

CERTIFICATE OF TRANSLATION ACCURACY

I am a professional reviewer and coordinator specializing in translating Japanese, Korean, and Chinese to English and vice versa.

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I certify that the following document translated from Japanese to English is a true, correct, and complete translation of the corresponding source text to the best of my knowledge and ability.

I certify under penalty of perjury that the foregoing is true and correct.

Executed this 7th day of January 2025 in Contra Costa County of the State of California.

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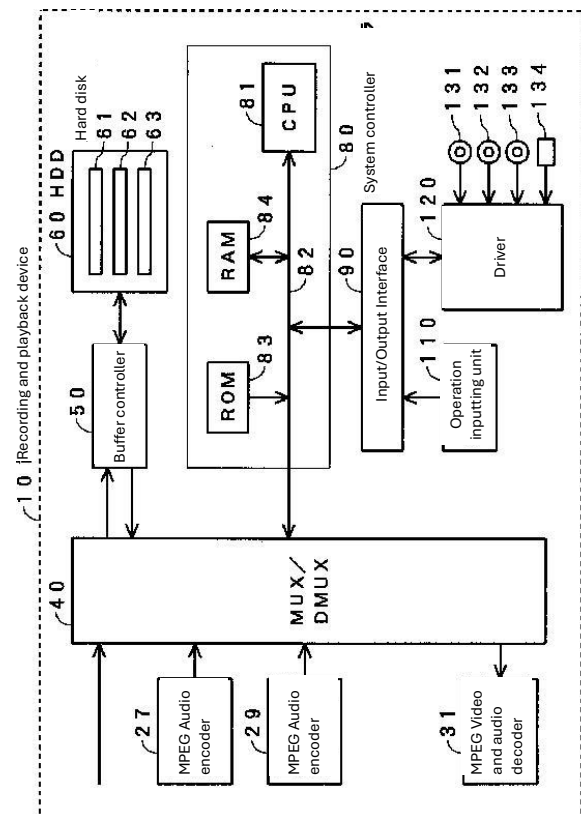
(54) [Title of the Invention]
IMAGE RECORDING AND PLAYBACK DEVICE, IMAGE RECORDING AND PLAYBACK METHOD, AND STORAGE MEDIUM

(57) ABSTRACT
PROBLEM

To effectively utilize the recording capacity of a storage medium without significantly increasing the capacity consumed for recording even when recording is scheduled for a program that has been broadcast a plurality of times, and to significantly reduce the burden of erasing operations on a user.

RESOLUTION MEANS

When the recording schedule setting information stored in RAM 84 is an update recording setting, a system controller 80 determines whether or not the past broadcast episodes of the program are in an erasable state, and if in an erasable state, erases the records from hard disks 61 to 63 and records the latest broadcast episodes on hard disks 61 to 63.



What is claimed is:

[Claim 1] An image recording and playback device, comprising:
 setting information storage means for storing program recording schedule setting information;
 image signal recording means for recording an image signal;
 management information storage means for storing information for managing the image signals recorded in the image signal recording means; and
 recording control means for controlling scheduled recording so as to erase past recordings of the program before recording the program when the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically.
 [Claim 2] The image recording and playback device according to claim 1, wherein when the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically, the controlling means controls the scheduled recording so that, prior to recording the program, past recordings of the program that are not forbidden from being erased are erased.
 [Claim 3] The image recording and playback device according to claim 1, wherein when the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically, the controlling means controls the scheduled recording so as to erase past recordings of the program, except for past recordings of the program that are being played back at the time of the scheduled recording of the program.
 [Claim 4] An image recording and playback method, comprising: a step of controlling a scheduled recording so as to erase a past recording of the program before recording the program when the program recording schedule setting information indicates that program recording is to be performed periodically.
 [Claim 5] The image recording and playback method according to claim 4, wherein the control step includes a controlling step of controlling the scheduled recording so that, when the program recording schedule setting information is a program recording schedule setting indicating that scheduled recording is to be performed periodically, past recordings of the program that are not forbidden from being erased are erased prior to recording the program.
 [Claim 6] The image recording and playback method according to claim 4, wherein the controlling step includes a step of controlling scheduled recording so as to erase past recordings of the program, except for past recordings of the program that are being played back at the time of scheduled recording of the program, when the program recording schedule setting information is a program recording schedule setting indicating that scheduled recording is to be performed periodically.
 [Claim 7] A storage medium for recording a computer-readable program, comprising: a controlling step of controlling scheduled recording so as to erase past recordings of the program prior to recording a program, when program recording schedule setting information is

a program recording schedule setting indicating that the program is to be recorded periodically.

