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(54) **RECEIVER APPARATUS**

(57) A receiving apparatus includes: an audio-signal-generating unit to generate an audio signal from a received signal received by a tuner; a control-signal output unit to output a control signal for controlling an audio-signal process on the audio signal, based on the received signal; an audio-signal-processing unit to perform the audio-signal process in accordance with the control signal, on the audio signal, and output the processed signal; and a receiving-station-control unit to control a receiving station of the tuner, and acquire information pertaining to a station-reception state, based on the received signal, wherein the receiving-station-control unit stores the control signal based on the received signal of a first receiving station, according to an instruction from an integrated-control unit, which integrally controls: the audio signal generating unit; the control signal output unit; the audio signal processing unit; and the receiving station control unit, when the receiving station is switched from the first receiving station to a second receiving station, wherein the receiving-station-control unit outputs the stored control signal to the audio-signal-processing unit according to the instruction, when the receiving station is returned to the first receiving station.

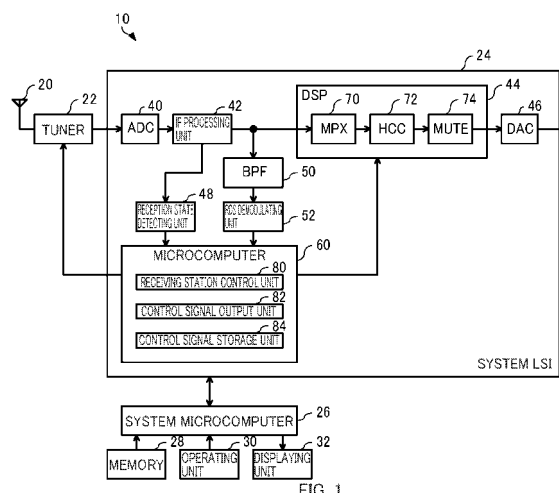


FIG. 1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a receiving apparatus.

Description of the Related Art

[0002] A system has been put to practical use, which multiplexes data on a broadcast station, a song title, etc., and distributes the data with radio broadcast signals. Such a system is known as RDS (Radio Data System) in Europe and RBDS (Radio Broadcasting Data System) in the United States, for example.

[0003] For example, in the case of RDS, alternative station data indicative of a frequency of an alternative station broadcasting the same program is superimposed on a broadcast signal. An RDS receiver receiving the RDS broadcast signals switches a station receiving the broadcast signals from a broadcast station designated by a user to the alternative station to detect the reception level of the alternative station, in each predetermined period based on the alternative station data; and switches the receiving station back to the original broadcast station to continue receiving. Further, if the reception level is decreased, the RDS receiver switches the receiving station from the broadcast station designated by a user to the alternative station to detect the reception level and automatically switches the receiving station to the alternative station with a higher reception level, for example.

[0004] In the case where the receiving station is switched to the alternative station, such an RDS receiver generally mutes an audio signal in order to reduce awkwardness in reproduced sound. Then, the audio signal is unmuted when the receiving station is returned to the original station or is switched to the alternative station with a higher reception level (e.g., Japanese Laid-Open Patent Publication No. H10-163895). A radio receiver including an RDS receiver often performs audio signal processes such as stereo noise control and high-cut control, based on a reception level of a received signal or an adjacent interference level, for example (e.g., Japanese Laid-Open Patent Publication No. H6-315016).

[0005] In the case where an RDS receiver performs an audio signal process based on a received signal, if a receiving station is switched to an alternative station, the control of the audio signal process performed for the original broadcast station is reset to initiate an audio signal process based on the received signal of the alternative station. Thereafter, when the receiving station is switched back to the original station and the muting is canceled, an audio signal process is newly initiated based on the received signal of the original station. In this case, it takes time to restore the state of the audio signal process based on the received signal into the state at the time before

the switching and stabilize it, which may cause awkwardness in reproduced sound.

[0006] The present invention has been made in view of the above problem and an object thereof is to reduce awkwardness in reproduced sound when information pertaining to a reception state of an alternative station is acquired.

SUMMARY OF THE INVENTION

[0007] A receiving apparatus according to an aspect of the present invention, includes: an audio signal generating unit configured to generate an audio signal from a received signal received by a tuner; a control signal output unit configured to output a control signal for controlling an audio signal process on the audio signal, based on the received signal; an audio signal processing unit configured to perform the audio signal process in accordance with the control signal, on the audio signal, and output the processed audio signal; and a receiving station control unit configured to control a receiving station of the tuner, and acquire information pertaining to a reception state of the receiving station, based on the received signal, the receiving station control unit configured to store the control signal which is based on the received signal of the first receiving station, according to an instruction from an integrated control unit, in a case where the receiving station is switched from a first receiving station to a second receiving station, the integrated control unit configured to integrally control the audio signal generating unit, the control signal output unit, the audio signal processing unit, and the receiving station control unit, the receiving station control unit configured to output the stored control signal to the audio signal processing unit according to the instruction, in a case where the receiving station is returned to the first receiving station.

[0008] Other features of the present invention will become apparent from descriptions of this specification and of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] For more thorough understanding of the present invention and advantages thereof, the following description should be read in conjunction with the accompanying drawings, in which:

Fig. 1 is a diagram illustrating a configuration of an RDS receiver according to one embodiment of the present invention;

Fig. 2 is a diagram illustrating an example of control based on a receiving station switching command;

Fig. 3 is a timing chart of an example of a receiving station switching process;

Fig. 4 is a diagram illustrating an example of change in an SNC control signal at the time of a receiving station switching process;

Fig. 5 is a diagram illustrating an example of change

in an HCC control signal at the time of a receiving station switching process;

Fig. 6 is a diagram illustrating an example of change in a mute control signal at the time of a receiving station switching process;

Fig. 7 is a diagram illustrating an example of change in an audio output signal at the time of a receiving station switching process;

Fig. 8 is a timing chart of another example of a receiving station switching process; and

Fig. 9 is a timing chart of another example of a receiving station switching process.

