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(54) **MONITOR APPARATUS**

MEDIZINISCHE ANZEIGEVORRICHTUNG

DISPOSITIF D'AFFICHAGE MÉDICAL

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Description

Technical Field

[0001] The present disclosure relates to a medical display apparatus and an endoscopic operation system, and particularly, to a medical display apparatus and an endoscopic operation system with an image processing function.

Background Art

[0002] In recent years, medical systems, such as an endoscopic operation system for using an endoscope to perform a procedure, are widely used, and a wide variety of medical devices are employed.

[0003] An example of a known medical system arranged in an operating room includes an endoscopic operation system illustrated in Japanese Patent Application Laid-Open Publication No. 2012-020011, the endoscopic operation system including: a cart provided with various medical devices, such as a camera apparatus for endoscope connected with an endoscope, a light source apparatus, and an image recording apparatus, and including a display apparatus, such as a TV monitor, that displays an endoscopic image and the like; and a patient bed.

[0004] In recent years, an apparatus is also known that receives video signals from a medical image shooting apparatus and the like called medical modalities in addition to endoscopic image signals and that displays the video signals from the medical modalities on the display apparatus in the endoscopic operation system along with the endoscopic images.

[0005] Note that examples of the medical modalities include MRI, CT, and an ultrasound endoscope, and other examples include a patient monitor apparatus and a fluoroscopic apparatus that output biological information.

[0006] A system is also proposed, in which the video signals from the modalities, such as MRI and CT, are supplied from an image saving and communication system terminal called PACS (picture archiving and communication system).

[0007] On the other hand, a monitor is proposed as a display apparatus in the endoscopic operation system in recent years, in which an internal image processing section can change a color set value and the like of an image to be displayed.

[0008] In this type of monitor, the internal image processing section enables processing of changing a resolution or changing a screen display mode (for example, changing between a one-screen display mode and a two-screen display mode) in addition to the processing of changing the color set value of the image, regardless of an external image processing apparatus.

[0009] As described, in the monitor in which the internal image processing section enables various settings, such as changing the color set value of the displayed image,

the change in the color set value and the like are reflected only in the screen displayed on the monitor in the conventional systems.

[0010] In recent years, the displayed image on the monitor after the change in various settings by the internal image processing section is expected to be recorded in another apparatus or displayed on another monitor in a state as it is (so to speak, "as-viewed" state).

[0011] On the other hand, a problem as illustrated below may occur in the case of the display on another monitor (hereinafter, referred to as "a monitor of a receiver") in the "as-viewed" state.

[0012] That is, assuming that the monitor of the receiver is, for example, a monitor of a personal computer, predetermined various set values can also be changed in the monitor of the receiver in many cases.

[0013] In this case, various settings in the receiver monitor doubly affect the image in the "as-viewed" state from an output monitor (monitor that displays the image after the change in various settings by the internal image processing section), and a problem may occur in some cases, such as a large color shift from the image in the "as-viewed" state.

[0014] That is, when the monitor can output the image in the "as-viewed" state, a desired result may be obtained if the other apparatus of a connection destination is a recording apparatus. However, there may be an inconvenience if the connection destination is another monitor.

[0015] US 2007/0091170 A1 discloses an endoscope system which includes an image signal processor and external devices. The image signal processor includes an external device identifier configured to identify an external device connected to the image signal processor and first to third processing units. Depending on the connected external device, for example an image output device and/or a monitor, the image signals are processed by a specified processing unit based on characteristics data representing the characteristics of the specified external device. In this way, high quality images can be reliably output regardless of the connected external device and even when the image data is transferred between different output devices in the endoscope system.

[0016] US 2007/0015989 A1 discloses an endoscope apparatus that comprises an endoscope that is communicatively coupled to electronics that receive images of tissue from the endoscope and determine a correlation between the received images and images of normal and abnormal tissues in a database.

[0017] US 2002/0085091 A1 discloses an electronic endoscope system with an image-signal processing unit that processes image signals obtained by a scope and an outputting device that is connected to the image-signal processing unit. The electronic endoscope system further comprises an outputting device specifying tool that specifies the model of the outputting device and an image-signal compensator that obtains characteristic data stored in a database based on the model specified by the outputting device specifying tool and that compen-

sates the image signals using the obtained characteristic data.

[0018] JP 2003 339634 A discloses a signal processor for an electronic endoscope system which is configured to make the quality of a displayed observation image uniform on a plurality of monitors regardless of the displaying characteristic of the respective monitor.

[0019] The present invention has been made in view of the circumstances, and an object of the present invention is to provide a monitor apparatus with a predetermined image processing function, the monitor apparatus being capable of outputting a signal after the image processing to another apparatus.

[0020] Another object of the present invention is to provide a monitor apparatus with a predetermined image processing function capable of outputting a signal after the image processing to another apparatus, the monitor apparatus being able to accurately switch set values reflected in an output signal according to an output destination of the signal after the image processing.

Disclosure of Invention

Means for Solving the Problem

[0021] The invention is defined solely in independent claim 1 and the dependent claims 2 - 4. All non-claimed embodiments which are disclosed in the description do not fall under the scope of protection.

Brief Description of the Drawings

[0022]

Fig. 1 is a diagram showing an entire configuration of an endoscopic operation system according to a first embodiment of the present invention;

Fig. 2 is a block diagram showing an electrical internal configuration of a monitor apparatus in the endoscopic operation system according to the first embodiment of the present invention;

Fig. 3 is a flowchart showing a video signal output mode switch action of the monitor apparatus in the endoscopic operation system according to the first embodiment of the present invention;

Fig. 4 is an explanatory diagram showing a situation in outputting an "as-viewed" signal from the monitor apparatus in the endoscopic operation system according to the first embodiment of the present invention;

Fig. 5 is an explanatory diagram showing a situation in outputting an original video signal of the monitor apparatus in the endoscopic operation system according to the first embodiment of the present invention;

Fig. 6 is an explanatory diagram showing a situation when the monitor apparatus in the endoscopic operation system according to the first embodiment of

the present invention detects a type of a video signal output destination;

Fig. 7 is a diagram showing an entire configuration of an endoscopic operation system according to a second embodiment of the present invention;

Fig. 8 is a block diagram showing an electrical internal configuration of a monitor apparatus in the endoscopic operation system according to the second embodiment of the present invention; and

Fig. 9 is a flowchart showing an action when an enhancement mode is set in the monitor apparatus of the endoscopic operation system according to the second embodiment of the present invention.

15 Best Mode for Carrying Out the Invention

[0023] Hereinafter, embodiments of the present invention will be described with reference to the drawings.

20 (First Embodiment)

[0024] Fig. 1 is a diagram showing an entire configuration of an endoscopic operation system according to a first embodiment of the present invention.

25 **[0025]** As shown in Fig. 1, an endoscopic operation system 1 according to the first embodiment of the present invention is a medical system arranged in, for example, an operation room. The endoscopic operation system 1 includes a cart 10 provided with various medical devices and the like described later and includes a patient bed 23.

30 **[0026]** The cart 10 is provided with apparatuses, such as a video processor 11, a light source apparatus 12, and a recording apparatus 13, which are medical devices to be controlled. The video processor 11 and the light source apparatus 12 are connected to an endoscope 21 through a universal cord.

35 **[0027]** The cart 10 is also provided with a monitor apparatus 14 that displays an endoscopic image and the like and that includes, for example, a liquid crystal display.

40 **[0028]** The monitor apparatus 14 is connected to the video processor 11 and displays an endoscopic image outputted from the video processor 11. A plurality of medical modalities are connected to the monitor apparatus 14.

45 **[0029]** Examples of the medical modalities include a fluoroscopic image output apparatus 31 of X-ray, MRI, or the like, an ultrasound endoscope 32, a patient monitor apparatus 33 that outputs biological information of patient, and a terminal apparatus 34 of so-called PACS (picture archiving and communication system). In the present embodiment, image signals (or information signals) from these various medical modalities are inputted to respective video input sections of the monitor apparatus 14.

50 **[0030]** Fig. 2 is a block diagram showing an electrical internal configuration of the monitor apparatus in the endoscopic operation system according to the first embodiment.

55 **[0031]** As shown in Fig. 2, the monitor apparatus 14

includes a plurality of video input sections (a first video input section 41, a second video input section 42, a video input section 43, a fourth video input section 44, ... and an n-th video input section 45) that receive the image signals (or information signals) from the various medical modalities and also includes: a display panel 53 including a liquid crystal panel or the like; and a signal processing section 40 that applies predetermined signal processing to each of the image signals inputted to the plurality of video input sections to generate video signals to be displayed on the display panel 53.

[0032] The monitor apparatus 14 further includes display mode switching means 58 for switching a display mode and the like through operation by an operator. The display mode switching means 58 is connected to the signal processing section 40, and the display mode switching means 58 can be operated to switch the plurality of video input sections (the first video input section 41, the second video input section 42, the video input section 43, the fourth video input section 44, ... and the n-th video input section 45) or to switch display patterns (for example, switching operation of one-screen display and two-screen display (or multiple-screen display)).

