correction using at least one non-reference type display (having a non-reference gamut) and a reference type display, and generating “mastered” content and associated information (e.g., metadata) so that corrected content can be transformed/mapped for display across devices with different gamuts. *Id.*, Abstract, 4:40-55.

51. The '268 patent specification contemplates achieving consistent viewing by (i) producing “mastered display content” for a particular gamut (e.g., a master associated with one of RCG or CG2), and (ii) providing “metadata” (i.e., data that controls processing of the mastered display content) that can be conveyed either “in-band” or “out-of-band.” This, in turn, enables transformation/mapping of the mastered content for display in a different gamut context. *Id.*, 4:40-55, 7:30-50.

52. Figure 5 shows an example color correction workflow. According to the '268 patent specification, this workflow achieves consistent viewing across consumer displays by using metadata that describes a color gamut mapping.

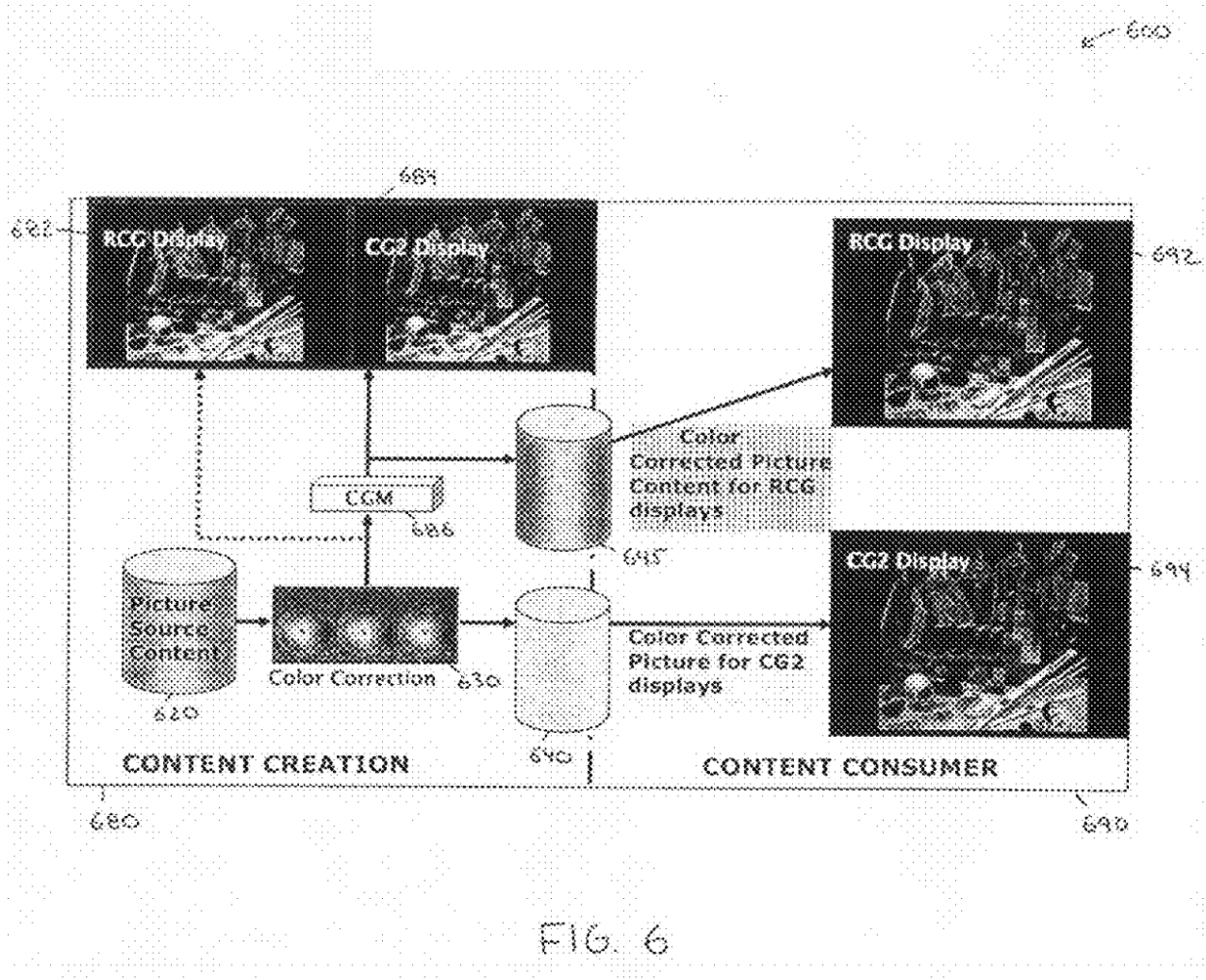


DOLBY-1001, FIG. 5

53. A content creation system (e.g., system 500) receives source picture content and performs a color-correction (“mastering”) process while monitoring the results on a CG2 display, thereby producing “mastered display content” that is mastered for the CG2 gamut. DOLBY-1001, 8:42-9:27. The system generates

“metadata” (e.g., metadata 510) that specifies a color-gamut mapping for transforming that mastered CG2 content into corrected content suitable for an RCG display. *Id.* On the consumer side (e.g., content consumer system 550), a consumer electronic device receives the mastered display content and the associated metadata (whether in-band with the content or out-of-band), and uses a color gamut mapping module (e.g., CGMM 586) to apply the metadata-specified mapping so that an RCG display can present corrected content consistent with the intended appearance, while a CG2 display can present the mastered CG2 content without requiring that same transformation. *Id.*

54. Figure 6 shows an example workflow in which the color-correction process produces separate “mastered” content versions (one intended for CG2 displays and another intended for RCG displays) so that the consumer side can select the appropriate master for each display type.



DOLBY-1001, FIG. 6

55. The workflow 600 includes a content creation side 680 and a content consumer side 690, where an RCG display 682 is used on the content creation side 680 and, in addition, a CG2 display 684 may be used for proof viewing the content intended for consumption on RCG displays. DOLBY-1001, 9:26-38. The color-correction process results in a master for CG2 displays (e.g., for CG2 display 694) and a master for RCG displays (e.g., for RCG display 692), and the RCG master is a derivative of the CG2 master. *Id.*, 9:39-43. The picture source content may be

stored (e.g., in picture source content store 620), and the resulting masters may be stored separately, such as the RCG master in a color-corrected picture content store 645 and the CG2 master in a color-corrected picture content store 640. *Id.*, 9:50-55. On the content creation side 680, a color correction module 630 generates the CG2 master, and the CG2 mastered content is applied to a CGM module 686 that performs a color-gamut mapping to generate the RCG master such that the CG2 mastered content is color corrected for display on the RCG display 682. *Id.*, 9:56-61. On the content consumer side 690, the RCG master and CG2 master are provided directly to the RCG display 692 and CG2 display 694, respectively, without the need for color gamut mapping on the consumer side. *Id.*, 9:62-67.

B. Prosecution History

56. The '268 patent issued on 11/10/2015 from U.S. Patent App. No. 12/450,622 ("the '622 Application"). DOLBY-1001. The prosecution of the '622 Application included two Office Actions (*see* DOLBY-1002, 252-63, 555-63).

57. The Examiner issued a first Office Action on 2/20/2013. The Office Action included a §103 rejection based on US 2005/0152612 ("Spaulding"). DOLBY-1002, 254-62.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented 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 to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7, 9-16, 18-26, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding et al. (US 20050152612).

DOLBY-1002, 254

The Office Action indicated that dependent claims 8, 17, and 27 recited allowable subject matter.

Allowable Subject Matter

3. Claims 8, 17, and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

DOLBY-1002, 262

58. The Applicant filed a Response to Office Action on 7/22/2013. Applicant included arguments focused on distinguishing Spaulding. Applicant argued Spaulding did not describe the “metadata” recited in claim 1:

Despite Spaulding's reference to color space identifier 24 as "metadata", it is submitted that Spaulding fails to meet the full set of features defined in claim 1 as "metadata". In claim 1, Applicants define their metadata "*for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut*". That Spaulding generates metadata as identifier 24 is not enough, because color space identifier does not represent the specific color gamut mapping defined in Applicants' claims. Spaulding's identifier 24 as metadata fails to be useful in transforming the "*mastered color corrected picture content for display on reference type displays having a reference color gamut*".

DOLBY-1002, 282

Applicant further argued that Spaulding did not describe or suggest a first "mastering" limitation recited in claims 1 and 6, and a second "mastering" limitation recited in claim 6:

Spaulding does not teach or suggest "*mastering the source picture content to provide ...*" as defined in all the independent claims. The USPTO has relied on paragraph [0015] and Figure 3 of Spaulding in this regard. But in Spaulding, and particularly Figure 3, it is clear that steps 22-28 transform the input digital image into an output digital image in a reference color space. Any color correction and mastering employed in these steps results in a transformation of the input image into an output image for a reference color space.

Contrary to Spaulding's teachings, Applicants' claims all require that the mastering generates a mastered color corrected picture content for display in a non-reference color space. Specifically, the claims all require that the mastering provides "*mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut*". For these reasons, it is submitted that the Spaulding fails to teach, show, or suggest all the limitations of the claimed subject matter defined in independent base claims 1, 6, 12, 15, 20 and 25 and the claims dependent thereon.

DOLBY-1002, 282

Spaulding also does not teach or suggest “*mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut*”, as defined in claims 6, 15 and 25 and the claims dependent thereon. Particularly, Spaulding does not teach or suggest that mastering the content for display on reference type displays having a corresponding reference color gamut should be performed “*using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut*”. Spaulding lacks any teaching or suggestion of the claimed mastering limitation – that is, the second “mastering” limitation in claims 6, 15 and 25 – for applying a color gamut mapping to a transformation of mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut so that the overall mastering procedure can provide mastered color corrected picture content for display on the reference type displays having a reference color gamut. Without such a teaching or suggestion by Spaulding, it is submitted that Spaulding fails to teach or suggest all the limitations of claims 6, 15 and 25 and the claims dependent thereon.

DOLBY-1002, 282-83.

59. The Examiner issued a first Notice of Allowance on 8/28/2013. DOLBY-1002, 526-528. The Applicant then filed a Request for Continued Examination on 11/26/2013 along with an Information Disclosure Statement (IDS). *Id.*, 546-56. The IDS listed the following non-patent literature:

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		Office Action for S. N. 12/450,621 mailed 8/30/2013, 9/26/2013 (PU070107)	
		Office Action for S. N. 12/450,637 mailed 9/27/2013 (PU070106)	

DOLBY-1002, 549

60. The Examiner then issued a second Office Action on 12/30/2013. DOLBY-1012, 555-63. The second Office Action included a double patenting rejection over claims of a co-pending application, U.S. App. No. 12/450,637:

3. Claims 1-2, 5, 15, 12, 14, and 18 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1, 4-6, 9-10, and 18 respectively, of co-pending US application SN 12/450637, hereinafter the '37 application. Although the conflicting claims are not identical, they are not patentably distinct from each other because the apparatus and method claims of the instant application have somewhat similar structural and functional features as those found in method and apparatus claims 1- of the '37 application.

DOLBY-1002, 558

The Office Action also indicated claims 1-30 included allowable subject matter:

Allowable Subject Matter

Application/Control Number: 12/450,622
Art Unit: 2612

Page 7

4. Claims 1-30 would be allowable upon filing of a Terminal Disclaimer to obviate the obviousness-type double patenting rejection.

DOLBY-1002, 561-62

61. Following an IDS filed by Applicant on 7/2/2014 (*id.*, 594-96), the Examiner issued a second Notice of Allowance on 8/18/2014 (*id.*, 847-54). The Notice of Allowance identified the following reasons for allowance over the prior art of record:

Reason for allowance

2. The following is an examiner's statement of reasons for allowance:

The best prior art of record, Spaulding et al. (US 20050152612) discloses a method for color correcting, comprising: performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut (*see for example fig. 3 and at paragraph 15 in which Spaulding teaches transforming images from an input color space to a reference color space. Spaulding teaches inputting a digital image from a first input color space 20 which is equivalent to a non-reference gamut. Spaulding further teaches outputting an image in a reference color space 28. At paragraph [0016] Spaulding teaches that it is common for many digital images to have device dependent color spaces. However, Spaulding fails to teach "mastering the*

source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut," and generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut" (as recited in claims 1, 12 and 20); and: *"mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut," and mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut"* (as recited in claims 6, 15 and 25).

DOLBY-1002, 852-53

62. Applicant then filed a second RCE on 11/18/2014 (DOLBY-1002, 877), along with an IDS (*id.*, 880-82). The Examiner subsequently issued a third Notice of Allowance on 7/20/2015 without specifying additional reasons for allowance. The Applicant paid the issue fee on 10/8/2015 (*id.*, 908), and the Office then issued an Issue Notification specifying an issue date on 11/10/2015 (*id.*, 916).

C. Claim Construction

63. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in a patent claim should be interpreted according to their “ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37

C.F.R. § 42.100(b). In that regard, I understand that the best indicator of claim meaning is its usage in the context of the patent specification as understood by a POSITA. I further understand that the words of the claims should be given their plain meaning unless that meaning is inconsistent with the patent specification or the patent's history of examination before the Patent Office. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSITA at the time of the invention was made (not today). Because I do not know at what exact date the invention as claimed was made, if ever, I have used the Critical Date of the '268 patent as the point in time for claim interpretation purposes. My opinion does not change if the invention date is earlier.

1. “Color Correcting”/“Color Correction” (Claims 1, 3, 4, 6, 12, 15, 20, 22, 23, 25)

64. According to the '268 patent specification, “the phrase ‘color correction’ refers to a creative procedure to manually choose the right (preferred) colors on the content creation side (versus the consumer consumption side).” DOLBY-1001, 8:10-24. The use of *color correction* within the claims means “a creative procedure to manually choose the right (preferred) colors on the content creation side (versus the consumer consumption side.”

D. Level of Ordinary Skill in the Art

65. Based on my knowledge and expertise in the field, and my review of the documents analyzed in this declaration, a person of ordinary skill in the art (“POSITA”) relating to the subject matter of the ’268 patent would have had (1) a bachelor’s degree in electrical engineering, computer engineering, computer science, image science, color science, or a related field, and (2) two to five years of industry experience in digital image/video processing and color management, including creation-side color correction/color grading workflows and LUT-based color transformation and gamut mapping for different display devices (e.g., projectors, CRT/Rec.709-class displays).

IX. SUMMARY OF RELEVANT PRIOR ART REFERENCES

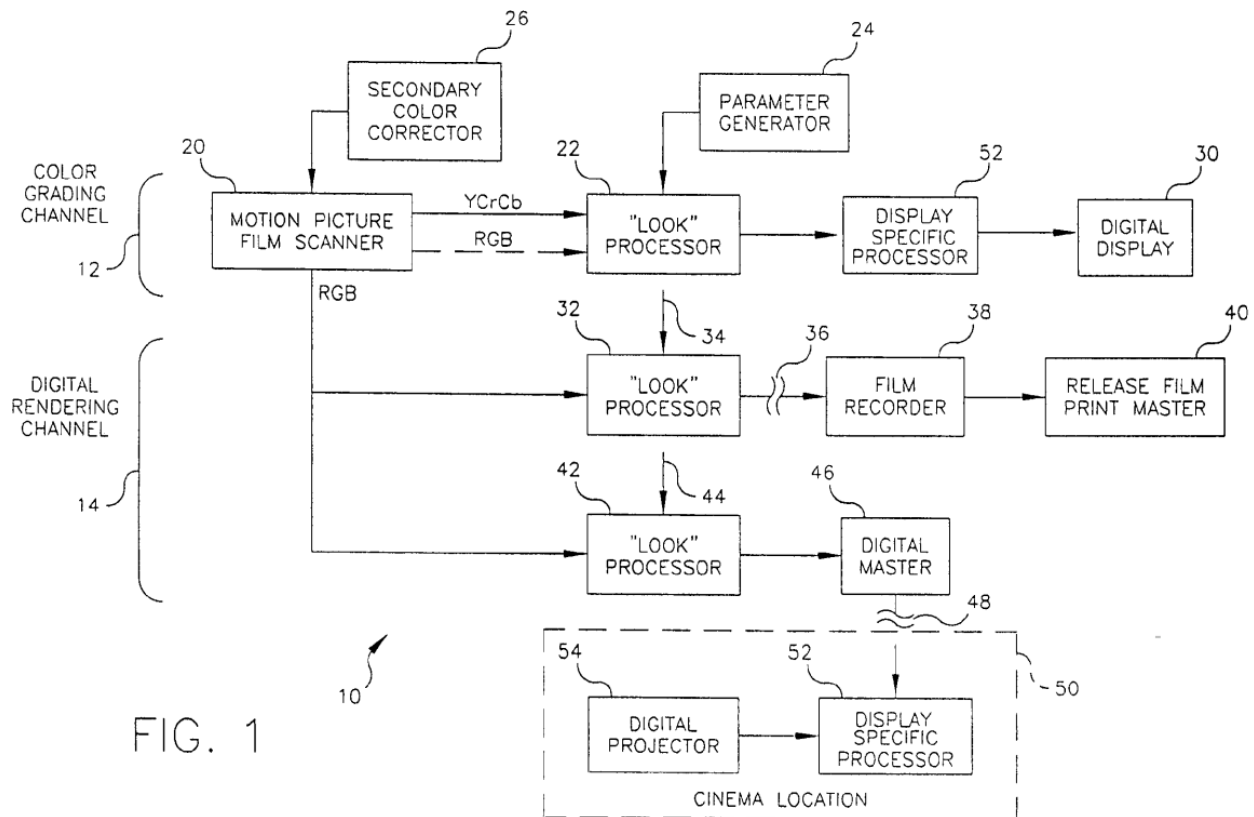
A. Jones

66. Jones is focused on a “digital mastering system” in which motion picture content is processed through a “digital color grading channel 12” and a “digital rendering channel 14.” DOLBY-1004, 4:34-38. In channel 12, a colorist performs a creative “pre-visualization” workflow to establish a desired “look.” *Id.* This workflow involves generating creative “look parameters” that allow “a myriad of different ‘looks’ and creative effects” to be imparted to digital image signals representing the motion picture content. *Id.*, 6:17-35. The output of the colorist’s work (the look parameters generated during pre-visualization) is then used in digital

rendering channel 14 to render that look into mastered data, producing a mastered output file. *Id.*, 4:34-38, 10:26-44.

67. The Jones system takes source picture content in the form of “digital image signals” received from a “motion picture film scanner 20” and processes those signals through “look” processing blocks to produce mastered deliverables.

DOLBY-1004, 7:3-18, FIG. 1. This is shown in Figure 1:



DOLBY-1004, FIG. 1

As shown above, in the digital projection path of channel 14, the digital image signals (“RGB” signals) are modified and adjusted in a “look” processor and then “recorded as a digital master 46.” *Id.*, 7:3-18. Digitally mastered output may be used

“to create a digital cinema distribution master 46 for playback/projection using the digital projector 54,” directly tying master 46 to a projector-based output environment. *Id.*, 10:26-44.

68. According to Jones, different reproduction environments can introduce variables that make it harder to maintain or reconstruct the intended “look,” motivating approaches, including device-dependent process of digital image signals, that preserve intent across reproduction contexts. DOLBY-1004, 1:16-28; *see also id.*, 2:43-50, 2:58-3:5. Consistent with this theme, Jones describes a wider-gamut display device 30 used during pre-visualization (“preferably a wider-gamut device such as a digital projector”) and notes that digital projectors can provide a wider gamut than conventional CRT displays. *Id.*, 6:35-56. Device-dependent processing mechanisms (e.g., “display specific transforms”), as Jones describes, can remap values of the digital image signals (pre-visualized on the wider-gamut device) that would be outside of a limited gamut of a target display device so that the resulting values fall within this limited gamut. *Id.*, 2:58-63, 5:23-31, 6:35-56.

69. Jones’s architecture also includes a downstream output-processing stage for projection at a cinema location, where a processor applies projector specific transforms before projection. DOLBY-1004, 7:19-30. Jones also notes that “[v]ariations” of this digital projection path may be practiced, including one implementation in which display specific transforms are not imparted during

rendering in the channel 14 digital projection path, leaving device-dependent processing for downstream output-related stages. *Id.*, 7:3-18; *see also id.*, 7:45-49.

70. Jones is analogous prior art to the '268 patent because it is in the same general field of endeavor, e.g., color management and post-production distribution workflows. Jones also addresses similar technical problems as those identified in the '268 patent specification, e.g., preserving an intended appearance when content is reproduced on different display classes that impose different constraints. For example, Jones recognizes that more reproduction variables make it harder to maintain or reconstruct original intent and by describing "display specific transform[s]" that remap out-of-gamut values to fall within a target display device's gamut. *See* DOLBY-1004, 1:16-28, 5:23-31, 6:35-56. Jones also describes a digital projector can provide a wider gamut than a conventional CRT display device, which suggests that Jones is concerned with cross-gamut reproduction constraints that would have been central to a POSITA working on the problems addressed in the '268 patent. *Id.*, 6:35-56.

B. Ollivier

71. Ollivier describes a device-centric post-production and distribution approach directed to reproducing content across different display types while avoiding the need to recreate a separate master file for each viewing environment. Ollivier explains that traditional consumer viewing environments have been based

on CRT standards such as “REC609/REC709,” while other environments (e.g., digital cinema projectors) can involve different color settings (e.g., “P7V2”), and that increasing display diversity creates distribution complexity if content must be tailored to each display technology specifically. DOLBY-1005, 1:12-26.¹

72. To address this, Ollivier teaches maintaining a single underlying video sequence while separately storing and communicating “correction information” that can be translated into one or more lookup tables (LUTs) used to render the content appropriately on different display device types. DOLBY-1005, 2:2-33; *see id.*, 6:3-22.

73. Ollivier’s approach is illustrated in its Figure 1, which depicts a translation module 22 that generates display-specific LUTs 21 for different display types.

¹ Citations to DOLBY-1005 throughout are to the page numbers specified within the document, and not the PDF page numbers.

10

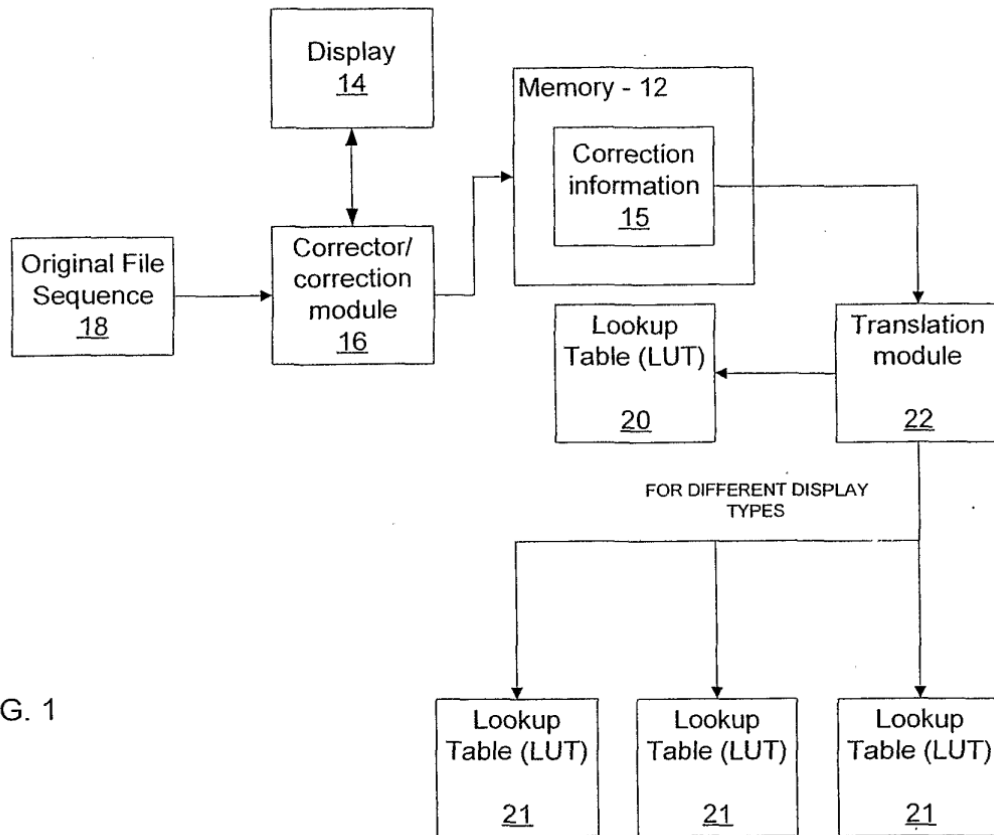


FIG. 1

DOLBY-1005, FIG. 1

As shown above, correction information 15 is stored separately from the original video signal and translation module 22 translates that correction information into a first LUT (e.g., LUT 20), such that the original sequence and the LUT can be combined to provide a corrected video sequence. DOLBY-1005, 6:3-22. Additional LUTs (display-specific LUTs 21) are created and stored for different display types, including a LUT 21 “for CRT displays.” *Id.*, 6:23-7:6. Each LUT 21 provides, for example, “formatting and adjustments needed to conform the sequence for display

on a given display type.” *Id.*, 10:14-23; *see id.*, 6:23-7:6. Ollivier also describes an example of a “3D LUT” that represents “all possible combinations of color values resulting from all possible input color values after the application of [a] 3×3 matrix algorithm,” confirming that LUTs can encode complete input-to-output color transformations. DOLBY-1005, 10:29-11:12.

