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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | | 12015320 | |
| | Filing Date | | 2008-01-16 | |
| | First Named Inventor | Russell W. White, et al. | | |
| | Art Unit | 2617 | | |
| | Examiner Name | Erika A. Gary | | |
| | Attorney Docket Number | AFF.0004C5US | | |

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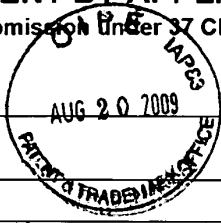
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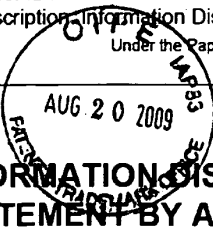
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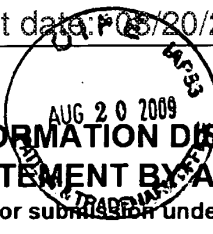
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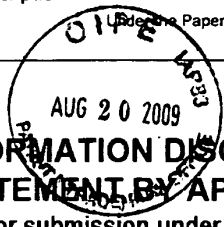
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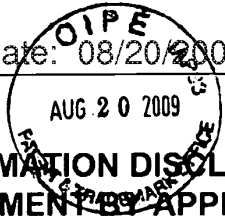
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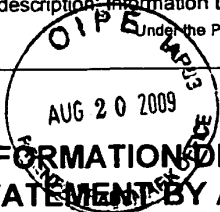
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| <p style="text-align: center;">AUG 20 2009</p> <p>INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)</p> | Application Number | | 12015320 | |
| | Filing Date | | 2008-01-16 | |
| | First Named Inventor | Russell W. White, et al. | | |
| | Art Unit | 2618 | | |
| | Examiner Name | | | |
| | Attorney Docket Number | AFF.004C5US | | |

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| | 1 | 20040151327 | | 2004-08-05 | Marlow | |
| | 2 | 20050049002 | | 2005-03-03 | White, et al. | |
| | 3 | 20050054379 | | 2005-03-10 | Cao, et al. | |
| | 4 | 20050096018 | | 2005-03-05 | White, et al. | |

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| | 1 | Affinity Labs of Texas, LLC, Plaintiff, v. BMW North America, LLC, et al, Defendants, Case No. 9:08-cv-00164-RC, Defendant Volkswagen Group of America, Inc's Invalidity Contentions, Pages 1-346. | <input type="checkbox"/> |

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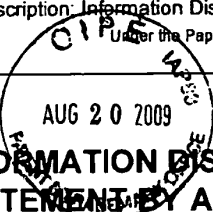
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| | 2 | 6230322 | | 2001-05-08 | Saib, et al. | |
| | 3 | 6694200 | | 2004-02-17 | Naim | |
| | 4 | 6526335 | | 2003-02-25 | Treyz, et al. | |
| | 5 | 6990334 | | 2006-01-24 | Ito | |
| | 6 | 5307326 | | 1994-04-26 | Osawa | |
| | 7 | 4905272 | | 1990-02-27 | Van de Mortel, et al. | |
| | 8 | 6629000 | | 2003-09-30 | Moon, et al. | |

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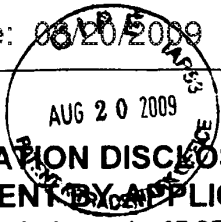
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| | 1 | CN 1218258 A | CN | | 1999-06-02 | | | <input type="checkbox"/> |

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| | 1 | Affinity Labs of Texas, LLC, Plaintiff, v. BMW North America, LLC, et al, Defendants, Case No. 9:08-cv-00164-RC, Defendant Volkswagen Group of America, Inc's Invalidity Contentions, Pages 1-346. | <input type="checkbox"/> |

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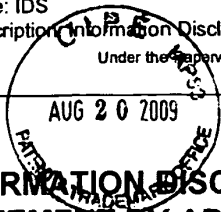
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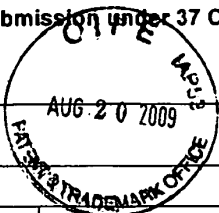
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| | 1 | CN 1218258 A | CN | | 1999-06-02 | | | <input type="checkbox"/> |

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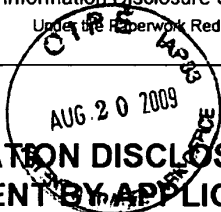
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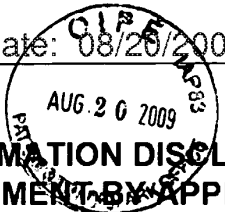


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| 1 | U.S. Patent and Trademark Office, Order Granting/Denying Request For Ex Parte Reexamination dated December 19, 2008 for U.S. Patent No. 7,324,833 (request granted), Pages 1-13. | <input type="checkbox"/> |
| 2 | Affinity Labs of Texas, LLC, Plaintiff, v. BMW North America, LLC, et al., Defendants, Civil Action No. 9:08-cv-164, Order Denying Defendants' Motion To Stay, Filed February 20, 2009, Pages 1-9. | <input type="checkbox"/> |

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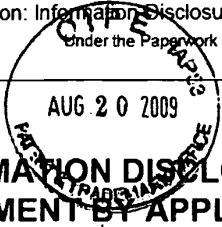
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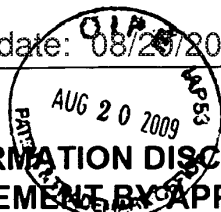
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| Art Unit | 2618 |
| Examiner Name | |
| Attorney Docket Number | AFF.004C5US |

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| 1 | EP0982732 A1 | EP | | 2000-01-03 | Saehan Information Systems, Inc. | <input checked="" type="checkbox"/> |
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| 1 | | Yamaha Corporation, "QY Data Filer - Owner's Manual," pages 1-250, 1997. | <input type="checkbox"/> |

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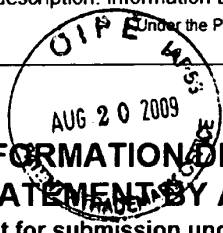
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| 1 | Affinity Labs of Texas, LLC, Plaintiff, v. BMW North America, LLC, et al., Defendants, C.A. No. 9:08-cv-00164-RC, Affinity's Infringement Contentions, with Infringement Chart Exhibits A-G. | <input type="checkbox"/> |
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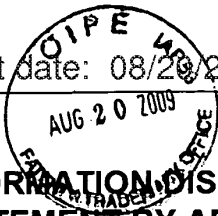
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| 1 | Affinity Labs of Texas, LLC, Plaintiff, v. DICE Electronics, LLC; et al., Defendants, C.A. No. 9:08-cv-00163 (Eastern District of Texas), Defendants' Motion To Stay Litigation Pending Reexamination, Filed January 12, 2009, Pages 1-15. | <input type="checkbox"/> |
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| | Art Unit | | 2618 |
| | Examiner Name | Unknown | |
| | Attorney Docket Number | | AFF.004C5US |

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| | Filing Date | 2008-01-16 |
| | First Named Inventor | Russell W. White |
| | Art Unit | 2618 |
| | Examiner Name | GELIN, Jean Alland |
| | Attorney Docket Number | 1111111.1111-5C |

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| | Art Unit | 2618 | | |
| | Examiner Name | GELIN, Jean Alland | | |
| | Attorney Docket Number | 111111.1111-5C | | |

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| | Filing Date | 2008-01-16 |
| | First Named Inventor | Russell W. White |
| | Art Unit | 2618 |
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| | First Named Inventor | Russell W. White | |
| | Art Unit | | |
| | Examiner Name | Unknown | |
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| | First Named Inventor | Russell W. White | |
| | Art Unit | | |
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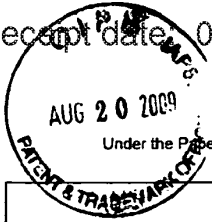
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| | Filing Date | 2004-09-23 |
| | First Named Inventor | Russell W. White |
| | Art Unit | 2617 |
| | Examiner Name | GARY, Erika A. |
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First Named Inventor Russell W. White
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| | Application Number | 10/947,755 |
| | Filing Date | 09/23/2004 |
| | First Named Inventor | Russell W. White |
| | Art Unit | 2617 |
| | Examiner Name | GARY, Erika A. |
| Sheet 2 of 3 | Attorney Docket Number | 111111.1111-2C |

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| Examiner Signature | /Erika Gary/ (09/15/2010) | Date Considered | 09/15/2010 |
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| | | Application Number | 10/947,755 |
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i> | | Filing Date | 09/23/2004 |
| | | First Named Inventor | Russell W. White |
| | | Art Unit | 2617 |
| | | Examiner Name | GARY, Erika A. |
| | | Attorney Docket Number | 111111.1111-2C |
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| | 7-B | | |
| | 8-B | | |
| | 9-B | | |
| | 10-B | | |

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| Examiner Signature | /Erika Gary/ (09/15/2010) | Date Considered | 09/15/2010 |
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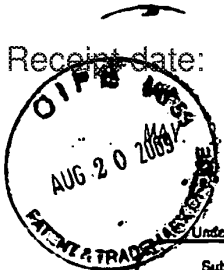
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Sheet 1 of 2

| Complete If Known | |
|------------------------|---------------------|
| Application Number | 10/947,755 |
| Filing Date | 09/23/2004 |
| First Named Inventor | Russell W. White |
| Art Unit | 2686 |
| Examiner Name | Perez-Gutierrez, R. |
| Attorney Docket Number | 111111.1111-2C |

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| Substitute for form 1449/PTO | | Complete If Known | |
| | | Application Number | 10/947,755 |
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i> | | Filing Date | 09/23/2004 |
| | | First Named Inventor | Russell W. White |
| | | Art Unit | 2686 |
| | | Examiner Name | Perez-Gutierrez, R. |
| | | Attorney Docket Number | 111111.1111-2C |
| Sheet | 2 | of | 2 |

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| | D1 | U.S. Application No. 10/947,754, filed 09/23/2004 (111111.1111-1C) | |
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| | Application Number | 09/537,812 | |
| | Filing Date | 03/28/2000 | |
| | First Named Inventor | Russell W. White | |
| | Art Unit | 2617 | |
| | Examiner Name | GELIN, Jean Alland | |
| Sheet 1 of 4 | Attorney Docket Number | 111111.1111 | |

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| | | Country Code ³ Number ⁴ Kind Code ⁵ (if known) | | | | |
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| | | Application Number | 09/537,812 |
| | | Filing Date | 03/28/2000 |
| | | First Named Inventor | Russell W. White |
| | | Art Unit | 2617 |
| | | Examiner Name | GELIN, Jean Alland |
| Attorney Docket Number | 111111.1111 | | |
| Sheet | 3 | of | 4 |

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| | 1-B | U.S. Patent No. 60/167,179, filed 11/23/1999 | |
| | 2-B | U.S. Patent No. 09/234,259, filed 01/20/1999 | |
| | 3-B | | |
| | 4-B | | |
| | 5-B | | |
| | 6-B | | |
| | 7-B | | |
| | 8-B | | |
| | 9-B | | |
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| | 11-B | "Phillips PSA [128MAX," PC Authority Reviews, 1 May 2003, 1 pg. | |
| | 12-B | "Sony Network Walkman NW-MS70D," PC Authority Reviews, 8 October 2003, 1 pg. | |
| | 13-B | "Targa TMU-401," PC Authority Reviews, 8 October 2003, 1 pg. | |
| | 14-B | "Targa TMU-604," PC Authority Reviews, 8 October 2003, 1 pg. | |
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| | 17-B | | |
| | 18-B | | |
| | 19-B | | |
| | 20-B | | |

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Receipt date: 09/04/2009

12495190 - GAU: 2617

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

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| | Filing Date | | 2009-06-30 | | |
| | First Named Inventor | Russell W. White, et al. | | | |
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| | 1 | EP 1 146 674 A2 | EP | | 2001-10-17 | Mazda Motor Corporation | | <input type="checkbox"/> |
| | 2 | DE 102 05 641 A 1 | DE | | 2002-02-12 | Volkswagen AG | | <input checked="" type="checkbox"/> |

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|--------------------|---------|---|--------------------------|
| | 1 | "Request for Inter Partes Reexamination Of U.S. Patent No. 7,324,833 Pursuant To 37 CFR 1.915," Requestor: Volkswagen Group of America, Inc., Filed on August 21, 2009, Pages 1-61 with Certificate of Mailing, and Claim Charts A - HH. | <input type="checkbox"/> |
| | 2 | YAMAHA CORPORATION, "Yamaha Music Sequencer, QY70, Owner's Manual," Chapters 1-11, 1997. | <input type="checkbox"/> |
| | 3 | MULTI TECHNOLOGY EQUIPMENT, "Neo Car Jukebox, Installation and Instruction Manual," Pages 1-30. | <input type="checkbox"/> |

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Receipt date: 09/11/2009

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| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

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| | 1 | 6622083 | | 2003-09-16 | Knockheart, et al. | | | |
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| | Filing Date | | 2009-06-30 | | |
| | First Named Inventor | Russell W. White, et al. | | | |
| | Art Unit | | | | |
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| | Attorney Docket Number | AFF.004C7US | | | |

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| | 1 | DE 19 651 308 A1 | DE | | 1996-10-12 | Becker GmbH | | <input type="checkbox"/> |

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| | Art Unit | | | | |
| | Examiner Name | Unassigned | | | |
| | Attorney Docket Number | AFF.004C7US | | | |

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| | 3 | Response to "Notice of Failure to Comply with Inter Partes Reexamination Request Filing Requirements (37 CFR 1.915(d)) filed on September 22, 2009. Requestor: Volkswagen Group of America, Inc. with Replacement Request for Inter Partes Reexamination of U.S. Patent No. 7,324,833 and Claim Charts A-JJ. | <input type="checkbox"/> |
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| Applicant: | Russell W. White et al. | § | Group Art Unit: | 2617 |
| Serial No.: | 12/495,190 | § | | |
| Filed: | June 30, 2009 | § | Examiner: | Erika A. Gary |
| For: | Method for Content Delivery | § | Atty. Dkt. No.: | AFF.0004C7US |
| | | § | | |

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PRELIMINARY AMENDMENT

Dear Commissioner:

Applicants respectfully request consideration and entry of the following Preliminary Amendment with support therefore indicated in the following Remarks, in which:

Amendments to the Claims begin on page 2 of this paper; and

Remarks/Arguments begin on page 7 of this paper.