DETAILED DESCRIPTION OF THE INVENTION

[0001]

TECHNICAL FIELD OF THE INVENTION

The present invention relates to scheduled recording, in particular for an image recording and playback device and an image recording and playback method.

[0002]

CONVENTIONAL TECHNOLOGY

Storage media such as hard disks or the like have achieved larger capacity, cheaper price, faster access speed for recording and playback to storage media, faster transmission speed for recording and playback, and faster processing for compressing and encoding image signals and audio signals including moving images, so image recording devices have been developed that use these technologies to compress and encode the image signals and audio signals of a television program, record the program, and decode and play back the program.

[0003] The image recording device enables recording image signals and audio signals of a plurality of television programs on a large capacity storage medium such as a hard disk, so there is desire for a device equipped with a function for setting the programs to be recorded and a recording control function for recording the set programs on the storage medium so that a plurality of programs can be scheduled for recording.

[0004] For example, in an image recording device having a function for scheduling and recording a program when a user schedules recording of a program that is broadcast a plurality of times, such as a serial drama, the user can schedule the recording of each episode of the program with a single recording schedule.

[0005]

PROBLEM TO BE SOLVED BY THE INVENTION

However, in this case, when recording a program that is broadcast a plurality of times, the recording capacity required to record all of the broadcasts becomes enormous. Furthermore, when a user deletes recorded broadcast episodes that have already been viewed and do not need to be kept, the deletion operation is a significant burden on the user.

[0006] Therefore, the present invention effectively utilizes the recording capacity of a storage medium without significantly increasing the capacity consumed for recording even when recording is scheduled for a program that has been broadcasted a plurality of times, and significantly reduces the burden of erasing operations by a user.

[0007]

MEANS FOR SOLVING THE PROBLEM

The image recording and playback device of the present invention includes: setting information storage means for storing program recording schedule setting information; image signal recording means for recording an image signal; management information storage means for storing information for managing the image signals recorded in the image signal recording means; and recording control means for controlling scheduled recording so as to erase past recordings of the program before recording the program when the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically.

[0008] When the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically, the controlling means can control the scheduled recording so that, prior to recording the program, past recordings of the program that are not forbidden from being erased are erased.

[0009] Furthermore, when the program recording schedule setting information stored in the setting information storage means is a program recording schedule setting indicating that scheduled recording is to be performed periodically, the controlling means can control the scheduled recording so as to erase past recordings of the program, except for past recordings of the program that are being played back at the time of the scheduled recording of the program.

[0010] The image recording and playback method of the present invention includes a step of controlling a scheduled recording so as to erase a past recording of the program before recording the program when the program recording schedule setting information indicates that program recording is to be performed periodically.

[0011] Furthermore, the image recording and playback method of the present invention includes a controlling step of controlling the scheduled recording so that, when the program recording schedule setting information is a program recording schedule setting indicating that scheduled recording is to be performed periodically, past recordings of the program that are not forbidden from being erased are erased prior to recording the program.

[0012] Furthermore, the image recording and playback method of the present invention includes a controlling step of controlling scheduled recording so as to erase past recordings of the program, except for past recordings of the program that are being played back at the time of scheduled recording of the program, when the program recording schedule setting information is a program recording schedule setting indicating that scheduled recording is to be performed periodically.

[0013] The program for recording on storage media of the present invention includes a step of controlling a scheduled recording so as to erase a past recording of the program before recording the program when the program recording schedule setting information indicates that program recording is to be performed periodically.