74. Ollivier also discloses how LUTs are provided for downstream application in consumer-side playback/output environments. LUTs may be provided to end users and distribution endpoints together with the video content, including by being written onto a transferable medium “along with the raw video data signals,” or transmitted “in conjunction with” the raw video data signals for receipt and use prior to display. DOLBY-1005, 7:13-27.

75. This downstream application architecture is further illustrated in Figure 3:

100

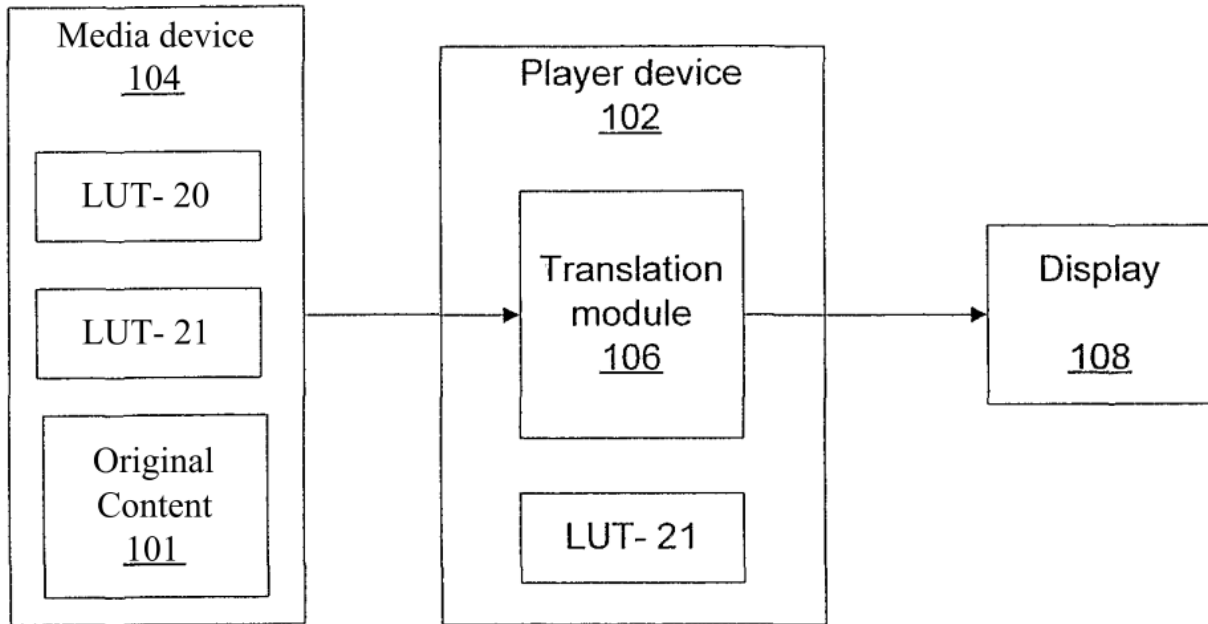


FIG. 3

DOLBY-1005, FIG. 3

As shown above, a consumer-side player device 102 includes a translation module 106 and a stored LUT-21, and outputs the processed video for presentation on a display 108. *See* DOLBY-1005, 8:12-9:14. The translation/output path applies the appropriate LUT (e.g., display-specific LUT 21) to the corrected sequence (e.g., the LUT 20 and original sequence combination) to yield output suitable for the selected display type. *Id.*; *see also id.*, 10:14-11:12. Ollivier thereby provides a LUT-based

framework for creation-side generation of LUTs (including display-specific LUTs) and downstream distribution and application of those LUTs in consumer-side playback/output.

76. Ollivier is analogous art to the '268 patent because it is in the same general field of endeavor, e.g., color management and post-production distribution workflows. Ollivier also describes a device-centric post-production and distribution approach that maintains a single underlying video sequence while separately storing and communicating “correction information” that can be translated into LUTs used to render the content appropriately on different display device types. DOLBY-1005, 2:2-33; *see also id.*, 6:3-22. Ollivier also addresses similar technical problems as those identified in the '268 patent specification, e.g., how to carry and apply device-dependent mapping information so that content authored in one context can be rendered correctly in another. This would have suggested to a POSITA that Ollivier is concerned with downstream content processing that would have been central to a POSITA working on the problems addressed in the '268 patent. *Id.*, 6:23-7:6, 7:13-27.

C. Osaki

77. Osaki describes a device-centric color management approach directed to reproducing content across different output devices that may have different color gamuts. Osaki explains that different display/output devices (e.g., projector vs. CRT)

can have different gamuts and that gamut conversion/compression may be used so that video data can be appropriately reproduced on the target output device. DOLBY-1006, [0005]-[0007].

78. Osaki's conversion mechanism also involves generating and using an explicit LUT mapping (e.g., a 3D LUT) that maps color values from an input gamut to an output gamut. A LUT generator facilitates the LUT generation process by acquiring input-gamut and output-gamut information and creates a LUT that embodies the mapping relationship. DOLBY-1006, [0122], [0123]. The LUT includes table data mapping first-gamut color values to second-gamut color values, and that a color converter uses the LUT to convert input RGB values (first-gamut color values) into output RGB values (second-gamut color values). *Id.*, [0067]-[0069]. As one example, imagery created for reproduction on a projector device may be reproduced on a CRT, thereby enabling narrower-gamut CRT-oriented output relative to a projector-oriented input. *Id.*, [0091]-[0093]. Osaki also discloses how the LUT mapping is carried and later applied, including by storing the mapping information in memory and/or transmitting it via a recording medium or communication means for later use by a downstream conversion system. *Id.*, [0065], [0074], [0157].

79. Osaki is analogous art to the '268 patent because it is in the same general field of endeavor, e.g., color management and post-production distribution

workflows. Osaki also describes a device-centric color management approach for reproducing content across different output devices with different gamuts. DOLBY-1006, [0005]-[0007]. Osaki also addresses similar technical problems as those identified in the '268 patent specification, e.g., cross-gamut reproduction problems. This would have suggested to a POSITA that Osaki is concerned with downstream content processing that would have been central to a POSITA working on the problems addressed in the '268 patent. *Id.*, [0067]-[0069], [0122], [0123].

D. Yeung

80. Yeung describes a color processing and color management approach directed to reproducing motion picture content across multiple distribution environments that can differ in viewing conditions and device characteristics. DOLBY-1007, Abstract. Yeung identifies multiple target environments, including “digital cinema, conventional cinema, network television and packaged media in various formats, including...DVD and VHS.” *Id.*, [0027]. Processing techniques include a “color gamut mapping,” which enables transformation of “a color gamut of one color space to the color gamut of another color space.” *Id.*, [0018]. This is accomplished using a gamut mapper (e.g., gamut mapper 222), which “maps the color gamut of an image input color space to the color gamut of a display image output color space.” *Id.*, [0031]. This enables downstream stages to account for display-specific characteristics.

81. The Yeung system is also directed to creation-side generation of masters for distribution. *Id.* This is visualized in Figure 1 (below):

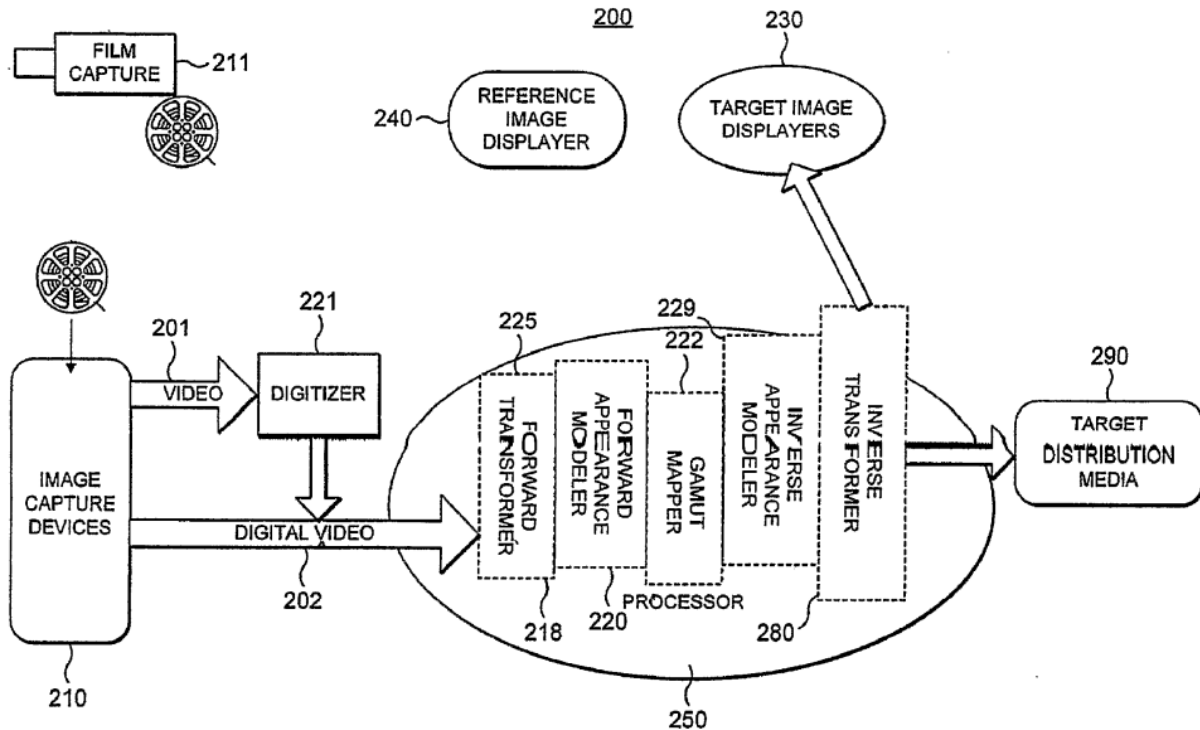


FIG. 1

DOLBY-1007, FIG. 1

Functionality associated with creation-side processes is accomplished using processor 250. This element “provides a color processed image master 290 to support media distribution.” DOLBY-1007, [0037]. Further, “the processed master image 290 is copied and the copy is distributed and displayed on display devices having device characteristics similar to a selected target image displayer 230.” *Id.* Examples of such target image display devices include “D-cinema projectors, high

definition CRT monitors, computer monitors, LCD and LCOS displays...” *Id.*, [0039].

82. Figure 5 shows examples of creation-side processes that may be implemented by the processor 250 to “provide video image versions suitable for display by various display devices.” DOLBY-1007, [0027]; *see id.*, [0066]-[0068].

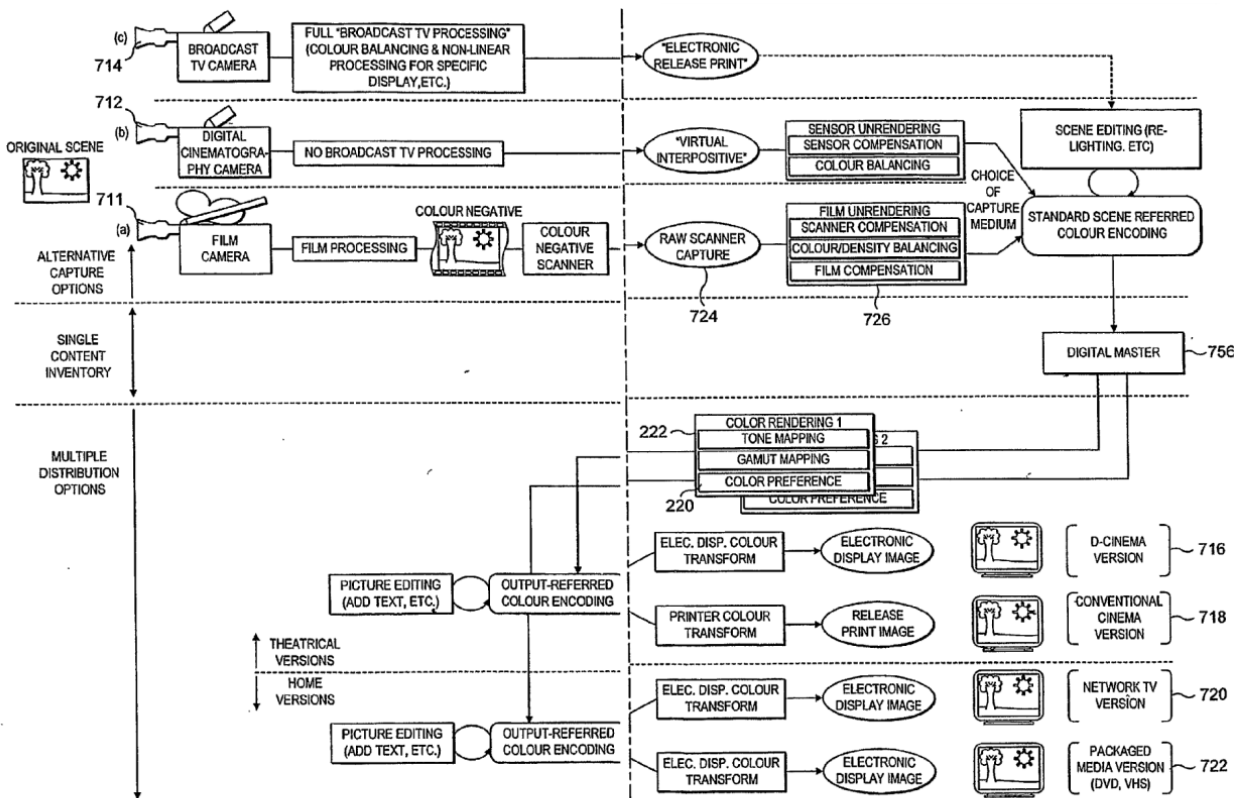


FIG. 5

FIG. 5 CONT'D

DOLBY-1007, FIG. 5 (left), FIG. 5 (CONT'D) (right)

The processing workflow shown above “allow[s] for consistent automation of color recovery during creation of distribution masters from [a] supermaster for a plurality of types.” DOLBY-1007, [0066]. Specifically, a digital master 756 is processed

using gamut mapper 222 to create “distribution masters” for “various types of distribution paths 716, 718, 720...” *Id.* Consistent with this theme, Yeung explains elsewhere that this “reduces the amount of expensive colorist’s work for each new version.” *Id.*, [0057]. A POSITA would have understood that creation of these “distribution masters” involves color transformations by gamut mapper 222, including using “TONE MAPPING,” “GAMUT MAPPING” and “COLOR PREFERENCE.” *See* DOLBY-1008; DOLBY-1009.

83. A POSITA would have understood that generating distribution-specific deliverables commonly involves applying multiple color transformations as part of a rendering stage tailored to an intended output target. For example, Bancroft explains that “[d]ifferent renderings are needed to maintain this effect with the different reproduction scenarios.” DOLBY-1008, 1. Like Yeung, it also identifies a rendering stage as including “Tone Mapping,” “Gamut Mapping,” and “Colour Preference.” *Id.* Bancroft further notes the need to preserve information for re-rendering to the “different color gamut of a cinema projector,” *Id.*, 6. This is distinguished from the “CRT color phosphor color gamut” of television (*id.*, 2), which reinforces that output-specific rendering commonly includes gamut-dependent transformations.

84. The DCI Digital Cinema System Specification (DOLBY-1009) similarly reflects that distribution masters are formed through defined color

transformations tied to a target display environment. DCI explains that the Digital Cinema Distribution Master (“DCDM”) “incorporates all of the creative color decisions” and is “colorimetrically defined for its intended display on the cinema screen,” DOLBY-1009, 13. DCI also defines the DCDM’s “encoding primaries...as a gamut container” and specifies an “encoding transfer function.” *Id.* DCI further recognizes that the upstream Digital Source Master can be “made of any color space,” (*id.*, 11) and assigns responsibility to the content provider to “convert the DSM into the DCDM specification” (*id.*, 13).

85. Yeung is analogous art to the ’268 patent because it is in the same general field of endeavor, e.g., color processing and color management workflows for producing mastered picture content suitable for different distribution environments and display device characteristics (including differences in color gamut). DOLBY-1001, Abstract, 1:10-30, 2:29-49, 4:40-55. Yeung also describes a color processing and color management approach for reproducing motion picture content across multiple distribution environments. DOLBY-1007, Abstract, [0027]. This would have suggested to a POSITA that Yeung is concerned with production of environment-specific mastered deliverables that would have been central to a POSITA working on the problems addressed in the ’268 patent. *Id.*, [0018], [0031], [0066].

E. Morovič

86. Morovič describes principles and practical implementations of color management systems, including the International Color Consortium (ICC) framework. DOLBY-1010, 167-169. Morovič addresses the challenge of verifying how color content will appear across different reproduction media, identifying “proofing” as a critical stage in the workflow. *Id.*, 186. “Soft proofing” refers to using a computer display “to simulate or preview a piece of printed output,” and, more broadly, “proofing” refers to “the production of a sample of output of any kind to simulate a sample of output of any other kind.” *Id.* This encompasses simulating a target display (e.g., a television) on a grading display (e.g., display used for color correction).

87. To achieve accurate proofing, Morovič’s system accounts for differences between the source gamut (e.g., the grading environment) and the destination gamut (e.g., the target device). DOLBY-1010, 160, 183. When a destination gamut is smaller than the source, Morovič explains that a “colour gamut mapping” is applied to ensure source colors are mapped inside the destination gamut (e.g., via clipping or compression). *Id.*, 167, 183. Morovič also details that in proofing contexts, specific rendering intents (such as relative colorimetric or perceptual) are used to map the target’s colorimetry to the proofing device, thereby simulating the target’s appearance constraints on the preview display. *Id.*, 189-190.

This reflects a configuration where a target simulation is transformed with a gamut mapping transform to enable accurate visual verification during the editing process.

88. Morovič is analogous art to the '268 patent because it is in the same general field of endeavor, e.g., color management and post-production distribution workflows. Morovič also describes implementations of color management, including that color management involves translating color information between devices to provide a chosen relationship between colors produced by different imaging devices. DOLBY-1010, 159. For example, Morovič “proofing” as “the production of a sample of output of any kind to simulate a sample of output of any other kind,” and describes “soft proofing” as using a computer display “to simulate or preview” output, which directly relates to creation-side verification of how content will appear on a target reproduction condition. DOLBY-1010, 186. Morovič also addresses similar technical problems as those identified in the '268 patent specification, e.g., managing and verifying appearance across device gamuts using mapping techniques. This would have suggested to a POSITA that Morovič is concerned with downstream content processing that would have been central to a POSITA working on the problems addressed in the '268 patent. *See* DOLBY-1010, 159, 183, 186.

F. Vetro

89. Vetro describes concepts related to Part 7 of the MPEG-21 standard (ISO/IEC 21000-7). DOLBY-1011, Abstract, 2. Vetro describes a “Digital Item Adaptation (DIA)” framework that addresses the “heterogeneity in our terminals, in our networks, and in the people who ultimately consume and interact with the information.” *Id.*, Abstract. Vetro’s DIA concept involves adapting a “Digital Item” (e.g., multimedia content) using resource and descriptor adaptation engines to produce an “Adapted Digital Item.” *Id.*, 3, FIG. 1. Vetro also specifies tools to assist this adaptation, including “usage environment description tools” that describe terminal capabilities and characteristics of the “natural environment” (e.g., “lighting condition”) and “illumination characteristics” that affect visual display. *Id.*, 4. These tools enable “Universal Multimedia Access (UMA),” allowing users to adapt content for consumption on particular terminals and within specific environments. *Id.*, Abstract, 4.

90. Vetro is analogous art to the ’268 patent because it is in the same general field of endeavor, e.g., color management and post-production distribution workflows. Vetro describes MPEG-21 Digital Item Adaptation (DIA) as addressing “heterogeneity in our terminals, in our networks, and in the people who ultimately consume and interact with the information,” and describes an adaptation framework in which a Digital Item is processed using standardized description tools to produce

an adapted Digital Item. DOLBY-1011, Abstract, 3, FIG. 1. Vetro also addresses similar technical problems as those identified in the '268 patent specification, e.g., how to convey standardized metadata so a downstream system can adapt a received content representation for the relevant terminal and viewing environment. This would have suggested to a POSITA that Vetro is concerned with downstream content processing that would have been central to a POSITA working on the problems addressed in the '268 patent. *Id.*, 3-4.

X. SUMMARY OF RELEVANT PRIOR ART COMBINATIONS

A. Combination Of Jones, Ollivier, and Osaki

1. Jones in view of Ollivier

(a) Motivation to Combine

91. Jones describes a color correction workflow that includes a color grading channel 12, in which a colorist uses display device 30 to pre-visualize digital image signals and establish a creative “look,” and a digital rendering channel 14, in which parameters from the color grading are used to generate a digital cinema distribution master 46 for playback and projection on a projector-class device. DOLBY-1004, 10:26-44. Jones also explains that different display devices may have different reproduction characteristics, including differences in gamut, and that device-dependent processing may be needed to maintain or reconstruct the original intent across different reproduction environments. DOLBY-1004, 1:16-28 (“...the

more variables one has to work with, the harder it is to maintain or reconstruct the original intent”); *id.*, 2:43-50, 2:58-3:5.

92. A POSITA implementing Jones’s mastering workflow would have considered how to preserve the intended look when the mastered content is presented on display classes with tighter constraints, including narrower-gamut video monitor or CRT contexts. A POSITA would have looked to device-gamut-specific techniques for generating and carrying mapping information so that the same mastered content can be reproduced consistently on different output devices.

93. A POSITA considering techniques for device-specific rendering would have identified Ollivier when reviewing Jones. Ollivier describes a device-centric post-production and distribution approach in which a single underlying video sequence is maintained while “correction information” is stored and communicated separately, and that correction information can be translated into one or more LUTs for rendering the content on different display device types. DOLBY-1005, 2:2-33. Ollivier explains that the correction information is stored separately from the original video signal and that a translation module translates the correction information into a first LUT (for example, LUT 20) so the original sequence and the LUT can be combined to provide a corrected video sequence. *Id.*, 6:3-22. Ollivier also describes creating and storing LUTs (LUT 21) for different display types, including a LUT 21 for a CRT display, where LUT 21 provides the “formatting and

adjustments” used to conform the sequence for display on the selected display type (for example, CRT). *Id.*, 6:23-7:6. Ollivier also describes that these LUTs may be provided to end users or distribution endpoints together with the video content, including by being written onto a transferable medium. *Id.*, 7:13-27.

94. A POSITA would have also been motivated to combine Jones with Ollivier because Ollivier’s correction-and-validation workflow would have improved upon the Jones system by providing additional creation-side flexibility for previewing and refining the intended “look” on reference-type display classes. Jones describes pre-visualization for establishing the creative “look” using display device 30, which is “preferably a wider-gamut device such as a digital projector,” and the resulting “look” is then rendered into the mastered data. DOLBY-1004, 4:34-38; *id.*, 6:17-35; *id.*, 6:35-56. Ollivier describes that its correction module is employed by an operator to “correct/adjust the original video image” using a display device that can serve as a “reference display” or as a “quality check tool to validate display related LUTs.” DOLBY-1005, 5:1-25. Ollivier further describes determining LUTs for a different display device based on corrections made using that display device (for example, using display device 14A to determine a corresponding LUT for that display type). *Id.*, 7:30-35. In the Jones-Ollivier system, a POSITA would have leveraged Ollivier’s reference-display validation and adjustment approach to allow the colorist to preview how Jones’s mastered content would appear on a reference-

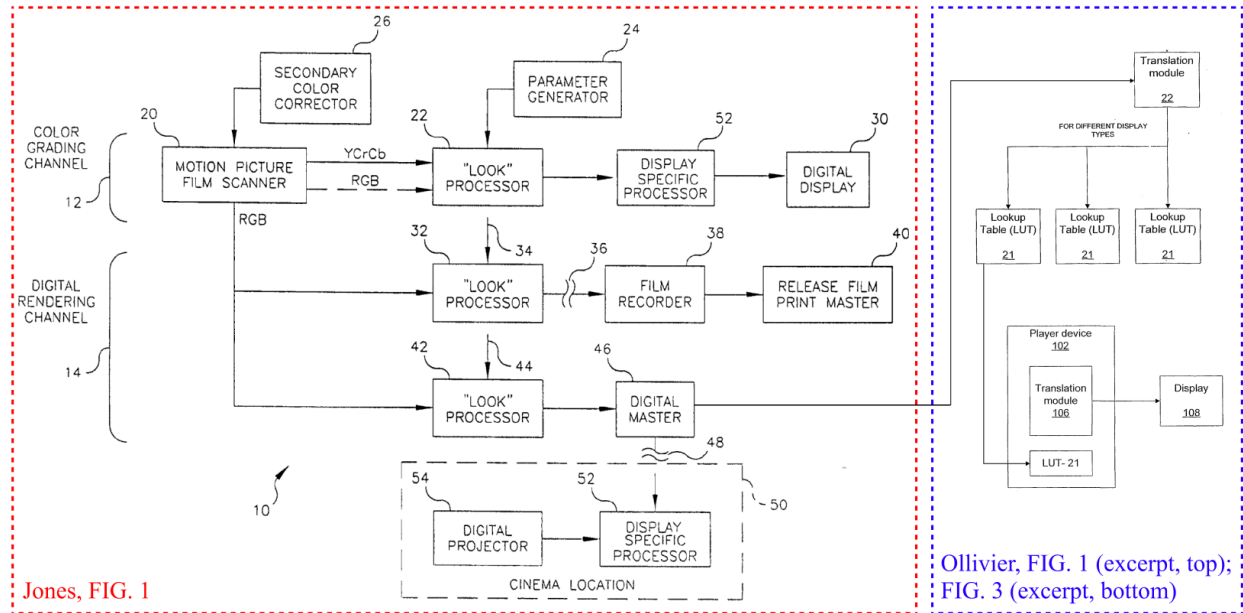
type display class and to make manual adjustments that refine the display-type conversion applied for that reference display, while maintaining Jones's creation-side pre-visualization and mastering workflow.