Date of Deposit: August 4, 2010
I hereby certify under 37 CFR § 1.8 this correspondence is being deposited **via EFS** on the date indicated above.

/Nishi Pasarya/

Nishi Pasarya

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-18 (Canceled)

Claim 19 (New): A method for content delivery, comprising:

maintaining a network resource that is accessible to a remote electronic device, the remote electronic device being capable of wireless communication, wherein the network resource facilitates access to a selectable piece of media content;

storing a first collection of instructions on at least one storage device, wherein the first collection of instructions are executable by a processor of a computing device to present a graphical user interface for the network resource; and

storing a different collection of instructions on the at least one storage device, wherein the different collection of instructions are executable by a processor of the remote electronic device: (1) to access a website; (2) to recognize selection of an icon presented on a display of the remote electronic device, wherein the icon is associated with content that is deliverable as a streaming media; (3) to present an other icon comprising the word "store" on the display; (4) to locally store a playlist; and (5) to switch between a set of communication rates at which the remote electronic device can wirelessly receive a first portion and a second portion of the content, wherein the set of communication rates comprise at least a first data rate and a second data rate that is slower than the first data rate.

Claim 20 (New): The method of Claim 19, wherein the set of communication rates include a communication rate that is lower than 100 Kbps.

Claim 21 (New): The method of Claim 20, wherein the communication rate is 10 Kbps.

Claim 22 (New): The method of Claim 19, further comprising communicating information from a network location for use by the remote electronic device via a computing

device that already has the first collection of instructions and is operable to execute the first collection of instructions in connection with accessing the network resource.

Claim 23 (New): The method of Claim 22, further comprising communicating a software upgrade for the remote electronic device.

Claim 24 (New): The method of Claim 19, further comprising:
maintaining a store resource that can be accessed in response to a selection of the other icon comprising the word “store” on the display of the remote electronic device; and
making a piece of software available at the store resource, wherein the piece of software includes instructions executable by the processor of the remote electronic device.

Claim 25 (New): The method of Claim 19, further comprising providing a copy of the first collection of instructions to a user.

Claim 26 (New): The method of Claim 19, further comprising providing a copy of the different collection of instructions to a user.

Claim 27 (New): The method of Claim 19, wherein the content is segmented into a plurality of portions.

Claim 28 (New): The method of Claim 27, wherein the different collection of instructions are further executable by the processor of the remote electronic device to receive communication of the plurality of segments in connection with outputting the content.

Claim 29 (New): The method of Claim 19, wherein the different collection of instructions are further executable by the processor of the remote electronic device to receive at least one portion of the content in a compressed format and to process the at least one portion.

Claim 30 (New): A method for content delivery, comprising:
presenting a graphical user interface on a display of an electronic device that is capable of wireless communication;
recognizing selection of an icon presented on the display, wherein the icon is associated with content that is deliverable as a streaming media;
accessing a listing of network locations from which information associated with the content may be obtained; and
executing instructions at the electronic device to direct a processor in the electronic device to switch between a set of communication rates at which the electronic device receives a first portion and a second portion of the content, wherein the set of wireless communication rates comprises at least a first data rate and a second data rate that is slower than the first data rate.

Claim 31 (New): The method of Claim 30, further comprising utilizing a portion of the instructions at the electronic device to switch between at least two of the set of communication rates.

Claim 32 (New): The method of Claim 30, further comprising:
executing instructions at the electronic device to direct the processor in the electronic device to present an other icon comprising the word “store” on the display;
accessing a network based store resource in response to a selection of the other icon comprising the word “store”; and
selecting a piece of software available at the store resource, wherein the piece of software includes instructions executable by the processor of the electronic device.

Claim 33 (New): The method of Claim 30, further comprising receiving a software upgrade.

Claim 34 (New): The method of Claim 30, wherein each of the presenting, recognizing, accessing, and executing steps are performed by one or more components of a portable device that is operable as a telephone.

Claim 35 (New): The method of Claim 30, wherein each of the presenting, recognizing, accessing, and executing steps are performed by one or more components of a portable device that is not operable as a cellular telephone.

Claim 36 (New): The method of Claim 30, further comprising switching between the first data rate and the second data rate based on an amount of the content that has been buffered in the electronic device.

Claim 37 (New): A system for content delivery, comprising:

a portable device having a display, a local rechargeable battery, a wireless communication system, and a processor;

a physical interface of the portable device, the physical interface configured to connect to an interface system that includes a cable having multiple conductive elements, wherein the physical interface is designed such that a different electronic device can be communicatively coupled with the physical interface of the portable device using the interface system in a manner that allows the different electronic device to recharge the local rechargeable battery using at least one of the multiple conductive elements and to communicate with the portable device using at least one other of the multiple conductive elements; and

a computer-readable medium having stored instructions that when executed are operable to cause the processor: (1) to present an icon on the display, the icon associated with content that is deliverable as streaming media; (2) to recognize a selection of the icon; and (3) to switch between a set of communication rates at which the portable device receives a first portion and a second portion of the content, wherein the set of communication rates comprise at least a first data rate and a second data rate that is slower than the first data rate.

Claim 38 (New): The system of Claim 37, further comprising the interface system and the different electronic device, wherein at least a portion of the different electronic device is a component of an automobile sound system and the interface system utilizes at least one bus to communicatively couple with the different electronic device.

Claim 39 (New): The system of Claim 37, further comprising the interface system and the different electronic device, wherein at least a portion of the different electronic device is a component of a stereo system and the interface system utilizes at least one bus to communicatively couple with the different electronic device.

Claim 40 (New): The system of Claim 37, wherein the stored instructions are further operable to cause the processor: (1) to obtain a listing of network locations at which to access the streaming media; and (2) to cause a first of the network locations to be accessed to facilitate a streaming delivery of the streaming media.

Claim 41 (New): The system of Claim 37, wherein the content is selected from a group consisting of a song and a video.

REMARKS/ARGUMENTS

Applicants respectfully request that the above amendments be entered in the present application and that the Examiner allow all pending claims.

Applicants have canceled claims 1-18 without prejudice or disclaimer. Applicants have added claims 19-41. Each of the independent claims include a limitation directed at switching between different communication rates during the process of receiving a piece of content (e.g., a song or a video) that is being delivered as streaming media (i.e., the delivery method is streaming media as opposed to download and play). Support for the new claims can be found throughout the specification. By way of example, Figure 4 depicts a user interface to be considered and the specification states in paragraphs [0031] and [0034], respectively:

[0031] In one embodiment, the selected information may be formatted and transmitted to achieve a desirable transmission rate. For example, conventional systems may transmit information at a speed of 10 kilobits per second.

[0034] ... For example, the selected audio information may first be transmitted to the electronic device via high-speed communication until enough information has been wirelessly communicated and buffered into a memory device operably associated with the electronic device. Upon communication of a certain percentage of the selected audio information, slower communication speeds may then be used to communicate additional selected audio information.

Applicants hereby request that the Examiner review the specification, as necessary, to ensure support of the claims and to identify any subject matter for which the Examiner needs the Applicant to identify additional support.

Applicants respectfully submit that support is readily apparent and that the present application is now in condition for allowance. If for any reason the Examiner believes that the application may not be in condition for allowance after entry of this amendment and

consideration of these remarks, Applicants request the Examiner to contact the undersigned attorney at the telephone number listed below to advance the prosecution of this application.

The application is believed to be in condition for allowance and the Examiner's prompt action in accordance therewith is respectfully requested. The Commissioner is authorized to charge any additional fees or credit any overpayment to Deposit Account No. 20-1504.

Respectfully submitted,

Date: August 4, 2010

/Mark J. Rozman/
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(713) 468-8883 [Fax]
Customer No.: 21906

Electronic Patent Application Fee Transmittal

| | | | | |
|--|------------------------------|-----------------|---------------|-----------------------------|
| Application Number: | 12495190 | | | |
| Filing Date: | 30-Jun-2009 | | | |
| Title of Invention: | Method For Content Delivery | | | |
| First Named Inventor/Applicant Name: | Russell W. White | | | |
| Filer: | Mark J. Rozman/Nishi Pasarya | | | |
| Attorney Docket Number: | AFF.0004C7US | | | |
| Filed as Large Entity | | | | |
| Utility under 35 USC 111(a) Filing Fees | | | | |
| Description | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
| Basic Filing: | | | | |
| Pages: | | | | |
| Claims: | | | | |
| Claims in excess of 20 | 1202 | 3 | 52 | 156 |
| Miscellaneous-Filing: | | | | |
| Petition: | | | | |
| Patent-Appeals-and-Interference: | | | | |
| Post-Allowance-and-Post-Issuance: | | | | |
| Extension-of-Time: | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--------------------------|----------|----------|--------|----------------------|
| Miscellaneous: | | | | |
| Total in USD (\$) | | | | 156 |

Electronic Acknowledgement Receipt

| | |
|---|------------------------------|
| EFS ID: | 8156490 |
| Application Number: | 12495190 |
| International Application Number: | |
| Confirmation Number: | 2380 |
| Title of Invention: | Method For Content Delivery |
| First Named Inventor/Applicant Name: | Russell W. White |
| Customer Number: | 21906 |
| Filer: | Mark J. Rozman/Nishi Pasarya |
| Filer Authorized By: | Mark J. Rozman |
| Attorney Docket Number: | AFF.0004C7US |
| Receipt Date: | 04-AUG-2010 |
| Filing Date: | 30-JUN-2009 |
| Time Stamp: | 17:53:39 |
| Application Type: | Utility under 35 USC 111(a) |

Payment information:

| | |
|--|-----------------|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | \$156 |
| RAM confirmation Number | 4277 |
| Deposit Account | 201504 |
| Authorized User | |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

| File Listing: | | | | | |
|---|-----------------------------|--|--|-------------------------|-------------------------|
| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
| 1 | | AFF004C7US_PreliminaryAmendment.pdf | 186983 <small>bbff905115ff7aaae6d7fed1eb916cdabd2e d536</small> | yes | 8 |
| Multipart Description/PDF files in .zip description | | | | | |
| | | Document Description | Start | End | |
| | | Preliminary Amendment | 1 | 1 | |
| | | Claims | 2 | 6 | |
| | | Applicant Arguments/Remarks Made in an Amendment | 7 | 8 | |
| Warnings: | | | | | |
| Information: | | | | | |
| 2 | Fee Worksheet (PTO-875) | fee-info.pdf | 30065 <small>61e553937ea014efec39c0f4e5cb8082a20f 9e65</small> | no | 2 |
| Warnings: | | | | | |
| Information: | | | | | |
| Total Files Size (in bytes): | | | 217048 | | |
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| | | | | | | | | | | | | |
|---|---|---|--------------|------------------------------------|---|----------|----------------------------------|-------------------------|---------------------------------------|----------|-------------------------|---------------------|
| PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875 | | | | | Application or Docket Number 12/495,190 | | Filing Date 06/30/2009 | | <input type="checkbox"/> To be Mailed | | | |
| APPLICATION AS FILED – PART I | | | | | | | | | | | | |
| (Column 1) | | | (Column 2) | | SMALL ENTITY <input type="checkbox"/> OR | | | OTHER THAN SMALL ENTITY | | | | |
| FOR | | NUMBER FILED | NUMBER EXTRA | | RATE (\$) | FEE (\$) | OR | | RATE (\$) | FEE (\$) | | |
| <input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small> | | N/A | N/A | | N/A | | OR | | N/A | | | |
| <input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small> | | N/A | N/A | | N/A | | OR | | N/A | | | |
| <input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small> | | N/A | N/A | | N/A | | OR | | N/A | | | |
| TOTAL CLAIMS <small>(37 CFR 1.16(i))</small> | | minus 20 = | * | | X \$ = | | OR | | X \$ = | | | |
| INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small> | | minus 3 = | * | | X \$ = | | OR | | X \$ = | | | |
| <input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small> | | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | | | | | |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small> | | | | | | | | | | | | |
| | | | | | TOTAL | | OR | | TOTAL | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | | | | | | | | | | |
| APPLICATION AS AMENDED – PART II | | | | | | | | | | | | |
| (Column 1) | | | (Column 2) | | (Column 3) | | | SMALL ENTITY OR | | | OTHER THAN SMALL ENTITY | |
| AMENDMENT | 08/04/2010 | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE (\$) | ADDITIONAL FEE (\$) | OR | | RATE (\$) | ADDITIONAL FEE (\$) |
| | Total <small>(37 CFR 1.16(o))</small> | * 23 | Minus | ** 20 | = 3 | | X \$ = | | OR | | X \$52= | 156 |
| | Independent <small>(37 CFR 1.16(h))</small> | * 3 | Minus | ***3 | = 0 | | X \$ = | | OR | | X \$220= | 0 |
| | <input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small> | | | | | | | | | | | |
| | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small> | | | | | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | | OR | | TOTAL ADD'L FEE | |
| | | | | | | | | | OR | | 156 | |
| AMENDMENT | | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE (\$) | ADDITIONAL FEE (\$) | OR | | RATE (\$) | ADDITIONAL FEE (\$) |
| | Total <small>(37 CFR 1.16(o))</small> | * | Minus | ** | = | | X \$ = | | OR | | X \$ = | |
| | Independent <small>(37 CFR 1.16(h))</small> | * | Minus | *** | = | | X \$ = | | OR | | X \$ = | |
| | <input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small> | | | | | | | | | | | |
| | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small> | | | | | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | | OR | | TOTAL ADD'L FEE | |
| | | | | | | | | | OR | | | |
| * If the entry in column 1 is less than the entry in column 2, write "0" in column 3. | | | | | | | | | | | | |
| ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". | | | | | | | | | | | | |
| *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". | | | | | | | | | | | | |
| The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1. | | | | | | | | | | | | |
| Legal Instrument Examiner: /VICTORIA BROWN/ | | | | | | | | | | | | |