DETAILED DESCRIPTION OF THE INVENTION

[0010] At least the following details will become apparent from descriptions of this specification and of the accompanying drawings.

[0011] Fig. 1 is a diagram illustrating a configuration of an RDS receiver according to one embodiment of the present invention. An RDS receiver 10 includes an antenna 20, a tuner 22, a system LSI (Large-Scale Integration) 24, a system microcomputer 26, a memory 28, an operating unit 30, and a displaying unit 32.

[0012] The tuner 22 extracts a broadcast signal of a receiving station, designated by the system LSI 24, from an FM multiplex broadcast signal, received via the antenna 20, and converts the broadcast signal into an intermediate frequency signal (IF signal), to be output.

[0013] The system LSI 24 includes an AD converter (ADC) 40, an IF processing unit 42, a digital signal processing circuit (DSP) 44, a DA converter (DAC) 46, a reception state detecting unit 48, a band-pass filter (BPF) 50, an RDS demodulating unit 52, and a microcomputer 60.

[0014] An IF signal output from the tuner 22 is converted into a digital audio signal by the ADC 40 and is output to the IF processing unit 42 (audio signal generating unit). The IF processing unit 42 amplifies the IF signal and thereafter executes a detection process thereof, to be output to the DSP 44. The DSP 44 (audio signal processing unit) performs various audio signal processes for the digital audio signal. The DSP 44 includes a multiplexer (MPX) 70, a high-cut control unit (HCC) 72, and a mute unit (MUTE) 74, for example. The MPX 70 generates a stereo signal from a composite signal, and performs a stereo noise control process for suppressing the noise of the stereo signal. The HCC 72 performs a high-cut control process for suppressing a high-frequency component. The MUTE 74 performs a mute process for controlling the muting of the audio signal.

[0015] The reception state detecting unit 48 detects the reception levels, such as an S-meter DC value and an S-meter AC value, and the reception states such as an adjacent interference level, to be output to the microcomputer 60, based on the IF signal output from the IF processing unit 42. The BPF 50 allows a frequency band of 57-kHz, for example, of the detected output of the IF

processing unit 42 to pass therethrough, so as to extract an RDS signal. The RDS demodulating unit 52 demodulates the RDS signal to generate RDS data, to be output to the microcomputer 60.

[0016] The microcomputer 60 is built into the system LSI 24 and controls a receiving station of the tuner 22 and the audio signal process in the DSP 44 under the control of the system microcomputer 26. For example, the microcomputer 60 includes a receiving station control unit 80, a control signal output unit 82, and a control signal storage unit 84. The receiving station control unit 80 changes a receiving station of the tuner 22, detects a reception state of the receiving station after change thereof, and outputs the result to the system microcomputer 26; as well as outputs the RDS data output from the RDS demodulating unit 52 to the system microcomputer 26, based on a command from the system microcomputer 26. The control signal output unit 82 outputs control signals with respect to the MPX 70, the HCC 72, and the MUTE 74, based on the reception state of the receiving station. For example, if the reception level becomes equal to or lower than a predetermined level, the control signal output unit 82 outputs to the MPX 70 a control signal for making the audio output monaural. The receiving station control unit 80 is capable of storing a control signal output from the control signal output unit 82 in the control signal storage unit 84, and restoring a stored control signal into the control signal output unit 82, based on a command from the system microcomputer 26.

[0017] The receiving station control unit 80 and the control signal output unit 82 are implemented by the microcomputer 60 executing a program. The control signal storage unit 84 is implemented by a storage area of a memory included in the microcomputer 60. The control signal storage unit 84 may be implemented by a memory on the outside of the microcomputer 60.

[0018] The system microcomputer 26 (integrated control unit) integrally controls the RDS receiver 10 as a whole. For example, the system microcomputer 26 outputs a command to change a receiving station to the microcomputer 60 according to an operation of selecting a receiving station in the operating unit 30. For example, the system microcomputer 26 stores, in the memory 28, a detection result of a reception state output from the microcomputer 60. For example, the system microcomputer 26 stores the RDS data output from the microcomputer 60 in the memory 28. The RDS data includes: data pertaining to a station name of a receiving station and a title of a song being broadcasted; and alternative station data indicating a frequency of an alternative station which is broadcasting the same program as that of the receiving station, for example. The system microcomputer 26 displays the station name of the receiving station and the title of the song being broadcasted on the displaying unit 32, periodically outputs to the microcomputer 60 a command to check the reception state of the alternative station, and outputs to the microcomputer 60 a command

to switch to the alternative station with a higher receiving sensitivity in the case where the receiving station is low in receiving sensitivity, based on the RDS data stored in the memory 28, for example.

[0019] Fig. 2 is a diagram illustrating an example of control based on a receiving station switching command. The receiving station control unit 80 of the microcomputer 60 receives, from the system microcomputer 26, a receiving station switching command with parameters P1 to P5 set therein (S101). The receiving station control unit 80 selects whether muting is performed, i.e., whether a mute-ON process is performed, based on the parameter P1 (S102). If the mute-ON process is performed, a control signal for muting is output to the DSP 44 via the control signal output unit 82. The receiving station control unit 80 selects whether a state storage process is performed of storing the control signal which has been output from the control signal output unit 82 before switching of the receiving station, based on the parameter P2 (S103). If the state storage process is performed, the control signal output from the control signal output unit 82 is stored in the control signal storage unit 84. The receiving station control unit 80 instructs the tuner 22 to switch to the receiving station designated by the parameter P3 (S104). The receiving station control unit 80 selects whether a state restoration process is performed of restoring the control signal stored in the control signal storage unit 84, based on the parameter P4 (S105). If the state restoration process is performed, the control signal stored in the control signal storage unit 84 is restored, and the restored control signal is output to the DSP 44 via the control signal output unit 82. The receiving station control unit 80 selects whether the muting is canceled, i.e., whether a mute-OFF process is performed, based on the parameter P5 (S106). If the mute-OFF process is performed, a control signal for canceling the muting is output to the DSP 44 via the control signal output unit 82. In an embodiment of the present invention, the processes corresponding to the parameters are performed, respectively, when each of the parameters P1, P2, P4, and P5 is "1", and are not performed, respectively, when each of the parameters is "0".