95. A POSITA reviewing Jones and Ollivier together would have also recognized that Jones discusses challenges in maintaining an intended look across different viewing environments when different display classes impose different reproduction constraints. DOLBY-1004, 2:53-3:55. A POSITA would have also recognized that Ollivier describes a LUT-based adaptation framework directed to differences between display technologies, including CRT-based standards REC609/REC709 and a digital cinema projector setting P7V2, and discusses the growing variety of display technologies. DOLBY-1005, 1:12-26. Ollivier describes creating and storing LUTs 21 for different display types, including CRT, and applying a selected display-specific LUT 21 to conform the sequence for display. DOLBY-1005, 6:23-7:6; *id.*, 9:33-10:13. Ollivier also describes providing the LUTs to end users and distribution endpoints together with the video content, including by writing LUTs onto a DVD along with raw video data signals or transmitting LUTs in conjunction with the raw video data signals. *Id.*, 7:13-27. A POSITA would have viewed this display-specific LUT approach as fitting within Jones's broader objective of preserving the intended look when content is rendered on different display classes. DOLBY-1004, 2:53-3:55.

96. A POSITA would have also been motivated to combine Jones and Ollivier because the references describe similar creation-side workflows and employ similar LUT-based mechanisms for managing device-dependent appearance. Jones describes a color grading channel in which a colorist uses display device 30 to pre-visualize digital image signals and establish a creative “look,” with the resulting parameters used in the rendering channel to generate mastered output. DOLBY-1004, 4:34-38; *id.*, 6:17-35. Ollivier similarly describes an operator using a display device to “correct/adjust [an] original video image,” and it identifies display device 14 as a display type used in post-production, including as a “quality check tool to validate display related LUTs.” DOLBY-1005, 5:1-25. Jones also describes applying display specific transforms using a LUT, reflecting a LUT-based approach for adapting content to the characteristics of a display device. DOLBY-1004, 6:35-45. Ollivier describes a LUT-based framework in which correction information is translated into LUT 20 and display-specific LUTs 21 are created for different display types, including a LUT 21 for CRT displays, to conform the sequence for the selected display type. DOLBY-1005, 6:3-22, 6:23-7:6. Based on these similarities, a POSITA would have viewed Ollivier’s display-specific LUT generation and application framework as compatible with Jones’s LUT-based, device-dependent processing concepts when implementing output adaptation across different display classes.

97. Jones's rendering pipeline generates a digital cinema distribution master 46 for display on a projector-class device, and Jones describes "use of a digital projector [that] provides a wider gamut than a conventional CRT display device and can display a broader range of colors..." DOLBY-1004, 6:35-56. Similarly, Ollivier describes creating and storing display-specific LUTs 21 for different display types, and applying a selected display-specific LUT 21 to conform the sequence for display. DOLBY-1005, 6:23-7:6; *id.*, 9:33-10:13. Ollivier further describes providing these LUTs with the video content to end users or distribution endpoints, including by writing them onto a transferable medium. *Id.*, 7:13-27. In the Jones-Ollivier combination, a POSITA would have implemented Jones's master 46 for use with projector-class output and would have used Ollivier's display-specific LUTs 21 as mapping information enabling reproduction of that mastered content on narrower-gamut reference-class devices, including a CRT display device with a Rec. 709 gamut. *See* DOLBY-1005, 6:23-7:6, 7:13-27, 9:33-10:13; DOLBY-1004, 6:35-56.

98. An example of the Jones-Ollivier system is visualized below based on Jones' Figure 1 and excerpts of Ollivier's Figures 1 and 3:



Jones-Ollivier

As shown above, Jones' digital rendering channel 14 generates master 46 based on the "look" established in the color grading channel 12, and that master 46 is distributed for downstream output processing, including projection using projector 54 at cinema location 50. DOLBY-1004, 10:26-44; *id.*, 7:19-30. In a Jones-Ollivier system, a POSITA would have provided master 46 to a downstream playback and output path that applies display-specific LUTs 21 to conform the content for a selected output display type, including a CRT display type. DOLBY-1005, 6:23-7:6, 10:13-23.

99. Jones also describes variations in which device-dependent processing is applied during rendering rather than only downstream. Jones explains that "[i]n one variation, the projector specific transforms may be implemented by the 'look'

processor 42 if the requirement of the specific projector 54 is known during the rendering stage.” DOLBY-1004, 7:19-30. In this configuration, a POSITA would have understood that the mastered output (recorded as master 46) is created after the relevant projector-specific transform is applied during rendering, so that master 46 already reflects the display-specific transformation for the intended projector output device. *Id.*, 7:19-30; *see also id.*, 7:3-18. In a Jones-Ollivier implementation, a POSITA could use a LUT-based display-specific transform of the type described by Ollivier as the projector-specific transform applied by look processor 42 during rendering. Ollivier describes display-specific LUTs 21 for different display types and explains that a selected LUT provides “formatting and adjustments needed to conform the sequence for display on a given display type.” DOLBY-1005, 6:23-7:6; *id.*, 10:14-23. Applying the selected LUT-based transform during rendering is consistent with Jones’s described variation in which the projector requirement is known at that stage and the projector-specific transform is implemented in the rendering pipeline. DOLBY-1004, 7:19-30.

100. Based on my review of Ollivier, a translation and output module applies a selected display-specific LUT 21 (for example, a LUT 21 for CRT) to a corrected sequence (for example, a combination of LUT 20 and the original sequence) to produce output suitable for the selected display type. DOLBY-1005, 10:29-11:12. Ollivier also explains that LUTs can be distributed to end users and distribution

systems, including by being written onto transferable media (for example, DVD) with the raw video data signals or transmitted in conjunction with the raw video data signals, and then stored or downloaded into memory of a set top box, television, or DVD player prior to display. DOLBY-1005, 7:13-27. In a Jones-Ollivier implementation, a POSITA would have used this LUT-based, display-specific conversion mechanism (including a CRT LUT 21) to convert master 46 for output on a selected display device, including a CRT display. DOLBY-1005, 6:23-7:6, 10:29-11:12. Jones's color grading and rendering channels can remain as described in Jones, with the downstream conversion applied after master 46 is generated. DOLBY-1004, 10:26-44; DOLBY-1005, 7:28-8:11.

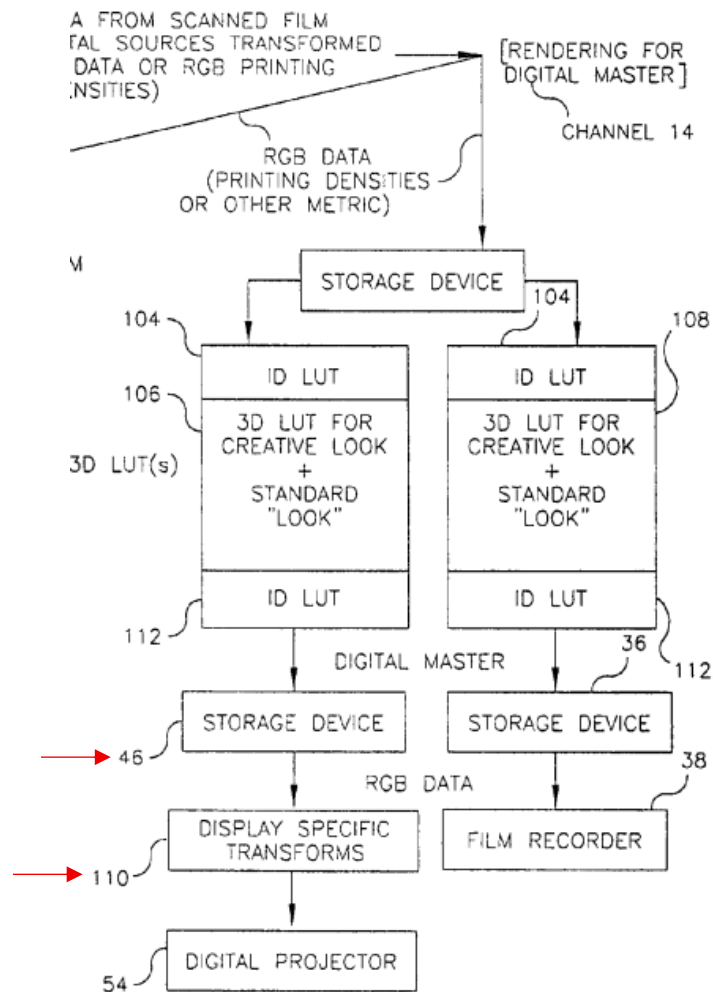
101. A POSITA implementing the Jones-Ollivier system would have used the combination to generate, carry, and apply a device-gamut transform that converts projector-class color values into color values suitable for a narrower-gamut display class. Jones describes a "display specific transform" as "an algorithm for re-mapping any output values that are out of gamut of [a] display device such that such values would be within the display device gamut." DOLBY-1004, 6:35-56. In the workflow described by Jones, master 46 is generated as a "digital cinema distribution master." DOLBY-1004, 10:26-44. Ollivier describes determining and communicating display-related correction information, including LUTs, for differences between display technologies. DOLBY-1005, 1:12-26. Ollivier discusses traditional viewing

based on CRT standards, including REC609 and REC709, and contrasts that with digital cinema projector color settings such as P7V2, and it also discusses distribution challenges when increasing display diversity requires addressing each display technology specifically. *Id.*, 1:12-26.

102. Ollivier describes generating and using display-specific LUTs 21 for different output display types, including a CRT display type, where LUT 21 provides “formatting and adjustments needed to conform the sequence for display on a given display type.” DOLBY-1005, 10:14-23. Ollivier’s discussion of CRT standards REC609 and REC709 and its display-specific LUT approach reflect converting image data for reproduction on an output device with different display capability, including a narrower-gamut display context. DOLBY-1005, 1:12-26, 12:1-13. Ollivier also describes that display-specific LUTs, including a CRT LUT 21, can be stored and communicated for later use by a downstream conversion and output stage. DOLBY-1005, 7:13-27. Ollivier describes writing LUTs onto transferable media, including DVD, with the raw video data signals or transmitting LUTs “in conjunction with” the raw video data signals, and storing or downloading the LUTs into memory of a set top box, television, or DVD player prior to display. *Id.*, 7:13-27.

103. Similarly, Jones contemplates applying device-dependent transforms in more than one location in the pipeline. Jones explains that “projector specific

transforms may be implemented by the ‘look’ processor 42 if the requirement of the specific projector 54 is known during the rendering stage.” DOLBY-1004, 7:19-30; *id.*, 7:45-49. Jones also describes implementations in which master 46 is rendered without applying display-specific transforms within the rendering channel, with device-dependent processing applied downstream in connection with output to a particular output device, including projector 54. DOLBY-1004, 7:19-30; *id.*, 7:45-49.



DOLBY-1004, FIG. 2 (annotated)

Hence, a POSITA would have implemented the Jones-Ollivier system with Ollivier's display-specific LUT generation and output-device conversion applied to Jones's master 46 during downstream output processing. Jones describes downstream processing in which processor 52 applies "projector specific transforms" at a cinema location 50. DOLBY-1004, 7:19-30. In this type of implementation, Jones's mastering workflow for generating master 46 remains as described in Jones. DOLBY-1004, 7:19-30. Ollivier describes using display-specific LUTs 21, including for a CRT display type, to provide "formatting and adjustments" used to conform content for display on a selected display type. DOLBY-1005, 6:23-7:6. In the combined system, the LUT-based conversion applied during downstream output processing enables mastered content from master 46 to be reproduced on a narrower-gamut CRT display device. DOLBY-1004, 1:16-28; DOLBY-1005, 6:23-7:6.

104. A POSITA would have understood that incorporating Ollivier's display-specific LUT framework into Jones allows master 46 to be used for output on a broader range of display devices, including narrower-gamut devices such as CRT display devices with a Rec. 709 gamut. DOLBY-1005, 6:23-7:6, 7:13-27, 10:29-11:12. In this approach, Jones's color grading channel 12 and digital rendering channel 14 remain as described in Jones, and Ollivier's conversion is applied as downstream processing to master 46. DOLBY-1004, 7:19-30. Jones describes

downstream processing in which display-specific processing is applied in connection with output to a particular device, including where processor 52 applies “projector specific transforms” at a cinema location 50. *Id.*, 7:19-30.

(b) Reasonable Expectation of Success

105. A POSITA would have expected to succeed in combining the teachings of Jones and Ollivier as discussed above. Based on my experience in the relevant technology and my review of the prior art documents, this combination involves using known elements (e.g., downstream device-specific transforms applied to mastered content and display-specific LUTs 21 for a selected output display type, including CRT) according to known methods (e.g., applying a LUT-based, display-specific transform during downstream output processing to conform mastered content for display on the selected output device). This would have been predictable because Jones describes downstream device-specific processing at the cinema location and Ollivier describes a downstream display-specific LUT mechanism that performs that type of output conformance. For example, Jones contemplates applying device-specific processing downstream in connection with output to a particular device at a cinema location, including where processor 52 applies “projector specific transforms.” DOLBY-1004, 7:19-30. Ollivier describes generating and applying a display-specific LUT (e.g., LUT 21) to conform content for a selected output display type, including a CRT display type, and describes

distribution of LUTs with the video content for downstream use. DOLBY-1005, 6:23-7:6, 7:13-27, 10:29-11:12. A POSITA would have understood that incorporating Ollivier's LUT-based downstream conversion into Jones's downstream device-specific processing uses processing steps already contemplated in Jones, implemented using the LUT mechanism described by Ollivier.

106. A POSITA would have also expected success because the signal processing architectures of both systems are compatible. They rely on similar underlying mechanisms of LUTs to manipulate digital image data. Because Jones already employs a reconfigurable compute engine capable of chaining multiple LUTs (e.g., separate LUTs for creative look versus display transforms), a POSITA would have recognized that integrating Ollivier's display-specific LUTs into Jones' existing processing pipeline would require no fundamental change to the system's operation. The combination would simply involve populating the configurable LUT stages of Jones's downstream processor (e.g., processor 52) with the specific coefficients taught by Ollivier.

107. A POSITA would have also expected success because Jones's upstream mastering process generates similar content data involved in Ollivier's downstream distribution techniques. Jones's digital rendering channel 14 is capable of producing a digital master that includes the rendered creative "look." This aligns with Ollivier's requirement for a system where the video sequence is maintained in its original form

or master file, and display-specific adjustments are applied separately as metadata or external LUTs. Because Jones's system is already designed to output a master file that isolates the creative intent from display characteristics, a POSITA would have been confident that this master file may be successfully distributed and processed using Ollivier's deferred rendering technique, ensuring that, for instance, Jones' display specific transforms are applied at the correct stage (the playback or projection location).

2. Jones-Ollivier in view of Osaki

(a) Motivation to Combine

108. A POSITA reviewing Jones and Ollivier would have understood that Ollivier describes generating display-specific LUTs 21 for use during output processing to conform content for a selected output display type, including a CRT display type. DOLBY-1005, 6:23-7:6; *id.*, 9:33-10:13. Jones describes generating master 46 in the digital rendering channel and distributing master 46 for downstream output processing, and Jones also describes a “display specific transform” as “an algorithm for re-mapping any output values that are out of gamut of [a] display device such that such values would be within the display device gamut.” DOLBY-1004, 10:26-44; *id.*, 7:19-30; *id.*, 6:35-56. In the Jones-Ollivier combination, a POSITA would have implemented master 46 with a downstream path that applies a display-specific LUT 21 for a selected output display device, including a CRT

display device, and a POSITA would have used that LUT 21 to specify color gamut mapping information consistent with the display-specific remapping described in Jones. DOLBY-1004, 6:35-56; DOLBY-1005, 6:23-7:6.

109. Osaki describes converting content between device gamuts using a LUT-based mapping, including conversion from a projector gamut to a CRT gamut. DOLBY-1006, [0056]-[0061], [0065], [0091]-[0093], [0122], [0123]. Osaki also describes generating a LUT mapping for converting content intended for one device class to another device class and applying the LUT to convert the content for output on the destination device class, including projector-to-CRT conversion. *Id.*, [0067]-[0069], [0091]-[0093]. Osaki explains that this downstream conversion derives second-gamut values from first-gamut values using information in the LUT mapping. *Id.*, [0067]-[0069]; *see also id.*, [0091]-[0093]. Osaki describes the LUT mapping as encoding mapping information relating to the two color gamuts involved in the conversion. *Id.*, [0067]-[0069], [0122], [0123]. A POSITA implementing Ollivier's display-specific LUT 21 would have used Osaki's LUT mapping approach as an example of encoding device-gamut conversion information in a LUT for downstream application, including projector-to-CRT conversion. *Id.*, [0067]-[0069], [0091]-[0093].

110. Ollivier describes a translation module 22 that generates display-specific LUTs 21 for different display types. DOLBY-1005, 6:23-7:6. I also

reviewed Osaki and understand that Osaki describes LUT techniques for device-gamut conversion, including projector-to-CRT conversion. DOLBY-1006, [0091]-[0093]. In a combined Jones-Ollivier-Osaki implementation, a POSITA would have configured Ollivier's translation module 22 to generate display-specific LUT 21 using LUT generation techniques of the type Osaki describes for device-gamut conversion, so that the LUT 21 includes information for performing a color gamut mapping. DOLBY-1005, 6:23-7:6; DOLBY-1006, [0091]-[0093]. A POSITA would have implemented display-specific LUT 21 as a LUT mapping of the type described in Osaki and would have applied that LUT 21 downstream in Ollivier's consumer-side playback and output path to convert master 46 for display on a CRT display device, including a Rec. 709-class output gamut. DOLBY-1007, [0067]-[0069], [0091]-[0093].

(b) Reasonable Expectation of Success

111. A POSITA would have expected to succeed in combining Jones, Ollivier, and Osaki in the manner described above. The POSITA would have understood that the Jones and Ollivier framework supports incorporating device-gamut mapping information of the type described by Osaki's LUT mapping into display-specific LUTs 21 used for output conversion in the combined system. Jones describes a "display specific transform" as "an algorithm for re-mapping any output values that are out of the gamut of the display device such that such values would be

within the display device.” DOLBY-1004, 6:35-55. Jones also recognizes that “use of a digital projector provides a wider gamut than a conventional CRT display device,” and explains that display-specific processing can be used to “remap[]” values that are “out of gamut.” *Id.* Ollivier similarly describes a “3D LUT” as “all possible combinations of color values resulting from all possible input color values after the application of [a] 3×3 matrix algorithm,” which reflects that a LUT can encode an input-to-output color transformation. DOLBY-1005, 10:29-11:12.

112. A POSITA would have also expected success because the combination relies on the routine integration of compatible, well-known data structures. Ollivier explicitly implements its display adaptation via standard Look-Up Tables (LUTs) that contain correction information. Osaki teaches a specific method for generating precisely this type of data structure (3D LUT) to map colors between different device gamuts (e.g., Projector to CRT) while preserving gradation. This fits well together because Ollivier’s system provides a data container (display-specific LUT 21) and Osaki provides content (the gamut mapping coefficients) to fill that container. A POSITA would have viewed this as the predictable application of a known high-quality mapping algorithm (Osaki) to populate a standard correction table (Ollivier) within an established mastering workflow (Jones).

B. Combination of Jones, Ollivier, Osaki, and Morovič

(a) Motivation to Combine

113. Jones describes a digital mastering system that includes a color grading preview channel 12 in which a colorist pre-visualizes a desired “look” on a wider-gamut digital projector-class display device 30 before a master is generated in the digital rendering channel 14. DOLBY-1004, 4:34-38, 6:17-35. Jones also describes an objective of providing the colorist an “optimal view” of results and supporting “a myriad of different ‘looks’ and creative effects.” DOLBY-1004, 3:43-45, 6:60-66. Jones situates its color-grading workflow in the context of established telecine and post-production color-correction tools and references, including workflows where grading is performed “based on a CRT monitor,” and identifies existing color correctors (including the da Vinci color corrector) and prior patent literature, including Capitant (DOLBY-1015) and Mowry patents (DOLBY-1013; DOLBY-1014). DOLBY-1004, 1:65-2:24.

114. The Mowry references provide examples of LUT-based modification workflows in which operator preview is part of the process, including selecting and applying a look-up-table to modify pixel data, previewing adjustments from a “balanced monitor display,” and optionally previewing modifications “in real time” before insert recording. DOLBY-1013, 5:10-12; DOLBY-1014, 13:44-14:3. In this professional preview-driven context, a POSITA would have reasonably looked to Morovič’s description of proofing, including “soft proofing,” where “a computer

display is used to simulate or preview” output of another kind, as a recognized way to extend previewing to additional target output conditions. DOLBY-1010, 186-187.

115. Capitant similarly reflects that professional color-correction pipelines account for downstream display and standard constraints, describing “video standard converters” and explaining that conversion is performed “to ensure that the resulting video color signals ... conform to the applicable display standard,” including “any video or television color standard (e.g. NTSC, PAL or SECAM).” DOLBY-1015, 11:22-30. Capitant also describes that display masking parameters can be provided from an outside source and “modified as desired” via a computer or keyboard interface. DOLBY-1015, 10:63-11:3. A POSITA would have understood these references, cited by Jones, as reinforcing that target-oriented processing and operator-driven adjustment are routine aspects of color-correction systems, and would have considered Morovič’s proofing framework (including soft proofing with target simulation and gamut mapping) as a compatible way to implement and extend Jones’s pre-visualization workflow for preview and verification of target display conditions. DOLBY-1010, 186-187.

116. A POSITA would have understood that metadata provided by Jones-Ollivier-Osaki includes information represents the specific mapping itself, including in the form of a lookup table that encodes the conversion from input color values to output color values for the target reference display type. Ollivier describes display-

specific LUTs 21 for different display types, including a LUT 21 for CRT displays, and explains that LUT 21 provides “formatting and adjustments needed to conform the sequence for display on a given display type.” DOLBY-1005, 6:23-7:6; *id.*, 10:14-23. Ollivier also describes a reconstructed 3D LUT as “the list of all possible combinations of output color values resulting from all possible input color values” after application of a matrix algorithm. *Id.*, 10:29-11:12. These disclosures reflect that a display-specific LUT can represent the specific input-to-output relationship used to conform content for the selected display type, rather than identifying a display or color space. *Id.*, 10:14-23, 10:29-11:12. Jones similarly describes implementing display specific transforms using LUT-based processing to adapt the content for a target display device, including remapping values that are out of gamut so that the resulting values are within the display device gamut. DOLBY-1004, 6:35-45; *id.*, 6:35-56. The '268 patent specification similarly describes metadata for gamut mapping in terms of LUT-style mechanisms, including a look up table such as a 3D-LUT or a gain-offset-gamma function used to calculate and apply a transformation between the non-reference and reference gamuts. DOLBY-1001, 7:51-65, 9:8-19.