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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| | | |
|---|------------------------|--------------------------|
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | 12495190 |
| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

| U.S. PATENTS | | | | | | | Remove |
|-------------------|---------|---------------|------------------------|------------|---|--|--------|
| Examiner Initial* | Cite No | Patent Number | Kind Code ¹ | Issue Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | |
| | 1 | 5539658 | | 1996-07-23 | McCullough, Timothy L. | | |
| | 2 | 6675233 | | 2004-01-26 | Du | | |
| | 3 | 6681120 | | 2004-01-20 | Kim, Ki, Il | | |

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| Examiner Initial* | Cite No | Publication Number | Kind Code ¹ | Publication Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | |
| | 1 | 20030126335 | | 2003-07-03 | Silvester, Kelan, C. | | |

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| Examiner Initial* | Cite No | Foreign Document Number ³ | Country Code ² j | Kind Code ⁴ | Publication Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | T ⁵ |
| | 1 | DE 19 651 308 A1 | DE | | 1996-10-12 | Becker GmbH | | <input type="checkbox"/> |

| | | |
|--|------------------------|--------------------------|
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | 12495190 |
| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

| | | | | | | | | |
|--|---|--------------|----|--|------------|----------------------|--|--------------------------|
| | 2 | EP 333330 A1 | EP | | 1989-02-17 | Pudsey, David Graham | | <input type="checkbox"/> |
|--|---|--------------|----|--|------------|----------------------|--|--------------------------|

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NON-PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T ⁵ |
|--------------------|---------|--|--------------------------|
| | 1 | "Universal Serial Bus Specification," Revision 1.1, September 23, 1998, pages ii-106. | <input type="checkbox"/> |
| | 2 | Reply to Office Action Mailed August 5, 2009 in Reexamination Control No. 90/010,333 of U.S. Patent No. 7,324,833 (along with a Supplemental Reply and Second Supplemental Reply). | <input type="checkbox"/> |
| | 3 | Response to "Notice of Failure to Comply with Inter Partes Reexamination Request Filing Requirements (37 CFR 1.915(d)) filed on September 22, 2009. Requestor: Volkswagen Group of America, Inc. with Replacement Request for Inter Partes Reexamination of U.S. Patent No. 7,324,833 and Claim Charts A-JJ. | <input type="checkbox"/> |
| | 4 | The United States Patent and Trademark Office, Office Action Mailed November 12, 2009 in related patent application serial no. 12/015,320. | <input type="checkbox"/> |
| | 5 | The United States Patent And Trademark Office, Office Action Mailed November 9, 2007 in related patent application serial no. 10/947,755. | <input type="checkbox"/> |

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EXAMINER SIGNATURE

| | | | |
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| Examiner Signature | | Date Considered | |
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

| | | |
|---|------------------------|--------------------------|
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | 12495190 |
| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|------------|------------------|---------------------|------------|
| Signature | /Mark J. Rozman/ | Date (YYYY-MM-DD) | 2009-11-16 |
| Name/Print | Mark J. Rozman | Registration Number | 42117 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



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12 Offenlegungsschrift
10 DE 196 51 308 A 1

21 Aktenzeichen: 196 51 308.1
22 Anmeldetag: 10. 12. 96
43 Offenlegungstag: 16. 7. 98

51 Int. Cl. 6:
H 04 L 12/42
H 04 R 5/04
H 04 S 3/00
H 04 H 1/00
B 60 R 16/02
H 02 J 13/00
H 04 L 29/00

DE 196 51 308 A 1

71 Anmelder:
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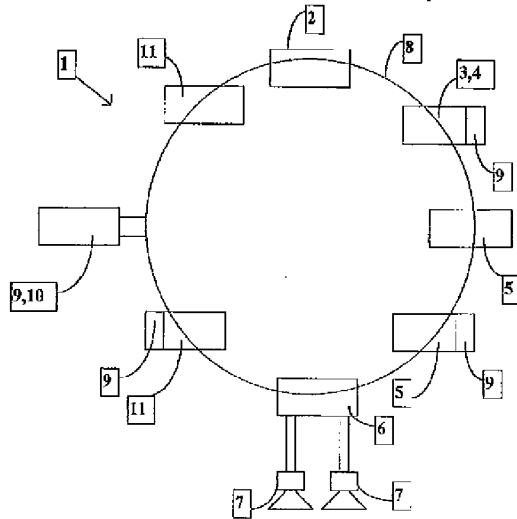
56 Entgegenhaltungen:
EP 07 25 522 A2
EP 05 49 005 A1

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Prüfungsantrag gem. § 44 PatG ist gestellt

54 Audio-Soundsystem für ein Kraftfahrzeug

57 Audio-Soundsystem (1) für ein Kraftfahrzeug mit einer Steuereinheit (2), mit einer Eingabeeinheit (3) zur Bedienung des Systems (1), mit einer Anzeigeeinheit (4), mit einer Einheit (5) zur Generierung der Quelldaten in Form von Audiodaten, mit einer Verstärkereinheit (6) zur Verstärkung der Quelldaten, mit einem oder mehreren Lautsprechern (7) und mit einem Bussystem (8), das die Übertragung der Quelldaten und der Steuerdaten zur Steuerung der Einheiten (2, 3, 4, 5, 6, 7) sicherstellt, bei dem zumindest eine von der Steuereinheit (2) verschiedene Einheit (3, 4, 5, 6, 7) des Systems (1) einen ihr zugeordneten Speicher (9) aufweist, in dem der Funktionsumfang dieser Einheit (3, 4, 5, 6, 7) dargestellt ist, und dieser Funktionsumfang über den Bus (8) an die Steuereinheit (2) übertragbar ist und in dieser der übermittelte Funktionsumfang zumindest teilweise zur Bildung des Funktionsumfangs des gesamten Systems (1) herangezogen werden kann. Dabei sind die Steuereinheit (2), die Eingabeeinheit (3) und die Anzeigeeinheit (4) dergestalt miteinander verbunden, daß mittels der Anzeigeeinheit (4) die für die Bedienung des gesamten Systems (1) erforderlichen Bedienmanus entsprechend dem Funktionsumfang des gesamten Systems (1) darstellbar sind und die Bedienung des Systems (1) mit Hilfe der Eingabeeinheit (3) anhand der Darstellungen in der Anzeigeeinheit (4) erfolgen kann.



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Beschreibung

Die Erfindung betrifft ein Audio-Soundsystem für ein Kraftfahrzeug mit einer Steuereinheit, mit einer Eingabeeinheit zur Bedienung des Systems, mit einer Anzeigeeinheit, mit einer Einheit zur Generierung der Quelldaten in Form von Audiodaten, mit einer Verstärkereinheit zur Verstärkung der Quelldaten, mit einem oder mehreren dieser zugeordneten Lautsprechern und mit einem Bussystem, das die Übertragung der Quelldaten und der Steuerdaten zur Steuerung der Einheiten zwischen den einzelnen Einheiten sicherstellt.

Ein derartiges Audio-Soundsystem ist allgemein in der BP-A-0 725 522 beschrieben. Weiterhin ist ein derartiges System in der Druckschrift "OCC 8001" CONAN "Optical Transceiver", C&C Electronics Ltd., 1996 beschrieben. Die dargestellten Audio-Soundsysteme zeigen eine Steuereinheit, welche auch Head Unit genannt wird, die die Steuerung des gesamten Systems bewirkt und die die Ausgabe von Information über die Anzeigeeinheit, die Bedienung des Systems über die Eingabeeinheit durch den Benutzer sowie die Umsetzung in entsprechende Steuerbefehle für die einzelnen Einheiten des Audio-Soundsystems ermöglicht. Dabei zeigen die bekannten Audio-Soundsysteme für Kraftfahrzeuge einen starren Systemaufbau, der es nur erlaubt, bestimmte Einheiten in das System zu integrieren, welche durch die Steuereinheit/Head Unit vorgesehen sind. Damit erweisen sich die bekannten Audio-Soundsysteme für Kraftfahrzeuge als wenig flexibel, wenig benutzerfreundlich und sehr teuer im Falle einer Adaption des Systems an die neuen Gegebenheiten. Eine Anpassung an neue, andersartige, zusätzliche Komponenten wird bei den bekannten Audio-Soundsystemen dadurch gewährleistet, daß neben der neuen Einheit zusätzlich eine neue Steuereinheit/Head Unit in das System integriert werden muß, was die bereits beschriebenen Nachteile mit sich bringt.

Aufgabe der Erfindung ist es, das Audio-Soundsystem für ein Kraftfahrzeug so auszubilden, daß Änderungen am System möglichst einfacher, kostengünstiger und sicherer durchgeführt werden können.

Diese Aufgabe wird bei dem bekannten Audio-Soundsystem dadurch erreicht, daß die Steuereinheit in die Lage versetzt ist, daß sie von einer oder mehreren oder allen anderen Einheiten des Systems deren möglichen Funktionsumfang, welcher in einem dieser zugeordneten Speicher abgelegt ist, über das Bussystem zugeführt bekommt und aus der Summe der einzelnen Funktionsumfänge der Funktionsumfang des Gesamtsystems gebildet wird. Dieser Funktionsumfang des gesamten Systems bildet stets eine Teilmenge aller Funktionsumfänge der einzelnen Einheiten des Audio-Soundsystems. Das dargestellte Audio-Soundsystem zeigt erfindungsgemäß eine Struktur, welche an dezentralen Stellen den Funktionsumfang der einzelnen Einheiten hinterlegt hat und wo an zentraler Stelle vorzugsweise in der Steuereinheit ein aus den verschiedenen einzelnen Funktionsumfängen der einzelnen Einheiten gebildeter Funktionsumfang des gesamten Systems zur Steuerung des gesamten Systems hinterlegt ist.

Anders als im Stand der Technik wird bei einer Änderung, beispielsweise beim Hinzufügen einer neuen, ursprünglich nicht vorgesehenen Einheit des Audio-Soundsystems, nicht mehr die Steuereinheit, respektive die Head Unit, ausgetauscht, sondern in ihrer Art beibehalten und sichergestellt, daß der hinzugekommene Funktionsumfang der zusätzlichen Einheit zur Bildung des Funktionsumfangs des gesamten Systems mit herangezogen wird, wodurch den Änderungen des gesamten Systems Rechnung getragen wird und der Benutzer den Änderungen entsprechend neue, geänderte Bedienmöglichkeiten und entsprechende Funktionalitäten

des Systems zur Verfügung gestellt bekommt. Es wird damit, soweit erforderlich, dem neuen Funktionsumfang des gesamten Systems entsprechend eine neue Bedienungsführung zur Bedienung des gesamten Systems zur Verfügung gestellt, was ggf. mit geänderten Darstellungen in der Anzeigeeinheit bzw. mit geänderten Zuordnungen von Befehlen zu den Eingabetasten der Eingabeeinheit verbunden ist.

Durch diese Ausbildung des Audio-Soundsystems gelingt es, den Funktionsumfang des Audio-Soundsystems neuen Anforderungen sicher, einfach und kostengünstig anzupassen. Aufwendige Zusatzgeräte und Neugeräte sind in diesem Falle nicht erforderlich.

Ein besonders vorteilhaftes, flexibles Audio-Soundsystem ist dann gegeben, wenn eine Vielzahl von Einheiten über ihnen zugeordnete Speicher verfügt, in denen die für sie spezifischen Funktionsumfänge abgelegt sind und aus diesen der Gesamtfunktionsumfang des Systems gebildet wird, in dem alle Funktionalitäten verwendet werden oder nur bestimmte Teile der Funktionalitäten der einzelnen Einheiten in die Funktionalität des Gesamtsystems übertragen werden sollen. Diese teilweise Übertragung kann automatisch durch die Steuereinheit oder durch den Benutzer oder durch eine zusätzliche, zeitweise in das Soundsystem über die Busleitung angeschlossene, integrierte Einheit erfolgen.

Damit wird die Vielfältigkeit des Systems auf besonders vorteilhafte Weise nach den jeweiligen Bedürfnissen des Benutzers entsprechend den jeweils zur Verfügung stehenden Einheiten zur Erzeugung von Audiodaten oder den Einheiten zur Verstärkung dieser Daten oder den Lautsprechern flexibel und frei konfigurieren, was auch der Fall sein kann, wenn keine neuen Einheiten in das System aufgenommen werden, sondern nur die verwendeten Teilmengen der Einzelfunktionsumfänge neuen Anforderungen durch Erweiterung oder Einschränkung angepaßt werden.