[0033] The signal processing section 40 applies predetermined signal processing, synthesizing processing, or the like to an image signal inputted to one of the plurality of video input sections 41 ... 45 or to image signals inputted to a plurality of video input sections according to the switching operation of the display mode switching means 58 and generates a video signal to be displayed on the display panel 53.

[0034] The monitor apparatus 14 further includes first color setting reflection means 51 for applying predetermined color adjustment (color setting) to the video signal after the predetermined signal processing by the signal processing section 40 and for reflecting information of the color setting in an image displayed on the display panel 53.

[0035] The monitor apparatus 14 further includes color setting operation means 57 for performing the color adjustment in the first color setting reflection means 51 through operation by the operator. The first color setting reflection means 51 applies predetermined color adjustment (color setting) to the video signal after the predetermined signal processing by the signal processing section 40, according to the operation of the color setting operation means 57.

[0036] On the other hand, the monitor apparatus 14 of the present embodiment includes an output terminal 54 (hereinafter, referred to as "as-viewed output terminal 54") that outputs a video exactly the same as the video outputted from the signal processing section 40 to the display panel 53.

[0037] The monitor apparatus 14 further includes second color setting reflection means 52 with a function similar to the first color setting reflection means 51, that is, the second color setting reflection means 52 is for applying predetermined color adjustment (color setting) to the

video signal after the predetermined signal processing by the signal processing section 40 and for outputting an output signal reflecting information of the color setting to the as-viewed output terminal 54.

[0038] The color setting operation means 57 is also connected to the second color setting reflection means 52. That is, like the first color setting reflection means 51, the second color setting reflection means 52 is configured to apply predetermined color adjustment (color setting) to the video signal after the predetermined signal processing by the signal processing section 40, according to the operation of the color setting operation means 57.

[0039] In this way, the same video signal after the predetermined signal processing by the signal processing section 40 is outputted to both of the display panel 53 and the as-viewed output terminal 54 in the present embodiment.

[0040] Through the operation of the color setting operation means 57, the first color setting reflection means 51 and the second color setting reflection means 52 perform similar color adjustment (color setting), and the same color adjustment (color setting) is applied to the video signals outputted to both of the "display panel 53" and the "as-viewed output terminal 54".

[0041] Therefore, when the color setting operation means 57 is operated to perform the predetermined color adjustment (color setting) in the monitor apparatus 14 of the endoscopic operation system according to the present embodiment, the video signal of the same image as the image after the color setting displayed on the display panel 53 can be outputted from the as-viewed output terminal 54 to an external recording apparatus or to a peripheral apparatus such as an external monitor apparatus.

[0042] Furthermore, in the endoscopic operation system of the present embodiment, the display mode switching means 58 is operated to output the same video signal after synthesis/switch of the video by the signal processing means (signal processing section 40) in the monitor apparatus 14 to both of the "display panel 53" and the "as-viewed output terminal 54" in a case of a multiple-display mode for displaying a plurality of images on one screen of the display panel 53 or in a case of switching and displaying images of the plurality of medical modalities. Therefore, the video signal to be outputted to a recording apparatus or to a peripheral apparatus, such as an external monitor apparatus, can be easily switched without reconnecting a video output cable.

[0043] Here, a problem in outputting, from the "as-viewed output terminal 54", the video signal reflecting the "same color setting" as the color setting reflected in the video signal displayed on the "display panel 53" will be described.

[0044] As described, a technical scope of outputting, from the "as-viewed output terminal 54", the video signal reflecting the "same color setting" as the color setting reflected in the video signal displayed on the "display

panel 53" according to the present invention attains a great amount of effects. However, the technical scope has a new problem illustrated below.

[0045] Fig. 4 is an explanatory diagram showing a situation in outputting the "as-viewed" signal from the monitor apparatus in the endoscopic operation system according to the first embodiment. Fig. 5 is an explanatory diagram showing a situation in outputting an original video signal (video signal from each modality) of the monitor apparatus in the endoscopic operation system according to the first embodiment.

[0046] In the circumstances shown in Fig. 4, the monitor apparatus 14 first synthesizes an endoscopic image from the video processor 11 and an ultrasound image from the ultrasound endoscope 32 to perform two-screen display, and the first color setting reflection means 51 and the second color setting reflection means 52 further perform the "same color setting". The video signal reflecting the "same color setting" as the video signal displayed on the display panel 53 is outputted from the as-viewed output terminal 54.

[0047] In this case, the video signal reflecting the "same color setting" as the video signal displayed on the display panel 53 can be recorded as it is in the recording apparatus 13 connected to the as-viewed output terminal 54, and this is useful. However, the following problem may occur when the same video signal is displayed on another external monitor (2nd monitor) 15.

[0048] That is, assuming that the external monitor (2nd monitor) is, for example, a monitor of a personal computer, predetermined various set values can also be changed in the external monitor in many cases.

[0049] In this case, various settings doubly affect the video signal outputted from the as-viewed output terminal 54 of the monitor apparatus 14, and a problem may occur in some cases, such as a large color shift from the image in the "as-viewed" state.

[0050] On the other hand, as shown in Fig. 5, if video signals not reflecting the color settings in the first color setting reflection means 51 and the second color setting reflection means 52, that is, original video signals, are outputted from the as-viewed output terminal 54, there is no inconvenience for the external monitor as described above. However, the video signals are obviously not an image in the "as-viewed" state, and an expected object may not be attained in consideration of recording the image in the recording apparatus 13.

[0051] In view of the circumstances, the present applicant switches the state of the video signal outputted from the "as-viewed output terminal 54" according to a connected output destination and provides the following solving means.

[0052] As described, the action of the second color setting reflection means 52 enables the monitor apparatus 14 in the endoscopic operation system according to the present embodiment to output, from the "as-viewed output terminal 54", the video signal reflecting the "same color setting" as the color setting reflected in the video

signal displayed on the "display panel 53", and the second color setting reflection means 52 according to the present embodiment enables outputting of other types of video signals through the "as-viewed output terminal 54".

[0053] That is, the second color setting reflection means 52 enables outputting of the video signal in three modes: a first output mode (color output mode) for causing the "as-viewed output terminal 54" to output a video signal reflecting the "same color setting" as the color setting reflected in the video signal displayed on the "display panel 53"; a second output mode (through mode) for causing the "as-viewed output terminal 54" to output a video signal in a state not reflecting the color setting; and a third output mode (PC mode) for causing the "as-viewed output terminal 54" to output a video signal after predetermined color adjustment in addition to the color setting reflected in the video signal displayed on the "display panel 53" in order to reproduce a video signal suitable for replay in an external monitor when the output destination is, for example, the external monitor of a personal computer.

[0054] The second color setting reflection means 52 also includes a table used particularly in the third output mode (PC mode), the table storing color set value information that is set according to a predetermined device of the connection destination. When the third output mode (PC mode) is set, a color set value of the video signal to be outputted from the "as-viewed output terminal 54" is changed based on the table storing the set value information.

[0055] The monitor apparatus 14 according to the present embodiment includes communication means 56 for performing predetermined communication with an external peripheral device that is the output destination of the video signal.

[0056] The communication means 56 has a function of detecting the device of the connection destination through communication based on RS232C or through communication based on EDID (extended display identification data) storing model/specification information of the display, for example. The communication means 56 is configured to transmit the detection result information to the second color setting reflection means 52.

[0057] The second color setting reflection means 52 selects each of the modes of the video signal to be outputted from the "as-viewed output terminal 54" based on the information from the communication means 56.

[0058] Fig. 3 is a flowchart showing a video signal output mode switch action of the monitor apparatus in the endoscopic operation system according to the first embodiment. Fig. 6 is an explanatory diagram showing a situation when the monitor apparatus in the endoscopic operation system according to the first embodiment detects a type of the video signal output destination.

[0059] As shown in Figs. 3 and 6, the communication means 56 in the monitor apparatus 14 first connects to the external peripheral device 16, then acquires the EDID

of the external peripheral device 16 or receives the device information of the external peripheral device 16 through predetermined communication to detect the type of the device, and transmits the detection result information to the second color setting reflection means 52 (step S1, step S2).

[0060] Subsequently, if the external peripheral device 16 is, for example, the recording apparatus 13 based on the information from the communication means 56, the second color setting reflection means 52 sets the first output mode (color output mode) for causing the "as-viewed output terminal 54" to output the video signal reflecting the "same color setting" as the color setting reflected in the video signal displayed on the "display panel 53" (step S3).

[0061] On the other hand, if the external peripheral device 16 is an external monitor or the like that can change various set values, the second color setting reflection means 52 sets the second output mode (through mode) for causing the "as-viewed output terminal 54" to output the video signal in the state not reflecting the color setting (step S4).

[0062] If the external peripheral device 16 is, for example, an external monitor of a personal computer, and the storage table including the information for reproducing the video signal suitable for replay in the external monitor is acquired, the second color setting reflection means 52 sets the third output mode (PC mode) for causing the "as-viewed output terminal 54" to output the video signal after further predetermined color adjustment of the color setting reflected in the video signal displayed on the "display panel 53" based on the table storing the set value information (step S5).

