

(19) Japan Patent Office (JP)

(12) **Japanese Unexamined Patent Application Publication (A)**

(11) **Japanese Unexamined Patent Application Publication**
2001-128280
(P2001-128280A)

(43) Publication date: May 11, 2001

(51) Int. Cl. ⁷	Identification codes	FI	Theme code (reference)
H04R 3/00	310	H04R 3/00	5D020
G11B 31/00	511	G11B 31/00	
	519		
	525		
			310
			511Z
			519A
			525Z

Request for examination: Not yet requested Number of claims: 6; OL (Total of 16 pages)

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		F term (reference)	5D020 AC01 AC10

(54) [TITLE OF THE INVENTION] AUDIO DEVICE

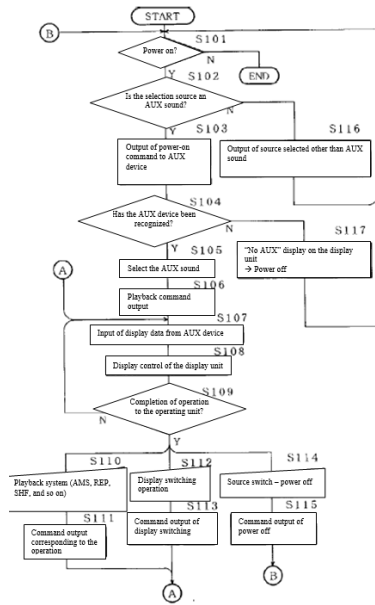
(57) Abstract

[PURPOSE]

To enhance the operability of a user interface function in a system where the sound of a portable audio device is output by an on-vehicle audio device.

[CONSTITUTION] A headphone terminal of a portable audio device is connected to an AUX terminal of an on-vehicle audio device. Thus, display information and operation information signal can be communicated as user interface information. Then in the on-vehicle audio device, an operation information signal in response to an operation applied to its own operating unit is output to the portable audio device to be controlled. Furthermore, based on the display information output from the portable audio device, the operating state of the portable audio device is displayed by its own display unit. Thereby, the user interface function of the portable

audio device can be realized by the on-vehicle audio device.



[Scope of Patent Claims]

[Claim 1] An audio device, characterized in that the audio device comprises

an audio signal input terminal for inputting an audio signal output from an external audio device,
an output means capable of outputting the audio signal input from said audio signal input terminal,
a user interface input/output terminal for inputting or outputting a predetermined user interface information between said external audio device and the audio device, and

a control means that can perform a necessary control based on an output of a predetermined user interface information via said user interface input/output terminal or a predetermined user interface information input via said user interface input/output terminal.

[Claim 2] The audio device according to claim 1, characterized in that said control means is configured to be able to output as said user interface information the control information for controlling said external audio device; the information of which was generated based on the operation performed to the operation means provided in the audio device.

[Claim 3] The audio device according to claim 1, characterized in that said control means is configured to be able to perform a necessary display on a display means provided in the audio device based on the display information as said interface information output from said external audio device, the display information of which was input via said user interface input means.

[Claim 4] The audio device according to claim 1, characterized in that, in said external audio device, a terminal group comprising a terminal connected to said audio signal input terminal and a terminal connected to said user interface input/output terminal is arranged in a form of capable being connected to one connector, and a terminal group comprising said audio signal input terminal of said audio device and said user interface input/output terminal is arranged in a form of capable of being connected to one connector of the other side connected via a cable to the connector to which said terminal group of said external audio device is connected.

[Claim 5] The audio device according to claim 1, characterized in that, in said external audio device, the terminal group comprising a terminal connected to said audio signal input terminal and a terminal connected to said user interface input/output terminal outputs as a sound an audio signal output from this external audio device, and at the same time, is connected to a connector of a voice output means with a user interface function having a predetermined user interface function corresponding to the input and output of the predetermined user interface information.

[Claim 6] The audio device according to claim 1,

characterized in that the audio device is used as an on-vehicle device.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The present invention relates to an audio device that can input an audio signal output from an external audio device, by being connected to the external audio device, and output it as a sound to a speaker, for example.

[0002]

[Prior Art] In recent years, portable audio devices adopting a configuration suitable to be carried around as audio devices have been known widely. Such portable audio devices have been known to be able to play media, such as cassette tapes, CDs (Compact Disc), MDs (Mini Disc), for example, and to record on recordable media.