[0014]

EMBODIMENT OF THE INVENTION

[System configuration of a recording and playback device]

FIGS. 1 and 2 depict an example of the recording and playback device of the present invention, in which video and audio signals are compressed and encoded by the Moving Picture Experts Group (MPEG) method,

multiplexed, and recorded on a hard disk in a hard disk drive (HDD) as a transport stream (TS) of the MPEG system, and then played back from the hard disk.

[0015] Note that analog video signals and analog audio signals will be referred to as video signals and audio signals, and digital video signals and digital audio signals will be referred to as digital video data and digital audio data, or simply as video data and audio data.

[0016] In this example, the recording and playback device 10 is connected to an antenna 1 for receiving analog television broadcasts, and includes analog input terminals 11V, 11A, 11S, analog output terminals 12V, 12A, 12S, a digital input/output terminal 15, a digital interface 17, an input processing unit 20, an output processing unit 30, a multiplexer/demultiplexer 40, a buffer controller 50, a hard disk drive 60, a synchronization control circuit 70, a system controller 80, an input/output interface 90, an operation input unit 110 and a driver 120.

[0017] In this example, the hard disk drive 60 includes three hard disks 61, 62, 63, and is configured so that a transport stream is recorded on any one hard disk, and the transport stream is reproduced from any one of the hard disks.

[0018] The system controller 80 includes a CPU (Central Processing Unit) 81 and is configured by connecting ROM (Read Only Memory) 83, RAM (Random Access Memory) 84, and the like to a host bus 82.

[0019] The ROM 83 stores in advance a program to be executed by the CPU 81, and the CPU 81 reads the program and controls each unit of the recording and playback device 10. Other programs and data necessary for the CPU 81 to control each unit of the recording and playback device 10 are written in RAM 84 as appropriate.

[0020] An operation input unit 110 includes a keyboard, a mouse, buttons, switches, a remote commander, and the like, and is connected to the host bus 82 via the input/output interface 90.

[0021] The driver 120 is also connected to the host bus 82 via the input/output interface 90. The driver 120 is configured so that a magnetic disk 131, an optical disk 132, a magneto-optical disk 133, a semiconductor memory 134, or the like can be mounted thereon, and installs programs recorded thereon into RAM 84, as will be described later.

[0022] (Analog Input Processing and Recording)
An analog television broadcast signal received by antenna 1 is selected by a tuner 21 in accordance with instructions from the system controller 80 based on operations of the operation input unit 110, and composite video and audio signals of the selected channel are obtained from tuner 21. The composite video and audio signals are then supplied to one input end of an input switching circuit 22.

[0023] A composite video signal is supplied to the input terminal 11V from an external device, an audio signal is supplied to the input terminal 11A from the external device, and a separate video signal is supplied to the input terminal 11S from an external device.

[0024] The composite video signal from the input terminal 11V and the audio signal from input terminal 11A are supplied to the other input end of the input switching circuit 22, the input switching circuit 22 is switched by the system controller 80, and one of the composite video signal and audio signal is selected and extracted from the input switching circuit 22.

[0025] The composite video signal from the input switching circuit 22 is separated into a luminance signal and a color difference signal by a YC separation circuit 23, and supplied to one input terminal of another input switching circuit 24. In addition, the separate video signal (luminance signal and color difference signal) from the input terminal 11S is supplied to the other input terminal of the input switching circuit 24, and the input switching circuit 24 is switched by the system controller 80, and either the luminance signal or the color difference signal is selected and output from the input switching circuit 24.

[0026] The luminance signal and color difference signal from the input switching circuit 24 are A/D (Analog to Digital) converted and further chroma encoded by an NTSC (National Television System Committee) decoder 25, and the component video data is obtained from the NTSC decoder 25.

[0027] In addition, the NTSC decoder 25 separates a vertical synchronizing signal and a horizontal synchronizing signal from the luminance signal from the input switching circuit 24, and generates a clock and a field discrimination signal based on the separated synchronizing signal. The synchronizing signal, clock, and field discrimination signal are supplied to a synchronization control circuit 70. In the synchronization control circuit 70, the clocks and timing signals required for each unit of the recording and playback device 10 are generated based on these signals, and are supplied to each unit of the recording and playback device 10.