[0020] Fig. 3 is a timing chart of an example of a receiving station switching process. In the initial state, the receiving station is a station A (first receiving station), and an audio signal is output, i.e., the muting is canceled. If a receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (1, 1, B, 0, 0) is transmitted from the system microcomputer 26 to the microcomputer 60, the receiving station control unit 80 gives an instruction for performing the mute-ON to the control signal output unit 82 based on the parameter P1=1, so as to mute the audio output signal. The receiving station control unit 80 stores, in the control signal storage unit 84, a control signal in the state of the station A based on the parameter P2=1. Thereafter, the receiving station control unit 80 changes the receiving station to a station B (second receiving station) based on the parameter

P3=B, and acquires the reception state of the station B. Since the parameters P4 and P5 are "0", the state restoration process and the mute-OFF process are not performed.

[0021] Subsequently, if a receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (0, 0, A, 1, 1) is transmitted from the system microcomputer 26 to the microcomputer 60, the receiving station control unit 80 does not perform the mute-ON process and the state storage process since the parameters P1 and P2 are "0", and changes the receiving station to the station A based on the parameter P3=A. The receiving station control unit 80 restores the control signal stored in the control signal storage unit 84 into the control signal output unit 82 based on the parameter P4=1, and gives an instruction for performing the mute-OFF to the control signal output unit 82 based on the parameter P5=1. In other words, returning to the station A is performed and the muting is canceled, in a state where the control signal before switching to the station B is performed is restored, and therefore awkwardness when the muting is canceled is reduced. It is possible to perform a series of the processes, exemplarily illustrated in Fig. 3, by one command.

[0022] Figs. 4 to 6 are diagrams illustrating examples of change in control signals when the receiving station switching process is performed. Fig. 7 is a diagram illustrating an example of change in an audio output signal when the receiving station switching process is performed. The examples of Figs. 4 to 7 represent the change in signal in the case where the receiving station is switched to the alternative station at time T1 and is returned to the original receiving station at time T2. As depicted in Fig. 4, when switching to the alternative station is performed at time T1, a stereo noise control (SNC) control signal before the switching is stored in the control signal storage unit 84. After switching to the alternative station is performed, the SNC control signal fluctuates with the received signal of the alternative station. Thereafter, when returning to the original receiving station is performed at time T2, the SNC control signal stored in the control signal storage unit 84 is restored, and therefore the SNC control signal output from the control signal output unit 82 is immediately stabilized in the state at the time before the switching. As in the cases of a high-cut control (HCC) control signal depicted in Fig. 5 and a mute (MUTE) control signal depicted in Fig. 6, control signals fluctuate after switching to the alternative station at time T1 is performed, however, when switching to the original receiving station is performed at time T2, the control signals are restored and thus are immediately shifted into the state at the time before the switching to the alternative station is performed. Therefore, as depicted in Fig. 7, in the case where the muting is canceled at time T2 after the muting is performed at time T1, the control signals are restored into the state at the time before the switching, and as a result, the audio output signal is immediately stabilized in the state similar to that before the switching

to the alternative station is performed. Therefore, when the receiving station is switched to the alternative station with muting and is returned from the alternative station to the original receiving station with unmuting, awkwardness in reproduced sound can be reduced.

[0023] Figs. 8 and 9 are timing charts of other examples of the receiving station switching process. In the example depicted in Fig. 8, a receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (1, 1, B, 0, 0) is first transmitted from the system microcomputer 26 to the microcomputer 60. This is the same as the first command in Fig. 3. A receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (0, 0, C, 0, 0) is then transmitted from the system microcomputer 26 to the microcomputer 60. In this case, since all the parameters P1, P2, P4, and P5 are "0", performed is only a process for switching the receiving station from the station B to a station C and acquiring the reception state of the station C. Similarly, when a receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (0, 0, D, 0, 0) is transmitted from the system microcomputer 26 to the microcomputer 60, performed is only a process for switching the receiving station from the station C to a station D and acquiring the reception state of the station D. Thereafter, a receiving station switching command with the parameters (P1, P2, P3, P4, and P5) set at (0, 0, A, 1, 1) is transmitted from the system microcomputer 26 to the microcomputer 60, and as is the case with the second command of Fig. 3, the receiving station is returned to the station A, the initially stored control signal is restored, and the muting is canceled. As such, in the example of Fig. 8, the reception states of the stations B, C, and D are acquired during one muting period. Therefore, the reception states of a plurality of alternative stations can be acquired without the mute-ON/OFF being performed a number of times, and awkwardness in reproduced sound can be reduced when the reception states of a plurality of alternative stations are acquired.

[0024] In the example depicted in Fig. 9, although the first to third commands are the same as in the example of Fig. 8, the fourth command is different. Specifically, the parameters (P1, P2, P3, P4, and P5) in the fourth command are set at (0, 0, C, 0, 1). Therefore, the receiving station is not returned to the station A but changed to the station C. Since the receiving station is not returned to the original station A, the parameter P4 is set at "0" and the control signal stored in the control signal storage unit 84 is not restored. Such a control is performed in the case where the receiving sensitivity of the station C is higher than the receiving sensitivity of the station A.