[0003] Such portable audio device is usually connected to a headphone to listen to this audio output device. Such headphone has been known to be provided with an operating unit to a cable between an ear driver of the headphone and the portable audio device, for example. A user operates this operating unit to perform various operations such as playback, and so forth, to the portable audio device. Also, said operating unit has been known to be provided with a small display unit by a liquid crystal display, or the like, allowing the user to see the display content displayed on this display unit to know the present playback status of the portable audio device. For example, it is possible to know various statuses including the track number being played, the playback progress time of the track, and so on.

[0004] Audio devices mounted on vehicles have been popular in recent years. As one of those on-vehicle audio devices, for example, audio devices called head unit are known. This head unit is mounted with an audio device, such as a playback apparatus corresponding to a predetermined recording medium and a tuner, for example, and the audio signal output from this audio device can be output as a sound by a speaker. It has an operation panel for comprehensively controlling this audio device and a display unit for displaying its operating status. As necessary, for example, a user can connect another audio device to this head unit and build an audio system that can reproduce a sound via this head unit.

[0005]

[Problem to be solved by the invention] By the way, it is naturally conceivable that, depending on each user, one may wish to hear the sound reproduced by a portable audio device inside a car. To fulfil such a

request, a configuration has been known where the on-vehicle audio device like a head unit is connected to a portable audio device using, for example, a cable, or the like, to input the audio signal output from this portable audio device. And this head unit operates to output this input audio signal as a sound from a speaker.

[0006] However, under the present circumstances, connecting a portable audio device and a head unit only inputs/outputs the audio signal. To put it another way, this means that there is no input/output of the control information on a user interface, and so forth, between the portable audio device and the head unit.

[0007] This presents the following problems. That is, when the sound currently reproduced by the portable audio device is output by the head unit, the operation of the portable audio device must be controlled using the operating unit on the portable audio device side. When one would like to check the playback status, one would need to look at the display unit on the portable audio device side. This display unit is small, so it is hard for the user to see. Some display units of such portable audio devices may not have a backlight, so it becomes almost impossible to see the display content of such a display unit at night. Some portable audio devices have a display unit only in the middle of the cable of the headphone, without having a display unit in the device itself. In such type of a device, when an audio output terminal is only this headphone terminal, it becomes impossible to check the playback status since the audio output terminal in this headphone terminal is used for connection to the head unit.

[0008] Thus, when the audio signal reproduced by the portable audio device is output by an audio device, such as a head unit; user interface such display and operation such as playback must be performed at the portable audio device side, so these devices are not user-friendly, which is a problem.

[0009]

[Means for solving problem] Taking the above problem into consideration, the present invention has an objective to improve usability by achieving a user interface function of an external audio device on an audio device when a system is built so that the sound output from the external audio device can be output as a sound by the audio device.

[0010] For this reason, the audio device is constituted as follows. The audio device comprises an audio signal

input terminal for inputting an audio signal output from an external audio device, an output means capable of outputting the audio signal input from this audio signal input terminal, a user interface input/output terminal for inputting or outputting a predetermined user interface information between the external audio device and the audio device, and a control means that can perform a necessary control based on an output of the predetermined user interface information via this user interface input/output terminal or a predetermined user interface information input via the user interface input/output terminal.

[0011] According to the above-mentioned configuration, in addition to the function of inputting the sound output from an external audio device to be output as a sound in the audio device of the present invention, the audio device of the present invention can be added with a predetermined user interface function corresponding to the external audio device based on the user interface information input/output between the audio device of the present invention and the external audio device.

[0012]

[Mode for Carrying Out the Invention] Examples of embodiment of the invention will be described below. Here, an on-vehicle audio device called a head unit will be made as an example of the audio device of the embodiment of the invention. Although there is no need to particularly limit the external audio device connected to the on-vehicle audio device of this embodiment, used in this example was an MD recorder/player capable of recording and playing audio data on a magneto-optical disc called MD (Mini Disc). This MD recorder/player has a portable configuration.

[0013] First, the outline of the audio system as this embodiment will be described with reference to FIG. 1 and FIG. 2. The audio system of the present invention shall be the on-vehicle audio device as the above-mentioned head unit and the portable MD recorder/player.