117. A POSITA would have configured Jones’s color grading channel 12 to render a soft-proofed view of a selected target display (for example, a Rec. 709 monitor) on the wide-gamut grading display, including projector 30. Jones describes

that the color grading channel applies a “look” using LUT 106 and separately applies a display-specific transform using LUT 110. DOLBY-1004, 9:30-33. Morović describes soft proofing as simulating a target output on another display and explains that this type of target simulation can be implemented in combination with gamut mapping so the simulated output reflects the destination device’s gamut. DOLBY-1010, 183. In this combined configuration, the target simulation is implemented by loading parameters into the “look” LUT 106 to represent the target display’s appearance, and the associated gamut mapping needed to represent that target within the grading display’s gamut is implemented by loading parameters into the “display specific transform.” DOLBY-1004, 9:30-33; DOLBY-1010, 183. This approach is consistent with Jones’s disclosure that the system uses “reconfigurable” parameters and supports “any number of experimental ‘looks’.” DOLBY-1004, 4:14-16, 7:31-35. Morović describes color management as requiring verification of appearance across different devices, and this combined configuration uses Jones’s existing pre-visualization hardware to support that device-to-device verification workflow. DOLBY-1010, 159.

118. In one implementation of the Jones-Ollivier-Osaki-Morović system, a POSITA would have used a LUT configured for a CRT target simulation to apply a “target simulation,” including a soft-proof profile of the reference target display, so that the wide-gamut grading display device 30 presents a preview corresponding to

how the content would appear on a CRT target output device. DOLBY-1004, 9:30-33; DOLBY-1010, 183, 186. Jones describes a programmable LUT-based architecture in the color grading channel, including use of LUTs to apply the relevant transforms. DOLBY-1004, 9:30-33. Morovič describes soft proofing as using a computer display “to simulate or preview” output, and explains that target simulation can be implemented together with gamut mapping so the simulated output reflects the destination device’s gamut constraints. DOLBY-1010, 183, 186. In this configuration, a POSITA would have used Jones’s LUT-based transform hardware to support Morovič’s professional soft-proofing workflow, allowing the colorist to make creative decisions on display device 30 while previewing how the result will appear on a CRT display. DOLBY-1004, 9:30-33; DOLBY-1010, 183, 186.

(b) Reasonable Expectation of Success

119. A POSITA would have expected to succeed in combining the teachings of Jones and Morovič in the manner described. The combination involves using known elements in combination according to known methods to achieve predictable results. Jones describes a pre-visualization workflow that uses programmable LUT-based processing to support different looks and device-related transforms, and Jones describes remapping out-of-gamut values for a display device as part of accommodating device constraints. DOLBY-1004, 4:9-13, 6:40-44. Morovič describes soft proofing as simulating one output on another display and explains that

this target simulation can be implemented together with gamut mapping to reflect the destination device's gamut constraints. DOLBY-1010, 183-186. Based on these disclosures, a POSITA would have understood that using Jones's pre-visualization pipeline and LUT-driven transform mechanisms to implement Morovič's soft-proofing target simulation and gamut mapping is a predictable integration of compatible processing steps.

120. A POSITA would have also expected success because gamut constraints identified by Morovič and Jones is provided by Osaki's specific LUT-generation algorithms, which are compatible with Jones's hardware. Morovič articulates the technical challenge of reproducing images on devices with different gamuts, noting that simple clipping can destroy image detail and that advanced mapping is required to maintain the look and feel of the original. Osaki describes a potential solution with a gamut compression method that mathematically preserves gradation and relative color differences when mapping to a smaller gamut. Because Jones's system is built 3D LUTs, a POSITA would have recognized that Osaki's gradation-preserving algorithms may be implemented within Jones's existing "look" processor, thereby resolving the mapping issues highlighted by Morovič. The configuration would have allowed the combined system to effectively manage the transition to narrower-gamut devices without the detail loss associated with standard clipping.

121. A POSITA would have also expected success because integrating the teachings of Jones, Ollivier, Osaki, and Morovič creates a verifiable closed-loop workflow where the upstream preview accurately simulates downstream distribution results. Jones’s color grading channel 12 is designed to provide an optimal view of color-corrected content. By applying Morovič’s soft proofing principles (e.g., simulating target output), a POSITA would have understood that display-specific LUTs generated for Ollivier’s downstream devices (e.g., a display-specific LUT for CRT) may be loaded into Jones’s upstream preview path.

C. Combination of Jones and Yeung

(a) Motivation to Combine

122. Jones describes a color correction workflow that includes a color grading preview channel 12 and a digital rendering channel 14. In the color grading preview channel 12, a colorist pre-visualizes a desired “look” on a digital projector-class display device 30. In the digital rendering channel 14, that “look” is rendered into mastered data and recorded as a digital master 46, and the master may be distributed for projection using digital projector 54. DOLBY-1004, 4:34-38, 6:17-35, 10:26-44. Jones also explains that different display devices can impose different reproduction constraints and describes device-dependent processing mechanisms, including a display specific transform that re-maps out-of-gamut values into a target device gamut, and Jones describes digital projectors as providing a wider gamut than

conventional CRT devices. *Id.*, 6:35-56. Jones also describes flexibility in where device-specific transforms are applied, including implementations with projector-specific transforms applied downstream at a cinema location and variations in which those transforms may be implemented earlier during rendering when projector requirements are known. *Id.*, 7:19-30.

123. Based on my review of Jones, a POSITA implementing and extending Jones's digital mastering workflow would have recognized that Jones is directed to preserving an intended "look" while accommodating device constraints, and that this objective supports generation of additional mastered deliverables tailored to distribution environments beyond digital projection. A POSITA would have considered distribution environments with different viewing conditions and device characteristics, including broadcast television and packaged media distribution. *Id.* Yeung addresses these distribution environments by identifying digital cinema, conventional cinema, network television, and packaged media such as DVD/VHS, and by describing a color management pipeline that includes gamut mapping to adapt content for a selected output device or environment. DOLBY-1007, [0027].

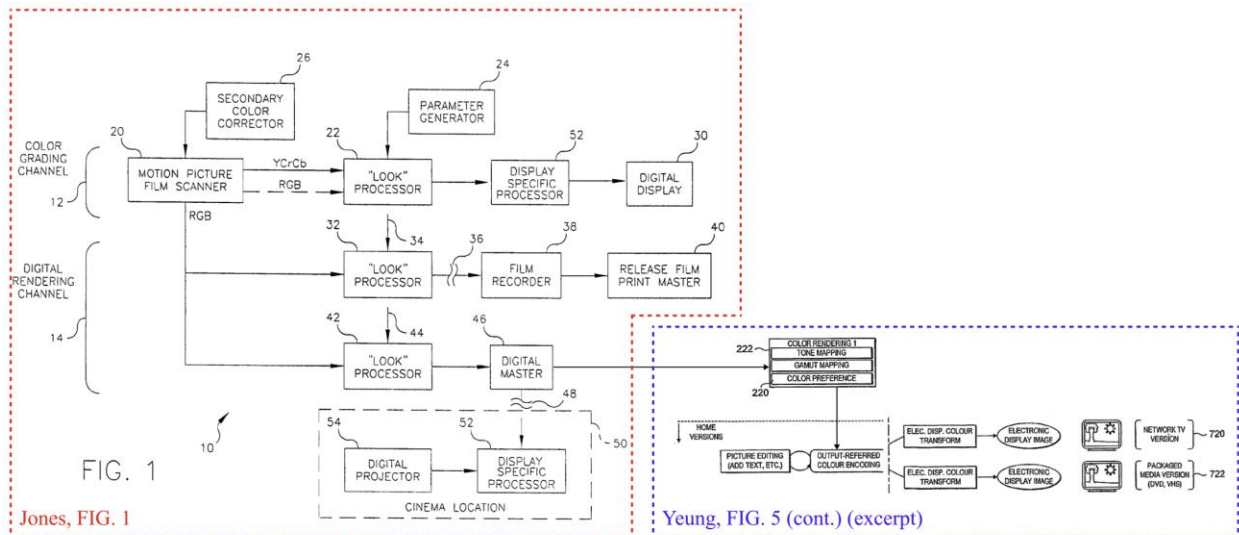
124. Yeung describes a creation-side architecture in which multiple distribution masters are derived from a supermaster through use of a gamut mapper. DOLBY-1007, [0066]. Yeung explains that this approach "reduces the amount of expensive colorist's work for each new version," and also enables output across

“various types of distribution paths 716, 718, 720, and 722.” *Id.*, [0057], [0066]. A POSITA would have viewed Yeung’s use of gamut mapping to generate environment-specific outputs as fitting with Jones’s mastering framework, which renders a colorist-established “look” into a digital master and addresses out-of-gamut remapping using device-dependent processing for different display devices. A POSITA would have been motivated to incorporate Yeung’s techniques for creating environment-specific distribution masters into the Jones system so that additional environment-specific mastered deliverables, including a packaged-media master, can be derived from Jones’s mastered content. Yeung describes an example workflow in which a supermaster 756 is processed using a gamut mapper to perform color transformations related to a particular environment and output display characteristics. DOLBY-1007, [0031], [0066], FIG. 5.

125. In a combined Jones-Yeung system, Jones’s rendering pipeline generates a mastered output, including digital master 46, that embodies the colorist-established creative “look.” Yeung describes a creation-side workflow in which a mastered output is treated as a “supermaster” and is processed to derive additional distribution masters for different environments, including packaged media and network television. DOLBY-1007, [0031], FIG. 5. In the workflow shown in Yeung’s Figure 5, the derivation path includes a “gamut mapping” operation that maps between the input and output gamuts of different color spaces and devices. *Id.*,

[0031], FIG. 5. Jones also describes flexibility in where device-dependent transforms are applied, including implementations with downstream processing at a cinema location and variations in which transforms are implemented earlier during rendering when projector requirements are known. DOLBY-1004, 7:19-30. A POSITA would have implemented the Yeung creation-side derivation stage using Jones's mastered output as an input to generate additional environment-specific mastered deliverables for distribution environments identified by Yeung, including DVD/VHS and broadcast, while maintaining the established "look" across different reproduction constraints.

126. An example of the Jones-Yeung system is visualized below based on Jones' Figure 1 and excerpts of Yeung's Figure 5:



Jones-Yeung

Jones describes that the digital rendering channel 14 generates master 46 based on the “look” established in the color grading channel 12, and that master 46 may be distributed for downstream output, including projection using projector 54 at cinema location 50. DOLBY-1004, 10:26-44; *id.*, 7:19-30. Yeung describes a creation-side workflow in which a digital super master 750 is processed to generate environment-specific distribution masters along distribution paths 716, 718, 720, and 722. DOLBY-1007, [0066], FIG. 5. In a Jones-Yeung implementation, a POSITA would have used master 46 as, or as the basis for, a Yeung-like digital super master 750 and would have processed that supermaster through Yeung’s environment-specific operations, including a color gamut mapping operation (including a “gamut mapping” stage, step 330 of FIG. 3), to derive distribution masters for particular distribution environments, including a network-TV master (720) and a packaged-media master (722) (DVD/VHS). *Id.*, [0041], [0066], Fig. 5. A POSITA would have implemented this creation-side distribution-master stage by supplying master 46 as an input, without changing Jones’s pre-existing color grading channel 12 or digital rendering channel 14 beyond providing master 46 to the Yeung-like distribution-master generation stage. DOLBY-1004, 10:26-44; DOLBY-1007, [0066], FIG. 5.

(b) Reasonable Expectation of Success

127. A POSITA would have expected to succeed in combining the teachings of Jones and Yeung in the manner described above. The combination uses known

prior art elements in combination according to known methods and yields predictable results. Jones describes a mastering workflow in which a “look” is rendered into a mastered output (master 46) that is distributed and recorded to a storage medium, and Jones also describes flexibility in when device-dependent transforms are applied, including projector-specific transforms applied downstream at a cinema location and variations in which such transforms are implemented earlier during rendering when projector requirements are known. DOLBY-1004, 7:3-18, 7:19-30. Yeung describes creation-side processing for extending a mastered deliverable into multiple environment-specific distribution masters. DOLBY-1007, [0031], [0041], [0066], FIG. 5. A POSITA would have implemented Yeung’s distribution-master derivation stage as an additional creation-side processing stage applied to Jones’s mastered output to generate additional environment-specific mastered deliverables derived from that mastered output.

128. A POSITA would have also expected success because the signal processing architectures of both systems are compatible because they rely on standard color transformation mechanisms (e.g., LUTs) to manipulate digital image data. Jones describes that its “look” processors are implemented using reconfigurable hardware capable of applying 3D LUTs to process motion imagery. Yeung similarly implements color transformation techniques using processors programmed to perform matrix operations and LUT selections to achieve color space

transformations. Jones' system already employs a reconfigurable compute engine designed to execute processing (e.g., applying a creative look followed by specific transforms), and thus, a POSITA would have recognized that integrating Yeung's environment-specific distribution logic into Jones's existing pipeline would have been relatively straightforward. The combination would essentially involve configuring Jones' rendering processors to apply the specific color gamut mapping and appearance modeling transforms taught by Yeung for targets like television or home video, utilizing the hardware structures found in Jones.

129. A POSITA would have also expected success because Jones' upstream mastering process generates a similar type of content data (e.g., master 46) as that suggested in Yeung's multi-distribution workflow (e.g., supermaster 756). Jones's digital rendering channel is capable of producing a digital master that contains the rendered creative "look" as a master quality source. This aligns with Yeung's description of a supermaster serving as a source from which various output-specific versions may be derived. Jones' system, in some implementations, is also designed to output a master file that isolates the creative intent from the limitations of a specific projector, leading a POSITA to recognize that master 46 may be successfully processed using Yeung's creation-side processing techniques to generate additional masters for diverse viewing environments (e.g., network TV, DVD) without degrading the original artistic intent.

D. Combination of Jones, Yeung, and Morovič

(a) Motivation to Combine

130. As discussed above, a POSITA would have found it obvious to configure the Jones's color grading channel 12 (which would have been provide by Jones-Yeung) by incorporating Morovič's proofing methodology into Jones's color grading channel 12. Jones describes a pre-visualization workflow in the color grading channel 12 in which a colorist uses display device 30 to establish a desired "look" before a master is generated in the digital rendering channel. DOLBY-1004, 4:34-38, 6:17-35.

131. Morovič describes "soft proofing" as using a computer display "to simulate or preview" output and describes proofing as producing a sample output to simulate output of another kind. DOLBY-1010, 186. Yeung describes a "color gamut mapping" that transforms a color gamut of one color space to the color gamut of another color space and describes a gamut mapper that maps an image input color space to a display image output color space. DOLBY-1007, [0018], [0031].

132. In the Jones-Yeung- Morovič combination, a POSITA would have used Yeung's gamut mapping operation as the mapping component within Morovič-style proofing so that Jones's grading display can present a simulated view of a selected standard target display while the colorist performs the pre-visualization workflow in the color grading channel (in a similar manner as the Jones-Ollivier-Osaki-Morovič

combination discussed in the previous section). DOLBY-1004, 4:34-38, 6:17-35; DOLBY-1007, [0018], [0031]; DOLBY-1010, 186.

133. Yeung describes a “color gamut mapping” as “techniques that act on a color space to transform a color gamut of one color space to the color gamut of another color space.” DOLBY-1007, [0018]. Yeung also describes a “gamut mapper” that “maps the color gamut of an image input color space to the color gamut of a display image output color space,” reflecting a specific mapping relationship between an input gamut and a selected output display gamut. DOLBY-1007, [0031]. Morovič describes proofing, including soft proofing, as simulating one output condition on another display and explains that target simulation can be implemented together with gamut mapping so the simulated output reflects the destination device’s gamut constraints. DOLBY-1010, 183, 186. Based on these disclosures, a POSITA would have understood that Yeung’s gamut mapping operation provides the type of specific, device-to-device mapping information used in Morovič-style proofing workflows when simulating a selected target display environment. DOLBY-1007, [0018], [0031]; DOLBY-1010, 183, 186.

134. In a Jones-Yeung-Morovič implementation, a POSITA would have configured Jones’s color grading channel 12 to present a soft-proofed preview of a selected Yeung target environment on the wide-gamut grading display, including projector-class display device 30. Jones describes a LUT-based architecture in which

the color grading channel applies a “look” using LUT 106 and applies a separate display-specific transform using LUT 110, with reconfigurable parameters supporting “any number of experimental ‘looks’.” DOLBY-1004, 9:30-33; *id.*, 4:14-16, 7:31-35. Yeung describes creation-side generation of multiple environment-specific versions and distribution masters from a supermaster, including distribution paths such as network television and packaged media, and Yeung describes applying a gamut mapping operation in connection with producing output for a selected output device or environment. DOLBY-1007, [0027], [0041], [0066], FIG. 5 (cont’d). Morovič describes soft proofing as using a computer display “to simulate or preview” output and describes proofing as producing a sample output to simulate output of another kind. DOLBY-1010, 186. Based on these disclosures, a POSITA would have used Jones’s reconfigurable LUT framework to implement a Morovič-style target simulation in the grading channel and to apply Yeung’s gamut mapping operation as the mapping component used to conform the simulated target into the grading display’s gamut for preview. DOLBY-1004, 9:30-33; DOLBY-1007, [0018], [0031], [0041]; DOLBY-1010, 183, 186.

(b) Reasonable Expectation of Success

135. A POSITA would have expected success in combining the teachings of Jones, Yeung, and Morovič in the manner discussed above. As discussed above, Jones and Yeung are technically compatible because they involve color

transformations. A POSITA would have recognized that integrating Yeung's gamut mapping algorithms into Jones's existing color grading channel 12 and soft proofing would be a straightforward engineering task. The combination may be achieved using the hardware structures already described in Jones.

136. A POSITA would have also expected success because Jones's pre-visualization workflow is functionally designed to support the exact type of target simulation described by Morovič and enabled by Yeung. Jones's descriptions relating to providing the colorist with an optimal view before the master is finalized aligns with Morovič's soft proofing techniques. This would have involved using a computer display to simulate the output of another device.

137. Additionally, the combination would have created a verifiable workflow where soft proofing improves the verifiability of Jones' upstream processes in Yeung's downstream distribution processes. By applying Morovič's soft proofing principles, the system ensures that pre-visualization is not merely a generic approximation, but an accurate simulation of the final distributed content. A POSITA would have recognized that the combination yields a predictable result, giving the colorist confidence that the intended look established during mastering will be faithfully preserved across the diverse display environments targeted by the system.

E. Combination of Jones, Yeung, and Vetro

(a) Motivation to Combine

138. Yeung describes a creation-side architecture that generates environment-specific distribution masters from a digital supermaster, including a network television distribution master 720. DOLBY-1007, [0066], FIG. 5. Yeung describes that this distribution-master creation workflow processes the supermaster through environment-specific operations, including a gamut mapping operation, to derive distribution masters suited for particular distribution paths. *Id.*, [0041], [0066]. Yeung also contemplates that viewing environments can vary at the time of consumption and describes a configuration that “automatically adapts to different visual environments,” including “a broadcast version” and a “DVD version.” *Id.*, [0057]. Yeung explains that a “customer may want to turn the lights down in the living room” when viewing the DVD version. *Id.*, [0057].

139. A POSITA implementing the Jones-Yeung distribution workflow would have recognized that delivering a static, pre-rendered network television distribution master 720 does not account for real-time changes in a viewer’s illumination conditions at playback. Yeung describes viewing environments that can change at the time of consumption and provides an example in which a “customer may want to turn the lights down in the living room.” DOLBY-1007, [0057]. Based on this disclosure, a POSITA would have understood that illumination conditions

can vary dynamically and may not be known when a particular version is prepared on the creation side. DOLBY-1007, [0057]. Vetro addresses adaptation for heterogeneous consumption conditions by describing MPEG-21 Digital Item Adaptation (DIA) as part of enabling “Universal Multimedia Access (UMA)” across terminals, networks, and users. DOLBY-1011, 1.

140. Vetro describes standardized “usage environment description tools” that include terminal capabilities. DOLBY-1011, 4. Vetro explains that these tools account for characteristics including the “natural environment,” and that “natural environment pertains to the physical environmental conditions around a User such as lighting condition.” *Id.* For a visual environment, Vetro describes “illumination characteristics that may affect the perceived display of visual information.” *Id.* Vetro describes using these description tools in an adaptation framework in which a Digital Item is processed by an adaptation engine, including resource and descriptor adaptation engines, to produce an adapted Digital Item. DOLBY-1011, 3, FIG. 1.

141. A POSITA would have recognized that Vetro’s standardized usage environment description tools provide a compatible addition to the Jones-Yeung system in implementations that account for viewing conditions at the time of consumption. Yeung describes a processor configuration capable of “flexibly tun[ing] a target image in real time” and describes adjusting color space with respect to viewing environment conditions, including “dark, dim, ambient

lighting.” DOLBY-1007, [0036]. Vetro describes usage environment description tools that provide standardized inputs about the terminal and natural environment and describes an adaptation framework that uses those descriptions as part of producing an adapted Digital Item. DOLBY-1011, 3, 4, FIG. 1.

142. A POSITA would have also recognized that Vetro’s adaptation tools include a comprehensive set of descriptors sufficient to parameterize the environment-specific and device-specific color transformations required to generate a distribution master. Vetro describes that its usage environment description tools encompass “terminal capabilities,” including a specific description of “display characteristics.” DOLBY-1011, 4. Vetro also discusses “presentation preferences” that define how information is rendered, including “preferred color temperature, brightness, saturation, and contrast” as definable parameters. *Id.* A POSITA would have recognized that these standardized descriptors capture both the target display’s capabilities (e.g., gamut constraints) and the user’s color preferences (e.g., saturation) and provide the necessary inputs to drive Yeung’s gamut mapping and rendering operations locally on an output device (e.g., network TV device). Vetro’s tools would have been understood to account for both the chrominance and luminance aspects of the reconstruction process, ensuring the locally generated presentation accurately reflects the specific requirements of the consumer’s terminal and viewing environment.

143. Based on these disclosures, a POSITA would have incorporated Vetro's usage environment descriptors into the Jones-Yeung system so that the real-time tuning contemplated by Yeung can be selected or parameterized using standardized description inputs, including lighting-related conditions at playback. DOLBY-1007, [0036]; DOLBY-1011, 3, 4. In this combined configuration, a POSITA would have modified the distribution approach so that, instead of relying only on a pre-rendered network television distribution master 720 for playback, the system can provide a more flexible representation of the content for downstream adaptation together with MPEG-21 DIA usage environment descriptors. DOLBY-1011, 3, 4. Vetro discusses enabling Universal Multimedia Access using "scalable content representation formats" together with standardized description tools, which supports transmitting a representation that remains amenable to downstream adaptation. DOLBY-1011, 3.

144. In a combined Jones-Yeung-Vetro system, a POSITA would have implemented adaptation closer to consumption so that the rendered presentation reflects the user's then-current illumination conditions at playback. Yeung describes a configuration that can "automatically adapt[] to different visual environments," including an example in which a "customer may want to turn the lights down in the living room." DOLBY-1007, [0057]. Yeung also describes a processor configuration capable of "flexibly tun[ing] a target image in real time" and adjusting color space with respect to viewing environment conditions, including "dark, dim,

ambient lighting.” *Id.*, [0036]. Vetro describes standardized usage environment description tools and explains that these tools describe terminal capabilities, including terminal input-output characteristics such as “display characteristics,” and describe natural environment characteristics including “illumination characteristics that may affect the perceived display of visual information.” DOLBY-1011, 4. Based on these disclosures, a POSITA would have configured a playback system to consume standardized DIA descriptions, including display characteristics and illumination characteristics, as inputs for selecting or parameterizing the real-time tuning contemplated by Yeung during consumption. DOLBY-1007, [0036]; DOLBY-1011, 4. This configuration supports using standardized, interoperable description inputs to account for Yeung’s described scenario of changed illumination in a home viewing environment. DOLBY-1007, [0057]; DOLBY-1011, 4.

(b) Reasonable Expectation of Success

145. A POSITA would have expected to succeed in combining the teachings of Jones, Yeung, and Vetro in the manner described above. The combination involves using known elements in combination according to known methods and yields predictable results. Jones describes generating a mastered output recorded as master 46 and distributing that mastered output for downstream use. DOLBY-1004, 7:3-18. Yeung describes generating environment-specific distribution masters and describes a processor configuration capable of “flexibly tun[ing] a target image in

real time” with adjustments based on viewing environment conditions. DOLBY-1007, [0036], [0066]. Vetro supplies standardized usage environment description tools, including descriptions of illumination characteristics and display characteristics, for use in an adaptation framework across heterogeneous terminals. DOLBY-1011, 4. Based on these disclosures, incorporating Vetro’s usage environment descriptors into the Jones-Yeung system provides a predictable mechanism for supplying standardized inputs that can be used to parameterize the real-time tuning described by Yeung so the presentation is appropriate for a target display environment while accounting for the user’s viewing conditions at consumption. DOLBY-1007, [0036]; DOLBY-1011, 4.

146. A POSITA would have also expected success because the combination involves the routine integration of well-known, complementary components, such as a data processing engine and a data input format. Yeung describes a processing mechanism but relies on input data to drive adjustments. Vetro provides this input via well-known tools. A POSITA would have recognized that combining these references involves nothing more than using Vetro’s standardized descriptors as the input parameters for Yeung’s known tuning processor. This fits well together because adaptation engines (like Yeung’s) involves structured environmental data. Supplying this data using the industry-standard mechanism described by Vetro is a predictable use of prior art elements to achieve their established functions.