Nach einer bevorzugten Ausführungsform der Erfindung ist der einer Einheit zugeordnete Speicher als Teil dieser Einheit ausgebildet. Dadurch ist gewährleistet, daß der Speicherinhalt mit dem möglichen Funktionsumfang der Einheit nicht über das Bussystem an die Einheit übertragen werden muß, um anschließend den Funktionsumfang von der Einheit wiederum über die Busleitung an die Steuereinheit zu übermitteln. Im Fall eines optischen Bussystems, welches besonders große Vorteile in Richtung EMV-Stabilität und Gewichtersparnis aufweist, kann auf die zwingend erforderlichen, kostenintensiven elektrisch-optischen Wandler zwischen den Speichern und den Einheiten verzichtet werden, was das System weniger anfällig gegen Störungen macht und dadurch die Sicherheit der Bedienung und damit die Bedienfreundlichkeit des Systems erhöht. Darüberhinaus erweist sich diese Ausbildung als besonders kostengünstig.

Nach einer vorteilhaften Weiterbildung der Erfindung ist der Speicher als Teil einer Rechneinheit ausgebildet, welche über das Bussystem mit der dem Speicher zugeordneten Einheit verbunden ist, und welche als eigenständige, räumlich von den anderen Einheiten separierte Rechneinheit ausgebildet ist, und welche bei Bedarf über das Bussystem den Funktionsumfang der dem Speicher zugeordneten Einheit direkt oder indirekt der Steuereinheit zur Bildung des Funktionsumfangs des gesamten Systems zuführen kann. Dabei erweist sich die Verwendung einer Rechneinheit als besonders vorteilhaft, da sie sehr flexible Speicherstrukturen aufweist, in welche über andere Schnittstellen der Rechneinheit auf einfache Weise andere, geänderte Funktionsumfänge einschreibbar sind. Auch ist ermöglicht, eine gegebenenfalls zentrale Rechneinheit mit entsprechendem Speicher in dem System vorzusehen, welche die zentrale Verwaltung der einzelnen Funktionsumfänge der einzelnen Ein-

heiten gewährleistet und bei Bedarf diese direkt oder indirekt an die Steuereinheit zur Bildung des neuen, geänderten Funktionsumfangs des gesamten Audio-Soundsystems über das Bussystem überträgt. Vorzugsweise ist die Reclinereinheit lösbar mit dem System verbunden. Durch Verwendung einer geliehenen spezifischen Rechereinheit in der Art einer vorübergehenden Integration in das System über eine vorbereitete Schnittstelle im Bussystem kann dem System ein neuer, geänderter Gesamtfunktionsumfang zugrunde gelegt werden. Dadurch ist ein sehr flexibles und für den Benutzer kostengünstiges System gegeben. Beispielsweise kann durch ein derartiges System sehr einfach eine neue Funktionalität, beispielsweise ein neuer Typ von 3-D-Sound als neue Funktionalität des Systems einschließlich der dieser Funktionalität zugeordneten Bedienungsführung eingegeben werden und damit den individuellen Bedürfnissen des Benutzers auf sehr einfache, kostengünstige und flexible Weise angepaßt werden. Damit gelingt es, die Notwendigkeit des Ersetzens kompletter Einheiten oder des gesamten Audio-Soundsystems in vielen Fällen durch eine reine Neu-5 programmierung des Systems zu ersetzen, was sich neben den genannten Vorteilen auch im Hinblick auf die Verschwendung von Ressourcen und die Vermeidung von Abfall vorteilhaft bemerkbar macht.

Eine besonders einfache und angenehme Art der Bedienung des Audio-Soundsystems wird dadurch erreicht, daß die Steuereinheit, die Eingabeeinheit und die Anzeigeeinheit dergestalt miteinander verbunden sind, daß entsprechend dem Funktionsumfang des gesamten Systems auf der Anzeigeeinheit spezifische Bedienmenüs dargestellt werden, die die Bedienung des Systems mit Hilfe der Eingabeeinheit anhand der Darstellungen in der Anzeigeeinheit zielstrebig und einfach ermöglichen. Die Bedienmenüs können spezifisch sein für die einzelnen Funktionalitäten der einzelnen Einheiten, sie können aber auch spezifisch sein für die Art und Weise des Vorgangs zur Bildung eines neuen, geänderten Funktionsumfangs des gesamten Systems. Dabei ist es möglich die Anzeigeeinheit mit einer zusätzlichen Sprachausgabe zu versehen, welche die Bedienfreundlichkeit und Bediensicherheit des Gesamtsystems deutlich erhöht. Ebenso kann mit vergleichbaren Vorteilen die Eingabeeinheit auch als sprachgesteuerte Eingabeeinheit ausgebildet sein.

Als bevorzugte Ausbildung des Audio-Soundsystems hat sich herausgestellt, die Eingabeeinheit und die Anzeigeeinheit zu einer einzigen Einheit zusammenzufassen und diese bevorzugt so auszubilden, daß die Anzeigeeinheit in einzelne Segmente unterteilt ist, denen einzelne Tasten der Eingabeeinheit räumlich zugeordnet sind und welche jeweils die der zugeordneten Taste zugewiesene Bedienfunktionen darstellen und die entsprechenden Tasten und die Segmente durch die Steuereinheit anhand des Funktionsumfangs des gesamten Systems so ansteuern, daß die den Tasten zugewiesenen und in dem zugeordneten Segment dargestellten Funktionen durch Befätigen der Tasten ausgelöst werden können. Durch diese Ausbildungen gelingt es, das Audio-Soundsystem sehr einfach mit möglichst wenigen Schnittstellen und Einheiten aufzubauen, was die Verwaltung des gesamten Systems, respektive die Steuerung der einzelnen Einheiten, wie auch die Versorgung des Systems mit der erforderlichen Energie vereinfacht und dadurch das System weniger anfällig gegen Störungen macht. Dadurch ist ein erhöhtes Maß an Bediensicherheit und ein erhöhtes Maß an Vereinfachung der Bedienung des Systems gegeben. Nach der beschriebenen Ausführungsform ist es möglich, eine zentrale Einheit als Man-Machine-Interface, bestehend aus Eingabe- und Anzeigeeinheit im Fahrzeug, vorzugsweise im Dashboard unterzubringen, und all die anderen Einheiten,

wie Tuner, CD-Player, Videoplayer oder ähnliches im Kraftfahrzeug an der ihrer Funktion oder den Möglichkeiten des Fahrzeuges angepaßten und optimierten Position unterzubringen und über das Bussystem so miteinander zu verbinden, daß die erforderlichen Steuer- und Quelldaten zielgerichtet übertragen werden. Damit ist es beispielsweise möglich, den Rundfunkuner oder TV-Tuner am an sich idealen Ort im Bereich der Antenne anzuordnen und nur noch die von diesen abgegebenen Quelldaten an den entsprechenden Verstärker und die Ausgabeeinheit weiterzuleiten. Die Steuerung erfolgt in diesem Fall über die zentrale Einheit, das Man-Machine-Interface, welches dem Benutzer die Möglichkeit der Bedienung aller Systemkomponenten mit deren jeweiligen Funktionsumfängen gewährt. Bei Änderungen der Funktionsumfänge des Systems durch Änderung der Funktionsumfänge einzelner Komponenten oder durch Hinzufügen oder Entfernen einzelner Komponenten läßt sich das erfindungsgemäße, beschriebene System besonders einfach und sicher neu konfigurieren.

Als bevorzugte Ausbildung der Erfindung hat sich gezeigt, daß neben den Audiodaten andere Multimediadaten, insbesondere Videodaten, übertragen werden können und daß entsprechende Einheiten zur Generierung dieser Multimediadaten und entsprechende Einheiten zur Darstellung dieser Multimediadaten vorgesehen sind. Als Beispiele für Einheiten zur Generierung von Multimediadaten sind insbesondere DVD-Player, CD-ROM-Lesegeräte oder Navigationsgeräte zu nennen und als Einheiten zur Darstellung dieser Multimediadaten zeigen sich beispielsweise LCD-Displays. Gerade durch die Vielfalt und die sehr dynamische Entwicklung des Multimediabereiches, mit seinen spezifischen Multimediadaten, den spezifischen Informationsumfängen der jeweiligen Geräte einschließlich der Art und Weise der Bedienbarkeit dieser Geräte, zeigt sich der besondere Vorteil des erfindungsgemäßen Systems, da es auf alle möglichen Änderungen von neuen Geräten im Bereich Multimedia und deren spezifische Entwicklungen jederzeit flexibel reagieren kann und das Soundsystem den Erfordernissen einfach und flexibel anpassen kann. Diese Flexibilität erweist sich umso mehr, je größer die Zahl der Einheiten zur Generierung von Audio- und/oder Multimediadaten sind, da bei derartigen Systemen-Änderungen durch Ersetzen der Geräte durch den Benutzer und damit Ändern des Funktionsumfangs sehr viel häufiger gegeben sind als bei Systemen mit nur einer einzigen Einheit zur Generierung von Audio- und/oder Multimediadaten. Bei derartigen Systemen kann der Benutzer gegebenenfalls nach seinen Vorstellungen den Funktionsumfang des gesamten Systems festlegen und ihm die entsprechenden Steuerbefehle und Bedienbefehle für die Zukunft für die Bedienung des Systems zugrunde legen.

Bei Systemen mit mehreren Verstärkereinheiten zur Verstärkung der Audio-Quelldaten zeigen sich die besonderen Vorteile des erfindungsgemäßen Systems in besonderer Weise, da gerade diese Verstärkereinheiten, insbesondere wenn sie jede für sich spezifisch zugeordnete Einheiten zur Wandlung der verstärkten Quelldaten in Schallwellen aufweisen, eine Vielzahl von unterschiedlichen Funktionalitäten aufweisen. Dies umso mehr, da jeder Verstärkereinheit für jeden ihr zugeordneten Lautsprecher spezifische, dem Ort und den sonstigen Eigenschaften des Lautsprechers angepaßte und spezifisch verstärkte Quelldaten zur Verfügung gestellt werden können, was sich durch unterschiedliche Laufzeitverzögerungen, Vorverzerrungen und ähnliches ausdrücken können. Wird aus irgendwelchen Gründen irgendeine Komponente, insbesondere eine Einheit zur Wandlung der verstärkten Quelldaten, geändert, so lassen sich die einzelnen Funktionsumfänge der Verstärkereinheit so an-

passen, daß das gesamte Audio-Soundsystem mit der neuen, geänderten Einheit zur Wandlung der verstärkten Quelldaten in Schallwellen für den Benutzer ein möglichst ideales Klangeempfinden erzeugt. Damit ist durch das erfindungsgemäße System auch ermöglicht, daß eine Änderung des Funktionsumfangs dahingehend möglich ist, daß für bestimmte Positionen im Fahrzeug, welche durch den Benutzer gewählt werden können, jeweils ein nahezu idealer Klangraum unter Ausnutzung der verschiedenen Verstärkerparameter, wie Fader, Balance, Verzögerungswerte, Verzerrung und ähnlichen eingestellt werden kann. Jeder neue Parametersatz stellt einen geänderten Funktionsumfang dar, der bei dem erfindungsgemäßen System auf besonders einfache und flexible Weise Verwendung finden kann. Diese Vorteile ergeben sich umso mehr, wenn jeder Einheit zur Wandlung der verstärkten Quelldaten in Schallwellen eine eigene Verstärkereinheit zugeordnet wird, d. h. sogenannte Aktivlautsprecher Verwendung finden. Damit kann je nach Art der Verwendung der aktiven Lautsprecher diesen ein jeweils spezifischer Funktionsumfang als deren Funktionsumfang zugeordnet sein, welcher dann erfindungsgemäß zur Bildung des Funktionsumfangs des gesamten Systems teilweise oder vollständig herangezogen wird.

Vorzugsweise ist das Audio-Soundsystem mit einem Zeitgeber versehen, der nach Ablauf einer vorgegebenen Zeitspanne die Generierung des Funktionsumfangs des gesamten Systems aus den Funktionsumfängen der einzelnen Einheiten sicherstellt. Durch dieses System ist eine automatisierte Generierung des Funktionsumfangs des gesamten Systems in regelmäßigen Zeitabständen gegeben, was ein sehr sicheres und einfaches Handhaben des Systems und der Möglichkeiten des Systems erlaubt. Wird die vorgegebene Zeitspanne einstellbar ausgebildet, so läßt sich auf vorteilhafte Weise den einzelnen Bedürfnissen des Benutzers Rechnung tragen. Wird der Benutzer das System öfters durch Hinzufügen oder Austauschen einzelner Komponenten oder Entfernen einzelner Komponenten oder einfach den veränderten einzelnen Wunschvorstellungen des jeweiligen Benutzers anpassen wollen, so wird er eine verkürzte, vorgegebene Zeitspanne einstellen, während ein Benutzer, der keine Änderungen oder praktisch keine Änderungen vorgesehen hat, dem System eine lange Zeitspanne bis zur Neukonfiguration des Systems einstellen wird. Durch diese einstellbare, vorgegebene Zeitspanne wird die Benutzerfreundlichkeit des Systems in besonderer Weise gewährleistet, da sich das System automatisch ohne Aktivitäten des Benutzers den Funktionsumfang des gesamten Systems festlegt, indem es auf die Funktionsumfänge der einzelnen Einheiten, Komponenten des Systems zurückgreift und aus diesen den Gesamtfunktionsumfang bildet. Darüberhinaus erweist sich ein derartiges System als besonders sicher, da der Ablauf der Festlegung des neuen Funktionsumfangs stets in festen Bahnen verläuft, ohne dabei die Flexibilität des Systems, d. h. Berücksichtigung von Änderungen in der verschiedensten Art und Weise einzuschränken.