[0028] The video data from the NTSC decoder 25 is subjected to processing, such as pre-filtering or the like in a video pre-processing circuit 26, and is then supplied to an MPEG video encoder 27 and a post-video processing circuit 32 of an output processing unit 30.

[0029] The MPEG video encoder 27 performs encoding processing such as block DCT (Discrete Cosine Transform) on the video data from the pre-video

processing circuit 26 to generate a video elementary stream (ES). The video elementary stream is then supplied to a multiplexer/demultiplexer 40.

[0030] On the other hand, the audio signal from the input switching circuit 22 is converted into digital audio data by an A/D converter 28 and then supplied to an MPEG audio encoder 29 and an output switching circuit 35 of an output processing unit 30.

[0031] In the MPEG audio encoder 29, the audio data from the A/D converter 28 is compression-encoded by the MPEG method to generate an audio elementary stream, and the audio elementary stream is then supplied to a multiplexer/demultiplexer 40.

[0032] In the multiplexer/demultiplexer 40, the video elementary stream from the MPEG video encoder 27 and the audio elementary stream from the MPEG audio encoder 29 are multiplexed with various control signals to generate an MPEG system transport stream, and the transport stream is sent to the buffer controller 50.

[0033] The buffer controller 50 intermittently transmits the transport stream, which is continuously input from the multiplexer/demultiplexer 40, to the hard disk drive 60. In other words, writing is not possible when the hard disk drive 60 is performing a seek operation, so the input transport stream is temporarily stored in a buffer, and when the hard disk drive 60 is capable of writing, the transport stream is read from the buffer at a rate higher than the input rate and transmitted to the hard disk drive 60. As a result, the transport stream continuously input to the buffer controller 50 is recorded to the hard disks 61 to 63 without interruption.

[0034] The hard disk drive 60 is controlled by the system controller 80 to write the transport stream to the hard disks 61 to 63. The protocol (interface) used between the buffer controller 50 and the hard disk drive 60 is IDE (Integrated Drive Electronics) or the like.

[0035] (Playback and Analog Output Processing) During playback, the hard disk drive 60 is controlled by the system controller 80 to read the transport stream from the hard disks 61 to 63 and to transmit the transport stream to the buffer controller 50. Contrary to the case of recording, the buffer controller 50 converts the transport stream intermittently input from the hard disk drive 60 into a continuous transport stream, and supplies the transport stream to the multiplexer/demultiplexer 40.

[0036] In the multiplexer/demultiplexer 40, the header of the continuous transport stream is analyzed in the demultiplexer, whereby a PES (Packetized Elementary Stream) is separated from the transport stream and supplied to an MPEG video and audio decoder 31.

[0037] In the MPEG video and audio decoder 31, the PES from the multiplexer/demultiplexer 40 is separated into a video elementary stream and an audio elementary stream, and the video elementary stream is further decoded by an MPEG video decoder and converted into baseband video data, and the audio elementary stream is decoded by an MPEG audio decoder and converted into baseband audio data. The converted video data is supplied to the post-video processing circuit 32, and the converted audio data is supplied to the output switching circuit 35.

[0038] In the post-video processing circuit 32, the video data from the MPEG video and audio decoder 31 and the video data from the pre-video processing circuit 26 are subjected to processing such as switching between the data, synthesis, and post-filtering, based on instruction from the system controller 80.

[0039] The post-video processing circuit 32 also generates representative screens for a GUI (Graphical User Interface), reduces a plurality of representative screens, and pastes the screens into a window. The processed video data is then supplied to an OSD (On Screen Display) processing circuit 33.

[0040] In the OSD processing circuit 33, image data corresponding to text information or the like is generated and processed to superimpose the video data from the post-video processing circuit 32 on the video data of the window portion described above, in response to instructions from the system controller 80, and the processed video data is supplied to the NTSC encoder 34.