[0025] The stations B, C, and D are alternative stations that broadcast the same program as that of the station A.

[0026] The RDS receiver 10 according to an embodiment of the present invention has been described. As described above, in the RDS receiver 10, a control signal is stored when the receiving station is switched to the alternative station, and the stored control signal is re-

stored when the station is returned to the original receiving station. Therefore, the control signal is immediately stabilized in the state at the time before the switching when returning to the original receiving station is performed, thereby being able to reduce awkwardness in reproduced sound which caused when information pertaining to the reception state of the alternative station is acquired.

[0027] Further, in the RDS receiver 10, in the state of the audio signal being muted at the time of switching to the alternative station, the receiving station can further be switched to another station without canceling the muting. In other words, the reception states of a plurality of alternative stations can be acquired without the mute-ON/OFF being performed a number of times, thereby being able to reducing awkwardness in reproduced sound at the time when information pertaining to the reception states of a plurality of alternative stations are acquired.

[0028] Further, in the RDS receiver 10, it is possible to select a destination to which the receiving station is switched, whether the mute-ON process is performed or not, whether the mute-OFF process is performed or not, whether the state storage process is performed or not, and whether the state restoration process is performed or not, based on the parameters set in the command to give an instruction for switching the receiving station. Therefore, setting the parameters in an appropriate manner enables acquisition of information pertaining to reception states of a plurality of alternative stations during one muting period, and enables adjustment of restoration timing of stored control information, thereby being able to support a wide variety of patterns using one command.

[0029] The above embodiments of the present invention are simply for facilitating the understanding of the present invention and are not in any way to be construed as limiting the present invention. The present invention may variously be changed or altered without departing from its spirit and encompass equivalents thereof.

EXPLANATIONS OF LETTERS OR NUMERALS

[0030]

10	RDS receiver
20	antenna
22	tuner
24	system LSI
26	system microcomputer
28	memory
30	operating unit
32	displaying unit
40	AD converter
42	IF processing unit
44	digital signal processing circuit
46	DA converter
48	reception state detecting unit
50	band-pass filter

52 RDS demodulating unit
 60 microcomputer
 80 multiplexer
 72 high-cut control unit
 74 mute unit
 80 receiving station control unit
 82 control signal output unit
 84 control signal storage unit

Claims

1. A receiving apparatus comprising:

an audio signal generating unit configured to generate an audio signal from a received signal received by a tuner;
 a control signal output unit configured to output a control signal for controlling an audio signal process on the audio signal, based on the received signal;
 an audio signal processing unit configured to perform the audio signal process in accordance with the control signal, on the audio signal, and output the processed audio signal; and
 a receiving station control unit configured to control a receiving station of the tuner, and acquire information pertaining to a reception state of the receiving station, based on the received signal, the receiving station control unit configured to store the control signal which is based on the received signal of a first receiving station, according to an instruction from an integrated control unit, in a case where the receiving station is switched from the first receiving station to a second receiving station, the integrated control unit configured to integrally control the audio signal generating unit, the control signal output unit, the audio signal processing unit, and the receiving station control unit,
 the receiving station control unit configured to output the stored control signal to the audio signal processing unit according to the instruction, in a case where the receiving station is returned to the first receiving station.

2. The receiving apparatus of claim 1, wherein the receiving station control unit

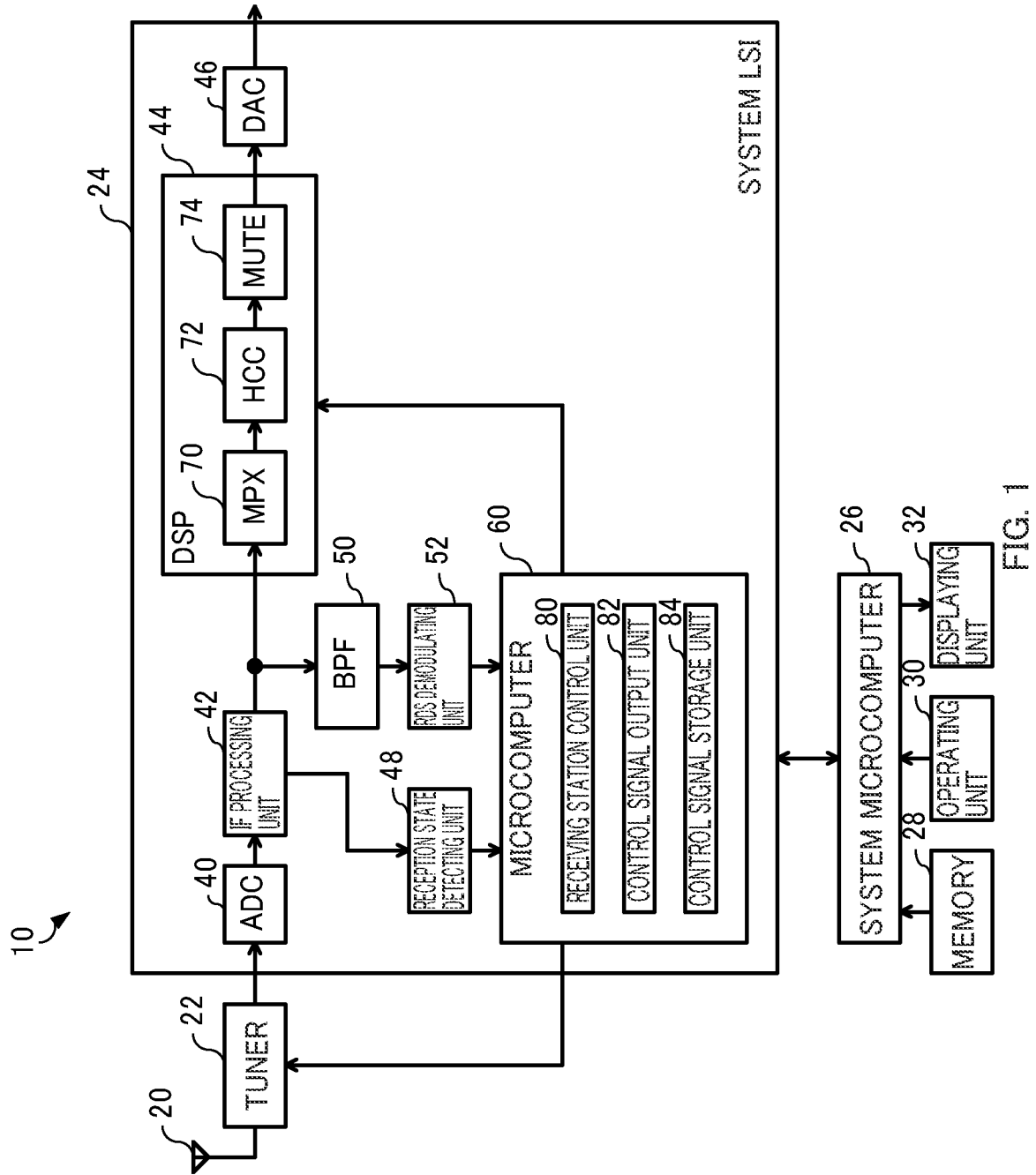
mutes the audio signal as well as stores the control signal which is based on the received signal of the first receiving station, in the case where the receiving station is switched from the first receiving station to the second receiving station, switches the receiving station from the second receiving station to another receiving station, in a state where the audio signal is muted, and outputs the stored control signal to the audio sig-