[0063] Note that although the communication means 56 automatically detects the information of the external peripheral device at the connection destination of the as-viewed output terminal 54 in the description, the monitor apparatus 14 according to the present embodiment may include color output setting switch means 55 for the operator to manually switch the color setting, and the three output modes may be switched according to the operation of the color output setting switch means 55.

[0064] As described, according to the monitor apparatus 14 in the endoscopic operation system of the present embodiment, the video signal of the same image as the image after the color setting displayed on the display panel 53 can be outputted from the as-viewed output terminal 54 to an external recording apparatus or to a peripheral apparatus such as an external monitor apparatus.

[0065] Furthermore, according to the monitor apparatus 14 in the endoscopic operation system of the present embodiment, the same video signal after the synthesis/switch of the video by the signal processing means (signal processing section 40) in the monitor apparatus 14 is outputted to both of the "display panel 53" and the "as-viewed output terminal 54" in the case of the multiple-display mode for displaying a plurality of images on one screen of the display panel 53 or in the case of switching

and displaying images of a plurality of the medical modalities. Therefore, the video signal to be outputted to a recording apparatus or to a peripheral apparatus, such as an external monitor apparatus, can be easily switched without reconnecting the video output cable.

[0066] Furthermore, according to the monitor apparatus 14 in the endoscopic operation system of the present embodiment, the set values of the color information values reflected in the video signal to be outputted can be changed according to the device information of the external peripheral device connected to the as-viewed output terminal 54 that outputs the video signal of the same image as the image after the color setting displayed on the display panel 53. Therefore, the video signal according to the type of the external peripheral device can be accurately outputted.

[0067] Next, a second embodiment of the present invention will be described.

[0068] In recent years, a monitor provided with an enhancement processing technique (processing technique such as a super-resolution technique) for emphasizing and displaying a sense of resolution in displaying a low-resolution video in an SD format or the like has come to be known as a display apparatus in the endoscopic operation system.

[0069] The enhancement processing technique is adapted to identify a color or a pattern of an entire screen to be displayed to control strength of the color or the pattern to thereby apply enhancement processing to the entire screen.

[0070] On the other hand, an apparatus is known that receives video signals from a medical image shooting apparatus and the like that are called medical modalities in addition to endoscopic image signals and that displays the video signals from the medical modalities on the display apparatus in the endoscopic operation system along with the endoscopic images.

[0071] In the display apparatus of this type, a two-screen function or the like can be used to display a plurality of medical modalities (for example, an endoscope, an ultrasound endoscope, and a fluoroscopic apparatus) with different colors or display contents on one screen.

[0072] However, when the enhancement processing is executed in a state that the images of the plurality of medical modalities are displayed on one screen in the display apparatus, there is an inconvenience that the images that should not be subjected to the enhancement processing are also enhanced and emphasized.

[0073] For example, when an endoscopic image is displayed as a main screen, and an ultrasound image or a fluoroscopic image is displayed as a sub screen, the enhancement processing may also be applied to the sub screens that should not be subjected to the enhancement processing.

[0074] In view of the circumstances, the present applicant provides a medical display apparatus that can set a range (area) for applying the enhancement processing according to the conditions of the display screen.

[0075] Fig. 7 is a diagram showing an entire configuration of an endoscopic operation system according to a second embodiment of the present invention.

[0076] As shown in Fig. 7, an endoscopic operation system 101 according to the second embodiment of the present invention has a configuration similar to the endoscopic operation system 1 according to the first embodiment, but a configuration of a monitor apparatus 114 is different. The other components are the same as in the first embodiment, and the details will not be repeated here.

[0077] The monitor apparatus 114 according to the present second embodiment is connected to the video processor 11 and displays an endoscopic image outputted from the video processor 11 as in the first embodiment. A plurality of medical modalities are connected to the monitor apparatus 114.

[0078] As in the first embodiment, examples of the medical modalities include the fluoroscopic image output apparatus 31 of X-ray, MRI, or the like, the ultrasound endoscope 32, the patient monitor apparatus 33 that outputs biological information of patient, and the terminal apparatus 34 of so-called PACS (picture archiving and communication system). Image signals (or information signals) from these various medical modalities are also inputted to respective video input sections of the monitor apparatus 114 in the present embodiment.

[0079] Fig. 8 is a block diagram showing an electrical internal configuration of the monitor apparatus 114 in the endoscopic operation system according to the second embodiment.

[0080] As shown in Fig. 8, the monitor apparatus 114 includes a plurality of video input sections (a first video input section 141, a second video input section 142, a video input section 143, a fourth video input section 144, ... and an n-th video input section 145) that receive the image signals (or information signals) from the various medical modalities and also includes: a display panel 153 including a liquid crystal panel or the like; and a signal processing section 140 that applies predetermined signal processing to each of the image signals inputted to the plurality of video input sections to generate video signals to be displayed on the display panel 53.

[0081] The monitor apparatus 114 further includes display mode switching means 158 for switching a display mode and the like through operation by the operator and also includes display mode setting means 161 for switching and setting the display mode for the video signals generated by the signal processing section 140.

[0082] The display mode setting means 161 is configured to switch the plurality of video input sections (the first video input section 141, the second video input section 142, the video input section 143, the fourth video input section 144, ... and the n-th video input section 145) or to switch display patterns (for example, switching operation of one-screen display state and two-screen display state (or multiple-screen display state)) according to the operation of the display mode switching means

158.

[0083] The monitor apparatus 114 further includes enhancement mode range determination means 163 for determining an enhancement mode range according to the display mode of the display mode setting means 161 and the state of the video signal of the signal processing section 140 (presence or absence of OSD display in the video signal displayed on the display panel 153) and also includes enhancement mode setting means 162 for applying predetermined enhancement processing to the range determined by the enhancement mode range determination means 163.

[0084] To prevent application of the enhancement processing to an area in which the enhancement processing is unnecessary (for example, sub screen in two-screen display and OSD menu), the enhancement mode range determination means 163 is configured to check the current state of the display mode in the display mode setting means 161 (one-screen display state or multiple-screen display state including two-screen) and presence or absence of the OSD display in the signal processing section 140 and is configured to determine the range (area) for applying the enhancement processing according to the result to report the range (area) to the enhancement mode setting means 162.

[0085] Enhancement mode switching means 164 for switching and setting the enhancement mode is connected to the enhancement mode setting means 162, and the enhancement mode setting means 162 is configured to set the enhancement mode according to the switching operation of the enhancement mode switching means 164.

[0086] Note that in the monitor apparatus 114 of the present embodiment, the enhancement mode setting means 162 is configured to apply the enhancement processing to the range determined by the enhancement mode range determination means 163 through predetermined enhancement processing operation not shown.

[0087] Fig. 9 is a flowchart showing an action when the enhancement mode is set in the monitor apparatus of the endoscopic operation system according to the second embodiment.

[0088] As shown in Fig. 9, after a user operates the enhancement mode switching means to set the enhancement mode (step S101), predetermined enhancement processing operation is performed (step S102), and the enhancement mode range determination means 163 checks the current display mode in the display mode setting means 161 and the presence or absence of the OSD display in the signal processing section 140 (step S103).

[0089] Subsequently, the enhancement mode range determination means 163 determines the enhancement processing range according to the result of the check in step S103 and reports the range (area) to the enhancement mode setting means 162 (step S104).

[0090] The enhancement mode setting means 162 applies the enhancement processing only to the designated enhancement processing range (step 105) and transmits

the video signal after the enhancement processing to the display panel 153 (step S106).

[0091] As described, according to the present second embodiment, the range (area) of applying the enhancement processing can be set on the screen of the display panel according to the conditions of the display screen, that is, according to the current state of the display mode (one-screen display state or multiple-screen display state including two-screen) and the presence or absence of the OSD display. Therefore, if the enhancement processing is applied to an endoscopic image for example, the enhancement processing is not applied to a sub screen display area or an OSD display area displayed on the same screen, and easily viewable screen display can be provided.