[0041] In the NTSC encoder 34, the video data (component video data) from the OSD processing circuit 33 is converted into luminance data and color difference data, or is directly D/A (Digital to Analog) converted without the aforementioned conversion, to generate a separate video signal and a composite video signal, each of which is an analog signal. The separate video signal is output to an output terminal 12S, and the composite video signal is output to an output terminal 12V.

[0042] On the other hand, in the output switching circuit 35, either the audio data from the MPEG video/audio decoder 31 or the audio data from the A/D converter 28 is selected and removed by the system controller 80. The selected audio data is converted to an analog audio signal by the D/A converter 36, and output to the output terminal 12A.

[0043] The separate video signal sent to output terminal 12S, the composite video signal sent to output terminal 12V, and the audio signal sent to output terminal 12A

are output to a monitor device 2 such as an external television receiver, whereby an image is displayed and audio is output on the monitor device 2.

[0044] (Recording and playing back video and audio data from an external device)

In this example, the recording and playback device 10 is configured such that a digital interface 17 is connected between the digital input/output terminal 15 and the multiplexer/demultiplexer 40, and by connecting an external device 5 to the digital input/output terminal 15, the transport stream input from the external device 5 can be recorded on the hard disks 61 to 63, and the transport stream can be played back from the hard disks 61 to 63 to the external device 5.

[0045] Devices such as an IRD (Integrated Receiver Decoder) and a personal computer can be connected as the external device 5. An IEEE (Institute of Electrical and Electronics Engineers) 1394 digital interface is used as the digital interface 17, and an IEEE 1394 serial bus is used as the serial bus 6 connecting the external device 5 and the digital input/output terminal 15.

[0046] The transport stream input from the external device 5 to the digital input/output terminal 15 via the serial bus 6 is interfaced by the digital interface 17 and transmitted to the multiplexer/demultiplexer 40, then transmitted from the multiplexer/demultiplexer 40 to the buffer controller 50, and recorded on hard disks 61 to 63 by the hard disk drive 60.

[0047] At the same time, the demultiplexer of the multiplexer/demultiplexer 40 separates the PES from the transport stream to be recorded and supplies the PES to the MPEG video and audio decoder 31, thereby enabling obtaining analog video signals and analog audio signals at the output terminals 12V, 12S and 12A.

[0048] During playback, the hard disk drive 60 reads the transport stream from the hard disks 61 to 63, and the played-back transport stream is sent to the buffer controller 50, sent from the buffer controller 50 to the multiplexer/demultiplexer 40, interfaced by the digital interface 17 and output to the digital input/output terminal 15, and then sent from the digital input/output terminal 15 via the serial bus 6 to the external device 5, where images are displayed and audio is output on the monitor device 7 connected to the external device 5.

[0049] At the same time, the demultiplexer of the multiplexer/demultiplexer 40 separates the PES from the transport stream that was played back and supplies the PES to the MPEG video and audio decoder 31, thereby enabling obtaining playback analog video signals and playback analog audio signals at the output terminals 12V, 12S and 12A.

[0050] [Embodiment of Update Recording]

An example of an update recording processing method will be described below for the recording and playback device 10 when a user schedules updated recording, in the aforementioned recording and playback device 10.

[0051] Herein, update recording refers to periodically deleting past programs while recording and saving only the latest program, for programs to be updated having recording schedule setting information stored in RAM 84, and for example, when recording a serial drama or news program that is broadcast daily or weekly, only the latest broadcast episode is recorded on the hard disks 61 to 63.

[0052] FIG. 3 depicts an example of an update recording processing routine executed by the system controller 80 in this case. As depicted in FIG. 4, it is assumed that operations and settings for an update recording schedule have already been performed at time *t*₀, and the recording schedule setting information for the program to be update recorded is already stored in the RAM 84.

[0053] During this update recording processing routine, first in step S1, the system controller 80 compares the current date and time information from a clock (not depicted in FIGS. 1 and 2) with the recording start date and time in the recording schedule setting information of the program to be update recorded and stored in RAM 84 to determine whether the recording start date and time has been reached, and if so, the process proceeds to step S2 to determine whether the program to be update recorded has been recorded in the past and is stored in the hard disks 61 to 63.