Vorzugsweise wird das System so ausgebildet, daß das Einschalten des gesamten Audiosystems oder auch jeder einzelnen Einheit erkannt wird und durch dieses Einschalten die Bildung des Funktionsumfangs des gesamten Systems aus den Funktionsumfängen der einzelnen Einheiten ausgelöst wird. Dabei ist zu beachten, daß ein Hinzufügen einer Einheit dem Einschalten dieser Einheit gleichkommt. Durch diese spezifische Art der Auslösung der Bildung des Gesamtfunktionsumfangs ist auf einfache Art und Weise sichergestellt, daß bei reduziertem Verwaltungsaufwand stets ein den einzelnen Komponenten angepaßter Gesamtfunktionsumfang gegeben ist, der sich automatisch den geänderten Bedingungen, insbesondere beim Hinzufügen weiterer

Komponenten, d. h. dem Ersetzen einzelner Komponenten durch Entfernen und anschließendes Hinzufügen, angepaßt ist. Dadurch ist ein sehr flexibles System gewährleistet, das aufgrund der reduzierten Verwaltung sicher in seiner Funktion ist. Dieses System zeichnet sich insbesondere dadurch aus, daß es nur für sehr begrenzte Zeit, insbesondere beim Einschalten, nicht im vollen Umfang funktionsfähig ist, da in dieser Zeit der gesamte Funktionsumfang erst gebildet werden muß und dadurch die Bedienung des Systems für diese Zeit nicht oder nur beschränkt möglich ist.

Als besonders geeignetes Gesamtsystem zeigt sich ein System, welches mittels der Bedieneinheit zur Bildung des gesamten Funktionsumfangs des gesamten Systems veranlaßt werden kann. Hat der Benutzer das Bedürfnis, das Soundsystem in seinem Funktionsumfang zu verändern oder den geänderten Eigenschaften anzupassen, so kann er die Bildung des Funktionsumfangs des gesamten Systems durch Betätigung eines oder mehrerer Bedienelemente der Bedieneinheit auslösen. Damit wird sichergestellt, daß alleine dann wenn es notwendig ist, die Bildung des Funktionsumfangs ausgelöst wird und dadurch das System für kurze Zeit in der Funktionsweise behindert wird. Dadurch ist die Funktionalität des gesamten Systems über nahezu die vollständige Zeit sichergestellt. Eine sichere und flexible Anpassung an die Erfordernisse und Wünsche des Benutzers ist bei dem System weiterhin in vorzüglicher Weise sichergestellt.

Darüberhinaus hat sich als bevorzugte Ausbildung des Audio-Soundsystems gezeigt, daß es in der Lage ist, durch den Benutzer veranlaßt die Ausgabe der Funktionsumfänge des gesamten Systems sowie der einzelnen und/oder aller Einheiten über die Anzeigeeinheit zu ermöglichen. Darüberhinaus hat es sich als vorteilhaft erwiesen, durch entsprechende Bedienungsführung mittels der Bedieneinheit und der Anzeigeeinheit sicherzustellen, daß einzelne Teilfunktionsumfänge oder auch ganze Funktionsumfänge einzelner Komponenten für die Benutzung zur Bildung des Funktionsumfangs des gesamten Systems selektiert werden. Nach Abschluß der Selektion der einzelnen ausgewählten Funktionsumfänge der einzelnen Einheiten wird dann der gesamte Funktionsumfang des Systems gebildet, wodurch der Bedien- und Anzeigeeinheit dem neuen gesamten Funktionsumfang entsprechende Menues und Funktionalitäten zugewiesen werden, wie auch die Steuereinheit und die einzelnen Einheiten nur noch die für den beschränkten, neugebildeten gesamten Funktionsumfang des Systems relevanten Steuerbefehle damit für die Funktionalitäten des neuen gesamten Funktionsumfangs des Systems relevanten Funktionalitäten sichergestellt sind. Damit läßt sich das System sehr einfach nach den Wünschen des Benutzers anpassen und auf das für den gewünschten Funktionsumfang notwendige Maß an Steuer- und Verwaltungstätigkeit reduziert. Es ist also nicht mehr notwendig, eine Vielzahl von Funktionalitäten des Systems zu unterstützen, die der Benutzer nicht wünscht. Damit läßt sich die Bediensicherheit und Funktionsunsicherheit des Systems deutlich erhöhen, ohne daß die Flexibilität des Systems beschränkt wird.

Neben der Anwendung des Audio-Soundsystems in einem Kraftfahrzeug erweist sich die Verwendung dieses Systems in einem Wohnwagen oder einem Haus oder einer Wohnung als vorteilhaft, da auch in diesen vergleichbare Problemstellungen, insbesondere beim Hinzufügen weiterer Komponenten in ein über ein Bussystem verbundene Einheiten aufweisendes System, auftreten. Damit zeigen sich auch die vergleichbaren Vorteile, insbesondere dann wenn einzelne Komponenten ergänzt werden, beispielsweise wenn ein weiterer Raum der Wohnung mit Einheiten zur Wandlung von Audio-Quelldaten in Schallwellen und gegebenenfalls Verstärkern versehen werden soll. Bei einer der-

artigen Änderung sollte das System möglichst einfach, sicher, schnell und flexibel an die neuen Bedürfnisse angepaßt werden. Insoweit erweist sich die Verwendung des Audio-Soundsystems für ein Kraftfahrzeug in den anderen Umgebungen als besonders vorteilhaft.

Die Erfindung wird nachfolgend anhand eines Ausführungsbeispiels gemäß Fig. 1 erläutert; in dieser zeigt:

Fig. 1 ein Audio-Soundsystem für ein Kraftfahrzeug, dessen Einheiten über ein Bussystem mit ringförmiger Topologie.

Das in Fig. 1 beispielhaft dargestellt Audio-Soundsystem 1 für ein Kraftfahrzeug zeigt eine Steuereinheit 2, eine in einem Gerät zusammengefaßte Eingabeeinheit 3, eine Ausgabeeinheit 4, welche zusätzlich einen Speicher 9 aufweist, die zusammengefaßte Einheit wird auch Man-Machine-Interface MMI genannt, ein CD-Wechsler 5, ein FM-Tuner 5 mit zugeordnetem Speicher 9, eine Verstärkereinheit 6 mit daran angeschlossenen zwei Lautsprechern 7, eine Navigationseinheit 11 mit zugeordnetem Speicher 9, eine Rechereinheit 10 mit integriertem Speicher 9 sowie einen TV-Tuner 11. Diese einzelnen Komponenten des Audio-Soundsystems 1 sind über ein Bussystem 8 ringförmig miteinander verbunden.

Über das Bussystem 8 werden sowohl Steuer-, Audio- als auch Multimediadaten übertragen. Durch die Steuereinheit 2 des Audio-Soundsystems 1 werden die einzelnen Komponenten 3, 4, 5, 6, 11, 10 entsprechend ihren Funktionalitäten angesteuert bzw. mit den notwendigen Daten für deren Funktionieren im System versorgt.

Beispielsweise wird das MMI 3,4,9 so angesteuert, daß die Anzeige 4 in einzelne Segmente unterteilt wird, welche einzelnen Tasten der Eingabeeinheit räumlich und funktionell zugeordnet sind, und daß in den Segmenten eine Darstellung der Bedienfunktion der diesem Segment zugeordneten Taste typisch in Form von Menuearstellung gezeigt werden. Durch die Betätigung einer der Tasten wird die in dem zugeordneten Segment der Anzeigeeinheit 4 dargestellte Funktion ausgelöst. Diese Funktionen können vielfältigster Natur sein, wie zum Beispiel Lautstärke erhöhen, Lautstärke absenken, Loudness ein oder aus, Surround ein oder aus, System aus, Schlafmodus ein, Baß verstärken oder absenken, Balance nach links oder rechts verschieben, Umschalten auf TV-Tuner, Eingabemodus Navigation starten, Equalizing-Programmieren starten oder vieles mehr. Durch diese Darstellung kann der Benutzer das gesamte System 1 über die eine zentrale Eingabe- 3 und Anzeigeeinheit 4 bedienen. Die Darstellung und die Bedienung erforderlichen Daten sind in dem Speicher 9 des MMI abgelegt. Darüberhinaus sind aber nicht nur die derzeit aktuellen Daten, d. h. aktueller Bedienungs- und Darstellungsumfang, abgespeichert sondern auch alle möglichen Daten, welche für das MMI in seiner allgemeinsten Darstellung- und Bedienmöglichkeit relevant sind. Diese allgemeinen Daten zeigen somit die grundsätzlichen Möglichkeiten und damit der Funktionsumfang des MMI. Dieser ist nicht unbedingt identisch zu dem aktuell aktiven Funktionsumfang.

Entsprechendes gilt für die anderen Einheiten zur Generierung von Quelldaten wie den FM-Tuner mit dem zugeordneten, integrierten Speicher 9 und die Navigationseinheit 11 mit deren integriertem Speicher 9, der vorzugsweise als CD-ROM ausgebildet ist und daher einen umfassenden Funktionsumfang darstellen kann. Dieser Funktionsumfang umfaßt neben den Daten zum möglichen Funktionsumfang der Navigationseinheit 11 auch die Daten zum Funktionsumfang des TV-Tuners. Durch die Möglichkeit des Austausches der CD-ROM als Speicherbasis läßt sich der mögliche Funktionsumfang sehr einfach in Form einer Art Software-Update ändern.

Darüberhinaus zeigt das dargestellte Audio-Soundsystem eine Rechereinheit 10 mit integriertem Speicher 9. Diese Rechereinheit 10 ist über eine nicht näher dargestellte lösbare Schnittstelle mit dem Bussystem 8 verbunden und kann über diese Daten mit den anderen Einheit des Systems 1 austauschen. Im Speicher 9 der Rechereinheit 10 sind beispielsweise die möglichen Funktionsumfänge des CD-Wechslers 5 und des Verstärkers 6 und ggf. der Lautsprecher 7 abgelegt. Der Rechereinheit 10 kann über eine vorhandene weiter standardisierte Schnittstelle wie RS 232 geänderte oder neue Funktionsumfänge für einzelne Einheiten des Systems eingespielt und bei Bedarf in deren Speicher 9 abgelegt werden. Da die Rechereinheit 10 lösbar mit dem Bussystem verbunden ist, ist mit Hilfe dieser stets auch eine einfache Überprüfung des Systems in der Art eines regelmäßigen Services mit integrierter Anpassung der möglichen Funktionsumfänge auf sehr einfache Weise möglich. In diesem Fall werden diese möglichen Funktionsumfänge entweder komplett oder in eingeschränktem Umfang einzelnen Speichern 9 des Systems 1 zugeordnet und dort abgespeichert.

Anhand der aus den einzelnen Funktionsumfänge der einzelnen Komponenten, auch Einheiten des Systems genannt, gebildete Funktionsumfang des gesamten Systems 1 werden der zu einer zentralen MMI zusammengefaßten Eingabe- 3 und Anzeigeeinheit 4 festgelegte Bedienmenues und Befehlsfolgen zu den Bedienelementen zugeordnet, anhand derer der Benutzer die Bedienung des Systems vornehmen kann. Weiterhin wird der Steuerbefehlsatz zwischen den einzelnen Komponenten entsprechend dem Funktionsumfang gewählt, wodurch ein reduzierter Verwaltungs- und Organisationsaufwand für den Betrieb des Systems notwendig ist. Dadurch wird auch die Betriebssicherheit erhöht, da weniger Wechselwirkungen zwischen einzelnen Systemzuständen und entsprechenden Funktionalitäten zu berücksichtigen sind.

Wird nun eine der Einheiten 3, 4, 5, 6, 7, 11 aus dem System 1 entfernt, durch eine andere Einheit ersetzt oder eine weitere Einheit hinzugefügt, so wird diese Veränderung des Systems durch die Steuereinheit 2 festgestellt. Danach wird automatisch ein Verfahrensablauf zur Festlegung des Funktionsumfangs des Audio-Soundsystems 1 ausgelöst. In diesem werden der Reihe nach über das Bussystem 8 alle Funktionsumfänge der einzelnen Einheiten des Systems zentral erfaßt und aus den erfaßten Einzelfunktionsumfängen der Funktionsumfang des gesamten Systems 1 gebildet. Dies kann durch vollständige Übernahme der einzelnen Funktionsumfänge einzelner Einheiten erfolgen oder durch teilweise Übernahme erfolgen. Welche Funktionalitäten einer Einheit in den Funktionsumfang des gesamten Systems übernommen wird, kann sich aus den Wechselwirkungen der einzelnen Einheiten ergeben oder kann durch individuelle Auswahl durch den Benutzer des Systems 1 ergeben.

Ein Beispiel für eine begrenzende Kombination von Einheiten wäre eine Balance- oder Paderfunktion, wenn das gesamte System nur einen einzigen Lautsprecher 7 aufweist. In diesem Fall würde die Steuereinheit 2 erkennen, daß die Pader- oder Balancefunktionalität der Verstärkereinheit 6 in der derzeitigen Systemkonfiguration mit einem einzigen Lautsprecher 7 nicht zulässig sind und daher nicht in den Funktionsumfang des gesamten Systems 1 übernommen werden können. Limitierende Faktoren können auch in den Eigenschaften einzelner Einheiten begründet sein.