Claims

1. A monitor apparatus (14) that is configured as a separate body from at least a video processor (11), and includes a housing in which a display section (53) that displays a predetermined medical image is disposed, the monitor apparatus (14) comprising:

the display section (53) that displays a medical image;

a video input section (41 to 45) disposed in the housing of the monitor apparatus (14) including the display section (53), the video input section (41 to 45) being capable of receiving a predetermined medical image signal including a medical image signal outputted from the video processor (11);

a signal processing section (40) that is disposed in the housing of the monitor apparatus (14) and applies predetermined signal processing to the medical image signal inputted to the video input section (41 to 45), to generate a video signal to be displayed on the display section (53);

a first color setting section (51) that is disposed in the housing of the monitor apparatus (14) and executes color adjustment processing based on a predetermined first color set value on the video signal to be displayed on the display section (53) which has been generated by the signal processing section (40);

a video signal output section (54) that is disposed in the housing of the monitor apparatus (14), the video signal output section (54) being connected with at least one or more external devices; and

an external device information detecting section (56) that is disposed in the housing of the monitor apparatus (14) and detects device information regarding a type of the external device connected to the video signal output section (54); **characterised in that** the apparatus further comprises:

es:

a second color setting section (52) that is disposed in the housing of the monitor apparatus (14) and executes at least one color adjustment processing based on a second color set value on the video signal to be displayed on the display section (53) which has been generated by the signal processing section (40), wherein the second color set value is a same color set value as the first color set value in the first color setting section; and

wherein the video signal output section (54) is capable of outputting the video signal outputted from the second color setting section (52); and

wherein the second color setting section (52) executes, according to the type of the external device, any one of: first mode processing for executing color adjustment processing based on the second color set value, which is the same color set value as the first color set value in the first color setting section (51), on the video signal to be displayed on the display section (53) which has been generated by the signal processing section (40), to cause the video signal output section (54) to output the video signal; second mode processing for causing the video signal output section (54) to output the video signal to be displayed on the display section (53) which has been generated by the signal processing section (40), without executing any color adjustment processing on the video signal; and third mode processing for executing color adjustment processing based on a third color set value set according to color set value included in the external device connected to the video signal output section (54), in addition to the second color set value, on the video signal to be displayed on the display section (53) which has been generated by the video signal processing section (40), when the external device has a color setting function different from the first color set value, based on a detection result from the external device information detecting section (56), to cause the video signal output section (54) to output the video signal.

2. The monitor apparatus according to claim 1, wherein the second color setting section (52) includes a color set value table including a color set value set according to the type of the external device connected to the video signal output section (54), and when executing the third mode processing, the second color setting section sets the third color set value based on the color set value in the color set value table.

3. The monitor apparatus according to claim 1, wherein the external device information detecting section (56) includes a communication section for communication between the monitor apparatus (14) and the external device, and detects the device information regarding the type of the external device through the communication by the communication section. 5
4. The monitor apparatus according to claim 1, further comprising an operation section (57) connected to the first color setting section (51) and the second color setting section (52), wherein the operation section executes processing regarding the first color set value in the first color setting section (51) and processing regarding the second color set value in the second color setting section (52). 10 15

Patentansprüche

1. Monitorvorrichtung (14), die als separater Körper zu mindestens einem Videoprozessor (11) ausgelegt ist und ein Gehäuse umfasst, in dem ein Anzeigeabschnitt (53), der ein vorbestimmtes medizinisches Bild anzeigt, angeordnet ist, wobei die Monitorvorrichtung (14) umfasst: 20 25
- den Anzeigeabschnitt (53), der ein medizinisches Bild anzeigt;
- einen Videoeingabeabschnitt (41 bis 45), der in dem Gehäuse der den Anzeigeabschnitt (53) umfassenden Monitorvorrichtung (14) angeordnet ist, wobei der Videoeingabeabschnitt (41 bis 45) fähig ist, ein vorbestimmtes medizinisches Bildsignal zu empfangen, das ein medizinisches Bildsignal umfasst, das aus dem Videoprozessor (11) ausgegeben wurde; 30 35
- einen Signalverarbeitungsabschnitt (40), der in dem Gehäuse der Monitorvorrichtung (14) angeordnet ist und eine vorbestimmte Signalverarbeitung auf das in den Videoeingabeabschnitt (41 bis 45) eingegebene medizinische Bildsignal anzuwenden, um ein auf dem Anzeigebereich (53) anzuzeigendes Videosignal zu erzeugen; 40 45
- einen ersten Farbeinstellabschnitt (51), der in dem Gehäuse der Monitorvorrichtung (14) angeordnet ist und eine Farbeinstellungsverarbeitung basierend auf einem vorbestimmten ersten Farbeinstellwert auf dem auf dem Anzeigeabschnitt (53) anzuzeigenden Videosignal durchführt, das von dem Signalverarbeitungsabschnitt (40) erzeugt wurde; 50
- einen Videosignalausgabeabschnitt (54), der in dem Gehäuse der Monitorvorrichtung (14) angeordnet ist, wobei der Videosignalausgabeabschnitt (54) mit mindestens einem oder mehreren externen Geräten verbunden ist; 55

einen Abschnitt zum Erfassen von Information externer Geräte (56), der in dem Gehäuse der Monitorvorrichtung (14) angeordnet ist und Geräteinformation hinsichtlich eines Typs des externen Geräts erfasst, das mit dem Videosignalausgabeabschnitt (54) verbunden ist; **dadurch gekennzeichnet, dass** die Vorrichtung ferner umfasst:

einen zweiten Farbeinstellabschnitt (52), der in dem Gehäuse der Monitorvorrichtung (14) angeordnet ist und mindestens eine Farbeinstellungsverarbeitung basierend auf einem zweiten Farbeinstellwert auf dem auf dem Anzeigeabschnitt (53) anzuzeigenden Videosignal durchführt, das von dem Signalverarbeitungsabschnitt (40) erzeugt wurde, wobei der zweite Farbeinstellwert derselbe Farbeinstellwert ist wie der erste Farbeinstellwert in dem ersten Farbeinstellabschnitt; und

wobei der Videosignalausgabeabschnitt (54) fähig ist, das aus dem zweiten Farbeinstellabschnitt (52) ausgegebene Videosignal auszugeben; und

wobei der zweite Farbeinstellabschnitt (52), gemäß dem Typ des externen Geräts, eins ausführt von: einer ersten Modusverarbeitung zum Ausführen von Farbeinstellungsverarbeitung basierend auf dem zweiten Farbeinstellwert, der derselbe Farbeinstellwert ist wie der erste Farbeinstellwert in dem ersten Farbeinstellabschnitt (51), auf dem auf dem Anzeigeabschnitt (53) anzuzeigenden Videosignal, das von dem Signalverarbeitungsabschnitt (40) erzeugt wurde, um zu bewirken, dass der Videosignalausgabeabschnitt (54) das Videosignal ausgibt; eine zweite Modusverarbeitung zum Bewirken, dass der Videosignalausgabeabschnitt (54) das auf dem Anzeigeabschnitt (53) anzuzeigende Videosignal, das von dem Signalverarbeitungsabschnitt (40) erzeugt wurde, auszugeben, ohne eine Farbanpassungsverarbeitung auf dem Videosignal auszuführen; und eine dritte Modusverarbeitung zum Ausführen einer Farbeinstellungsverarbeitung basierend auf einem dritten Farbeinstellwert, der gemäß dem Farbeinstellwert, der in dem externen Gerät enthalten ist, das mit dem Videosignalausgabeabschnitt (54) verbunden ist, zusätzlich zu dem zweiten Farbeinstellwert eingestellt wurde, auf dem auf dem Anzeigeabschnitt (53) anzuzeigenden Videosignal, das von dem Videosignalverarbeitungsabschnitt (40) erzeugt wurde, wenn das externe Gerät eine Farbeinstellfunktion

- aufweist, die sich von dem ersten Farbeinstellwert unterscheidet, basierend auf einem Erfassungsergebnis aus dem Abschnitt zum Erfassen von Information zu dem externen Gerät (56), um zu bewirken, dass der Videosignalausgabeabschnitt (54) das Videosignal ausgibt. 5
2. Monitorvorrichtung nach Anspruch 1, wobei der zweite Farbeinstellabschnitt (52) eine Farbeinstellwerttabelle umfasst, die einen Farbeinstellwert umfasst, der gemäß dem Typ des externen Geräts, das mit dem Videosignalausgabeabschnitt (54) verbunden ist, eingestellt wurde, und wenn die dritte Modusverarbeitung ausgeführt wird, stellt der zweite Farbeinstellabschnitt den dritten Farbeinstellwert basierend auf dem Farbeinstellwert in der Farbeinstellwerttabelle ein. 10
3. Monitorvorrichtung nach Anspruch 1, wobei der Abschnitt zum Erfassen von Information externer Geräte (56) einen Kommunikationsabschnitt für die Kommunikation zwischen der Monitorvorrichtung (14) und dem externen Gerät umfasst und die Geräteinformation in Bezug auf den Typ des externen Geräts durch die Kommunikation durch den Kommunikationsabschnitt erfasst. 15
4. Monitorvorrichtung nach Anspruch 1, die ferner einen Bedienabschnitt (57) umfasst, der mit dem ersten Farbeinstellabschnitt (51) und dem zweiten Farbeinstellabschnitt (52) verbunden ist, wobei der Bedienabschnitt Verarbeitung in Bezug auf den ersten Farbeinstellwert in dem ersten Farbeinstellabschnitt (51) und Verarbeitung in Bezug auf den zweiten Farbeinstellwert in dem zweiten Farbeinstellabschnitt (52) ausführt. 20
- 30
- 35