[0054] Furthermore, if the target program has not been recorded in the past, or has been recorded but has been erased, the system controller 80 proceeds from step S2 to step S3, and records the target program.

[0055] If the program to be update recorded has been recorded in the past and is stored in the hard disks 61 to 63, the process proceeds from step S2 to step S4 to determine whether the recorded and stored program is protected from erasure or not, and if not protected, the process proceeds to step S5 to determine whether the recorded and stored program is currently being played back or not, and if not being played back, the process proceeds from step S5 to step S6 to perform update recording.

[0056] If a determination is made in step S5 that the recorded and stored program is currently being played back, the system controller 80 proceeds from step S5 to step S7 and performs update recording excluding the program currently being played back.

[0057] If a determination is made in step S4 that the recorded and stored program is protected from erasure, the system controller 80 proceeds from step S4 to step S8 and performs update recording that excludes the protected programs and the programs being played back.

[0058] As described above, when recording a program for which update recording is scheduled, the program

can be recorded after erasing the corresponding program that has already been recorded.

Even when recording a program for which update recording is scheduled, if the corresponding program that has already been recorded is protected against erasure, the program can be recorded without erasing being performed. Furthermore, even if a program for which update recording has been scheduled is to be recorded, if the corresponding program that has already been recorded is being played back, the program can be recorded without erasing being performed.

[0059] The above example is a case where the update recording process is achieved by software. When the update recording process is achieved by software in this manner, the programs constituting the software are installed from a storage medium into the system controller 80, which is a computer incorporated therein. If the recording and playback device 10 is constituted of dedicated hardware, but if the recording and playback device 10 is constituted as a general-purpose personal computer that can execute various functions by installing various programs, the programs are installed from the storage media to the personal computer.

[0060] As depicted in FIG. 2, the storage medium is not only composed of package media such as magnetic disks (including floppy (registered trademark) disks) 131 on which the program is recorded, optical disks (including CD-ROM (Compact Disk-Read Only Memory) and DVD (Digital Versatile Disk)) 132, magneto-optical disks (including an MD (Mini Disks)) 133, or semiconductor memory 134, which are distributed separately from the recording and playback device 10 (computer) in order to provide the program to the user, but may also be composed of ROM 83 on which the program is stored, and hard disks 61 to 63 included in hard disk drive 60, which are provided to the user in a state in which the programs are pre-installed in the recording and playback device 10 (computer).

[0061] The steps described in the program recorded on the storage medium include processes that are executed chronologically in the order described in the claims, as well as processes that are not executed chronologically, but are executed in parallel or individually.

[0062] The update recording process can also be achieved by hardware rather than software.

[0063] [Other Embodiments]

In the aforementioned embodiment, the video data and audio data are compressed using the MPEG format, but may be compressed using other compression formats, or may not be compressed and may simply be converted to digital data or may remain as digital data.

[0064] Furthermore, in the aforementioned embodiment, a hard disk was used as the storage medium of the recording and playback device, but an optical disk, magneto-optical disk, semiconductor memory, or the like may also be used.

[0065]

EFFECT OF THE INVENTION

As described above, the present invention can effectively utilize the recording capacity of a storage medium without significantly increasing the capacity consumed for recording, even when recording is scheduled for a program that has been broadcasted a plurality of times, and can thus significantly reduce the burden of erasing operations by a user.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram depicting a portion of an example of a recording and playback device according to the present invention;