nal processing unit as well as unmutes the audio signal, in the case where the receiving station is returned to the first receiving station, based on the instruction from the integrated control unit.

3. The receiving apparatus of claim 2, wherein the receiving station control unit selects: a destination to which the receiving station is to be switched; whether the audio signal is to be muted or not; whether the audio signal is to be unmuted or not; whether the control signal is to be stored or not; and whether the control signal is to be output to the audio signal processing unit or not, based on parameters set in a command to give an instruction to switch the receiving station, the command being output from the integrated control unit.

4. The receiving apparatus of any one of claims 1 to 3, wherein the instruction from the integrated control unit includes an instruction to switch the receiving station to an alternative station according to a reception state of the receiving station, the alternative station being a station broadcasting the same program as that of the receiving station.

5. The receiving apparatus of any one of claims 1 to 3, wherein the second receiving station or the another receiving station is an alternative station which broadcasts the same program as that the first receiving station.



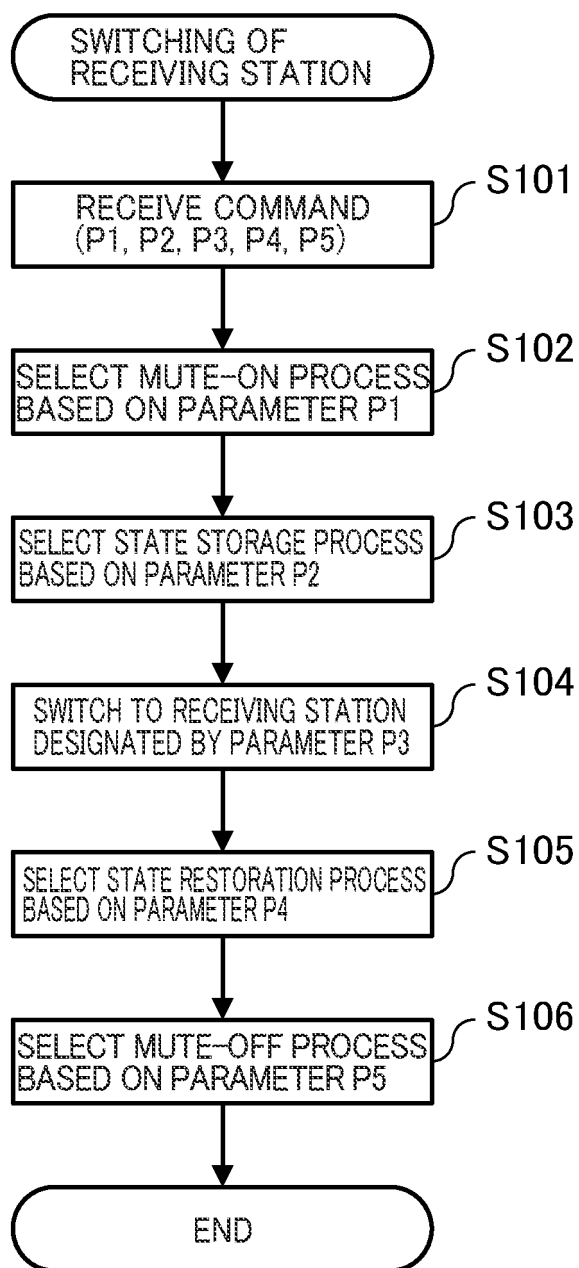


FIG. 2