Revendications 40

1. Appareil de moniteur (14) qui est configuré sous la forme d'un corps distinct d'au moins un processeur vidéo (11), et comprend un boîtier dans lequel une section d'affichage (53) qui affiche une image médicale prédéterminée est disposée, l'appareil de moniteur (14) comprenant : 45
- la section d'affichage (53) qui affiche une image médicale ; 50
- une section d'entrée de vidéo (41 à 45) disposée dans le boîtier de l'appareil de moniteur (14) comprenant la section d'affichage (53), la section d'entrée de vidéo (41 à 45) étant capable de recevoir un signal d'image médicale prédéterminé comprenant un signal d'image médicale délivré en sortie par le processeur vidéo (11); 55
- une section de traitement de signal (40) qui est

disposée dans le boîtier de l'appareil de moniteur (14) et applique un traitement de signal prédéterminé au signal d'image médicale entré dans la section d'entrée de vidéo (41 à 45), pour générer un signal vidéo à afficher sur la section d'affichage (53) ;

une première section de réglage de couleur (51) qui est disposée dans le boîtier de l'appareil de moniteur (14) et exécute un traitement d'ajustement de couleur sur la base d'une première valeur de réglage de couleur prédéterminée sur le signal vidéo à afficher sur la section d'affichage (53) qui a été généré par la section de traitement de signal (40) ;

une section de sortie de signal vidéo (54) qui est disposée dans le boîtier de l'appareil de moniteur (14), la section de sortie de signal vidéo (54) étant reliée à au moins un ou plusieurs dispositifs externes ; et

une section de détection d'informations de dispositif externe (56) qui est disposée dans le boîtier de l'appareil de moniteur (14) et détecte des informations de dispositif relatives à un type du dispositif externe relié à la section de sortie de signal vidéo (54) ;

caractérisé par le fait que l'appareil comprend en outre :

une seconde section de réglage de couleur (52) qui est disposée dans le boîtier de l'appareil de moniteur (14) et exécute au moins un traitement d'ajustement de couleur sur la base d'une deuxième valeur de réglage de couleur sur le signal vidéo à afficher sur la section d'affichage (53) qui a été généré par la section de traitement de signal (40), la deuxième valeur de réglage de couleur étant la même valeur de réglage de couleur que la première valeur de réglage de couleur dans la première section de réglage de couleur ; et

la section de sortie de signal vidéo (54) étant capable de délivrer en sortie le signal vidéo délivré en sortie par la seconde section de réglage de couleur (52) ; et

la seconde section de réglage de couleur (52) exécutant, selon le type du dispositif externe, l'un quelconque parmi : un traitement de premier mode pour exécuter un traitement d'ajustement de couleur sur la base de la deuxième valeur de réglage de couleur, qui est la même valeur de réglage de couleur que la première valeur de réglage de couleur dans la première section de réglage de couleur (51), sur le signal vidéo à afficher sur la section d'affichage (53) qui a été généré par la section de traitement de signal (40), pour amener la section de sortie

de signal vidéo (54) à délivrer en sortie le signal vidéo ; un traitement de deuxième mode pour amener la section de sortie de signal vidéo (54) à délivrer en sortie le signal vidéo à afficher sur la section d'affichage (53) qui a été généré par la section de traitement de signal (40), sans exécuter de traitement d'ajustement de couleur sur le signal vidéo ; et un traitement de troisième mode pour exécuter un traitement d'ajustement de couleur sur la base d'une troisième valeur de réglage de couleur définie selon une valeur de réglage de couleur comprise dans le dispositif externe relié à la section de sortie de signal vidéo (54), en plus de la deuxième valeur de réglage de couleur, sur le signal vidéo à afficher sur la section d'affichage (53) qui a été généré par la section de traitement de signal vidéo (40), lorsque le dispositif externe a une fonction de réglage de couleur différente de la première valeur de réglage de couleur, sur la base d'un résultat de détection de la section de détection d'informations de dispositif externe (56), pour amener la section de sortie de signal vidéo (54) à délivrer en sortie le signal vidéo.

2. Appareil de moniteur selon la revendication 1, dans lequel la seconde section de réglage de couleur (52) comprend une table de valeurs de réglage de couleur comprenant une valeur de réglage de couleur définie selon le type du dispositif externe relié à la section de sortie de signal vidéo (54) et, lors de l'exécution du traitement de troisième mode, la seconde section de réglage de couleur définit la troisième valeur de réglage de couleur sur la base de la valeur de réglage de couleur dans la table de valeurs de réglage de couleur.
3. Appareil de moniteur selon la revendication 1, dans lequel la section de détection d'informations de dispositif externe (56) comprend une section de communication pour établir une communication entre l'appareil de moniteur (14) et le dispositif externe, et détecte les informations de dispositif relatives au type du dispositif externe par l'intermédiaire de la communication par la section de communication.
4. Appareil de moniteur selon la revendication 1, comprenant en outre une section d'actionnement (57) reliée à la première section de réglage de couleur (51) et à la seconde section de réglage de couleur (52), la section d'actionnement exécutant un traitement relatif à la première valeur de réglage de couleur dans la première section de réglage de couleur (51) et un traitement relatif à la deuxième valeur de réglage de couleur dans la seconde section de réglage de couleur (52).