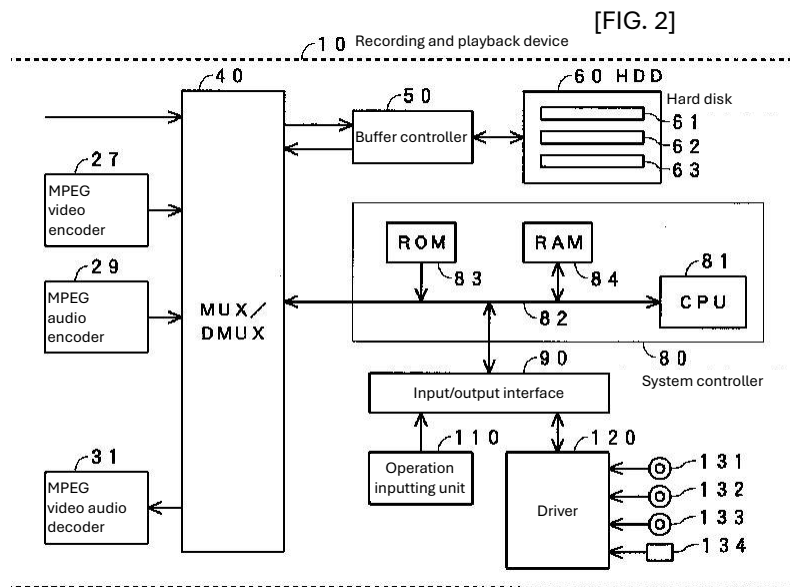
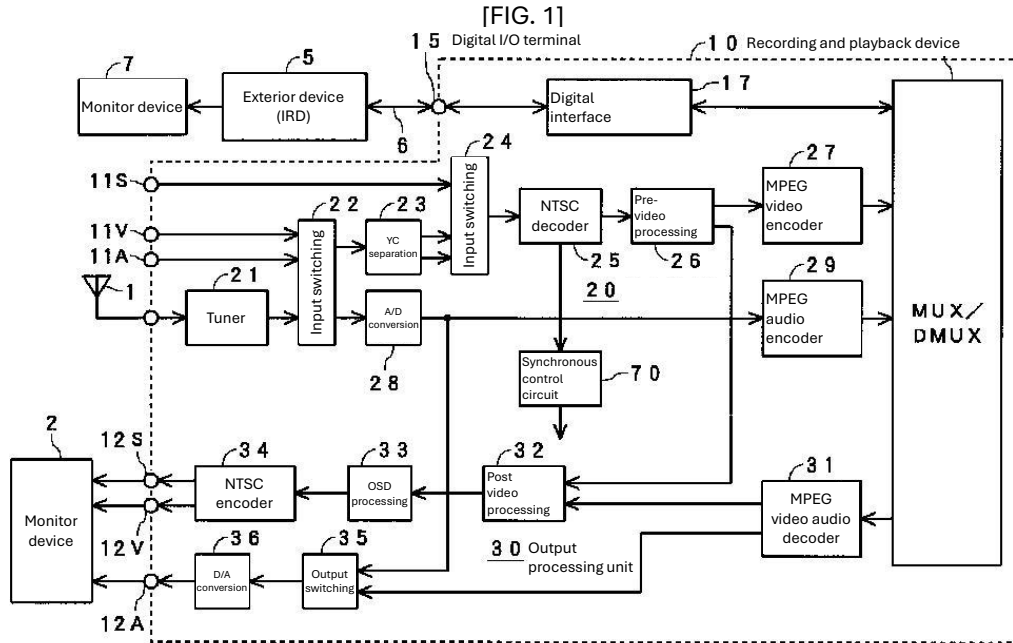
FIG. 2 is a diagram depicting a portion of an example of a recording and playback device according to the present invention;

FIG. 3 is a diagram depicting an example of an update recording processing routine performed by a system controller; and