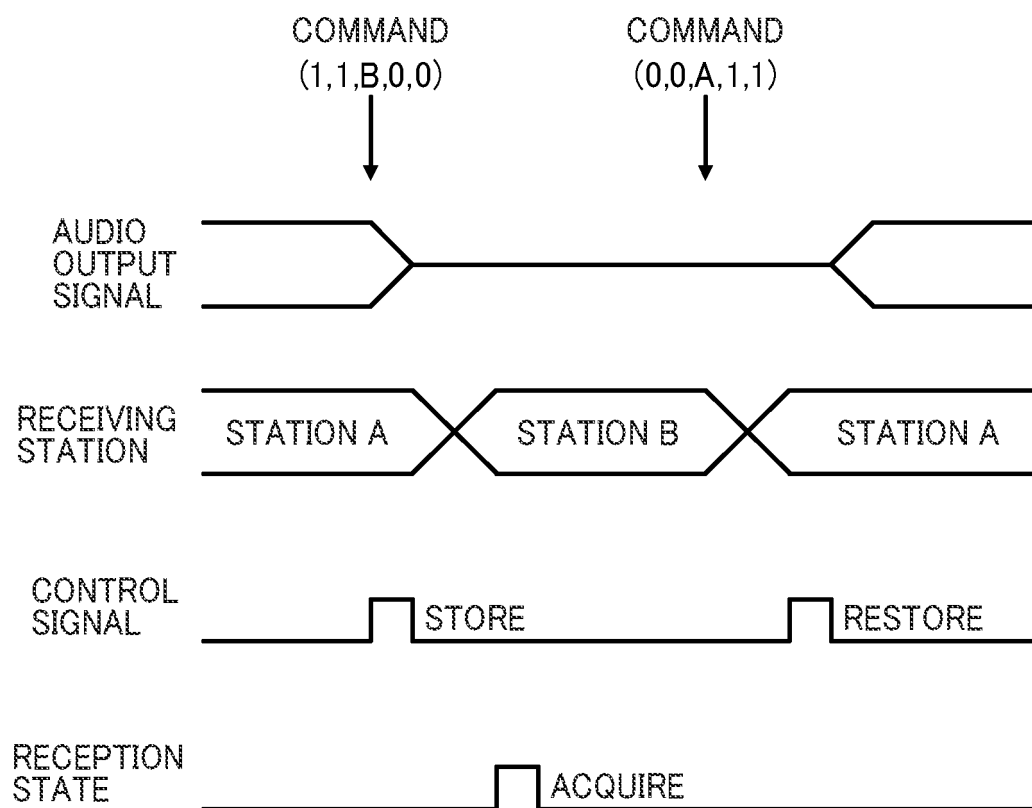


FIG. 3

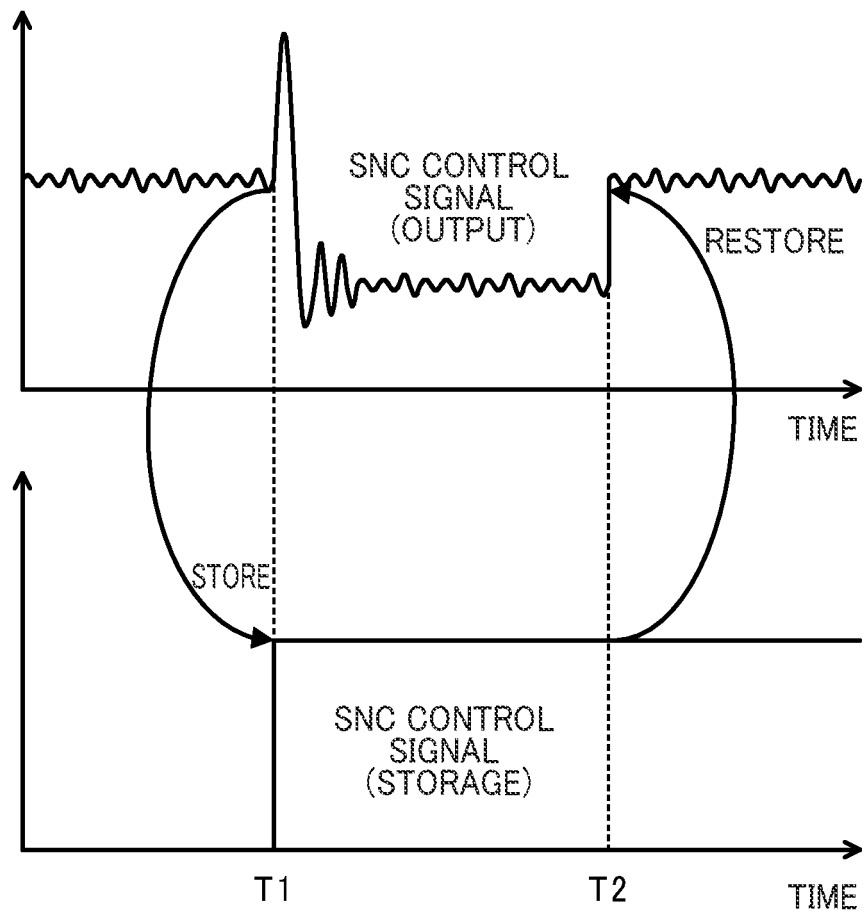


FIG. 4

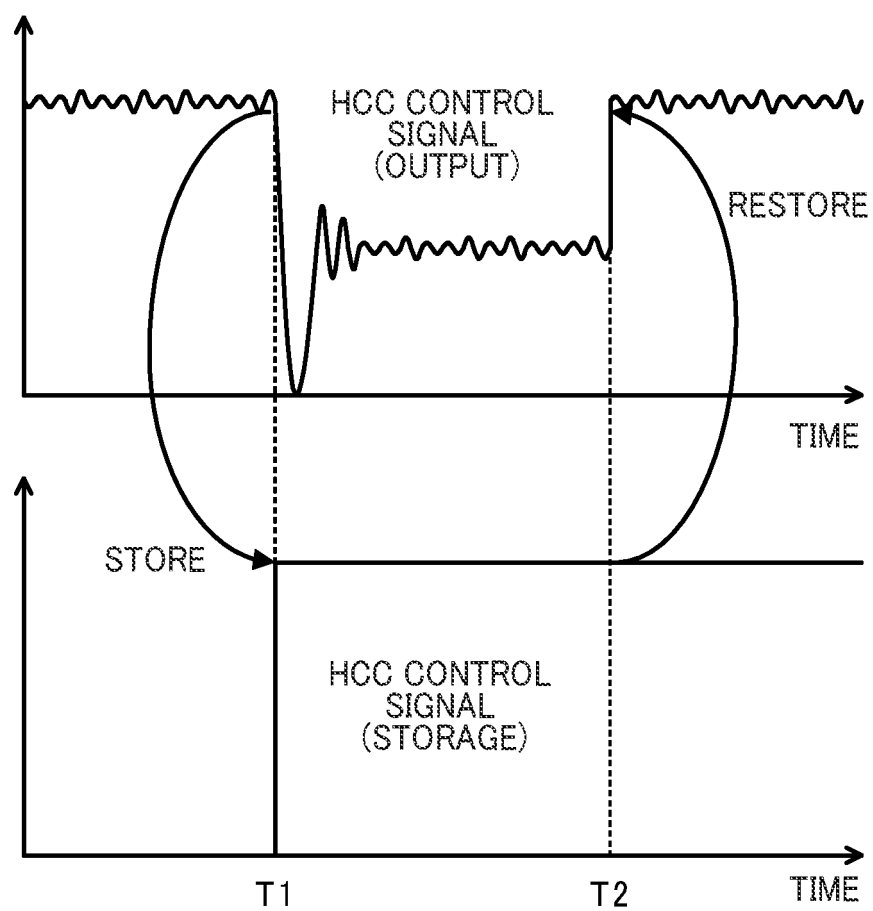


FIG. 5

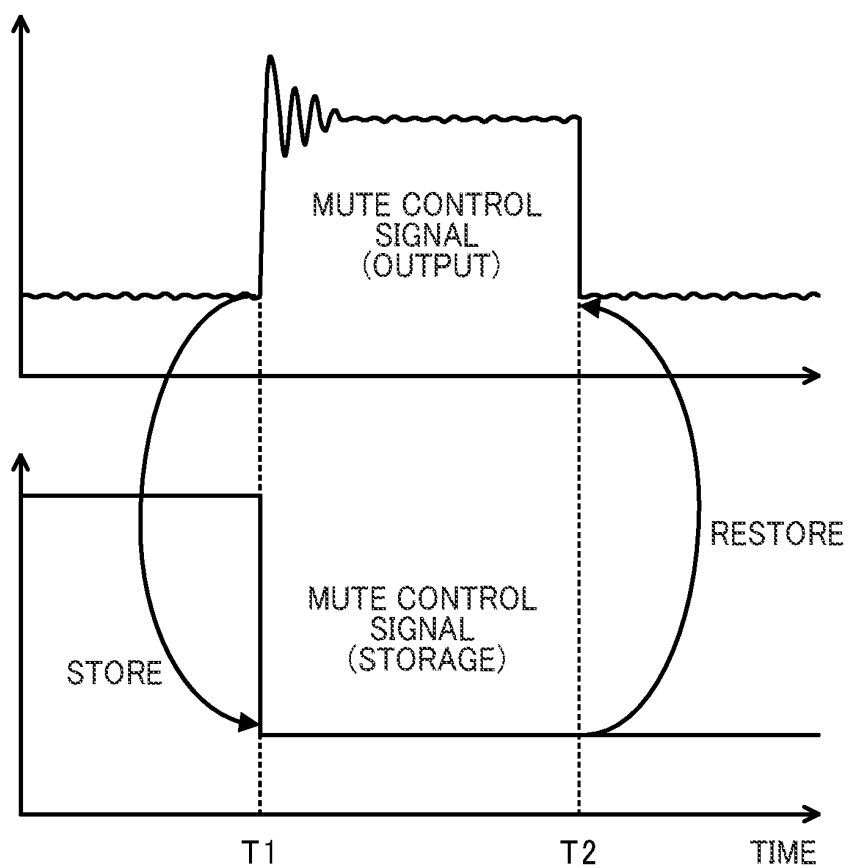


FIG. 6

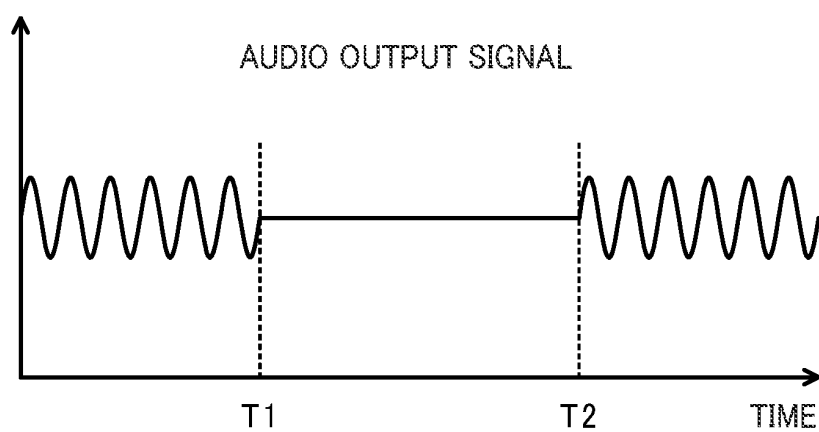


FIG. 7

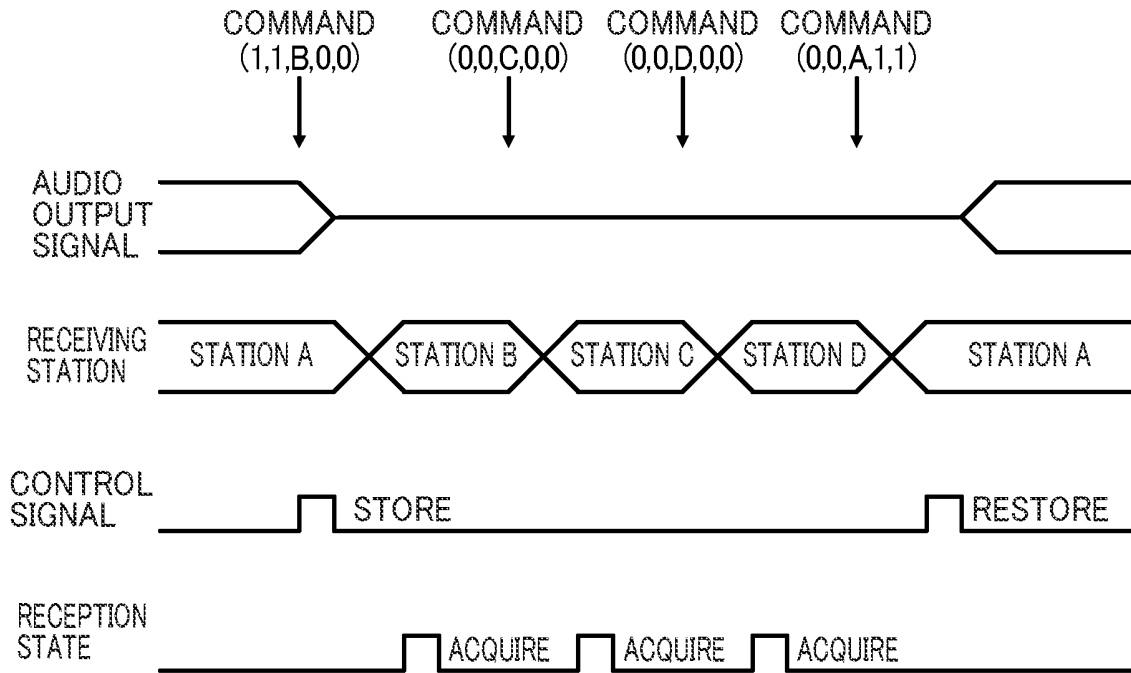


FIG. 8

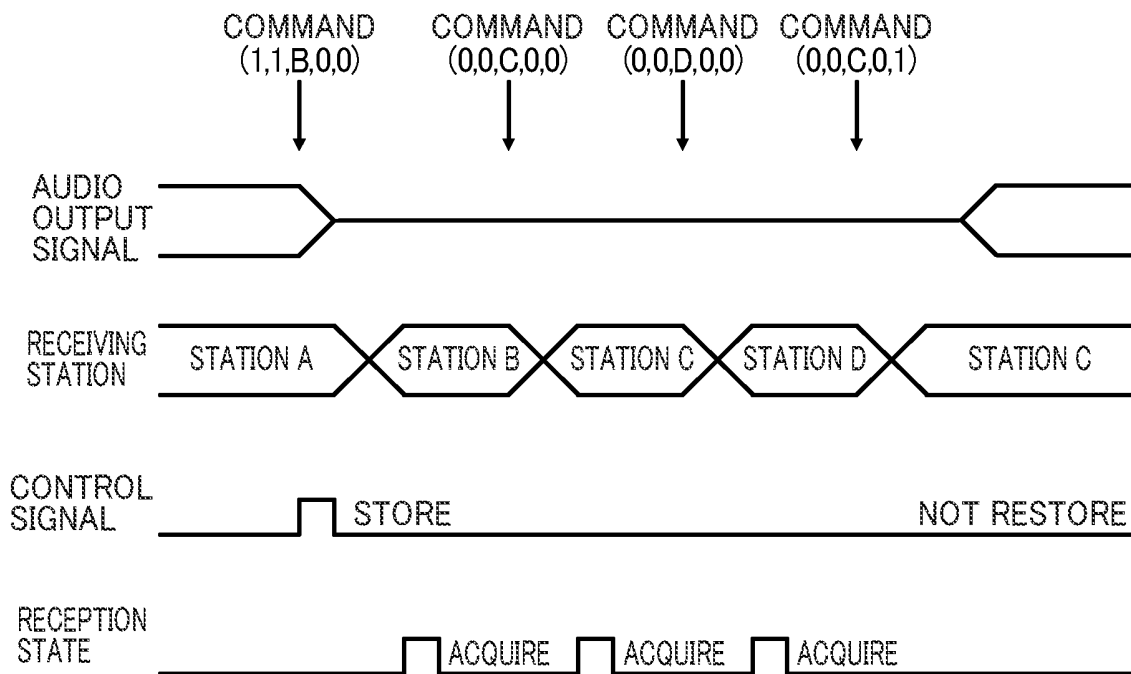


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/068099

A. CLASSIFICATION OF SUBJECT MATTER H04B1/16(2006.01) i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) H04B1/16		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010 Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2001-24603 A (Robert Bosch GmbH), 26 January 2001 (26.01.2001), paragraphs [0015], [0017], [0020], [0069] to [0072] & US 6822953 B1 & DE 19925925 A1	1, 4, 5 2, 3
Y	JP 11-97983 A (Kenwood Corp.), 09 April 1999 (09.04.1999), paragraphs [0004] to [0005]; fig. 4 (Family: none)	2, 3
A	JP 2002-9648 A (Mitsubishi Electric Corp.), 11 January 2002 (11.01.2002), paragraph [0029] (Family: none)	1
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Date of the actual completion of the international search 06 January, 2010 (06.01.10)	Date of mailing of the international search report 19 January, 2010 (19.01.10)	
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Patent documents cited in the description

- JP H10163895 B [0004]
- JP H6315016 B [0004]