FIG. 1

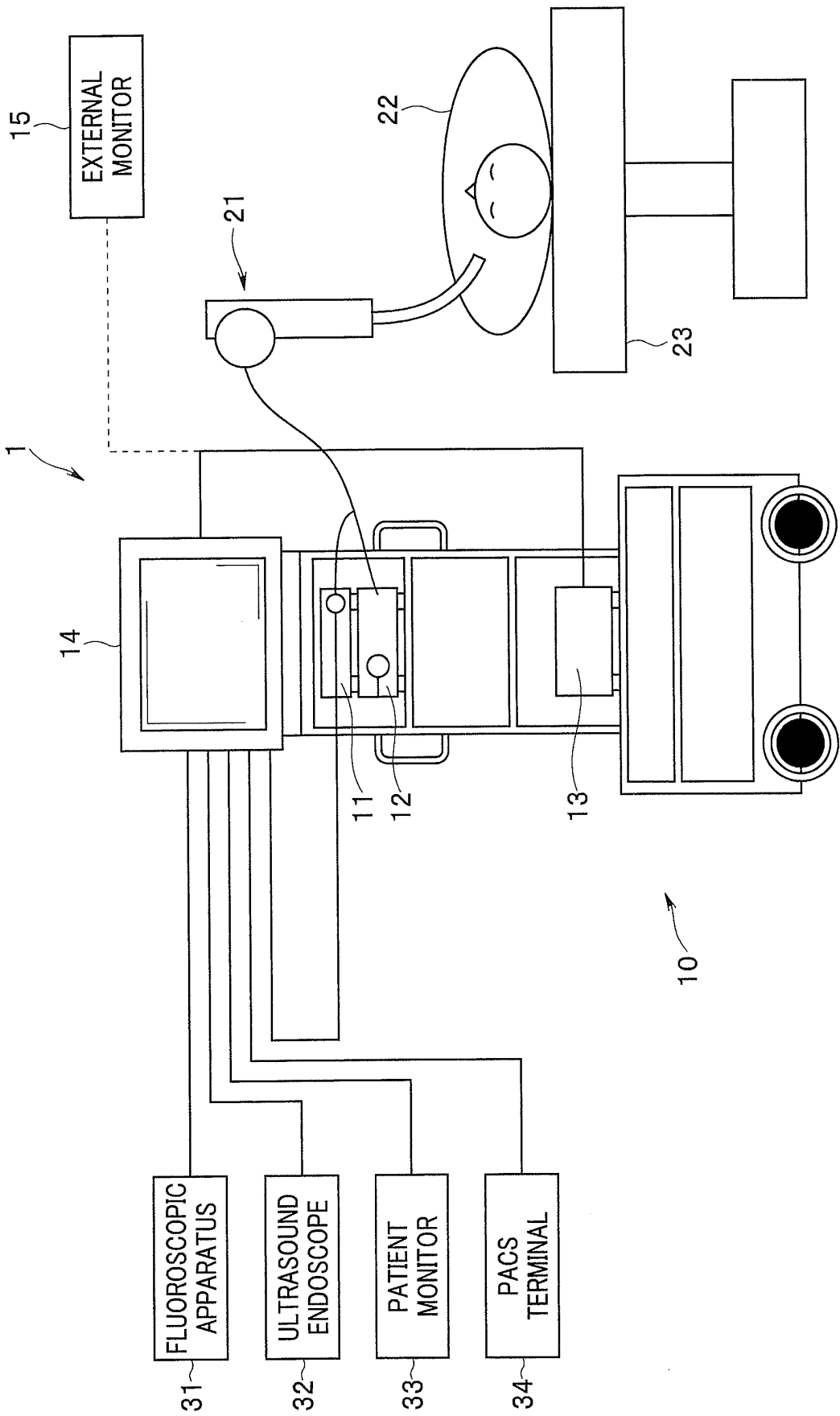


FIG. 2

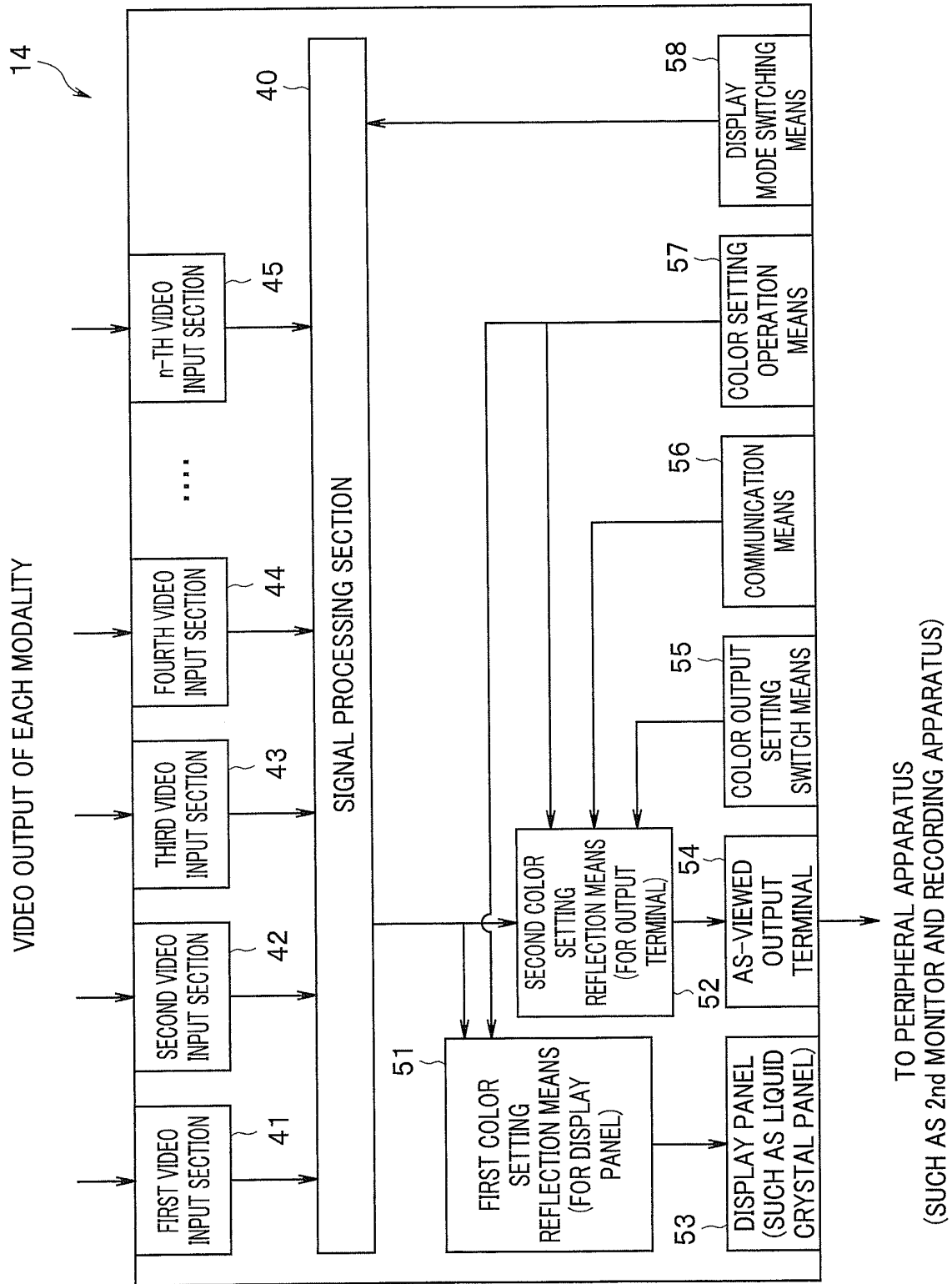


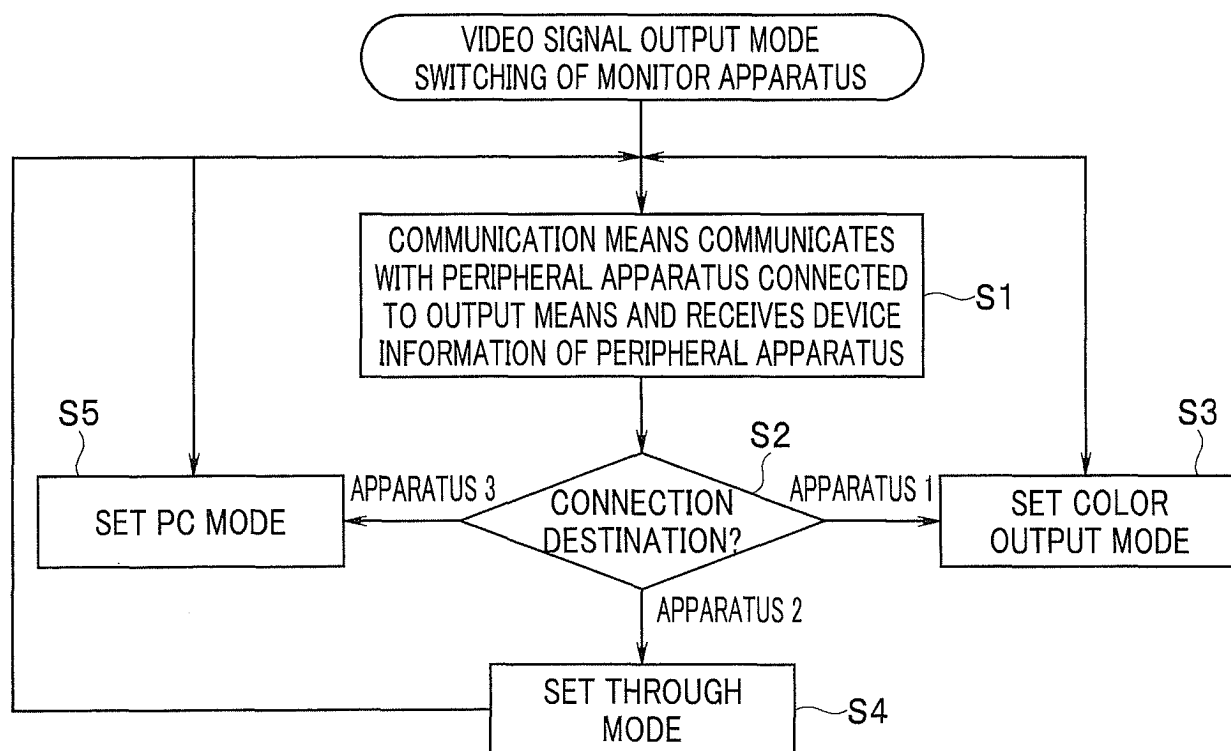
FIG. 3

FIG. 4

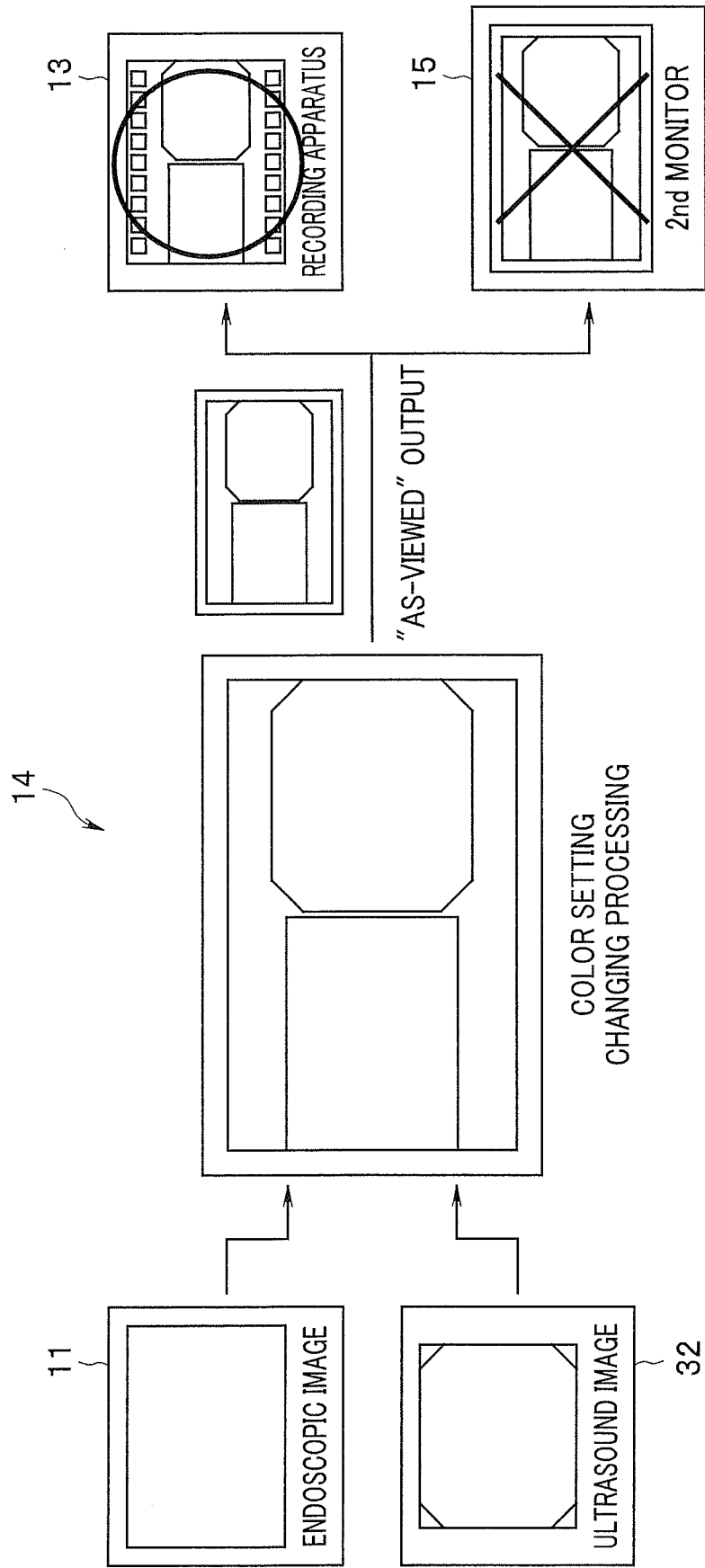


FIG. 5

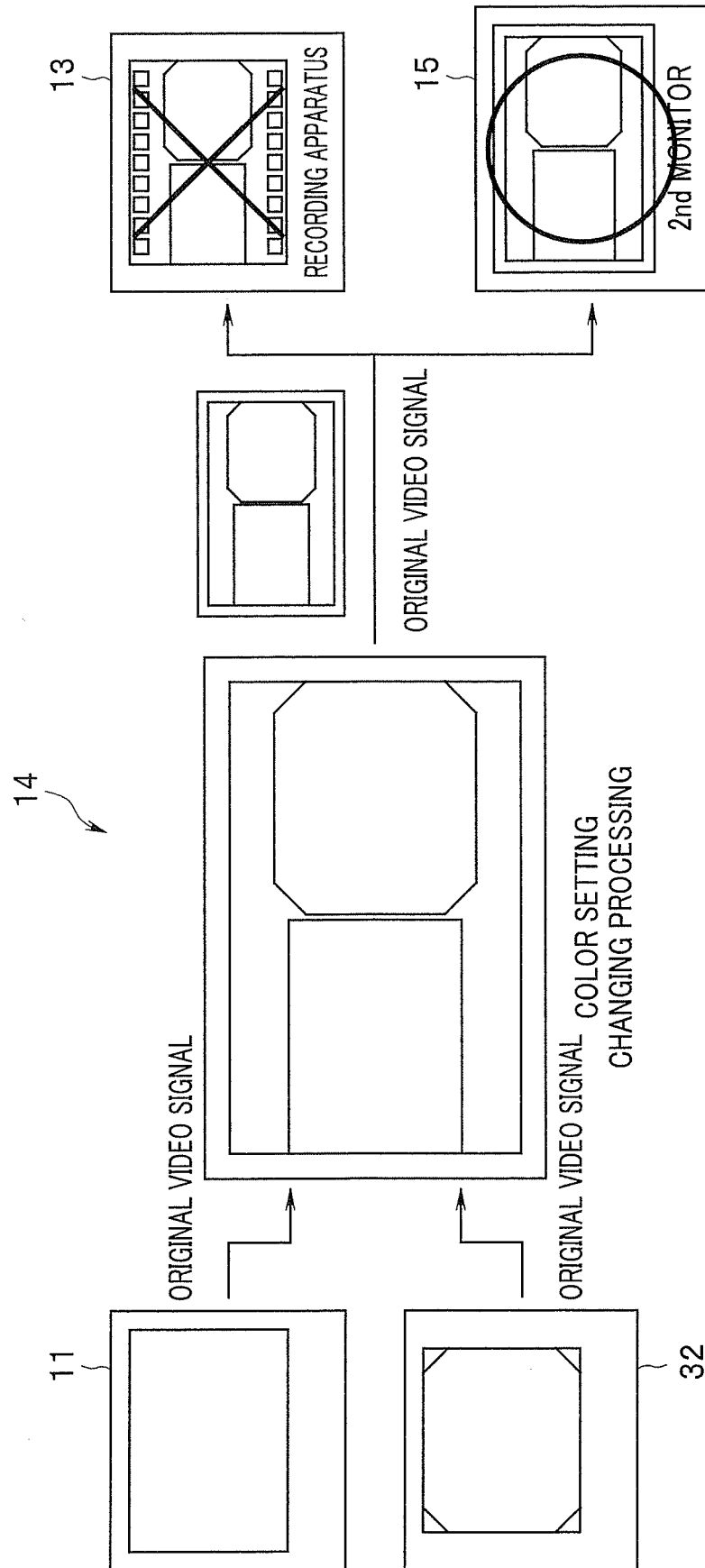


FIG. 6