Darüber hinaus kann der Benutzer des Systems durch Betätigung einer bestimmten Taste oder Tastenkombination der Eingabeeinheit 3 ohne Eingriff in die einzelnen Einheiten des Systems – Austausch, Entfernen oder Hinzufügen von Einheiten – eine Änderung des Funktionsumfangs aus-

lösen. Dabei kann der Benutzer dann einen ihm genehmen Funktionsumfang festlegen. Dies erfolgt dann durch entsprechende Selektion der einzelnen Funktionalitäten der einzelnen Einheiten des System mit Hilfe der Bedieneinheit 3 und der Anzeigeeinheit 4. Dabei werden die möglichen Funktionalitäten in der Anzeigeeinheit 4 dargestellt und durch spezifische Betätigung der Tasten der Bedieneinheit 3 für die Übernahme in den Funktionsumfang des gesamten Systems 1 selektiert. Dies wird für alle Einheiten, deren Funktionsumfang frei selektierbar ist, durchgeführt. Auch ist es möglich, daß nur die Änderungen zu dem bestehenden Funktionsumfang des gesamten Systems eingegeben werden, das heißt es werden nach Wunsch des Benutzers einzelne Funktionalitäten aus dem Funktionsumfang gelöscht oder neue Funktionalitäten dem bestehenden Funktionsumfang hinzugefügt. Auf der Basis des neu festgelegten Funktionsumfangs des Systems werden die diesem entsprechenden Bedienmenues in der Anzeigeeinheit 4 dargestellt und den Tasten der Bedieneinheit 3 die diesem entsprechenden Befehlsbereiche zugeordnet sowie die diesem Funktionsumfang entsprechenden Steuerbefehle zwischen den einzelnen Einheiten insbesondere zwischen der Steuereinheit 2 und der spezifischen Einheit ausgetauscht.

Durch diese Möglichkeit ist sichergestellt, daß jeder Benutzer nach seinen eigenen Bedürfnissen einen Funktionsumfang des gesamten Systems darstellen kann, ohne daß er jeweils auf andere neue Komponenten zurückgreifen muß. Damit kann ein und dasselbe Audio-Soundsystem durch die individuelle Möglichkeit, den Funktionsumfang festzulegen, völlig unterschiedliche Gesichter und Verhaltensweisen zeigen. Der eine Benutzer zeigt sich als völliger Purist in der Art der Bedienung, weshalb es ihm völlig genügt die Lautstärke zu regeln, sowie die Wahl der Signalquelle vornehmen zu können. Dieser wäre durch jede weitere Funktionalität gestört und wird sich durch diesen puristischen Funktionsumfang am ehesten angesprochen fühlen. Der andere Benutzer möchte alle möglichen Eingriffsmöglichkeiten und Funktionalitäten jeder einzelnen Einheit des Systems zur Verfügung stehen haben und wird daher alle möglichen Funktionalitäten in den Funktionsumfang des gesamten Systems übernehmen. Mit einem solchen System wäre der zuvor genannte Benutzer völlig überfordert während dieser Benutzer dadurch sehr angesprochen ist. Zumal dieses System ihm jederzeit die Möglichkeit gibt einzelne Komponenten durch andere Komponenten mit größerem Funktionsumfang auszutauschen oder weitere Komponenten hinzuzufügen und dadurch den Funktionsumfang ohne komplizierten Eingriff in das System einfach und sicher den jeweiligen Gegebenheiten anzupassen. Beispielsweise ist es möglich, die bisher einfache einfarbige, kleinflächige Anzeigeeinheit durch ein vielfarbiges Display zu ersetzen, was damit völlig andere komfortablere Bedienmenues ermöglicht und dadurch die Benutzung erleichtert. Diese Anpassung des Funktionsumfangs erfolgt stets aus der Kommunikation der einzelnen Einheiten untereinander über das Bussystem 8. Durch das gezeigte Audio-Soundsystem ist ein sehr flexibles, kostengünstig und sicher zu veränderndes System gegeben, das sich den individuellen Bedürfnissen in einfacher Weise anpassen läßt.

Bezugszeichenliste

- 1 Audio-Soundsystem
- 2 Steuereinheit
- 3 Eingabeeinheit zur Bedienung des Systems (1)
- 4 Anzeigeeinheit
- 5 Einheit zur Generierung der Quelldaten in Form von Audiodaten

- 6 Verstärkereinheit zur Verstärkung der Quelldaten,
- 7 Lautsprecher
- 8 Bussystem
- 9 Speicher
- 10 Rechneinheit
- 11 Einheit zur Generierung von Multimedia-Daten.

Patentansprüche

1. Audio-Soundsystem (1) für ein Kraftfahrzeug mit einer Steuereinheit (2), mit einer Eingabeeinheit (3) zur Bedienung des Systems (1), mit einer Anzeigeeinheit (4), mit einer Einheit (5) zur Generierung der Quelldaten in Form von Audiodaten, mit einer Verstärkereinheit (6) zur Verstärkung der Quelldaten, mit einem oder mehreren Lautsprechern (7) und mit einem Bussystem (8), das die Übertragung der Quelldaten und der Steuerdaten zur Steuerung der Einheiten (2, 3, 4, 5, 6, 7) zwischen den einzelnen Einheiten (2, 3, 4, 5, 6, 7) sicherstellt, **dadurch gekennzeichnet**, daß zumindest eine von der Steuereinheit (2) verschiedene Einheit (3, 4, 5, 6, 7) des Systems (1) einen ihr zugeordneten Speicher (9) aufweist, in dem der Funktionsumfang dieser Einheit (3, 4, 5, 6, 7) dargestellt ist, und dieser Funktionsumfang über den Bus (8) an die Steuereinheit (2) übertragbar ist und in dieser der übermittelte Funktionsumfang zumindest teilweise zur Bildung des Funktionsumfangs des gesamten Systems (1) herangezogen werden kann.
2. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß der einer Einheit (3, 4, 5, 6, 7) zugeordnete Speicher (9) Teil dieser Einheit (3, 4, 5, 6, 7) ist.
3. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß der der Einheit (3, 4, 5, 6, 7) zugeordnete Speicher (9) Teil einer über das Bussystem (8) mit der Einheit (3, 4, 5, 6, 7) verbunden, räumlich von den anderen Einheiten (2, 3, 4, 5, 6, 7) separierten Rechneinheit (10) ist.
4. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 3, dadurch gekennzeichnet, daß der der Einheit (3, 4, 5, 6, 7) zugeordnete Speicher (9) in der Rechneinheit (10) mit geänderten Funktionsumfängen beschreibbar ausgebildet ist.
5. Audio-Soundsystem für ein Kraftfahrzeug nach einem der Ansprüche 3 bis 4, dadurch gekennzeichnet, daß die Rechneinheit (10) über eine vorbereitete Schnittstelle in dem Bussystem (8) mit dem System (1) lösbar verbunden ist.
6. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Steuereinheit (2), die Eingabeeinheit (3) und die Anzeigeeinheit (4) dergestalt miteinander verbunden sind, daß mittels der Anzeigeeinheit (4) die für die Bedienung des gesamten Systems (1) erforderlichen Bedienmenues entsprechend dem Funktionsumfang des gesamten Systems (1) darstellbar sind und die Bedienung des Systems (1) mit Hilfe der Eingabeeinheit (3) anhand der Darstellungen in der Anzeigeeinheit (4) erfolgen kann.
7. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 6, dadurch gekennzeichnet, daß die Eingabeeinheit (3) und die Anzeigeeinheit (4) zu einer einzigen Einheit (3,4) zusammengefaßt sind.
8. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 7, dadurch gekennzeichnet, daß die Anzeigeeinheit (4) in einzelne Segmente unterteilt ist, welche einzelnen Tasten der Eingabeeinheit (3) räumlich zuge-

ordnet sind und welche die jeweils der zugeordneten Taste zugewiesene Bedienfunktion darstellen, und daß die Zuweisung der Bedienfunktion der Tasten sowie die Darstellung der Bedienfunktion in den einzelnen Segmenten durch die Steuereinheit (2) anhand des Funktionsumfangs des gesamten Systems (1) gewählt ist.

9. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß neben den Audiodaten andere Multimedia-Daten, insbesondere Videodaten, übertragen werden können, und daß entsprechende Einheiten (11) zur Generierung dieser Multimedia-Daten, insbesondere DVD-Player, sowie entsprechende Einheiten zur Darstellung dieser Multimedia-Daten, insbesondere Displays vorgesehen sind.

10. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche insbesondere Anspruch 9, dadurch gekennzeichnet, daß in dem System (1) mehrere Einheiten (5, 11) zur Generierung von Audio- und/oder Multimedia-Daten vorgesehen sind.

11. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das System (1) mehrere Verstärkereinheiten (6) zur Verstärkung der Audio-Quelldaten vorgesehen sind, welche jeweils einem oder mehreren Lautsprechern (7) räumlich zugeordnet und mit diesen so verbunden sind, daß ausschließlich diese mit den spezifisch verstärkten Audiodaten angesteuert werden.

12. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das System (1) einen Zeitgeber aufweist, durch den nach Ablauf einer vorgegebenen Zeitspanne die Bildung des Funktionsumfangs des gesamten Systems (1) aus den Funktionsumfängen der einzelnen Einheiten (2, 3, 4, 5, 6, 7, 11) auslösbar ausgebildet ist.

13. Audio-Soundsystem für ein Kraftfahrzeug nach Anspruch 12, dadurch gekennzeichnet, daß die vorgegebene Zeitspanne für die Bildung des Funktionsumfangs des gesamten Systems (1) einstellbar ausgebildet ist.

14. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche 1 bis 11, dadurch gekennzeichnet, daß das System (1) so ausgebildet ist, daß bei Einschalten des gesamten Audio-Soundsystems (1) oder einer einzelnen Einheit (2, 3, 4, 5, 6, 7, 11) davon die Bildung des Funktionsumfangs des gesamten Systems (1) aus den Funktionsumfängen der einzelnen Einheiten (2, 3, 4, 5, 6, 7, 11) auslösbar ist.

15. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß mittels der Bedieneinheit (3) die Ausgabe des Status der Funktionsumfänge des gesamten Systems (1) und/oder einzelner und/oder aller Einheiten (2, 3, 4, 5, 6, 7, 11) über die Anzeigeeinheit (4) auslösbar ist.

16. Audio-Soundsystem für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß mittels der Bedieneinheit (3) die Bildung des Funktionsumfangs des gesamten Systems (1) aus den Funktionsumfängen der einzelnen Einheiten (2, 3, 4, 5, 6, 7, 11) auslösbar ist.

17. Verwendung des Audio-Soundsystems (1) für ein Kraftfahrzeug nach einem der vorstehenden Ansprüche in einem Wohnwagen, in einem Haus oder in einer Wohnung.

18. Verfahren Festlegung des Funktionsumfangs eines Audio-Soundsystems (1) nach einem der vorstehenden Ansprüche 1 bis 16, dadurch gekennzeichnet, daß bei

einer Änderung des Systems (1) insbesondere durch Hinzufügen einer weiteren Einheit (5, 11) zur Generierung von Quelldaten und bei der damit verbundenen Änderung des Funktionsumfangs des Systems (1), die Steuereinheit (2) von den einzelnen Einheiten (2, 3, 4, 5, 6, 7, 11) ihren einheitenspezifischen Funktionsumfang aus den diesen Einheiten (2, 3, 4, 5, 6, 7, 11) zugeordneten Speichern (9) zur Verfügung gestellt bekommt, und diese einheitenspezifischen Funktionsumfänge gesamt oder teilweise zu einem neuen gesamten Funktionsumfang des gesamten Systems (1) zusammengefügt, und daß im folgenden die Steuereinheit (2) entsprechend diesem gesamten Funktionsumfang die einzelnen Einheiten ansteuert und die generierten Quelldaten dementsprechend den einzelnen entsprechenden Einheiten (2, 3, 4, 5, 6, 7, 11) im System zugewiesen werden.

19. Verfahren Festlegung des Funktionsumfangs eines Audio-Soundsystems nach Anspruch 18, dadurch gekennzeichnet, daß die Steuereinheit (2) entsprechend dem gesamten Funktionsumfang die Eingabe- (3) und die Anzeigeeinheit (4) derart mit Daten versorgt, daß der Benutzer des Soundsystems (1) die einzelnen Parameter der Funktionen des Systems (1) wie beispielsweise Lautstärke, Baß, Treble, Fader, Balance, Equalizer, usw. individuell einstellen kann.