XI. [GROUND 1] – Claims 1-3, 5, 12-14, 20-22, And 24 Are Obvious Over Jones-Ollivier-Osaki

A. Analysis

1. Claim 1

[1.pre] A method for color correcting, comprising:

147. The Jones-Ollivier-Osaki system would have performed a color correction process of the type described in the '268 patent. *See* DOLBY-1001, 8:10-14. Jones describes a process that includes “a digital color grading channel [12] which allows a colorist to pre-visualize a particular ‘look’ and a digital rendering channel [14] which allows the colorist to render that ‘look’ into the mastered data.” DOLBY-1004, 4:34-38.

[1.1] performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,

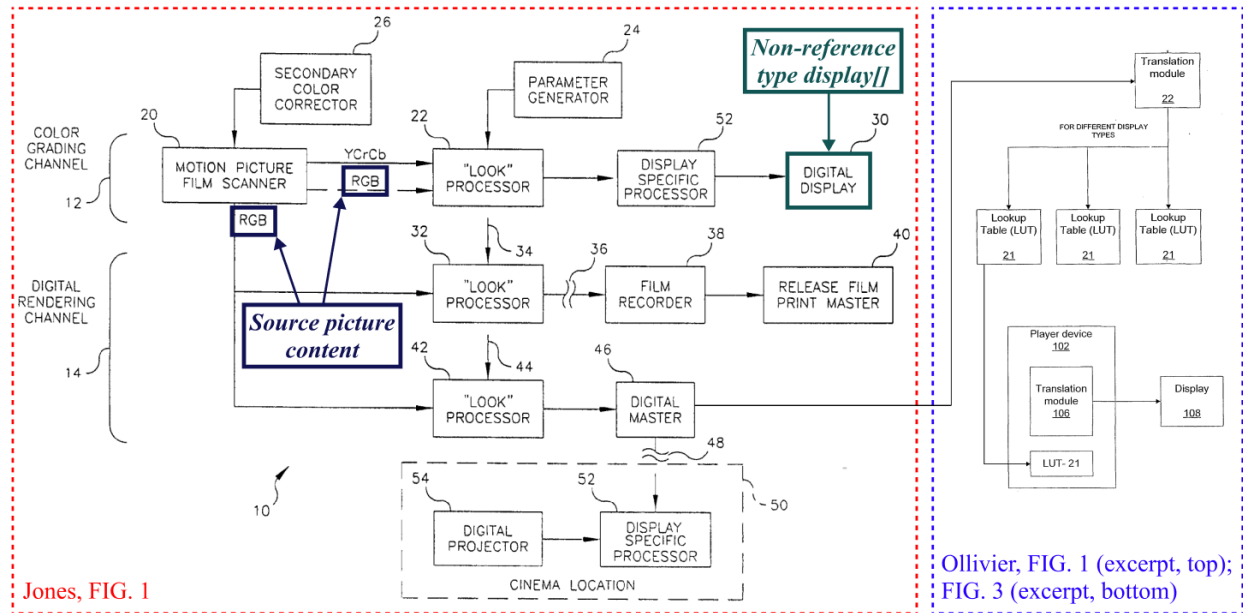
148. A POSITA would have performed Jones’s color grading process on motion picture film content (e.g., digital image signals received from motion picture film scanner 20) using display device 30 as a wide-gamut display (e.g., non-reference type display having a non-reference color gamut). DOLBY-1004, 7:3-18, FIG. 1. Jones also describes a color grading process in which a colorist uses display device 30 to pre-visualize a “look” for the digital image signals and generate creative “‘look’ parameters.” *Id.*, 6:17-35. Jones further describes display device 30 as “preferably a wider-gamut device such as a digital projector.” *Id.*, 6:35-56. This

coincides with the '268 patent specification, which describes a reference color gamut based on CRT phosphor colors and describes wide gamut displays as examples of non-reference displays. DOLBY-1001, 1:15-25, 2:29-37.

149. The '268 patent explains that “color correction” refers to “a creative procedure to manually choose the right (preferred) colors on the content creation side (versus the consumer consumption side).” DOLBY-1001, 8:10-14. Jones provides an example of this type of color correction because it describes a pre-visualization workflow that “allows the colorist to render creative ‘looks’ into the data (i.e., into a digital master)...” DOLBY-1004, 4:39-48. Jones also describes that the colorist uses display device 30 to pre-visualize a “look” for digital image signals, producing creative “‘look’ parameters” that “allows a myriad of different ‘looks’ and creative effects to be imparted to the digital signals.” *Id.*, 6:17-35. Based on these descriptions, a POSITA would have understood that Jones’s color grading workflow involves manual, creation-side selection and application of preferred colors through a step-based grading process that results in a mastered output embodying the selected “look.”

150. A POSITA would have understood that display device 30 is an example of a non-reference type display having a non-reference color gamut relative to a CRT display. DOLBY-1004, 6:35-56. Jones describes a creation-side workflow in which a colorist adjusts digital image signals to establish a creative “look” while visualizing

the image data using display device 30. DOLBY-1004, 6:35-56. Jones also describes display device 30 as “a wider-gamut device such as a digital projector,” and explains that “use of a digital projector provides a wider gamut than a conventional CRT display device and can display a broader range of colors....” *Id.* The ’268 patent similarly describes CRT phosphor colors as defining a “single color gamut” and identifies those CRT-based colors as “current standards for use in determining the reference color gamut (RCG) for displays.” DOLBY-1001, 1:15-25. The ’268 patent also describes examples of non-reference (CG2) displays as “wide gamut displays,” making it “possible to display a wider range of colors than was previously possible.” DOLBY-1001, 2:29-37. The ’268 patent also identifies “XYZ for Digital Cinema” as an example of a CG2 color gamut. DOLBY-1001, 2:38-49. Jones similarly describes creating a “digital cinema distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 10:27-44. A POSITA would have understood that Jones’s projector-class digital cinema workflow aligns with the ’268 patent’s CG2 wide-gamut context, and that Jones’s display device 30 and, in at least some implementations, digital projector 54 are examples of non-reference type displays associated with a non-reference color gamut. DOLBY-1001, 2:29-37, 2:38-49; DOLBY-1004, 10:27-44.



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[1.1.1] wherein said performing step comprises: mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

151. Jones describes that, in the digital rendering channel 14, RGB signals are processed using the “look” established during color grading and “recorded as a digital master 46.” DOLBY-1004, 7:3-18. Jones also describes that this mastered output may be a “digital cinema distribution master 46 for playback/projection using the digital projector 54.” *Id.*, 10:26-44. Based on Jones’s description of the color grading channel 12 and digital rendering channel 14, the rendering channel processes the motion picture content using the colorist-established “look” and produces master 46 as a mastered deliverable that embodies that intended “look” in the mastered data. *Id.*, 4:34-38, 7:3-18, 10:26-44.

152. Jones describes that display device 30 used in the color grading channel 12 is “preferably a wider-gamut device such as a digital projector.” DOLBY-1004, 6:35-56. Jones also states that “use of a digital projector provides a wider gamut than a conventional CRT display device and can display a broader range of colors.” *Id.*, 6:35-56. Jones describes that the “look” established during color grading using display device 30 is used in the rendering channel to generate master 46. DOLBY-1004, 6:35-56; *id.*, 10:26-44. Based on these descriptions, a POSITA would have understood that the pre-visualization on a wider-gamut device informs the creative “look” that is rendered into master 46, and that the mastered output reflects color information established in that wider-gamut display context.

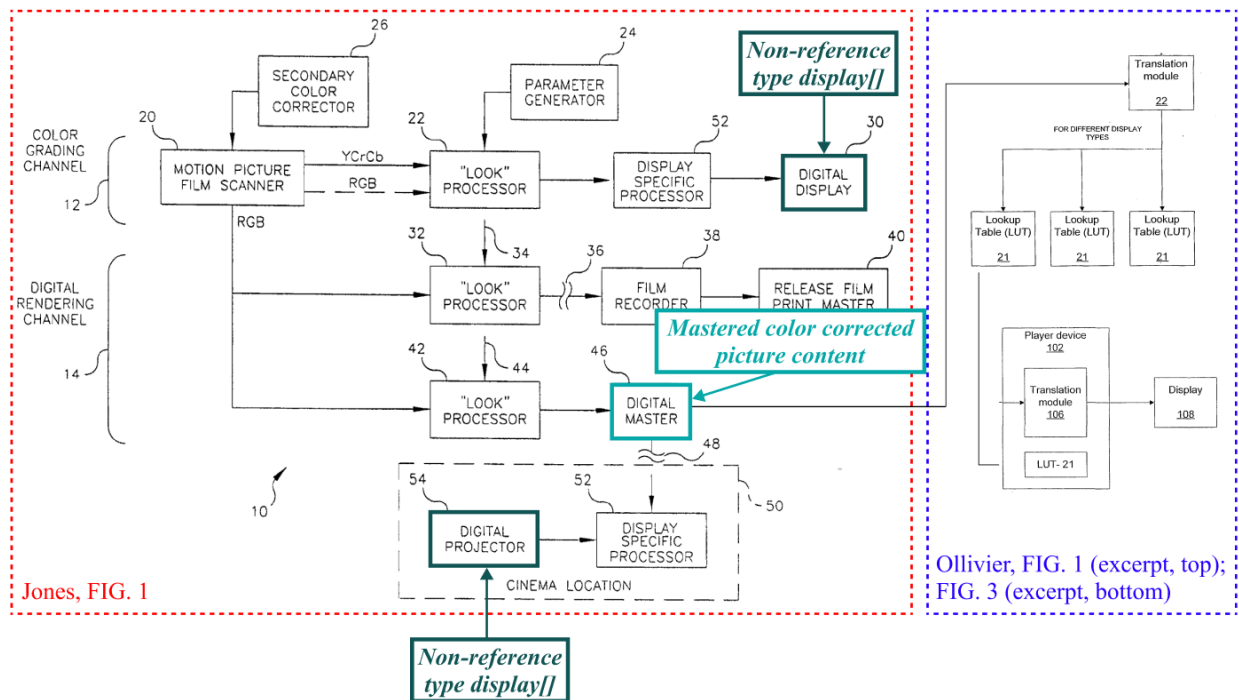
153. Jones describes that the “digitally mastered output could now be used...to create a digital cinema distribution master for playback/projection using the digital projector 54.” DOLBY-1004, 10:27-44. Jones also describes that “processed digital signals are then recorded as a digital master 46, such as magnetic tape, a hard drive or a CD/DV-ROM).” *Id.*, 7:3-18. Based on these descriptions, a POSITA would have understood that master 46 is a mastered output recorded in a form suitable for distribution and playback or projection using a projector-type output device, including digital projector 54.

154. Jones describes display device 30 as a “wider-gamut device,” and Jones identifies a “digital projector” as an example of a wider-gamut device. DOLBY-

1004, 6:35-57. In the same discussion, Jones states that “a digital projector provides a wider gamut than a conventional CRT display device and can display a broader range of colors.” *Id.* Jones also describes that master 46 may be a “digital cinema distribution master 46 [that is] for playback/projection using the digital projector 54.” *Id.*, 10:45-59. Based on these descriptions, a POSITA would have understood that the projector-type output device used for playback and projection, including digital projector 54, is a wider-gamut display relative to a conventional CRT display device, and that master 46 is authored for playback and projection in that projector-class viewing context.

155. A POSITA would have also found it obvious that master 46 is in a format that is ready for display, e.g., on projector 54. Jones identifies an implementation in which projector specific transforms are applied during rendering rather than only downstream. *Id.*, 7:19-30 (“In one variation, the projector specific transforms may be implemented by the ‘look’ processor 42 if the requirement of the specific projector 54 is known during the rendering stage.”). From this description, a POSITA would have understood that Jones contemplates implementations in which the projector-specific transformation is applied before master 46 is recorded, so that master 46 is generated after the display-specific transformation for the intended projector output and is ready for playback and projection on digital projector 54. *Id.*, 7:19-30; *see also id.*, 10:26-44. While Figure 1 reflects one

implementation in which projector-specific processing occurs in a downstream stage, the Jones-Ollivier-Osaki combination may also be configured according to Jones's implementations in which the projector-specific transforms are incorporated during rendering when projector requirements are known. DOLBY-1004, 7:3-18, FIG. 1; *see also id.*, 7:19-30, 7:45-49.



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[1.1.2] generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,

156. In the Jones-Ollivier-Osaki combination, a POSITA would have generated a display-specific LUT 21 using Ollivier's LUT framework and applied that LUT downstream to master 46 to conform the mastered content for display on

a CRT display device. DOLBY-1005, 6:23-7:6; DOLBY-1006, [0062], [0067], FIG. 2B. Based on the remapping concept described in Jones and the LUT-based device-gamut conversion described in Osaki, a POSITA would have understood that the display-specific LUT 21 encodes a projector-to-CRT color gamut mapping to the extent needed to render projector-class colors within the CRT's reproducible gamut. DOLBY-1004, 6:35-56; DOLBY-1006, [0062], [0067], FIG. 2B. Ollivier describes a LUT framework in which display-specific LUTs 21 are created for different display types, including a LUT 21 for CRT displays, and the LUT provides "formatting and adjustments needed to conform the sequence for display on a given display type." DOLBY-1005, 6:23-7:6; *see also id.*, 4:22-33. Jones describes device-specific processing that includes "re-mapping any output values that are out of the gamut of the display device such that such values would be within the display device gamut." DOLBY-1004, 6:35-56. Osaki describes a LUT used as a device-gamut mapping for converting content for reproduction on a CRT display device, including the "ITU-R709" or "Rec. 709" color gamut, and describes outputting video data by referencing the LUT. DOLBY-1006, [0062], [0067], FIG. 2B.

157. In the Jones-Ollivier-Osaki system, a device-specific LUT 21 is generated on the content-creation side using Ollivier's LUT framework and is made available for downstream processing of master 46 to enable output on a CRT display device. Ollivier describes that display-specific LUTs 21, including a LUT 21 for a

CRT display, are created and stored for communication to consumer-side playback and output endpoints. DOLBY-1005, 6:23-7:6, 7:13-27. Based on Ollivier's described workflow, once the mastered content is available, the display-specific LUT 21 is applied downstream by a consumer-side playback and output path to transform the color values of the mastered content for CRT display. *Id.*

158. Osaki describes that a LUT may serve as a device-gamut mapping for converting projector-oriented content for reproduction on a CRT display device. DOLBY-1006, [0091]-[0093], [0067]-[0069], [0122], [0123], FIG. 2B. Osaki explains that the LUT enables deriving a "color data value in [a] second gamut from the color data value in [a] first gamut," and outputting video data in the second gamut by referencing the LUT. *Id.*, [0067]. In a Jones-Ollivier-Osaki implementation, the display-specific LUT 21 would be configured so that applying LUT 21 downstream to master 46 performs a projector-to-CRT color gamut mapping of the type Osaki describes. Jones describes device-specific processing that includes "re-mapping any output values that are out of the gamut of the display device such that such values would be within the display device gamut." DOLBY-1004, 6:35-56. Ollivier describes generating display-specific LUTs 21 for different display types, including CRT, and applying the selected LUT 21 during output processing to conform the sequence for display. DOLBY-1005, 1:12-18, 4:22-33, 10:14-23, 10:29-11:12. Based on these disclosures, applying Ollivier's display-

specific LUT 21 downstream to master 46 for CRT display corresponds to a projector-to-CRT device-gamut mapping implemented using a LUT mapping as described in Osaki. DOLBY-1006, [0062], FIG. 2B.

159. A POSITA would have understood Jones' use of "display specific transform[s]" is functionally analogous process Ollivier's use of device-specific LUT 21 in generating content ready for display, e.g., on an CRT display device. Both processes involve applying a device-dependent transformation information to image content prior to presentation so the resulting output is conformed to the reproduction characteristics (including gamut constraints) of a selected target display device/type. *Id.*; Compare DOLBY-1004, 6:35-56 ("certain signal transformations are required by specific display devices, the 'look' processor 22 also applies display specific transforms to the digital signals"), and DOLBY-1005, 10:14-23 (applying LUTs 21 involves "formatting and adjustments needed to conform the sequence for display on a given display type"). Thus, a POSITA would have found it obvious that, in Jones-Ollivier-Osaki, the process of applying a display-specific LUT 21 to master 46 in generating content for display on a CRT display device involves a color gamut mapping.

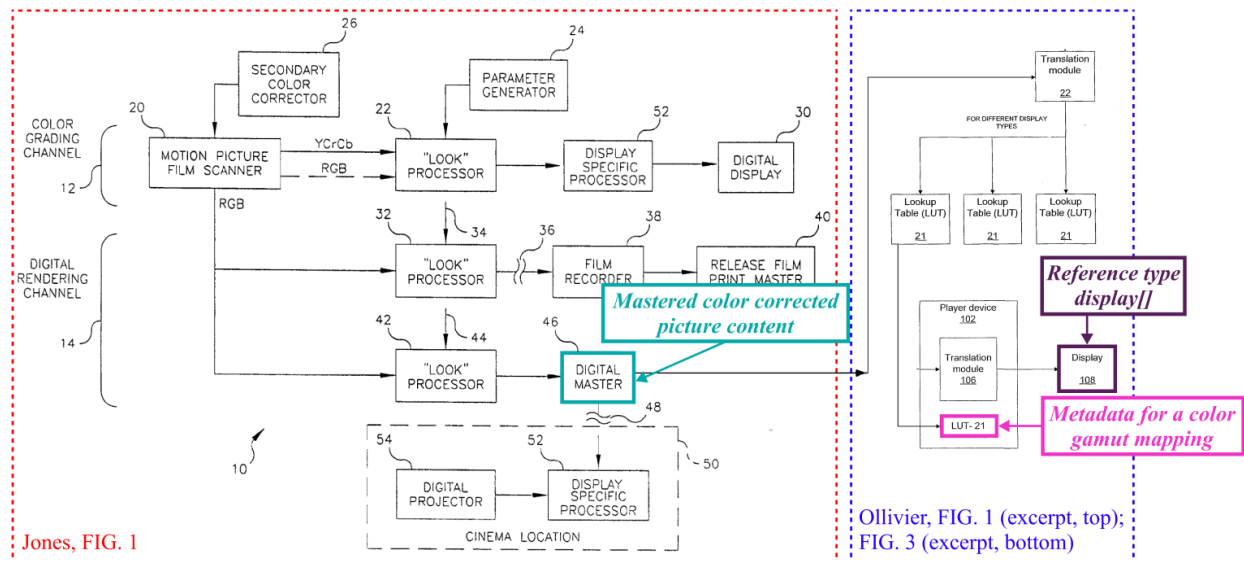
160. For example, where the display-specific LUT 21 is "stored for CRT displays," the process of applying the LUT 21 to image content (i.e., display-specific transformations) by the Jones-Ollivier-Osaki would have involved a projector-to-

CRT color transformation. More specifically, a POSITA would have recognized that, in this example, applying the display-specific LUT 21 involves mapping a first color gamut associated with Jones' film scanner 20 and a second color gamut associated with a CRT display device. In this regard, Jones-Ollivier-Osaki would have applied LUT 21 to implement a *color gamut mapping*, which was a well-known technique for color management systems by the Critical Date. For example, Osaki (DOLBY-1006) describes applying a 3D LUT as part of a "gamut compression process" for "converting an RGB signal value as an input video signal into an output RGB signal value using the LUT." DOLBY-1006, [0062], FIG. 2B.

161. Osaki further describes a color system in which "color converter 3" "acquir[es] [a] LUT that derives the color data value in [a] second gamut from the color data value in [a] first gamut and outputting video data in the second gamut in response to input video data in the first gamut by referencing the LUT." DOLBY-1006, [0067]. Thus, Osaki demonstrates that application of the display-specific LUT by Jones-Ollivier-Osaki was a well-known configuration by the Critical Date. Indeed, Ollivier describes a "3D LUT" may represent "[a] list of all possible combinations of output color values resulting from all possible color values..." DOLBY-1005, 10:29-11:12.

162. Ollivier further suggests applying LUT 21 to image content may involve color gamut adjustments. Ollivier attributes a "LUT" as "characterizing the

color corrections made for [a] set of consecutive frames,” suggesting and/or at least rendering obvious that the LUT 21 specifies color information. DOLBY-1005, 4:22-33. Ollivier also recognizes that different display technologies have different “color settings/standards” and “limitations of display capability,” further suggesting that application of display-specific LUT 21, in at least some instances (such as a projector-to-CRT conversion), would have involves color transformation. See DOLBY-1005, 1:12-18 (identifying “P7V2” color standard for “digital projectors” and “REC709” standard for “cathode ray tubes (CRT)”).



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163. A POSITA would have also understood that “metadata for a color gamut mapping” encompasses metadata that represents the specific mapping itself, including in the form of a lookup table that encodes the relationship between input color values and output color values for the target display type. This understanding

is consistent with the '268 patent's description of metadata for gamut mapping being implemented using a lookup table, including a 3D-LUT or similar function used to transform between display gamuts. DOLBY-1001, 7:51-65, 9:8-19. The interpretation is also consistent with Ollivier, which describes a "3D LUT" that represents "all possible combinations of color values resulting from all possible input color values after the application of [a] 3×3 matrix algorithm." DOLBY-1005, 10:29-11:12. This suggests a LUT can represent a complete input-to-output color transformation rather than merely identifying a color space. *Id.* Jones similarly describes applying display specific transforms using a LUT to adapt image content to the characteristics of a target display device, including remapping values that are outside the device's gamut so the resulting values are within the device's gamut. DOLBY-1004, 5:23-31; *id.*, 6:35-56.

[1.1.3] wherein the source picture content is mastered only for the non-reference type displays having the non-reference color gamut.

164. In the Jones-Ollivier-Osaki system, the motion picture film content, including digital motion picture data received from motion picture film scanner 20, is mastered to provide master 46 as mastered color corrected picture content authored for a digital projector. Jones describes a digital cinema distribution master 46 for playback and projection using a digital projector. DOLBY-1004, 10:26-44. Jones also describes that display device 30 is "preferably a wider-gamut device such as a digital projector," and that "use of a digital projector provides a wider

gamut than a conventional CRT display device.” *Id.*, 6:35-56. Ollivier describes display-specific LUTs 21 (including a LUT for CRT) and describes applying a selected display-specific LUT during output processing to conform the sequence for display. DOLBY-1005, 1:12-18, 4:22-33, 10:14-23, 10:29-11:12. Osaki describes device-gamut conversion using LUT techniques, including conversion between a projector gamut and a CRT gamut. DOLBY-1006, [0056]-[0061], [0091]-[0093]. Based on these disclosures, a POSITA would have understood that master 46 is authored as a projector-oriented master and that any CRT-oriented adaptation is handled by downstream conversion, rather than by creating a separate CRT-authored master at the mastering stage.

165. Jones describes a color correction process in which a colorist performs creative color grading by pre-visualizing content on display device 30 to establish a desired “look,” and the digital rendering channel 14 “render[s] that ‘look’ into the mastered data.” DOLBY-1004, 4:34-38; *see also id.*, 6:17-35, 10:26-44; DOLBY-1001, 8:10-14. Jones further describes that display device 30 is “preferably a wider-gamut device such as a digital projector,” and that “use of a digital projector provides a wider gamut than a conventional CRT display device and can display a broader range of colors....” DOLBY-1004, 6:35-56. Based on these disclosures, the creative “look” that is rendered into master 46 is established through pre-visualization on a wider-gamut device, and the mastered output reflects the color information and

creative adjustments made in that wider-gamut viewing context. DOLBY-1004, 4:34-38; *id.*, 6:35-56, 10:26-44. In this workflow, the mastering step authors master 46 for the wider-gamut, non-reference class associated with the pre-visualization device used to establish the “look.”

166. Jones describes that the purpose of the digital rendering channel 14 is “to create a digital cinema distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 10:26-44; *see also id.*, 7:3-18. Jones also states that a “digital projector provides a wider gamut than a conventional CRT display device.” *Id.*, 6:35-56. Based on these disclosures, a POSITA would have understood that master 46 is authored for playback and projection on a digital projector, including digital projector 54, and that this projector-class output device is wider-gamut relative to a conventional CRT display device. DOLBY-1004, 6:35-56, 10:26-44. Jones’s description of a “digital cinema distribution master” also corresponds with the ’268 patent’s discussion of “XYZ for Digital Cinema” as an example of “[a]n extended color gamut” used to “utilize [a] wider color gamut.” *Compare* DOLBY-1004, 10:26-44, 11:18-29, and DOLBY-1001, 2:38-49.