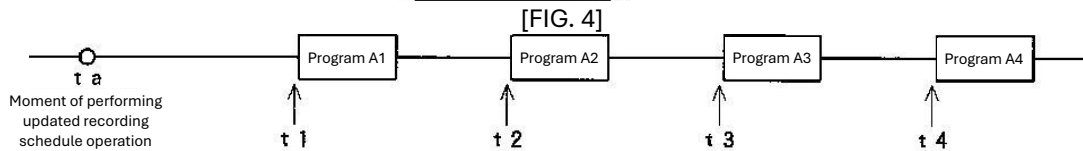
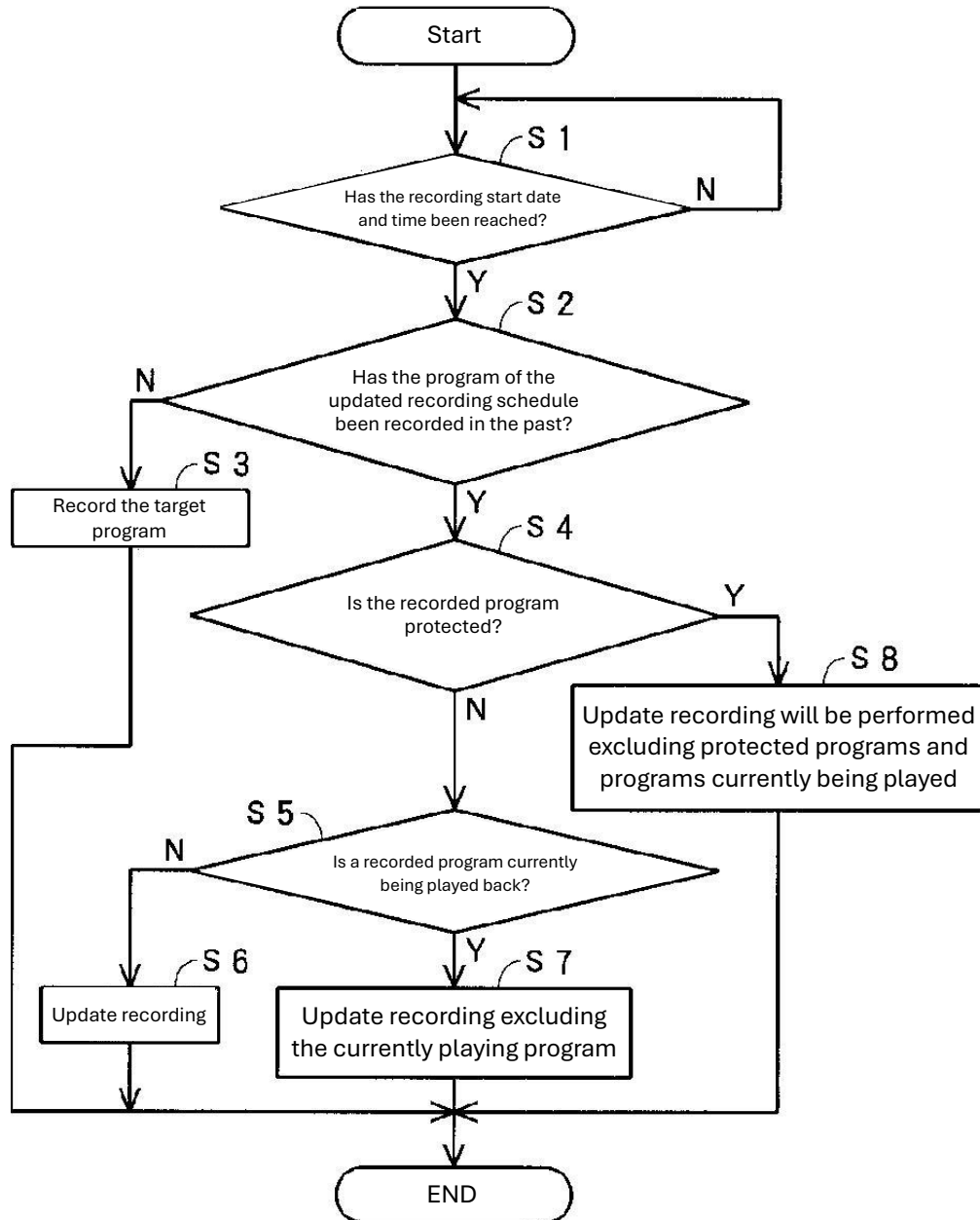
FIG. 4 is a diagram for describing update recording.

DESCRIPTION OF REFERENTIAL NUMERALS

All the names of the main parts are already described in the figures below, so they are omitted here.



[FIG. 3]
Recording Processing Update Routine



Continued from front page

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5D110 AA13 DA13 DA16 DA17 DB09
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