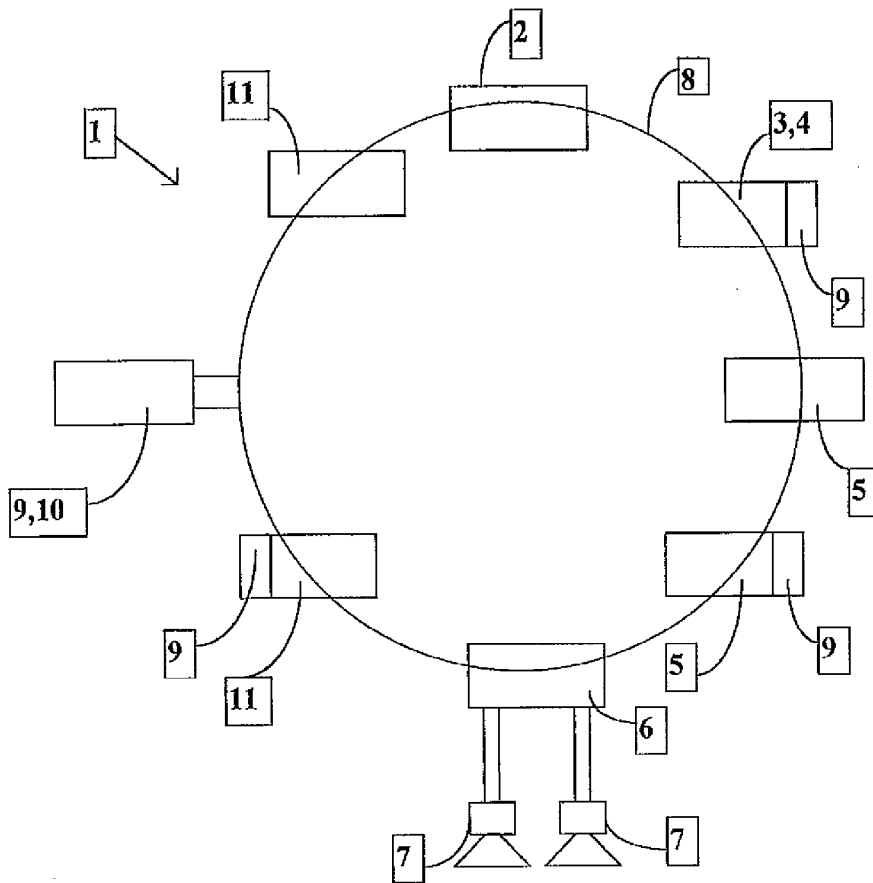
20. Verfahren Festlegung des Funktionsumfangs eines Audio-Soundsystems nach Anspruch 18 und/oder 19, dadurch gekennzeichnet, daß die Steuereinheit (2) entsprechend diesem gesamten Funktionsumfang die Eingabe- (3) und die Anzeigeeinheit (4) derart mit Daten versorgt, daß der Benutzer des Soundsystems (1) die einzelnen Funktionen der einzelnen Einheiten (2, 3, 4, 5, 6, 7, 11) zur Generierung von Quelldaten des Systems wie beispielsweise Play, Tracksprung, Repeat, Fast Forward, Rewind, Frequenzwechsel, Frequenzbandwechsel, Stummschaltung, Verkehrsnachrichten aktivieren/deaktivieren, Sendersuchlauf starten, RDS-Funktionen aktivieren/deaktivieren usw. über entsprechende Bedienmenues aufrufen kann.

Hierzu 1 Seite(n) Zeichnungen

Audio-Soundsystem für ein Kraftfahrzeug

Zeichnungen

Figur 1



D E C L A R A T I O N

I, Hans-Jakob Wilhelm, declare that I am well qualified as a translator of German to English and that I have carefully prepared the attached English language translation from the original document:

Audio-Soundsystem für ein Kraftfahrzeug (DE 196 51 308 A1)

[Audio sound system for a motor vehicle]

written in German; and that the attached translation is an accurate English version of such original to the best of my knowledge and belief.

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

Date

9/9/2009

Signature



Name

Hans-Jakob Wilhelm

AUDIO SOUND SYSTEM FOR A MOTOR VEHICLE

An audio sound system (1) for a motor vehicle having a control unit (2), having an input unit (3) for operating the system (1), having a display unit (4), having a unit (5) for generating the source data in the form of audio data, having an amplifier unit (6) for amplifying the source data, having one or multiple loudspeakers (7) and having a bus system (8), which ensures the transmission of the source data and the control data for controlling the units (2, 3, 4, 5, 6, 7) between the individual units (2, 3, 4, 5, 6, 7), in which at least one unit (3, 4, 5, 6, 7) of the system (1) that is distinct from the control unit (2) has an associated memory (9), in which the functional scope of this unit (3, 4, 5, 6, 7) is represented, and this functional scope is transmittable via the bus (8) to the control unit (2) and in the latter the transmitted functional scope is able to be used at least partially for forming the functional scope of the overall system (1). For this purpose, the control unit (2), the input unit (3) and the display unit (4) are connected to one another in such a way that the operating menus required for operating the overall system (1) are representable in accordance with the functional scope of the overall system (1) via the display unit (4) and the system (1) may be operated with the aid of the input unit (3) on the basis of the representations on the display unit (4).

Description

The invention relates to an audio sound system for a motor vehicle having a control unit, having an input unit for operating the system, having a display unit, having a unit for
5 generating the source data in the form of audio data, having an amplifier unit for amplifying the source data, having one or multiple loudspeakers associated with the amplifier unit and having a bus system, which ensures the transmission of the source data and the control data for controlling the units
10 between the individual units.

Such an audio sound system is generally described in EP-A-0 725 522. Furthermore, such a system is described in the printed publication "OCC 8001" CONAN "Optical Transceiver", C&C Electronics Ltd., 1996. The described audio sound systems
15 disclose a control unit, also called head unit, which effects the control of the overall system and which allows for the output of information via the display unit, the operation of the system by the user via the input unit and the conversion into corresponding control commands for the individual units
20 of the audio sound system. The known audio sound systems for motor vehicles feature a rigid system structure, which only allows for certain units to be integrated into the system, which are provided for by the control unit/head unit. The known audio sound systems for motor vehicles thus prove to
25 have little flexibility, not to be very user-friendly and to be very expensive in the event of an adaptation of the system to the new conditions. An adaptation to new, different, additional components is ensured in the known audio sounds systems by the fact that in addition to the new unit a new
30 control unit/head unit must also be integrated into the system, which entails the disadvantages already described.

The objective of the invention is to develop the audio sound

system for a motor vehicle in such a way that the system may be modified preferably in a simpler, more cost-effective and more reliable manner.

In the known [sic] audio sound system, this objective is achieved in that the control unit is enabled to receive from one or multiple or all other units of the system their possible functional scope, which is stored in a memory associated with the latter, via the bus system, and that the functional scope of the overall system is formed from the sum of the individual functional scopes. This functional scope of the overall system always forms a subset of all functional scopes of the individual units of the audio sound system. According to the invention, the described audio sound system reveals a structure, which has stored the functional scope of the individual units in decentralized locations and where in a centralized location, preferably in the control unit, a functional scope of the overall system for controlling the overall system is stored, which is formed from the different individual functional scopes of the individual units.

In contrast to the related art, in the event of a modification, for example when adding a new unit of the audio sound system for which there was originally no provision, the control unit, or rather the head unit, is no longer exchanged, but is rather maintained in its kind and it is ensured that the added functional scope of the additional unit is included in the formation of the functional scope of the overall system, whereby the modifications of the overall system are taken into account and the user is provided with new, modified operating options and corresponding functionalities of the system in accordance with the modifications. Thus, to the extent required, in accordance with the new functional scope of the overall system, a new operational guidance for operating the overall system is provided, which possibly

involves modified representations in the display unit or modified assignments of commands to the input keys of the input unit.

This development of the audio sound system makes it possible to adapt the functional scope of the audio sound system to new requirements in a reliable, simple and cost-effective manner. Costly ancillary devices and new devices are not required in this case.

A particularly advantageous, flexible audio sound system is provided if a plurality of units has memories associated with them, in which functional scopes specific for these units are stored, and if from these the overall functional scope of the system is formed, in which all functionalities are used or only certain parts of the functionalities of the individual units are to be transferred into the functionality of the overall system. This partial transfer may occur automatically through the control unit or through the user or through an additional unit that is temporarily integrated into the sound system and connected via the bus line.

In a particularly advantageous manner, the versatility of the system may thus be flexibly and freely configured according to the respective requirements of the user in accordance with the respectively available units for producing audio data or the units for amplifying these data, which may also be the case if no new units are included in the system, but rather only the utilized subsets of the individual functional scopes are adapted to new requirements by expansion or restriction.

According to a preferred specific embodiment of the invention, the memory associated with a unit is developed as a part of this unit. This ensures that the memory content containing the possible functional scope of the unit does not have to be transmitted via the bus system to the unit in order

subsequently to transmit the functional scope from the unit again via the bus line to the control unit. In the case of an optical bus system, which has particularly great advantages in terms of EMC stability and saving weight, one may dispense with the necessarily required, cost-intensive electrical-optical converters between the memories and the units, which makes the system less susceptible to failures and thus increases the reliability of operation and thus the user-friendliness of the system. Moreover, this development proves to be particularly cost-effective.

According to an advantageous development of the invention, the memory is developed as part of a computer unit, which is connected via the bus system to the unit associated with the memory, and which is developed as an independent computer unit spatially separated from the other units, and which, when required, is able to supply via the bus system the functional scope of the unit associated with the memory directly or indirectly to the control unit for forming the functional scope of the overall system. For this purpose, the use of a computer unit proves to be particularly advantageous since it has very flexible memory structures, into which other modified functional scopes may be written in a simple manner via other interfaces of the computer unit. It is also possible to provide in the system a possibly central computer unit having a corresponding memory, which ensures the central management of the individual functional scopes of the individual units and, when required, transmits these directly or indirectly to the control unit for forming the new modified functional scope of the overall audio sound system via the bus system. The computer unit is preferably connected to the system in a detachable manner. By using a borrowed specific computer unit by way of a temporary integration into the system via a prepared interface in the bus system, the system may be

provided with a new modified overall functional scope. This makes for a very flexible system that is cost-effective for the user. For example, via such a system, a new functionality, for example a new type of 3D sound may be very simply entered as a new functionality of the system, including the operational guidance associated with this functionality, and thus adapted to the individual requirements of the user in a very simple, cost-effective and flexible manner. This makes it possible in many cases to substitute the necessity of replacing complete units or the entire audio sound system with a pure reprogramming of the system, which in addition to the mentioned advantages also has advantageous consequences with respect to the waste of resources and the avoidance of waste material.

A particularly simple and comfortable way of operating the audio sound system is achieved by connecting the control unit, the input unit and the display unit to one another in such a way that, in accordance with the functional scope of the overall system, specific operating menus are represented on the display unit, which allow for the system to be operated in a purposeful and simple manner with the aid of the input unit on the basis of the representations on the display unit. The operating menus may be specific for the individual functionalities of the individual units, but they may also be specific for the type of process for forming a new modified functional scope of the overall system. In this connection, it is possible to provide the display unit with an additional voice output, which markedly increases the user-friendliness and operational reliability of the overall system. Likewise, with comparable advantages, the input unit may also be developed as a voice-controlled input unit.

It has turned out to be a preferred development of the audio sound system to combine the input unit and the display unit

into a single unit and to develop the latter preferably in such a way that the display unit is subdivided into individual segments, which are spatially associated with individual keys of the input unit and which respectively represent the operating function assigned to the associated key and control the corresponding keys and the segments via the control unit on the basis of the functional scope of the overall system in such a way that the functions assigned to the keys and represented on the associated segment may be triggered by operating the keys. These developments make it possible to construct the audio sound system in a very simple manner having as few interfaces and units as possible, which simplifies the management of the overall system, or the control of the individual units, as well as the supply of the system with the required power and thus makes the system less susceptible to failures. This provides for a higher degree of operational reliability and greater simplification of the operation of the system. According to the described specific embodiment, it is possible to accommodate a central unit as a man-machine interface, made up of input unit and display unit, in the vehicle, preferably in the dashboard, and to accommodate all the other units such as tuner, CD player, video player or the like in the motor vehicle in the location adapted and optimized with respect to their function or the possibilities of the vehicle and to connect these to one another via the bus system in such a way that the required control data and source data are transmitted in a targeted manner. This makes it possible for example to situate the radio tuner or TV tuner at the per se ideal location in the area of the antenna and only transmit the source data output by these tuners to the corresponding amplifier and the output unit. The control operation occurs in this case via the central unit, the man-machine interface, which affords the user the possibility of operating all system components having

their respective functional scopes. When changing the functional scopes of the system by changing the functional scopes of individual components or by adding or removing individual components, the described system of the invention
5 may be reconfigured in a particularly simple and reliable manner.

It has proved to be a preferred development of the present invention that, in addition to the audio data, other multimedia data, in particular video data, may be transmitted
10 and that corresponding units for generating these multimedia data and corresponding units for representing these multimedia data are provided. Particularly DVD players, CD ROM readers or navigation devices should be mentioned as examples of units for generating multimedia data, while LCD displays are
15 examples of units for representing these multimedia data. It is especially this variety and the very dynamic development of the multimedia field, with its specific multimedia data, the specific informational scopes of the respective devices including the manner of operating these devices, which reveals
20 the particular advantage of the system according to the invention because this system is able to react at any time flexibly to all possible changes of new devices in the multimedia field and their specific developments and to adapt the sound system simply and flexibly to the requirements. This
25 flexibility proves itself all the more, the higher the number of units for generating audio and/or multimedia data since in such systems modifications by replacement of the devices on the part of the user and thus the modification of the functional scope occurs much more frequently than in systems
30 having only one single unit for generating audio and/or multimedia data. In such systems, the user is able to define the functional scope of the overall system according to his ideas and assign to it the corresponding control commands and

operating commands for the future for operating the system.