2. *Claim 2*

[2] *The method of claim 1, wherein the metadata is provided to the reference type displays for final consumption at least one of in-band and out-of-band with respect to the mastered color corrected picture content.*

167. In the Jones-Ollivier-Osaki system, a display-specific LUT is provided to a consumer-side playback and output path associated with a CRT display device for use at final consumption. Ollivier describes distributing LUTs with the content for downstream application prior to display, including by writing LUTs onto transferable media along with the raw video data signals or transmitting LUTs in conjunction with the raw video data signals, and storing or downloading the LUTs in memory of a set top box, television, or DVD player prior to display. DOLBY-1005, 7:13-27. Based on this distribution mechanism, LUT 21 is carried with the mastered content and applied downstream in the playback and output path before display on the CRT device.

168. Ollivier describes display-specific LUTs 21 for different display types, including a CRT display type, and describes that these LUTs are created and stored for communication to consumer-side playback and output endpoints. DOLBY-1005, 6:23-7:6. Ollivier also explains that LUTs may be provided to end users and distribution endpoints together with the video content, including by being written onto a transferable medium “along with the raw video data signals,” or transmitted “in conjunction with” the raw video data signals for receipt and use prior to display.

DOLBY-1005, 7:13-27. Based on this distribution approach, a POSITA would have understood that display-specific LUT 21 can accompany master 46 as part of the same delivered media or transmission and be available for use in the playback and output path before display, which is an example of providing LUT 21 at least in-band with respect to master 46.

169. Osaki describes that LUT mapping information can be stored, including in memory, and can also be transmitted, including through a recording medium or communication means, for later use by a downstream conversion system. DOLBY-1006, [0065], [0074], [0157]. Based on this disclosure, a POSITA would have understood that display-specific mapping information can be provided separately from the video data and made available for later application by a downstream conversion and output path. In the Jones-Ollivier-Osaki system, a POSITA would have implemented Ollivier's display-specific LUT 21 as a separate mapping artifact, including a separate file or separately communicated, for later application by the consumer-side playback and output path that drives the CRT display device, out-of-band with respect to master 46.

3. *Claim 3*

[3] *The method of claim 1, wherein said step of performing the color correction further comprises performing the color gamut mapping using*

the metadata to verify a result of the color correction, when the display content is rendered on the reference type display.

170. In the Jones-Ollivier-Osaki combination, applying a display-specific LUT 21 to display content derived from master 46 for rendering on a CRT display device would have involved performing a projector-to-CRT color gamut mapping and provides a way to verify how the color-corrected content will appear when rendered on the CRT reference display. DOLBY-1005, 5:1-13, 6:23-7:6, 10:29-11:12; DOLBY-1006, [0067]-[0069], [0091]-[0093].

171. As discussed above for claim 1, in Jones, the objective of the creation-side color correction workflow is to preserve an intended “look” despite differences in reproduction environments, including where a display device’s characteristics (e.g., gamut) may constrain reproduction. *See* DOLBY-1004, 1:16-28; *see also id.*, 2:43-50, 2:58-3:5. Display specific transforms can further be applied to accommodate the requirements of a specific display device, including re-mapping out-of-gamut values so they fall within the target device gamut. *Id.*, 6:35-56. Thus, a POSITA would have understood that Jones provides a framework in which display/device-dependent transforms are relevant to confirming that the intended look will be preserved when content is rendered on a target display device having different reproduction constraints.

172. Ollivier describes using a display device to allow an “operator to correct/adjust [an] original video image.” DOLBY-1005, 5:14-25. Ollivier also

describes implementations in which display device 14 is a display type “commonly used in the post-production business,” including use as a “quality check tool to validate display related LUTs.” DOLBY-1005, 5:1-13. Based on these disclosures, a POSITA would have understood that a display used in post-production can be used to verify how content appears after application of a display-related LUT, including a display-specific LUT 21, by viewing the transformed content on a reference-type display such as a CRT display.

4. *Claim 5*

[5] The method of claim 1, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.

173. In the Jones-Ollivier-Osaki system, a POSITA would have used a CRT display device as an example of a reference type display, and a CRT display device is a cathode ray tube display. DOLBY-1006, [0091]-[0093], [0122], [0123]. Jones describes use of a projector-class display device, including display device 30 and digital projector 54, in the mastering and playback and projection workflow. DOLBY-1004, 6:35-56, 10:26-44. Based on these disclosures, a POSITA would have understood that the projector-class display devices used in Jones can be implemented as a digital light processing display. DOLBY-1006, [0091]-[0093], [0122], [0123].

174. Ollivier describes output of a device-specific LUT 21 to an output display device, including a CRT display device. DOLBY-1005, 6:23-7:6. In this workflow, the output path applies the display-specific LUT 21 for the selected display type, including CRT. *Id.*, 6:23-7:6. Based on this disclosure, a POSITA would have understood that, in a Jones-Ollivier implementation using Ollivier's display-specific LUT 21, an output display device includes a CRT display device, which is a cathode ray tube display. DOLBY-1006, [0091]-[0093].

175. Jones describes display device 30 as “preferably a wider-gamut device such as a digital projector” and describes creation of a “digital cinema distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 6:35-56; *id.*, 10:26-44. Jones also states that “use of a digital projector provides a wider gamut than a conventional CRT display device.” *Id.*, 6:35-56. Based on my review of Yeung, Yeung describes an implementation in which “the digital cinema projector is a DLP projector....” DOLBY-1007, [0035]. Based on these disclosures, a POSITA would have understood that at least some implementations of the wide-gamut digital projector described in Jones, including projector 54, could be realized using digital light processing (DLP) display technology. DOLBY-1004, 6:35-56, 10:26-44; DOLBY-1007, [0035].

176. Jones describes that display device 30 is “preferably a wider-gamut device such as a digital projector,” and that master 46 may be a “digital cinema

distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 6:35-56, 10:26-44. Based on these disclosures and the DLP projector implementation described in Yeung, a POSITA would have understood that some implementations of the Jones-Ollivier system output master 46 to digital projector 54 operating as a digital light processing (DLP) display. DOLBY-1004, 6:35-56, 10:26-44.

5. *Claims 12-14, 20-22, 24*

177. Other than specific aspects addressed below, Jones-Ollivier-Osaki renders the limitations and claims listed below obvious in the same manner as explained above for corresponding claim limitations listed in the table below.

Limitation	Corresponding Limitation
[1.pre]	[12.pre], [20.pre]
[1.1]	[12.1], [20.1]
[1.1.1]	[12.1], [20.1.1]
[1.1.2]	[12.2], [20.1.2]
[1.1.3]	[12.3], [20.1.3]
[2]	[13], [21]
[3]	[22]
[4]	[23]
[5]	[14], [24]

[12.pre] A system for color correcting, comprising:

178. If the preamble is interpreted to be limiting, the Jones-Ollivier-Osaki combination would have provided a digital mastering system configured to perform Jones's color correction process in a system implementation, including a digital color grading channel 12 and a digital rendering channel 14. DOLBY-1004, 4:34-38; *see* DOLBY-1001, 8:10-14.

[12.1] a color correction module for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut, to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

179. Jones describes a color grading channel 12 and a digital rendering channel 14 that perform color correction on motion picture film content using a projector-class display device. In Jones, the color grading channel allows a colorist to render creative "looks" into the data. DOLBY-1004, 4:39-48. Jones also describes that the colorist uses display device 30 to pre-visualize a "look" for digital image signals, producing "'look' parameters" that allow "a myriad of different 'looks' and creative effects to be imparted to the digital signals." *Id.*, 6:17-35. Jones further describes display device 30 as "preferably a wider-gamut device such as a digital projector," and describes creation of a digital cinema distribution master 46 for playback and projection using digital projector 54. DOLBY-1004, 6:35-56, 10:27-44.

180. The '268 patent describes reference and non-reference display classes, including CRT phosphor colors defining a reference color gamut and wide gamut displays as examples of non-reference displays. DOLBY-1001, 1:15-25, 2:29-37. The '268 patent also identifies "XYZ for Digital Cinema" as an example of an extended color gamut for digital cinema. DOLBY-1001, 2:38-49. Based on these disclosures, a POSITA would have implemented Jones's color grading channel 12 and digital rendering channel 14 as a color correction module that performs creation-side color correction on source picture content using display device 30 as a non-reference type display having a non-reference color gamut and generates master 46 as mastered color corrected picture content for display on a projector-class non-reference display, including digital projector 54. DOLBY-1004, 4:39-48, 6:17-35, 6:35-56, 10:27-44; DOLBY-1001, 1:15-25, 2:29-37, 2:38-49, 8:10-14.

[12.2] a color gamut mapping module for performing a color gamut mapping to generate metadata for a subsequent color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,

181. In the Jones-Ollivier-Osaki system, a POSITA would have implemented a color gamut mapping module by generating a display-specific LUT 21 using Ollivier's LUT framework and applying that LUT downstream to Jones's master 46 to conform the mastered content for display on a CRT display device. DOLBY-1005, 4:22-33, 6:23-7:6. Jones describes device-specific processing that includes re-mapping out-of-gamut values into a target device gamut. DOLBY-1004,

6:35-56. Osaki describes a LUT used as a device-gamut mapping for converting content for reproduction on a CRT display device, including the “ITU-R709” or “Rec. 709” color gamut, and Osaki describes outputting video data by referencing the LUT. DOLBY-1006, [0062], [0067], FIG. 2B. Based on these disclosures, a POSITA would have configured the display-specific LUT 21 to include a projector-to-CRT color gamut mapping to the extent needed to render projector-class colors within the CRT’s reproducible gamut, using a LUT-based mapping approach of the type Osaki describes.

[20.pre] A system for color correcting, comprising:

[20.1] means for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,

[20.1.1] wherein said means for performing color correction comprises: means for mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

[20.1.2] means for generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays having a reference color gamut,

[20.1.3] wherein the source picture content is mastered only for the non-reference type displays having the non-reference color gamut.

182. I have been informed that claim 20 is presumed to invoke 35 U.S.C. §112, ¶6 based on the recitation of “means for” phrase in various limitations. The limitations reciting this phrase are addressed below, providing means-plus-function (MPF) interpretations where appropriate.

Term	Function	Structure
<i>means for performing color correction</i> (Claims 20, 25)	Performing color correction on source picture content, using at least one of a non-reference type display and a reference type display	<u>Structure</u>: Color Correction Module (430, 530, 630). <u>Algorithm</u>: Manual adjustment via a user interface (GUI) comprising selection means (keyboard, mouse, buttons) allowing a colorist to manually tune colors. <i>See</i> DOLBY-1001, 8:11-24; 13:58–63.
<i>means for mastering the source picture content</i> (Claims 20, 25)	Mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays	<u>Structure</u>: Color Correction Module (530, 630) coupled to a Picture Content Store (540, 640). <u>Algorithm</u>: Logic for storing the manually corrected content

		as a master file for the wide-gamut (non-reference) display. <i>See</i> DOLBY-1001, 9:1-7; Fig. 5, 6
<i>means for generating metadata</i>	Generating metadata for a color gamut mapping that color transforms the mastered color corrected picture content for display on reference type displays	<u>Structure</u>: Color Gamut Mapping (CGM) Module (586) coupled to a Metadata Store (517). (Fig. 5). <u>Algorithm</u>: Calculating a transformation (e.g., difference) between the non-reference and reference gamuts using a look up table (e.g., 3D-LUT or gain-offset-gamma (GOG) function. DOLBY-1001, 7:51-65, 9:8-

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means for performing color correction

183. As discussed for [1.1], Jones discloses a “Color Grading Channel 12” (DOLBY-1004, 4:34-38) where a colorist utilizes a “Look Processor 22” and “Display Device 30” (*id.*, 6:35-40). This combination of hardware and software allows a colorist to manually apply creative adjustments (“looks”) to the digital signals. Jones also describes the “subjective creative control of a colorist” using these tools. *Id.*, 2:58-63. Thus, Jones discloses the corresponding structure that performs the claimed function.

means for mastering the source picture content

184. As discussed in [1.1.1], Jones describes using a “digital projector 3” which provides a “wider gamut” (non-reference) than conventional CRT displays. DOLBY-1004, 6:35-56. The colorist grades content on this wide-gamut display. The resulting data is recorded as master 46 in the “Digital Rendering Channel 14.” *Id.*, 7:3-18. Master is a “digital cinema distribution master” for projection on the wide-gamut projector 54. *Id.*, 10:26-44. Thus, Jones discloses the structure (Rendering Channel/Master 46) performing the function of mastering for the non-reference display.

means for generating metadata

185. As detailed in [1.1.2], the Jones-Ollivier-Osaki would have leveraged Ollivier’s teachings to supply the structure for generating Jones’ master 46. In Ollivier, a translation module 22 (corresponding structure, CGM module) translates correction information 15 into a display-specific LUT 21 (corresponding structure, metadata). DOLBY-1005, 6:3-22. LUT 21 is stored separately (metadata store) and is specifically generated for different display types, including “CRT displays” (reference type display). *Id.*, 6:23-7:6. Osaki further describes that such LUTs serve as a gamut mapping (DOLBY-1006, [0091]-[0093]) generated by a LUT generator (*id.*, [0122]) to convert first gamut values (projector) to second gamut values (CRT).

[22] The system of claim 20, wherein said means for performing color correction further comprises means for performing the color gamut mapping using the metadata to verify a result of the color correction, when the display content is rendered on the reference type display.

186. Claim 22 is presumed to invoke 35 U.S.C. §112, ¶6 based on the recitation of the MPF term identified below.

Term	Function	Structure
<i>means for performing the color gamut mapping</i>	Performing the color gamut mapping using the metadata to verify a result of the color correction	<u>Structure</u> : CGM Module (596, 786) (Fig. 5, 7). <u>Algorithm</u> : Applying LUT or

		GOG parameters to the mastered content to simulate the reference display appearance. DOLBY-1001, 9:12-19
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187. In Jones, a color grading preview channel 12 designed to allow a colorist to “pre-visualize” the look (DOLBY-1004, 4:34-38). Look processor 22 applies “display specific transforms” (CGM) via LUT 110 to map the content to the display currently being used. *Id.*, 6:35-45. This structure allows the user to verify (pre-visualize) how the content appears on different target displays, matching the claimed function and structure.

XII. [GROUND 2] – Claims 4 and 23 Are Obvious Over Jones-Ollivier-Osaki- Morovič

A. Analysis

1. Claim 4

[4] The method of claim 1, wherein the color gamut mapping is applied during the color correction and a subsequent consumer consumption.

188. A POSITA would have implemented the Jones-Ollivier-Osaki-Morovič system so that a display-specific LUT is applied during Jones’s color grading channel 12 while the colorist is performing creation-side color correction,

and the same display-specific LUT is also applied later during rendering for display on a CRT display device at consumer consumption. Jones describes a color grading channel 12 in which a colorist pre-visualizes a desired “look” and establishes parameters used to render the look into mastered data. DOLBY-1004, 4:34-38, 6:17-35. Morovič describes soft proofing as using a display “to simulate or preview” output, which supports applying a target-display mapping during the creation-side pre-visualization workflow. DOLBY-1010, 186. Ollivier describes display-specific LUTs and a consumer-side playback/output path in which a selected display-specific LUT is applied to render output suitable for the selected display type, including CRT. DOLBY-1005, 6:23-7:6, 10:29-11:12. Based on these disclosures, a POSITA would have applied the display-specific LUT both during color correction for preview and during subsequent consumer-side rendering for CRT display.

189. A POSITA would have implemented the Jones-Ollivier-Osaki-Morovič system so that a display-specific LUT is applied during Jones’s color grading channel 12 while the colorist is performing creation-side color correction, and the same display-specific LUT is also applied later during rendering for display on a CRT display device at consumer consumption. Jones describes a color grading channel 12 in which a colorist pre-visualizes a desired “look” and establishes parameters used to render the look into mastered data. DOLBY-1004, 4:34-38, 6:17-35. Morovič describes soft proofing as using a display “to simulate or preview”

output, which supports applying a target-display mapping during the creation-side pre-visualization workflow. DOLBY-1010, 186. Ollivier describes display-specific LUTs and a consumer-side playback/output path in which a selected LUT is applied to render output suitable for the selected display type, including CRT. DOLBY-1005, 6:23-7:6, 10:29-11:12. Based on these disclosures, a POSITA would have applied the display-specific LUT both during color correction for preview and during subsequent consumer-side rendering for CRT display.

190. A POSITA would have implemented the Jones-Ollivier-Osaki-Morovič system in a soft-proofing configuration in which content corresponding to master 46 is rendered as a simulation of a CRT display while the colorist is performing manual color corrections in Jones's color grading channel 12, using a display-specific LUT as the color gamut mapping applied for that simulation. Morovič describes "soft proofing" as using a display "to simulate or preview" output, including output of "any kind." DOLBY-1010, 186. Jones describes the use of the color grading channel to "pre-visualize[] a certain 'look' that can be applied to the digital image signals...." DOLBY-1004, Abstract. Jones also describes a display specific transform of interest as "an algorithm for re-mapping any output values that are out of the gamut of the display device such that such values would be within the display device gamut." DOLBY-1004, 6:35-56. Based on these disclosures, applying a display-specific LUT during the pre-visualization workflow

to simulate a CRT output supports the colorist's ability to preview how the corrected content will appear on the CRT reference display while the creative corrections are being made. DOLBY-1010, 186; DOLBY-1004, 6:35-56.

191. In the Jones-Ollivier-Osaki-Morovič system, a POSITA would have provided a device-specific LUT 21 as metadata for a color gamut mapping that is generated on the content-creation side using Ollivier's LUT framework and is applied later during rendering for display on a CRT display device at consumer consumption. Ollivier describes that display-specific LUTs 21 (including a LUT for CRT displays) are created and stored for communication to consumer-side playback and output endpoints. DOLBY-1005, 6:23-7:6, 7:13-27. Ollivier also describes that a translation and output path applies the selected LUT 21 to produce output suitable for the selected display type, including CRT. DOLBY-1005, 10:29-11:12. Based on these disclosures, once master 46 is available as the mastered content, the display-specific LUT 21 is applied downstream in the consumer-side playback and output path to transform the color values of the mastered content for CRT display. DOLBY-1005, 6:23-7:6, 10:29-11:12.

2. Claim 23

[23] The system of claim 20, wherein the color gamut mapping is applied during the color correction and a subsequent consumer consumption.

192. See discussion above regarding claim 8.

XIII. [GROUND 3] – Claims 6, 7, 10, 11, 15, 16, 18, 19, 25, 26, 29, And 30 Are Obvious Over Jones-Yeung

A. Analysis

1. Claim 6

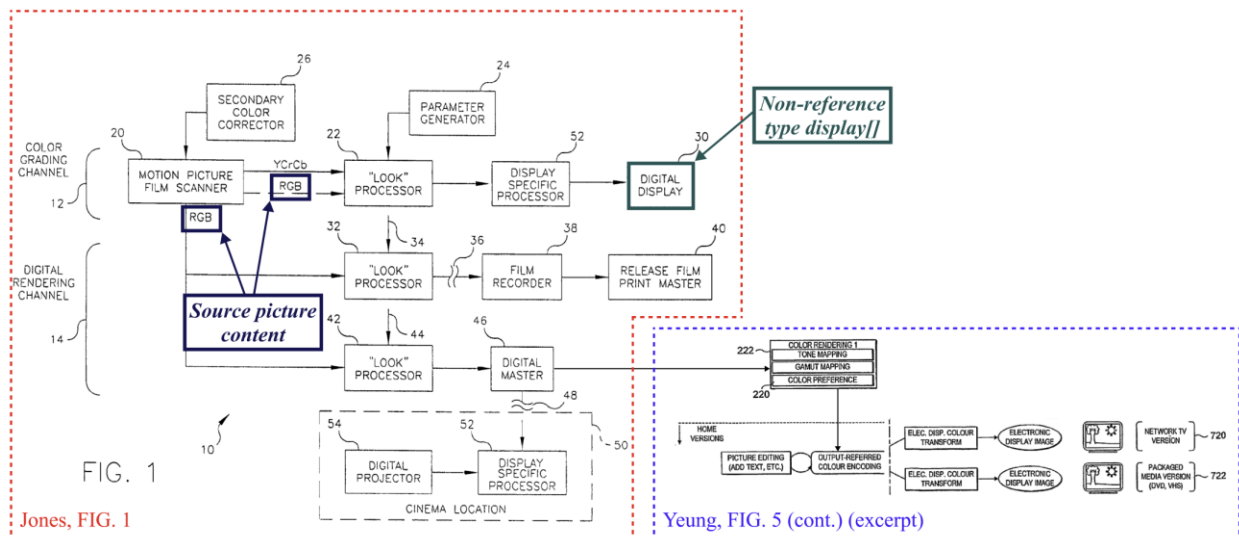
[6.pre] A method for color correcting, comprising:

193. If the preamble is interpreted to be limiting, the Jones-Yeung system would have been configured to perform a color correction process of the type described in the '268 patent. *See* DOLBY-1001, 8:10-14. Jones describes a process that includes “a digital color grading channel [12] which allows a colorist to pre-visualize a particular ‘look’ and a digital rendering channel [14] which allows the colorist to render that ‘look’ into the mastered data.” DOLBY-1004, 4:34-38.

[6.1] performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,

194. Jones describes a color grading process in which a colorist renders creative “looks” into the data and uses display device 30 to pre-visualize a “look” for digital image signals, producing “‘look’ parameters” used in the creation-side workflow. DOLBY-1004, 4:39-48, 6:17-56. Jones also describes creating a digital cinema distribution master for playback and projection using a digital projector. *Id.*, 10:27-44. The '268 patent explains that “color correction” is “a creative procedure to manually choose the right (preferred) colors on the content creation side.” DOLBY-1001, 8:10-14. The '268 patent also describes a reference color gamut

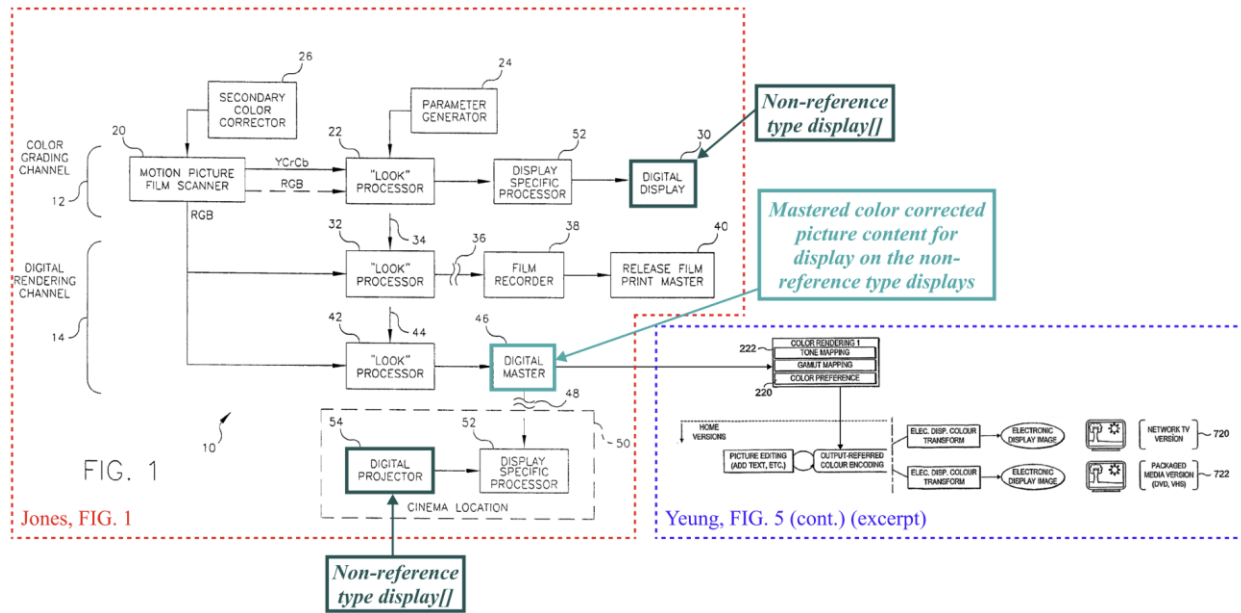
based on CRT phosphor colors and describes wide gamut displays as examples of non-reference displays. DOLBY-1001, 1:15-25, 2:29-49. Based on these disclosures, a POSITA would have implemented Jones's color grading process on source picture content using display device 30 as a non-reference type display having a non-reference color gamut. DOLBY-1004, 4:39-48, 6:17-56, 10:27-44; DOLBY-1001, 1:15-25, 2:29-49, 8:10-14. Jones also describes projector-class playback and projection using digital projector 54, and Jones describes digital projectors as wider-gamut relative to conventional CRT display devices. DOLBY-1004, 6:35-56, 10:27-44.