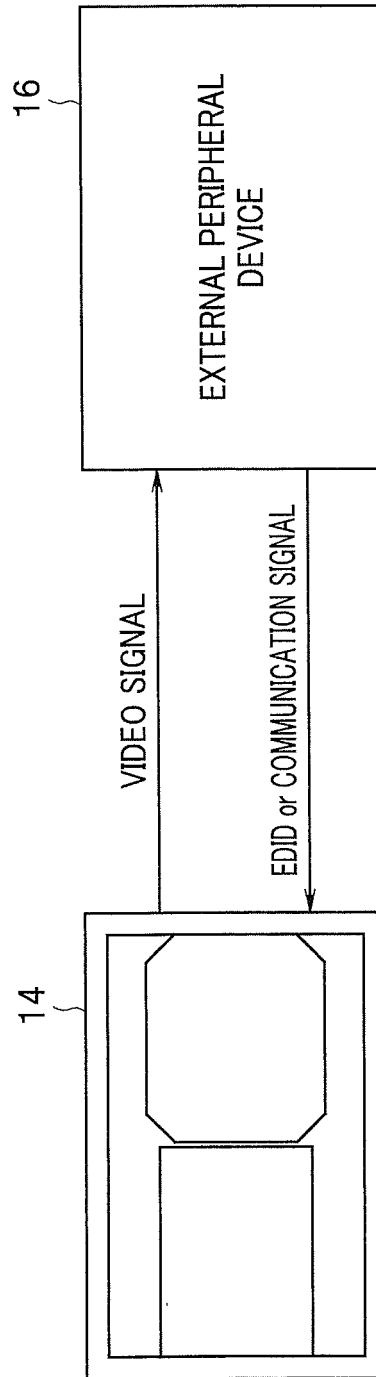


FIG. 7

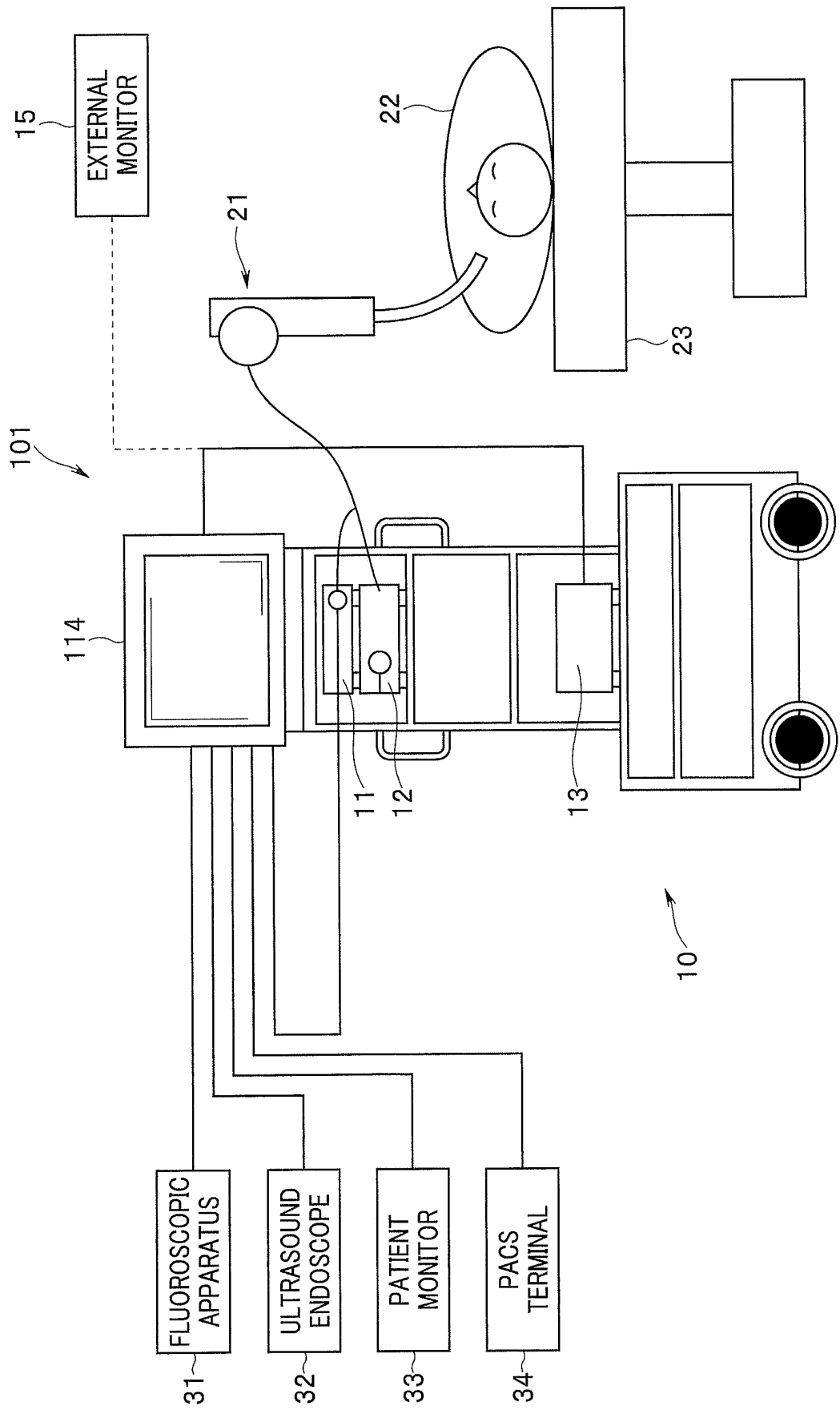


FIG. 8

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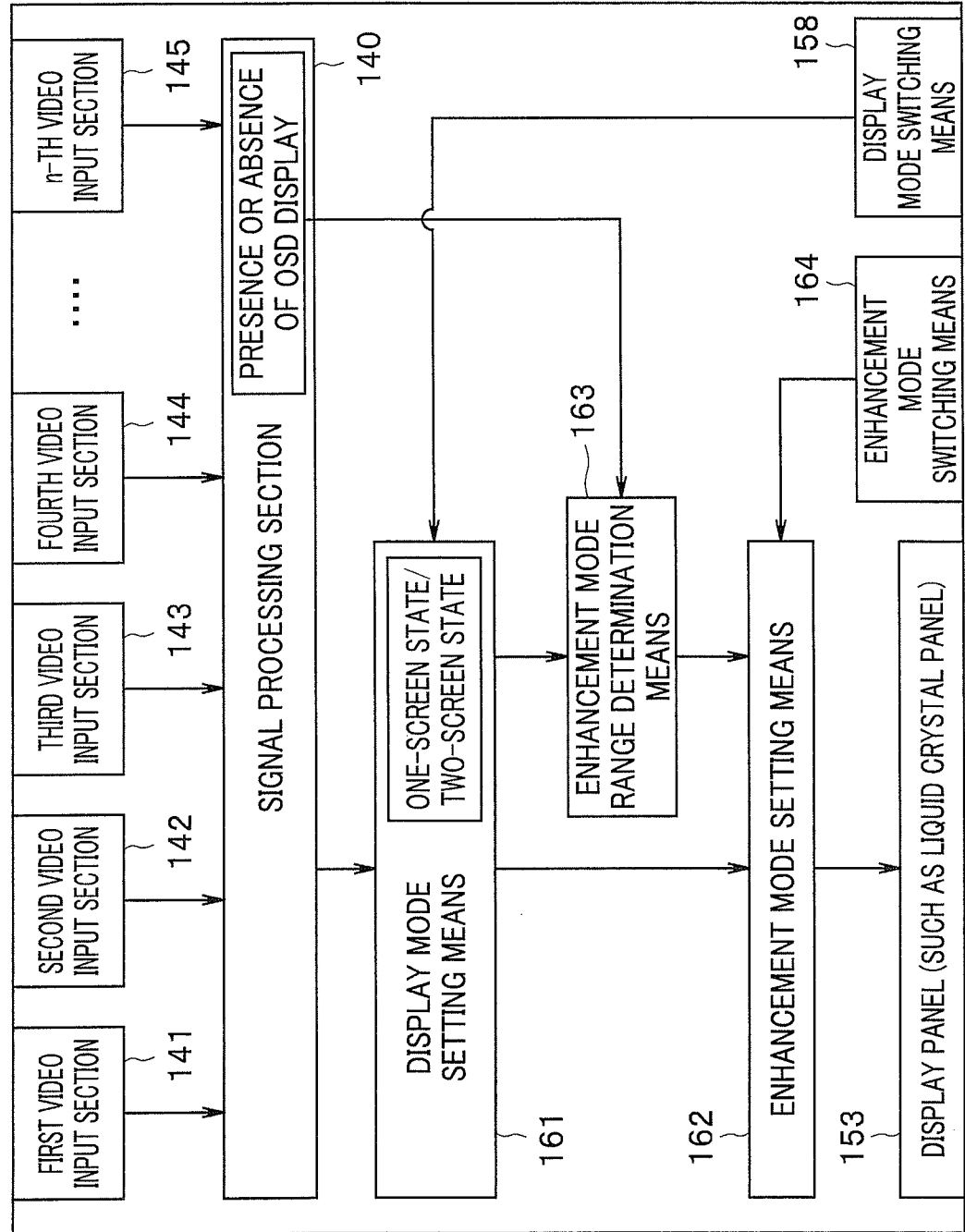
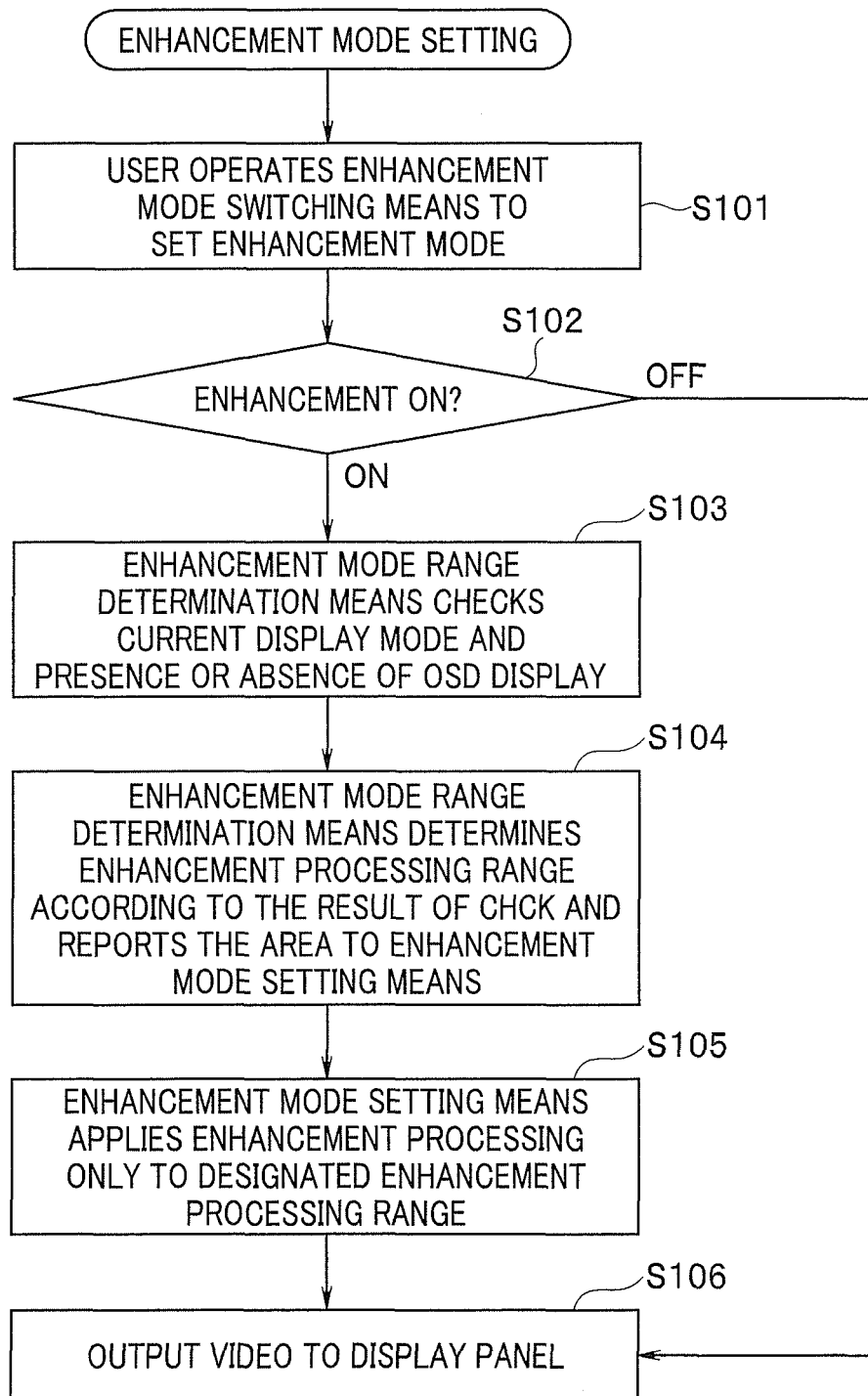


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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摘要(译)

一种医疗显示装置，包括：显示医学图像的显示面板53；观看输出端子54，能够输出反映与显示在显示面板53上的医用图像中反映的颜色设定值相同的颜色设定值的视频信号。通信单元56，其检测关于连接到所述观看输出终端54的外部设备的设备信息；第二颜色设定反映单元52，能够根据通信单元56的检测结果进一步改变从观看输出端54输出的视频信号中反映的颜色设定值。