[0014] FIG. 1 shows the appearance of the portable MD recorder/player, which is the external audio device. The MD recorder/player 1 shown in this drawing has a predetermined size as a portable. A disk cartridge 91 that stores MD 90 can be loaded to this MD recorder/player 1. The MD recorder/player 1 records or replays [the audio data] of MD 90 in this disk cartridge that has been loaded. In addition to a predetermined terminal group provided as a headphone terminal 21, the main part of this MD recorder/player 1 in this case is also provided with an audio signal input terminal, and so on, that can input the audio signal for recording such as a microphone jack, a line input terminal, or the like; and as necessary, a line output that outputs a play-

back audio signal may also be provided. The graphic illustration thereof will be omitted here. An operating unit for performing a certain operation on recording playback, and so on, and a display unit may also be provided here; however, those graphic illustrations are also omitted here. A headphone terminal 21 is provided to connect a headphone 30, which will be described next.

[0015] The headphone 30 is attached so that a user can hear the playback sound of the MD recorder/player 1. The headphone 30 in this case is provided with a connector part 32 at one end of the cable 31 and an ear driver 34 comprising a pair of ear drivers for right and left ears at the other end as shown in the drawing, for example. The connector 32 is connected to fit the headphone terminal 21 of the MD recorder/player 1. And when the disk is played in the MD recorder/player 1, the playback sound will be output to the ear driver 34.

[0016] An operating/display unit 33 is provided in the middle of the cable 31 of the headphone 30. This operating/display unit 33 is provided with various operators for performing a certain operation on playback, and so forth, to the MD recorder/player 1; for example, a user holds this operating/display unit 33 to perform a certain operation to operate the MD recorder/player 1. A small window is provided on the operating/display unit 33 as a display panel 33a. This display panel 33a is constituted by a liquid crystal display, or the like, for example. If registered, the track number or the track name will be displayed in character on this display panel 33a. The setting of playback modes, such as the progress time of playback track, repeat, shuffle, and program playback, is also displayed. The user can grasp the playback status of the MD recorder/player 1 by viewing this display panel 33a.

[0017] The function of such operating/display unit 33 is achieved by forming, via the headphone terminal 21 and the connector area 32, a route that transmits the audio signal (analog audio signal) reproduced at least by the MD recorder/player 1 to the ear driver 34, a route that transmits to the MD recorder/player 1 the operation information signal based on the operation performed to the operating/display unit 33, and a route that transmits the display information for display from the MD recorder/player 1 to the operating/display unit 33.

[0018] FIG. 2 is a perspective view showing a system comprising the MD recorder/player 1 as an external device shown in FIG. 1 and an on-vehicle audio device, which is the audio device of this embodiment. The on-vehicle audio device 50 shown in this drawing is used by mounting the front panel 51 so as to be exposed to

the user side, with respect to the front console inside an automobile. In this case, the front panel 51 of the on-vehicle audio device 50 has a function as a user interface by being provided with an operating unit 54 and a display unit 53.

[0019] Operators, such as various keys, a jog dial, and other components, for operating the on-vehicle audio device 50 are arranged as the operating unit 54 at a predetermined position on the front panel 51.

[0020] The display unit 53 displays necessary information according to the operation status of the on-vehicle audio device 50. For example, the on-vehicle audio device 50 allows a user to select an AUX sound, which is the input sound of the external audio device connected to the on-vehicle audio device 50, a CD sound, or a tuner sound as the audio source as will be mentioned below, and the display unit 53 displays the selection choice of these audio sources. The operating status according to this selected source is also displayed. For example, when the CD sound is selected, the track of CD currently played, its playback time, and other information will be displayed.

[0021] A CD loading slot 52 into which a CD is inserted is provided at the front panel 51. A user can insert a CD into or eject it from this CD loading slot 5.

[0022] As has been described above, the on-vehicle audio device 50 is provided with a CD player that plays a CD and a tuner as an output source of an audio source. The AUX sound for corresponding to the external audio device can also be input. [A user] can choose any of these audio sources by a certain operation to the operating unit 54 to allow the sound output from the speaker in the car, not illustrated here.

[0023] An AUX input terminal 55 is provided to the side surface of the front panel 51 to allow the on-vehicle audio device 50 of this embodiment to be connected with the portable MD recorder/player 1, which is the external audio device. The MD recorder/player 1 can be connected to the on-vehicle audio device 50 as the source of an AUX sound by connecting the AUX input terminal 55 of this on-vehicle audio device 50 and the headphone terminal 21 of the MD recorder/player 1 with an adapter cable 40.

[0024] In this case, the adapter cable 40 is configured to have connectors 42 and 42 to be connected to both ends of the cable 41. Here, the form of the AUX input terminal 55 is configured to be the same as that of the headphone terminal 21, and both connectors 42 and 42 of the adapter cable 40 also have the same form of plug. Although the shape of the AUX input terminal 55 is not always

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