Jones-Yeung

[6.1.1] wherein said performing step comprises: mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

195. Jones describes that the digital rendering channel 14 records processed digital signals as a digital master 46 and that the mastered output may be a “digital cinema distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 7:3-18, 10:26-44. Jones also describes that the “look” established during color grading is rendered into the mastered data. *Id.*, 4:34-38, 6:17-57. The ’268 patent describes creation-side color correction as a manual process of selecting preferred colors. DOLBY-1001, 8:10-14. Based on these disclosures, a POSITA would have mastered the source picture content to provide master 46 as mastered color corrected picture content for playback and projection on projector 54. DOLBY-1004, 4:34-38, 6:17-57, 7:3-18, 10:26-44. Jones also describes digital projectors as wider-gamut relative to conventional CRT display devices. *Id.*, 6:35-57.



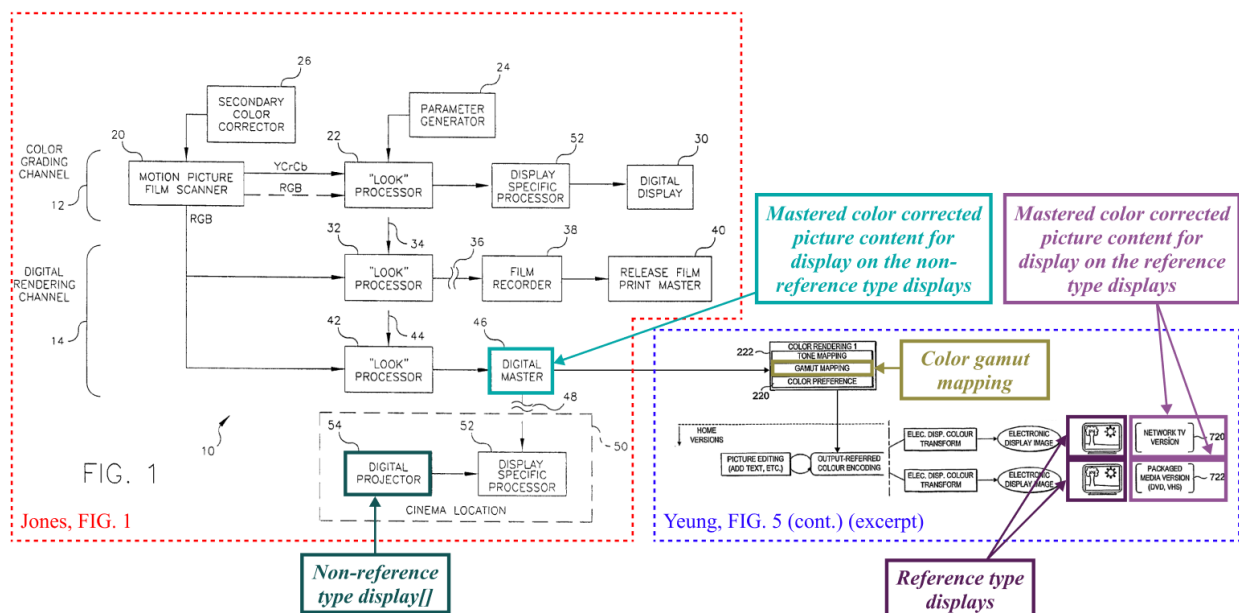
Jones-Yeung

[6.1.2] mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

196. Jones describes that the digital rendering channel 14 produces master 46 as a mastered output for playback and projection using projector 54. DOLBY-1004, 7:3-18, 10:26-44. The '268 patent describes creation-side color correction as a manual process of selecting preferred colors. DOLBY-1001, 8:10-14. Based on Jones's description of digital projectors as wider-gamut relative to conventional CRT display devices, a POSITA would have understood that projector 54 is a wide-gamut display in the Jones mastering and projection workflow. DOLBY-1004, 6:35-56, 7:3-18, 10:26-44. Yeung identifies multiple distribution environments, including

network TV and packaged media (DVD), and describes producing content for those environments. DOLBY-1007, [0027]. In a Jones-Yeung implementation, a POSITA would have further processed master 46 to generate an additional distribution master (e.g., for network TV or packaged media) for display on a display associated with the media environment, including a CRT device as a reference-type display. DOLBY-1007, [0027].

197. Yeung describes “creation of distribution masters from [a] supermaster for a plurality of types,” including “SD-HD movies, SD/DVD, HD/DVD and TV Broadcast.” DOLBY-1007, [0066]. Yeung’s Figure 5 depicts a workflow in which a digital super master is further processed to generate “distribution masters” for “various types of distribution paths 716, 718, 720 and 722....” *Id.*, [0066], FIG. 5. In a Jones-Yeung implementation, a POSITA would have used this supermaster-to-distribution-masters workflow to generate a distribution master 722 for packaged media, including DVD, by applying a gamut mapping operation using gamut mapper 222 to master 46. DOLBY-1007, [0066], FIG. 5.



Jones, FIG. 1

*Non-reference
type display[]*

Jones-Yeung

198. Yeung describes that distribution masters are created prior to distribution and display as part of a creation-side workflow. Yeung explains that processor 250 provides a “color processed image master 290 to support media distribution,” and that the “processed master image 290 is copied and the copy is distributed and displayed” DOLBY-1007, [0037]. This description indicates that mastered distribution content exists before it is received by a device used for playback and display of packaged media content. *Id.*, [0037]. Yeung also identifies target display environments for such mastered outputs, including “high definition CRT monitors.” *Id.*, [0033], [0039].

199. Yeung identifies packaged media distribution environments, including “SD/DVD” and “HD/DVD.” DOLBY-1007, [0066]. The ’268 patent describes that

content distributed for “digital video disks (DVD’s), television broadcasts, and/or via video over Internet Protocol (VoIP)” can be “encoded in a color space with a reference color gamut....” DOLBY-1001, 2:29-37. Based on these disclosures, a POSITA would have understood that a distribution master created for a DVD packaged media version is an example of mastered color corrected picture content for display on reference type displays having a reference color gamut.

200. In a Jones-Yeung implementation, Yeung’s distribution master (e.g., masters 720, 722) is generated by applying a color gamut mapping to Jones’s master 46 as part of the creation-side distribution-master workflow. Yeung defines “color gamut mapping” as “techniques that act on a color space to transform a color gamut of one color space to the color gamut of another color space.” DOLBY-1007, [0018]. Yeung also explains that a “gamut mapper” maps “the color gamut of an image input color space to the color gamut of a display image output color space,” reflecting that gamut mapping is used to adapt content to the gamut of a selected output display environment. *Id.*, [0031].

201. Yeung describes a “gamut mapping step” as part of producing output for a selected output device or environment, including “reduc[ing] colors according to output device (e.g. film to TV).” DOLBY-1007, [0041]. Yeung’s Figure 5 also depicts distribution paths that include a “GAMUT MAPPING.” DOLBY-1007, FIG. 5 (cont’d). In a Jones-Yeung implementation, a POSITA would have used Yeung’s

gamut mapping operation in generating a distribution master for a packaged media format using master 46. *See* DOLBY-1007, [0018], [0041], [0066]. The '268 patent describes that “DVD’s” and “television broadcasts” can be “encoded in a color space with a reference color gamut....” DOLBY-1001, 2:29-37. Jones also describes a projector-class output environment, including that display device 30 is a “wider-gamut device such as a digital projector.” DOLBY-1004, 6:35-56. Based on these disclosures, a POSITA would have understood that Yeung’s gamut mapping step is used to adapt the projector-oriented mastered content for distribution environments such as packaged media and network television that are associated with a reference color gamut.

2. *Claim 7*

[7] *The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is used directly by a consumer device.*

202. In a Jones-Yeung implementation, a POSITA would have processed master 46 using this distribution-master workflow to generate a distribution master (e.g., for network TV, for packaged media (DVD, VHS)). *Id.*, [0066], FIG. 5 (cont’d). Yeung describes generating the distribution master by processing a supermaster 756. DOLBY-1007, [0027], [0066], FIG. 5 (cont’d). Yeung also identifies network TV and packaged media as distribution environments and explains that its workflow reduces repeated colorist work “for each new version,”

which includes versions for packaged media distribution. *Id.*, [0027], [0057]. Based on these disclosures, a POSITA would have configured the packaged media distribution master to be used by consumer playback equipment in a home viewing environment, including a CRT display device as an example consumer device. DOLBY-1007, [0027], [0057].

203. Yeung identifies multiple display environments for its distribution masters, including “network television and packaged media in various formats,” and Yeung specifically identifies “DVD and VHS” as packaged media environments. DOLBY-1007, [0027]. Yeung’s Figure 5 depicts a “PACKAGED MEDIA VERSION (DVD, VHS),” reflecting that Yeung’s workflow produces a packaged media output intended for the packaged media distribution environment. *Id.*, FIG. 5. Jones describes recording processed digital signals as a digital master 46 and describes that the mastered output may be used to create a digital cinema distribution master 46 for playback and projection. DOLBY-1004, 7:3-18, 10:26-44. In a Jones-Yeung implementation, a POSITA would have used Yeung’s creation-side workflow to derive the packaged media version 722 from master 46. DOLBY-1007, [0066], FIG. 5. Based on Yeung’s identification of packaged media environments and the ’268 patent’s reference-gamut framework used elsewhere in this mapping, a POSITA would have understood that the packaged media output is configured for

display in a home environment, including on a CRT display as a reference-type display.

204. Yeung describes that a packaged media version, including a DVD version, is viewed in a home viewing environment. Yeung explains that “a customer may want to turn the lights down in the living room” when watching the DVD version. DOLBY-1007, [0057]. Based on this disclosure, a POSITA would have understood that Yeung’s packaged media distribution masters are consumer-facing deliverables intended for use with consumer playback equipment in a home viewing environment. *Id.*, [0057]. Yeung also describes a creation-side workflow in which processor 250 provides a “color processed image master 290 to support media distribution,” and the “processed master image 290 is copied and the copy is distributed and displayed.” DOLBY-1007, [0037]. This description reflects that the distribution master is prepared prior to distribution and then delivered for consumer viewing. *Id.*, [0037].

3. Claim 10

[10] The method of claim 6, wherein the reference type displays and the non-reference type displays are at least one of liquid crystal displays, plasma displays, cathode ray tube displays, digital light processing displays, organic light emitting diode displays, liquid crystal on silicon displays, and direct drive image light amplifier displays.

205. In the Jones-Yeung system, a POSITA would have used a CRT display device as an example of a reference type display, and a CRT display device is a

cathode ray tube display. DOLBY-1007, [0039]. Jones describes use of a projector-class display device in its workflow, including display device 30 used for pre-visualization and digital projector 54 used for playback and projection of mastered content. DOLBY-1004, 6:35-56, 10:26-44. Yeung describes an implementation in which “the digital cinema projector is a DLP projector...” DOLBY-1007, [0035]. Based on these disclosures, a POSITA would have understood that the projector-class display devices in the combined system, including digital projector 54, can be implemented as a digital light processing (DLP) display. DOLBY-1007, [0035]; DOLBY-1004, 6:35-56, 10:26-44.

206. Yeung describes that its processing produces output suitable for display by different display devices. Yeung explains: “The resulting video images are suitable for display by CRT, LCD, or other display devices...” DOLBY-1007, [0027]. Based on this disclosure, a POSITA would have understood that an output display device in the Jones-Yeung system includes a CRT display device, and a CRT display device is a cathode ray tube display. DOLBY-1007, [0027].

207. Jones describes display device 30 as “preferably a wider-gamut device such as a digital projector,” and Jones describes creation of a “digital cinema distribution master 46 for playback/projection using the digital projector 54.” DOLBY-1004, 6:35-56; *id.*, 10:26-44. Jones also states that “use of a digital projector provides a wider gamut than a conventional CRT display device.” *Id.*,

6:35-56. Yeung describes an implementation in which “the digital cinema projector is a DLP projector....” DOLBY-1007, [0035]. Based on these disclosures, a POSITA would have understood that the wide-gamut digital projector described in Jones, including projector 54, can be implemented as a DLP projector, which is a digital light processing display. DOLBY-1004, 6:35-56, 10:26-44; DOLBY-1007, [0035].

4. *Claim 11*

[11] The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is a derivative of the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

208. Jones describes that the digital rendering channel 14 records processed digital signals as master 46 and that the mastered output may be used for playback and projection using projector 54. DOLBY-1004, 7:3-18, 10:26-44. The '268 patent describes creation-side color correction as a manual process of selecting preferred colors. DOLBY-1001, 8:10-14. Based on Jones's description of digital projectors as wider-gamut relative to conventional CRT display devices, a POSITA would have understood that projector 54 is a wide-gamut, non-reference type display in the Jones mastering and projection workflow. DOLBY-1004, 6:35-56, 7:3-18, 10:26-44. Yeung describes a creation-side technique for generating distribution masters, including packaged media versions for DVD and VHS, from a supermaster.

DOLBY-1007, [0027], [0066], FIG. 5 (cont'd). Yeung describes “creation of distribution masters from [a] supermaster for a plurality of types,” and Yeung’s Figure 5 depicts distribution masters along paths 716, 718, 720, and 722 derived from the supermaster. DOLBY-1007, [0066], FIG. 5 (cont'd). In a Jones-Yeung implementation, a POSITA would have processed master 46 using Yeung’s distribution-master workflow to generate a packaged media distribution master derived from master 46 for display in a reference-gamut environment. DOLBY-1007, [0027], [0066], FIG. 5 (cont'd).

5. *Claims 15, 16, 18, 19, 25, 26, 29, 30*

209. Other than specific aspects addressed below, Jones-Yeung renders the limitations and claims listed below obvious in the same manner as explained above for corresponding claim limitations listed in the table below.

Limitation	Corresponding Limitation
[6.pre]	[15.pre], [25.pre]
[6.1]	[15.1], [25.1]
[6.1.1]	[15.2] , [25.1.1]
[6.1.2]	[15.2] , [25.1.2]
[7]	[16], [26]
[10]	[18], [29]
[11]	[19], [30]

[15.pre] A system for color correcting, comprising:

210. If the preamble is interpreted to be limiting, the Jones-Yeung combination would have provided a digital mastering system configured to perform Jones's color correction process in a system implementation, including a digital color grading channel 12 and a digital rendering channel 14. DOLBY-1004, 4:34-38; *see* DOLBY-1001, 8:10-14.

[15.1] a color correction module for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut, to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

211. Jones describes a color grading channel 12 and a digital rendering channel 14 that perform creation-side color correction using a projector-class display device. Jones describes a pre-visualization workflow that “allows the colorist to render creative ‘looks’ into the data,” and Jones describes that the colorist uses display device 30 to pre-visualize a “look” for digital image signals and generate “‘look’ parameters.” DOLBY-1004, 4:39-48, 6:17-35. Jones also describes display device 30 as “preferably a wider-gamut device such as a digital projector,” and Jones describes creating a digital cinema distribution master 46 for playback and projection using digital projector 54. DOLBY-1004, 6:35-56, 10:27-44. The '268 patent describes CRT phosphor colors defining a reference color gamut and

describes wide gamut displays as examples of non-reference displays, including “XYZ for Digital Cinema” as an extended color gamut. DOLBY-1001, 1:15-25, 2:29-37, 2:38-49. The ’268 patent also describes “color correction” as a creation-side procedure of manually selecting preferred colors. DOLBY-1001, 8:10-14. Based on these disclosures, a POSITA would have implemented Jones’s color grading channel 12 and digital rendering channel 14 as a color correction module that performs color correction on source picture content using display device 30 as a non-reference type display having a non-reference color gamut, and generates master 46 as mastered color corrected picture content for display on a projector-class non-reference display, including digital projector 54. DOLBY-1004, 4:39-48, 6:17-35, 6:35-56, 10:27-44; DOLBY-1001, 1:15-25, 2:29-37, 2:38-49, 8:10-14.

[15.2] a color gamut mapping module for performing a color gamut mapping with respect to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut.

212. Jones describes that the digital rendering channel 14 records processed digital signals as master 46 and that the mastered output may be used for playback and projection using projector 54. DOLBY-1004, 7:3-18, 10:26-44. The ’268 patent describes creation-side color correction as a manual process of selecting preferred colors. DOLBY-1001, 8:10-14. Based on Jones’s description of digital projectors as wider-gamut relative to conventional CRT display devices, a POSITA would have

understood that projector 54 is a wide-gamut display in the Jones mastering and projection workflow. DOLBY-1004, 6:35-56, 7:3-18, 10:26-44. In the Jones-Yeung system, a POSITA would have included a color gamut mapping module implemented using Yeung's gamut mapper 222 to perform a color gamut mapping with respect to master 46 and generate a distribution master for packaged media, including DVD, for display on a display associated with the packaged media environment, including a CRT device as a reference-type display.

[25.pre] A system for color correcting, comprising:

[25.1] means for performing color correction on source picture content, using at least one of a non-reference type display having a non-reference color gamut and a reference type display having a reference color gamut,

[25.1.1] wherein said means for performing color correction comprises: means for mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays having a non-reference color gamut; and

[25.1.2] means for mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays having a reference color gamut, using a color gamut mapping applied to the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

213. I have been informed that claim 25 is presumed to invoke 35 U.S.C. § 112, ¶6 based on the recitation of “means for” phrase in various limitations.

Term	Function	Structure
<i>means for</i>	Performing color correction	<u>Structure</u> : Color Correction

<i>performing color correction</i> (Claims 20, 25)	on source picture content, using at least one of a non-reference type display and a reference type display	Module (430, 530, 630). <u>Algorithm</u>: Manual adjustment via a user interface (GUI) comprising selection means (keyboard, mouse, buttons) allowing a colorist to manually tune colors. <i>See</i> DOLBY-1001, 8:11-24; 13:58–63.
<i>means for mastering the source picture content</i> (Claims 20, 25)	Mastering the source picture content to provide mastered color corrected picture content for display on the non-reference type displays	<u>Structure</u>: Color Correction Module (530, 630) coupled to a Picture Content Store (540, 640). <u>Algorithm</u>: Logic for storing the manually corrected content as a master file for the wide-gamut (non-reference) display.

		See DOLBY-1001, 9:1-7; Fig. 5, 6
<i>means for mastering the source picture content... [for the reference type display]</i>	Mastering the source picture content to provide mastered color corrected picture content for display on the reference type displays using a color gamut mapping applied to the mastered content	<u>Structure</u>: CGM Module (686) coupled to a Color Corrected Picture Content Store (645) <u>Algorithm</u>: Applying the gamut mapping (e.g., LUT, GOG) to the non-reference master to generate and store a distinct reference master file. DOLBY-1001, 9:60-65, FIG. 6.

means for performing color correction

214. See III.A(e) (addressing similar term in [20.1]).

means for mastering the source picture content

215. See III.A(e) (addressing similar term in [20.1.1]).

means for mastering the source picture content... [for the reference type display]

216. As detailed for [6.1.2], Yeung describes a mastering system where a color processor 250 (corresponding structure, CGM module/processor) performs gamut mapping 222 (DOLBY-1007, [0031]) to create distinct digital masters for various target distribution paths (*id.*, [0066], FIG. 5).

XIV. [GROUND 4] – Claims 9 and 28 Are Obvious Over Jones-Yeung-Morovič

A. Analysis

1. Claim 9

[9] The method of claim 6, wherein said step of mastering the source picture content comprises rendering the mastered color corrected picture content on the reference type display using a color gamut mapping that simulates the non-reference type display on the reference type display.

217. As previously discussed, a POSITA would have incorporated proofing techniques into Jones’s color grading channel 12 so the colorist can preview how the color-corrected content would appear on a reference-type display, including a CRT display, while the manual color corrections are being performed. DOLBY-1004, 4:34-38, 6:17-56, 7:3-18, 10:26-44. Morovič describes proofing, including soft proofing, as using a display “to simulate or preview” output of another kind. DOLBY-1010, 186. In a Jones-Yeung-Morovič combination, a POSITA would have used a display-to-CRT LUT as the color gamut mapping applied during the color grading channel to render a proofed preview on a reference display that simulates

the non-reference projector-class appearance, allowing the colorist to assess how the mastered content will appear when displayed on the CRT reference display. DOLBY-1004, 4:34-38, 6:17-56; DOLBY-1010, 186.

218. Morovič describes “proofing” as “the production of a sample of output of any kind to simulate a sample of output of any other kind.” DOLBY-1010, 183, 186. Morovič also explains that when a destination gamut, such as a television display gamut, is smaller than a source gamut, such as a projector or film gamut, “gamut-mapping needs to be applied” to maintain the intended appearance. *Id.* Based on these disclosures and Yeung’s gamut mapping framework, a POSITA would have implemented a Jones-Yeung-Morovič workflow in which the color grading channel 12 renders a proof that visualizes how the content will appear on a CRT display by applying a gamut mapping that simulates the wide-gamut device appearance on the CRT reference display. DOLBY-1010, 183, 186; DOLBY-1007, [0041]. This implementation is consistent with the ’268 patent’s disclosure that “[a] RCG display 782, using CG2 simulation via a CGM module 786, is used on the content creation side 780.” DOLBY-1001, 10:17-23.

2. Claim 28

[28] The system of claim 25, wherein said means for mastering the source picture content to provide the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut comprises means for rendering, the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut, on the reference type display using a color

gamut mapping that simulates the non-reference type display on the reference type display.

219. See discussion above regarding claim 9. I am informed that claim 28 is presumed to invoke 35 U.S.C. § 112, ¶6 based on the recitation of ***means for rendering, the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.***

Term	Function	Structure
<i>means for rendering</i>	Rendering, the mastered color corrected picture content on the reference type display using a color gamut mapping that simulates the non-reference type display	<u>Structure</u> : CGM Module (786) or internal display circuitry. <u>Algorithm</u> : Using a LUT or GOG to map/simulate the wide gamut content into the reference gamut for proofing. DOLBY-1001, 10:15–22; Fig. 7.

220. Jones describes using “display specific transforms” to “emulate” the look of a specific release print (non-reference) on a digital projector or other display (DOLBY-1004, 3:31-44). Yeung further describes allowing “viewing on a first device, a representation of colors that are not available on the first device,” which

allows a first device to simulate the look of a second device. DOLBY-1007, [0007].

This is done using the color Processor 250 and gamut mapper 222.

XV. [GROUND 5] – Claims 8, 17, And 27 Are Obvious Over Jones-Yeung-Vetro

A. Analysis

1. Claim 8

[8] The method of claim 6, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before display by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

221. As previously discussed, a POSITA would have understood that a Jones-Yeung system can generate an intermediate master representation, including master 46 or a Yeung-like supermaster 756, and can also generate environment-specific distribution masters, including a network television distribution master 720 and a packaged media distribution master 722, for delivery to an output device. DOLBY-1004, 7:3-18, 10:26-44; DOLBY-1007, [0066], FIG. 5 (cont'd). Vetro describes standardized usage environment description tools, including descriptions of the natural environment such as lighting condition and illumination characteristics. DOLBY-1011, 4. In a Jones-Yeung-Vetro implementation, a POSITA would have configured certain delivery scenarios to provide the intermediate master together with usage environment descriptors, including illumination characteristics, as metadata for downstream adaptation at the output

device, rather than providing only a pre-rendered distribution master. DOLBY-1011, 4. Vetro describes an adaptation framework in which a Digital Item is processed by an adaptation engine using description tools to produce an adapted Digital Item. DOLBY-1011, 3-4. Based on this framework, the output device would use the intermediate master and the usage environment descriptors to reconstruct an adapted distribution-master presentation before display on the output device. DOLBY-1011, 3-4.

222. Vetro describes addressing heterogeneity across terminals, networks, and users to enable “Universal Multimedia Access (UMA).” DOLBY-1011, 1. Vetro also describes standardized description tools, including usage environment description tools, as part of supporting adaptation of content for different consumption environments. DOLBY-1011, 1, 4. Based on these disclosures, a POSITA would have understood that, in some delivery scenarios, it is advantageous to avoid relying only on pre-rendered, static distribution masters, and instead provide a representation that remains amenable to adaptation together with standardized description inputs so the consumption-side system can adapt the presentation for the particular terminal and viewing environment. DOLBY-1011, 1, 4.

223. Vetro describes a terminal in the context of an adaptation framework in which a “Digital Item” is processed by an adaptation engine, using “usage environment description tools,” to produce an “Adapted Digital Item.” DOLBY-

1011, 3, FIG. 1, 4. Vetro describes that the usage environment description tools include characteristics of the “natural environment,” including lighting condition, and describes “illumination characteristics that may affect the perceived display of visual information.” DOLBY-1011, 4. Based on this framework, a POSITA would have understood that a consumer device can use an intermediate master representation together with usage environment metadata to produce an adapted presentation for display. DOLBY-1011, 3-4, FIG. 1.

224. Yeung also describes a viewing scenario in which illumination conditions can change at the time of consumption, including that a “customer may want to turn the lights down in the living room.” DOLBY-1007, [0057]. Vetro describes usage environment description tools that include natural environment characteristics such as lighting condition and “illumination characteristics that may affect the perceived display of visual information.” DOLBY-1011, 4. Based on these disclosures, a POSITA would have understood that configuring the Jones-Yeung architecture to use standardized illumination-related usage environment descriptors as inputs to consumer-side adaptation provides a predictable way to render a presentation that reflects the user’s current illumination conditions, including the changed illumination scenario identified by Yeung. DOLBY-1007, [0057]; DOLBY-1011, 4. This approach is also consistent with the ’268 patent’s discussion

of “reconstructing” content using a received master representation and associated information before display. DOLBY-1001, 7:19-25.

225. A POSITA incorporating Vetro’s usage environment adaptation tools into the Jones-Yeung system would have configured the system to perform consumption-side adaptation using an intermediate master representation, such as Yeung’s supermaster 756 or Jones’s master 46, rather than attempting to further modify a pre-rendered distribution master such as a Network TV distribution master 720. DOLBY-1004, 7:3-18, 10:26-44; DOLBY-1007, [0066], FIG. 5 (cont’d); DOLBY-1011, 3-4, FIG. 1. Yeung describes that creation-side generation of distribution masters involves environment-specific processing, including a “gamut mapping step” that “reduc[es] colors according to output device (e.g. film to TV).” DOLBY-1007, [0041]; *see also id.*, [0066], FIG. 5 (cont’d). Vetro describes an adaptation framework in which a Digital Item is processed by an adaptation engine using usage environment description tools to produce an adapted Digital Item. DOLBY-1011, 3-4, FIG. 1. Based on these disclosures, a POSITA would have understood that applying illumination-driven adaptation logic to a pre-rendered distribution master can be constrained by the earlier environment-specific processing applied when that version was prepared on the creation side. DOLBY-1007, [0041]; DOLBY-1011, 4.

226. Yeung identifies dynamic viewing environments at the time of consumption, including a scenario where a “customer may want to turn the lights down in the living room,” and describes real-time tuning with adjustments based on viewing environment conditions. DOLBY-1007, [0036], [0057]. Vetro’s usage environment description tools include natural environment characteristics such as lighting condition and “illumination characteristics that may affect the perceived display of visual information.” DOLBY-1011, 4. Jones describes a mastered output recorded as master 46 for downstream playback and projection, and describes a projection path in which display-specific processing is applied as part of output processing. DOLBY-1004, 7:3-18, 7:19-30, 10:26-44. Vetro explains that MPEG-21 DIA supports “Universal Multimedia Access (UMA)” across heterogeneous terminals using standardized description tools together with “scalable content representation formats.” DOLBY-1011, 1, 3. In this Jones-Yeung-Vetro configuration, the consumer device uses the intermediate master representation together with usage environment metadata to reconstruct an adapted presentation suitable for display before outputting the presentation for viewing, consistent with the ’268 patent’s discussion of “reconstructing” content using a received representation and associated information before display. DOLBY-1011, 3-4, FIG. 1, 4; DOLBY-1001, 7:19-25.

2. Claims 17

[17] The system of claim 17, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before display by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

227. See discussion above regarding claim 8.

3. Claim 27

[27] The system of claim 25, wherein the mastered color corrected picture content for display on the reference type displays having the reference color gamut is reconstructed by a consumer device before display by the consumer device, using metadata and the mastered color corrected picture content for display on the non-reference type displays having the non-reference color gamut.

228. See discussion above regarding claim 8.

XVI. CONCLUSION

229. The findings and opinions set forth in this declaration are based on my work and examinations to date.

230. I may continue my examinations. I may also receive additional documentation and other factual evidence over the course of this IPR that will allow me to supplement and/or refine my opinions. I reserve the right to add to, alter, or delete my opinions and my declaration upon discovery of any additional information. I reserve the right to make such changes as may be deemed necessary.

231. In signing this declaration, I recognize that the declaration will be filed as evidence in an IPR before the PTAB. I also recognize that I may be subject to

cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

APPENDIX A

Prof. Eli Saber

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EXPERIENCE

Computer Vision, Machine Learning, Digital Signal/Image/Video Processing, Video Compression and Coding

EDUCATION

Ph.D., Electrical Engineering, University of Rochester, Rochester, New York (March 1996)

Concentration: Signal/Image/Video Processing, Pattern Recognition, and Computer Vision.

Dissertation: Automatic image annotation and query-by-example using color, shape and texture information.

M.S., Electrical Engineering, University of Rochester, Rochester, New York (May 1992)

Concentration: Signal/Image/Video Processing, Pattern Recognition, Computer Vision, Communications.

B.S., Electrical and Computer Engineering, Summa Cum Laude, State University of New York at Buffalo, Buffalo, New York (May 1988).

Concentration: Computers, Microprocessors, Communications, Instrumentation.

A.S., Engineering Science, Mohawk Valley Community College, Utica, New York (May 1986)

CAREER MAJOR HIGHLIGHTS

❖ Academic Experience:

- **Teaching**: Taught/continue to teach undergraduate and graduate courses in the signal/image/video processing, computer vision, controls and communications focus areas with excellent feedback from students from 1996 to Present. Founded new coursework in Digital Video Processing and Pattern Recognition.
- **Research**: Conducted research on multiple acquired government and industry grants in the areas of: 1) image/video processing for multimedia, military and biomedical applications, 2) deep learning/artificial intelligence for object detection and tracking purposes, 3) three-dimensional scene reconstruction for remote sensing, and 4) color image processing for printing and multimedia applications. Graduated several PhD and MS students. Currently co-advising 2 PhD students.
- **External Funding**: Acquired external funding as PI in excess of \$3.5 Million and as PI/Co-PI in excess of \$5 Million over the period of September 2004 to present from government agencies and industry partners.
- **Publications**: 1 Book, 2 Special Issues, 38 Journal, 100 Conference and 11 Patents/Patent Publications.
- **Service**: Served/chaired several department, college and university level committees. Chaired the Graduate Program at the EE department for a period of five years. Served on the academic senate for a period of 9 years and on the Academic Senate Executive Committee for a period of 3 years.

❖ Industrial Experience: Worked for Xerox Corporation from 1988 until 2004 in a variety of engineering, managerial and scientific positions ending as Product Development Scientist and Manager.

❖ Consulting/Litigation Experience: Served as an expert in several patent and non-patent cases representing numerous companies. Provided declarations in support of multiple Inter Partes Reviews (IPR), expert opinions and reports with regards to validity/invalidity, infringement/non-infringement and domestic industry, tutorial at Markman hearing, multiple depositions, and multiple testimonies in court proceedings.

- ❖ **Professional Activities:** Served on several IEEE and SPIE conferences in various chair positions including Finance, Tutorials, Plenaries and Technical Program. Served as general chair for two conferences.
- ❖ **Honors & Awards:** RIT Trustees Award (2012), KGCOE Scholarship Award (2012), EME Gleason Professor (2011-2013), and PI Millionaire (2011).

RESEARCH INTERESTS

- Machine Learning for Imaging, Video and Remote Sensing Applications
- Image and Video Processing for Multimedia, Military & Biomedical Applications.
- Computer Vision and Three-Dimensional Scene Reconstruction.
- Color Image Processing for Printing and Multimedia Applications.

ACADEMIC EXPERIENCE

Professor (Associate 2004 – 2010, Full 2010 – Present), Department of Electrical and Microelectronic Engineering (EME), Kate Gleason College of Engineering (KGCOE), Rochester Institute of Technology.

Extended Faculty (2004 – Present), Center for Imaging Science (CIS), Rochester Institute of Technology.

Director of the Image, Video and Computer Vision Laboratory (2004 – Present)

Graduate Program Director (2010 – 2014)

- ❖ **Teaching:** Responsible for teaching undergraduate & graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Advanced Neural Network and Deep Learning, Engineering Analysis, Advanced Engineering Mathematics, Random Signal & Noise, Pattern Recognition, Communication Systems, Digital Data Communications, Computer Vision, Modern Control Theory, Linear Systems, and Matrix Methods. Typically teaching two courses per semester. Have taught three per semester on occasion to fulfill department needs.
- ❖ **Research:** Director of the Image, Video and Computer Vision Laboratory. Currently co-advising 2 PhD and 2 MS students on deep learning/machine learning/artificial intelligence applications for object detection and tracking. Advised several PhD and MS students in image/video segmentation, hierarchical image decomposition, video mosaicking/3-dimensional scene reconstruction, image/video understanding, object tracking/recognition. All students are/were funded under various government or corporate grants.
- ❖ **Funding:** Acquired funding as PI in excess of \$3.5 Million and as PI/Co-PI in excess of \$5 Million over the period of September 2004 – Present from various government agencies and industrial partners.
- ❖ **Service (Department, College and University):**
 - ❖ Advised/currently advising several undergraduate and graduate students on curriculum issues.
 - ❖ Member of the Academic Senate Resource Allocation and Budget Committee, the University Compensation Committee and of the Kate Gleason College of Engineering Promotion Committee.
 - ❖ Former Member (KGCOE representative) of the Academic Senate (2007 – 2013 and 2014-2017) and of the Academic Senate Executive Committee (2009-2010, 2016-2017).
 - ❖ Served as Chair of the RIT Vision 2025 committee per request from RIT President Dr William Destler. Committee was commissioned, over the summer of 2009, to review 80+ ideas submitted from all colleges and provide a recommendation to upper administration.
 - ❖ Former Member and Chair of KGCOE graduate committee.
 - ❖ Former Member of Graduate Council.
 - ❖ Served on several committees for curriculum development, recognition, and faculty search.

❖ **Professional Activities:**

- ❖ Senior member of the Institute of Electrical and Electronic Engineers (IEEE) society.
- ❖ Former Member of the IEEE Industry Technical Committee on DSP.
- ❖ Former Member of the IEEE Image and Multidimensional Digital Signal Processing (IMDSP) technical Committee.
- ❖ Former Area Editor for the Journal of Electronic Imaging.
- ❖ Former member of the Imaging Science and technology (IS&T) society.
- ❖ International Conference on Image Processing (ICIP) 2002 Finance Chair, ICIP 2007 and ICIP 2009 Tutorial Chair, ICIP 2012 General Chair, ICASSP 2017 Technical Program Chair, ICIP 2021 Plenary Chair.
- ❖ Co-founder and General Chair of the Video Surveillance and Transportation Imaging Conference within the Electronic Imaging Symposium.

❖ **Honors and Awards:**

- ❖ Awarded the Prestigious Trustees Scholarship award – the highest award at RIT with regards to research recognition
- ❖ Elected in 2011 as PI Millionaire.
- ❖ Awarded the EME Gleason Professor for 3 years (2011-2013).
- ❖ Elected as the Kate Gleason College of Engineering Scholarship award winner.

Adjunct Faculty Member, Dept. of Electrical & Computer Engineering, University of Rochester. (09/96-07/04)

- ❖ Taught undergraduate & graduate courses in Digital Signal Processing, Digital Image Processing, Pattern Recognition/Advanced Image Processing, Detection/Estimation Theory, and Analog & Digital Communications.
- ❖ Advised and graduated 1 Ph.D. student in the areas of “Image Understanding” and “Database Content Indexing”.
- ❖ Co-advised 1 Ph.D. student in the areas of “Watermarking”.
- ❖ Advised and graduated 1 MS student in the area of “Color Rendering” and “Printer Characterization”.
- ❖ Served as a committee member on several doctoral dissertations.
- ❖ Served on PhD qualifying examinations for the Signal Processing and Communications Concentration.
- ❖ Sought and captured funding from the National Science Foundation for the development of an intelligent image database system. Proposal funded for 4 years under NSF Grant IIS – 9820721
- ❖ Sought and captured industrial funding from Xerox Corporation for Printer Color Characterization & Digital Front End Object Oriented Rendering.

Adjunct Faculty Member, Dept. of Electrical Engineering, Rochester Institute of Technology. (03/98-07/04)

- ❖ Taught undergraduate and graduate courses in Pattern Recognition, Digital Video Processing, Random Signal & Noise, Image and Video Compression, and Communications.
- ❖ Advised and graduated a master student in the area of “Texture Classification”.

INDUSTRIAL EXPERIENCE

Product Development Scientist & Manager, Print Engine Development Unit, Xerox Corporation. (10/98-08/04)

Major responsibilities included:

- ❖ Lead the Image Science, Analysis and Evaluation area (12-15 direct reports and ~\$2 Million budget).
- ❖ Lead the development of highlight color specifications for the Sorrento print engine.
- ❖ Lead the development of color characterization algorithms for the iGen3 print engine.
- ❖ Lead the image quality integration of two color front end for the iGen3 Product.
- ❖ Lead the development of ROS and LED based imaging systems and image path architectures for upcoming highlight & full color products.
- ❖ Lead the development of xerographic hardware/algorithms & imaging systems for the DP92C highlight color product. (Product launched 9/30/99 and follow-on launched 4/20/00)
- ❖ Lead the research and development of image quality metrics for various product platforms and their dissemination throughout the Print Engine Development Unit and Xerox Corporation.

- ❖ Collaborate with the Department of Electrical & Computer Engineering (Univ. of Rochester) & the Center for Electronic Imaging Systems.

Advanced Development Scientist and Manager, Print Cartridge Delivery Unit, Xerox Corporation. (2/97 – 9/98)

Major responsibilities included:

- ❖ Establish the Advanced Design Laboratory (an imaging/xerographics lab) and provide technical and managerial leadership for the Electrical, Imaging and Xerographics Dept.
- ❖ Perform image processing and xerographic hardware/software design and development for low/mid volume color copiers and printers for current and future programs.
- ❖ Perform technology development, modeling, and product design for upcoming Xerox color products, specifically image on paper and image on belt products..
- ❖ Lead the development of the xerographic module for a color intermediate belt transfer product with direct technical and management responsibilities.
- ❖ Collaborate with the Department of Electrical & Computer Engineering (Univ. of Rochester) & the Center for Electronic Imaging Systems.

Research and Development Scientist, Production Systems Group, Xerox Corporation. (1/96-1/97)

Major responsibilities included:

- ❖ Lead the design and development of color characterization/management and image quality algorithms and specifications for digital front ends destined to drive high quality, high speed color print engines.
- ❖ Integrate color management & image processing algorithms into the Raster Image Processing module.
- ❖ Participate in the design and development of a high speed raster image processing architecture.
- ❖ Benchmark developed algorithms against existing products & systems both internally and externally.
- ❖ Collaborate with the Department of Electrical & Computer Engineering of the University of Rochester and the Center for Electronic Imaging Systems.

Research and Development Engineer, Corporate Research, Xerox Corporation (8/93-12/95) & Department of Electrical & Computer Engineering, University of Rochester. (1/95-12/95). Major responsibilities included:

- ❖ Design and develop query by image content and query by example image annotation algorithms utilizing color, shape, texture and motion cues. System is able to perform query by keywords, color, shape, texture, and/or a combination of the above cues.
- ❖ Design and develop intelligent image segmentation algorithms. These algorithms are currently utilized in the query by image content and query by example systems described above.
- ❖ Design and develop face detection and facial feature extraction approaches.
- ❖ Design and develop color characterization/calibration and image quality algorithms for Digital Front Ends aimed at driving high speed / high quality print engines.

(Note: Image annotation/content analysis research was done in conjunction with the Department of Electrical & Computer Engineering and Center for Electronic Imaging Systems leading to the Ph.D.)

Electronic, Computer and Instrumentation Engineer, New Toner/Developer Facility Engineering, Xerox Corporation. (6/88-7/93). Major responsibilities included:

- ❖ Provide design, development, installation, startup, and training for multiple toner production facilities.
- ❖ Provide development and implementation of control system database, software and displays for several systems.
- ❖ Evaluate vendor supplied electrical specifications and drawings.
- ❖ Manage and coordinate the efforts of technicians, electrical support, construction crew, and industrial workforce during the design, construction, startup, and implementation phases.
- ❖ Supervise and complete a number of upgrade projects for toner & photoreceptor production including software development, preparation of electrical design, procurement of necessary equipment and parts, supervision of technicians, contractors and industrial workforce, and scheduling of construction.

During this time, I gained extensive experience in the following systems: Fisher distributive control, unit operation controller, Provue console, Acrison material handling, Werner and Pfleiderer extrusion, Alpine air grinding, Majac/Micropul centrifugal classifiers, dry/wet material screening, Waeschle and others bulk powder storage and pneumatic convey, Ingersoll Rand and Joy compressed air equipment, Statistical process control.

CONSULTING EXPERIENCE

Expert on Legal Cases: Served as an expert in several patent and non-patent cases representing numerous companies. Provided declarations in support of multiple Inter Partes Reviews (IPR), expert opinions and reports with regards to validity/invalidity, infringement/non-infringement and domestic industry, tutorial at Markman hearing, multiple depositions, and multiple testimonies in court proceedings.

Summary of Experience:

- IPR/Declarations: Provided declarations in support of multiple IPR proceedings.
- Depositions: Provided multiple depositions.
- Court Testimony: Testified in International Trade Commission Court in Sept. 2018, Oct. 2019 and Sept. 2024
- Expert Opinions: Provided multiple expert opinions and reports in support of validity/invalidity, infringement/non-infringement, domestic industry and rebuttals.
- Claim Construction: Provided reports in support of claim construction.
- Hearings: Attended one Markman hearing and provided a brief technology tutorial.

Industrial Training: Developed and conducted industrial training at Xerox Corporation for engineering personnel over three separate summer periods in the areas of signal and image processing, color engineering, and control systems with a distinct focus on digital front ends and print engines. I have also provided pattern recognition/shape matching expertise for Leica corporation.

BOOKS

1. S. Dianat and E. Saber, “Advanced Linear Algebra for Engineers with MATLAB”, CRC press, February 2009.

SPECIAL ISSUES

1. H. J. Trussell, E. Saber and M. Vrhel, “Color Image Processing”, IEEE SP magazine, January 2005.
2. R. Loce and E. Saber, “Video Surveillance and Transportation Imaging”, Journal of Electronic Imaging, 22(4), Dec. 2013

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2. S. Singh, E. Saber, P. Markopoulos and J. Heard, “Regulating Modality Utilization within Multimodal Fusion Networks”, Multidisciplinary Digital Publishing Institute (MDPI) Sensors – Special Issue: Deep Learning Methods for Aerial Imagery, Sept. 2024
3. M. Sharma, M. Dhararaj, S. Karnam, D. Chachlakis, R. Ptucha, P. Markopoulos and E. Saber, “YOLOrs: Object Detection in Multimodal Remote Sensing Imagery”, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Vol. 14, 2020.
4. S. Piramanayagam, E. Saber, and N. Cahill, “Gradient Driven Unsupervised Video Segmentation using Deep Learning Techniques”, Journal of Electronic Imaging, 29 (1), 013019, 2020
5. U. Gewali, S. Monteiro and E. Saber, “Spectral Super-Resolution with Optimized Bands”, Remote Sensing, 11(14), 2019

6. U. Gewali, S. Monteiro and E. Saber, "Gaussian Processes for Vegetation Parameter Estimation from Hyperspectral Data with Limited Ground Truth", *Journal of Remote Sensing*, 11(13), 2019.
7. Y. Liang, P. Markopoulos and E. Saber, "Spatial-Spectral Segmentation of Hyperspectral Images for Subpixel Target Detection", *Journal of Applied Remote Sensing*, 13(3), 2019.
8. Y. Liu, S. Piramanayagam, S. Monteiro, and E. Saber. "Semantic segmentation of multisensor remote sensing imagery with deep ConvNets and higher-order conditional random fields." *Journal of Applied Remote Sensing* 13, no. 1 (2019): 016501
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1. D. Cherry, R. Jessome, R. Maggard, D. Siddall, Y. Raja and E. Saber, "Part Replacement Predictions using Convolutional Neural Networks", under review.
2. A. Rangnekar, E. Saber, S. Moudgalya, "Interpolating Pixel Values", Filed February 2016, Patent Pending.
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4. S. Vantaram, E. Saber, S. Dianat, M. Shaw and R. Bhaskar, "Methods for Adaptive and Progressive Gradient-Based Multi-resolution Color Image Segmentation and Systems Thereof", US 8515171B2.
5. M. Shaw, R. Bhaskar, L. Garcia, E. Saber, V. Amuso, "Image Segmentation using Dynamic Color Gradient Threshold, Texture and Multimodal Merging", US Patent Application Publication US2009/0080773A1.
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7. M. Shaw, R. Bhaskar, G. Balasubramanian, E. Saber, V. Misic, and E. Peskin "Unsupervised Color Image Segmentation by Dynamic Color Gradient Thresholding", US Patent 7,873,214.
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10. L. K. Mestha, E. Saber, "Systems and methods for sensing marking substrate area coverage using a spectrophotometer", US Patent 7,110,142 and European EP1309176A2.
11. D. Damji, A. Leon, P. Perez and E. Saber, "Processing system for replaceable modules in a digital printing apparatus", European Patent EP1079278B.
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EXTERNAL FUNDING/FUNDED PROPOSALS

Proposals Funded while at RIT

- Acquired/continue to acquire funding with multiple grants from government agencies and corporate partners (Hewlett-Packard, Dataphysics, Lenel, Xerox) in excess of \$3.5 Million as PI and in excess of \$5 Million as PI/Co-PI (total Portfolio) since joining RIT. A complete statement listing the details of each grant can be provided upon request.

Proposals Funded prior to Joining RIT as an employee of Xerox Corporation and University of Rochester:

- A. M. Tekalp and E. Saber (co-PI), "An intelligent visual database system: Hierarchical content description and matching using integrated similarity metrics", funded for \$243K for four years at the University of Rochester by the National Science Foundation under NSF Grant IIS – 9820721.

HONORS AND AWARDS

- Awarded the Prestigious Trustees Scholarship award – the highest award at RIT with regards to research recognition (2012)

- Elected as the Kate Gleason College of Engineering Scholarship award winner (2012).
- Elected as Electrical and Microelectronic Engineering Gleason Professor for 3 years Fall 2011 – Summer 2014.
- Elected as PI Millionaire by RIT Sponsored research organization.
- Winner of an M.S./Ph.D. scholarship for graduate study from Xerox Corporation.
- Winner of the quality recognition award from Xerox Corporation for outstanding performance.
- Core member of a toner/developer facility engineering project team recognized as "The 1991 and 1993 team of the year" by the Delaware Valley Chapter of the Project Management Institute.
- Elected to the Electrical Engineering Honor Society, Eta Kappa Nu.
- Winner of Gibran Khalil Gibran Scholarship for outstanding academic achievements.
- Valedictorian of the Electrical and Computer Engineering Department at the University of Buffalo.
- Recipient of several prizes and awards from the University of Buffalo and the Mohawk Valley Comm. College for excellent academic achievements; and from Xerox Corporation for outstanding performance.

PROFESSIONAL ACTIVITIES

- Senior Member of the Institute of Electrical & Electronic Engineers.
- Member of the IEEE Signal Processing Society.
- Plenary Chair for ICIP 2021.
- Technical Program Chair for ICASSP 2017 in New Orleans.
- General Chair for ICIP 2012.
- Member of the IEEE Signal Processing society conference board for 3 year team starting January 2013.
- Tutorial chair for the International Conferences on Image Processing, ICIP 2007 and ICIP 2009.
- Special session chair on Color Image Processing for the European Signal Processing Conference, Sept. 2006.
- Finance Chair for the International Conference on Image Processing 2002 held in Rochester, NY.
- Former Area Editor for the Journal of Electronic Imaging.
- Guest Editor for the "Color Image Processing" issue of the Signal Processing Magazine.
- Associate Editor for the IEEE Transactions on Image Processing for five years. Term ended: April 2009.
- Former Associate Editor for the IEEE Signal Processing Magazine for DSP Applications Forum.
- Former Member of the IEEE Image & Multidimensional Digital Signal Processing Technical Committee.
- Former Member of IEEE Tech. Comm. on Industry DSP Technology in 2003 & 2004 & Chair for 2005, 2006.
- Technical program committee member for ICIP 2009 and prior ICIPs.
- Technical program committee member for ICASSP 2010 and prior ICASSPs.
- Session chair for several ICIP & ICASSP Conferences and Workshops.
- Chairman, vice-chairman, treasurer, and secretary of the IEEE Rochester Chapter of the signal processing society in 1998, 1997, 1996 and 1995 respectively.
- Reviewer for the IEEE Trans. on Image Processing, IEEE Trans. on Pattern Analysis and Machine Intelligence, Graphical Models and Image Processing, IEEE Trans. on Signal Processing, IEEE Signal Processing Letters, Color Research and Applications, Graphical Modeling and Image Understanding, Image and Vision Computing, Optical Engineering, Journal of Imaging Science and Technology, and the Journal of Electronic Imaging.
- Technical committee for Western New York Imaging Workshop in 1997 and 1999 and general chair in 1998.
- Co-Chair of the Xerox Electronic Image and Video Processing Technology Council.

References Available Upon Request