In systems having multiple amplifier units for amplifying the audio source data, the particular advantages of the system according to the invention are revealed in a special way since precisely these amplifier units, particularly if each for itself has specifically associated units for converting the amplified source data into sound waves, have a plurality of different functionalities. This is all the more so since for each associated loudspeaker each amplifier unit may be provided with specific source data adapted to the location and the other characteristics of the loudspeaker and specifically amplified, which may express itself in different propagation time delays, predistortions and the like. If for any reason some component, particularly a unit for converting the amplified source data, is modified, then the individual functional scopes of the amplifier unit may be adapted in such a way that the overall audio sound system having the new modified unit for converting the amplified source data into sound waves produces for the user the most ideal sound experience possible. The system according to the invention thus also makes it possible to change the functional scope in such a way that for specific locations in the vehicle, which the user is able to choose, a nearly ideal sound space may be set respectively by using the various amplifier parameters such as fader, balance, delay values, predistortion and the like. Each new set of parameters represents a modified functional scope, which may be used in a particularly simple and flexible manner in the system according to the invention. These advantages are obtained all the more if each unit for converting the amplified source data into sound waves has an amplifier of its own assigned to it, i.e. if so-called active loudspeakers are used. Thus, depending on the type of use of the active loudspeakers, these may be assigned a respectively

specific functional scope as their functional scope, which in accordance with the invention is then used, partially or in its entirety, in the formation of the functional scope of the overall system.

5 Preferably, the audio sound system is equipped with a timer, which following the expiration of a specified time span ensures the generation of the functional scope of the overall system from the functional scopes of the individual units. This system provides for an automated generation of the functional scope of the overall system at regular intervals, 10 which allows for a very reliable and simple handling of the system and of the possibilities of the system. If the specified time span is developed to be adjustable, then the individual requirements of the user may be taken into account 15 in an advantageous manner. If the user will want to adapt the system frequently by adding or exchanging individual components or removing individual components or simply adapt it to the changed individual wishes of the respective user, then he will set a shortened specified time span, while a user 20 who plans no changes or practically no changes will set for the system a long time span until the reconfiguration of the system. This adjustable, specified time span ensures the user-friendliness of the system in a particular manner because the system defines the functional scope of the overall system 25 automatically without actions on the part of the user in that it makes use of the functional scopes of the individual units, the components of the system and from these forms the overall functional scope. Moreover, such a system proves to be particularly reliable since the process of defining the new 30 functional scope always proceeds along a fixed course without thereby limiting the flexibility of the system, i.e. taking into account changes of the most various kinds.

The system is preferably developed in such a way that the

activation of the overall audio system or also of each individual unit is detected and that this activation triggers the formation of the functional scope of the overall system from the functional scopes of the individual units. Here it must be noted that the addition of a unit is equivalent to the activation of this unit. This specific manner of triggering the formation of the overall functional scope ensures in a simple manner that at reduced management cost an overall functional scope adapted to the individual components is always provided, which automatically adapts to the changed conditions, particularly when adding further components, i.e. replacing individual components by removal and subsequent addition. This ensures a very flexible system which is reliable in its function due to the reduced management. This system is particularly characterized by the fact that it is not fully operational only for a very limited time, particularly upon activation, since at this time the overall functional scope must first be formed and as a result the operation of the system is not possible for this time or possible only in a limited way.

A particularly suitable overall system is a system which may be prompted to form the overall functional scope of the overall system with the aid of the operating unit. If the user has the need to modify the sound system in its functional scope or adapt it to the changed characteristics, he is able to trigger the formation of the functional scope of the overall system by activating one or several operating elements of the operating unit. This ensures that the formation of the functional scope is triggered, and the system thereby briefly hindered in its operation, only when necessary. This ensures the functionality of the overall system over nearly the entire time. The system continues to ensure in an excellent manner a reliable and flexible adaptation to the requirements and

wishes of the user.

Furthermore, a preferred development of the audio sound system has proved to be the ability to allow for the functional scopes of the overall system and of the individual and/or all units to be output via the display unit when prompted by the user. Furthermore, it has proved advantageous to ensure by appropriate operational guidance using the operating unit and the display unit that individual partial functional scopes or even entire functional scopes of individual components are selected for use in forming the functional scope of the overall system. After concluding the selection of the individual selected functional scopes of the individual units, the overall functional scope of the system is then formed, as a result of which menus and functionalities corresponding to the new overall functional scope are assigned to the operating unit and display unit, as also now only the control commands relevant for the limited, newly formed overall functional scope of the system and thus the functionalities relevant for the functionalities of the new overall functional scope of the system are ensured for the control unit and the individual units. The system may thus be adapted very simply to the wishes of the user and reduced to the extent of control activity and management activity necessary for the desired functional scope. Thus it is no longer necessary to support a multitude of functionalities of the system which the user does not desire. This makes it possible to increase the operational reliability and functional reliability of the system markedly without limiting the flexibility of the system.

Besides using the audio sound system in a motor vehicle, the use of this system in an automobile camper or a house or an apartment is advantageous since in these there also occur comparable problems, in particular when adding additional components in a system having units connected via a bus

system. The comparable advantages are thus revealed as well,
especially when individual components are added, for example
when another room of the apartment is to be equipped with
units for converting audio source data into sound waves and is
5 possibly to be equipped with amplifiers. In a modification of
this kind, the system should be adapted to the new
requirements as simply, reliably, quickly and flexibly as
possible. In this respect, the use of the audio sound system
for a motor vehicle proves to be particularly advantageous in
10 the other environments.

The invention is explained below on the basis of an exemplary
embodiment as shown in Figure 1. The figure shows:

Figure 1 an audio sound system for a motor vehicle,
whose units **[are connected]** via a bus system
15 having a ring-shaped topology.

The audio sound system 1 for a motor vehicle shown in Figure 1
by way of example shows a control unit 2, an input unit 3, an
output unit 4 combined in one device which additionally has a
memory 9, the combined unit also being called a man-machine
20 interface MMI, a CD changer 5, an FM tuner 5 having an
associated memory 9, an amplifier unit 6 having two connected
loudspeakers 7, a navigation unit 11 having an associated
memory 9, a computer unit 10 having an integrated memory 9,
and a TV tuner 11. These individual components of audio sound
25 system 1 are connected to one another in a ring-shaped manner
via a bus system 8.

Control data, audio data as well as multimedia data are
transmitted via bus system 8. The individual components 3, 4,
5, 6, 11, 10 are controlled in accordance with their
30 functionalities or supplied with the data necessary for their
functioning in the system by control unit 2 of audio sound
system 12.

The MMI 3, 4, 9 is controlled in such a way for example that display 4 is subdivided into individual segments, which are spatially and functionally associated with individual keys of the input unit, and that the segments present the operating
5 function of the key associated with this segment typically in the form of a menu representation. Operating one of the keys triggers the function represented on the associated segment of display unit 4. These functions may be of the most varied kinds such as for example, increase volume, lower volume,
10 loudness on or off, surround on or off, system off, sleep mode on, increase or decrease bass, shift balance to the left or to the right, switch to TV tuner, start input mode for navigation, start equalizer programming and much more. This representation allows the user to operate the entire system 1
15 via the one central input unit 3 and display unit 4. The data required [for] the representation and the operation are stored in memory 9 of the MMI. Not only the currently relevant data, i.e. the current scope of operation and representation, are stored, but also all kinds of other data that are relevant for
20 the MMI in its most general possibility of representation and operation. These general data thus reveal the basic possibilities and thus the functional scope of the MMI. The latter is not necessarily identical with the currently active functional scope.

25 The same holds for the other units for generating source data such as the FM tuner with the associated integrated memory 9, and navigation unit 11 with its integrated memory 9, which preferably takes the form of a CD-ROM and is thus able to represent a comprehensive functional scope. In addition to the
30 data regarding the possible functional scope of navigation unit 11, this functional scope also includes the data regarding the functional scope of the TV tuner. Because of the possibility of exchanging the CD-ROM as a memory base, the

possible functional scope may be very simply modified in the form of a kind of software update.

In addition, the represented audio sound system shows a computer unit 10 having an integrated memory 9. This computer unit 10 is connected to bus system 8 via a detachable interface (not shown) and is able to exchange data with the other unit of system 1 via this interface. Memory 9 of computer unit 10 stores for example the possible functional scopes of CD changer 5 and of amplifier 6 and, is applicable, of loudspeakers 7. Via an existing further standardized interface such as RS 232, modified or new functional scopes for individual units of the system may be imported into computing unit 10 and, when needed, stored in its memory 9. Since computing unit 10 is detachably connected to the bus system, it is always possible to use it to perform a simple check of the system in the manner of a regular service including an integrated adaptation of the possible functional scopes in a very simple manner. In this case, these possible functional scopes are assigned to individual memories 9 of system 1 and stored there, either in their entirety or to a limited extent.

On the basis of the functional scope of the overall system 1 formed from the individual functional scopes of the individual components, also called units of the system, the input unit 3 and display unit 4 combined into a central MMI is assigned defined operating menus and command sequences regarding the operating elements, on the basis of which the user is able to operate the system. Furthermore, the set of control commands between the individual components is selected in accordance with the functional scope, which reduces the administrative and organizational cost for operating the system. The operational reliability is thereby increased as well since fewer reciprocal effects between individual system states and

corresponding functionalities have to be taken into account.

If now one of the units 3, 4, 5, 6, 7, 11 is removed from system 1, is replaced by another unit or another unit is added, then this modification of the system is registered by control unit 2. Thereupon, a method sequence for determining the functional scope of audio sound system 1 is triggered automatically. In this process, all of the functional scopes of the individual units of the system are centrally registered in sequence via bus system 8 and the functional scope of overall system 1 is formed from the detected individual functional scopes. This may be done by completely taking over the individual functional scopes of individual units or by taking them over partially. Which functionalities of a unit are taken over into the functional scope of the overall system may be determined from interactions of the individual units or by individual selection on the part of the user of system 1.

One example of a limiting combination of units would be a balance or fader function if the overall system only has one single loudspeaker 7. In this case, control unit 2 would detect that the fader or balance functionality of amplifier unit 6 is not admissible in the current system configuration having a single loudspeaker 7 and may thus not be taken over into the functional scope of overall system 1. Limiting factors may also be based on the properties of individual units.

Furthermore, the user of the system may also trigger a modification of the functional scope by operating a certain key or key combination of input unit 3 without intervening in the individual units of the system - exchange, removal or addition of units. In the process, the user may define a functional scope agreeable to him. This then occurs by accordingly selecting the individual functionalities of the

individual units of the system with the aid of operating unit 3 and display unit 4. In the process, the possible functionalities are displayed in display unit 4 and selected by specific operation of the keys of operating unit 3 to be taken over into the functional scope of overall system 1. This is done for all units whose functional scope is freely selectable. It is also possible to enter only the changes to the existing functional scope of the overall system, that is, according to the wishes of the user, individual functionalities are deleted from the functional scope or new functionalities are added to the existing functional scope. On the basis of the newly defined functional scope of the system, the corresponding operating menus are represented in display unit 4 and the command scopes corresponding to this functional scope are assigned to the keys of operating unit 3 and the control commands corresponding to this functional scope are exchanged between the individual units, in particular between control unit 2 and the specific unit.

This possibility ensures that each user is able to produce a functional scope of the overall system in accordance with his own requirements, without respectively having to fall back on other new components. Because of the individual option of defining the functional scope, one and the same audio sound system may display completely different faces and modes of behavior. One user reveals himself as a complete purist in terms of the type of operation, which is why it is entirely sufficient for him to be able to control the volume and to select the signal source. This user would be bothered by any additional functionality and will find this purist functional scope most appealing. The other user would like to have all possible intervention options and functionalities of each individual unit of the system at his disposal and will therefore take over all possible functionalities into the

functional scope of the overall system. The previously
mentioned user would be completely overwhelmed by such a
system, while this user finds it very appealing. Especially
because this system gives him the option at any time to
5 exchange individual components with other components having a
greater functional scope or to add additional components and
thereby to adapt the functional scope to the respective
conditions in a simple and reliable manner without a
complicated intervention into the system. It is possible, for
10 example, to replace the hitherto simple, monochromatic, small-
area display unit with a polychromatic display, which
therefore allows for completely different and more comfortable
operating menus and thereby facilitates use. This adaptation
of the functional scope always results from the reciprocal
15 communication of the individual units via bus system B. The
disclosed audio sound system provides a very flexible, cost-
effective and reliably modifiable system, which is easily
adapted to individual requirements.

List of reference numerals

- 1 audio sound system
- 2 control unit
- 3 input unit for operating the system (1)
- 4 display unit
- 5 unit for generating the source data in the form of audio data
- 6 amplifier unit for amplifying the source data,
- 7 loudspeaker
- 8 bus system
- 9 memory
- 10 computer unit
- 11 unit for generating multimedia data.

What Is Claimed Is:

1. An audio sound system (1) for a motor vehicle having a control unit (2), having an input unit (3) for operating the system (1), having a display unit (4), having a unit (5) for generating the source data in the form of audio data, having an amplifier unit (6) for amplifying the source data, having one or multiple loudspeakers (7) and having a bus system (8), which ensures the transmission of the source data and the control data for controlling the units (2, 3, 4, 5, 6, 7) between the individual units (2, 3, 4, 5, 6, 7),
wherein
at least one unit (3, 4, 5, 6, 7) of the system (1) distinct from the control unit (2) has an associated memory (9), in which the functional scope of this unit (3, 4, 5, 6, 7) is represented, and this functional scope is transmittable via the bus (8) to the control unit (2) and in the latter the transmitted functional scope may be used at least partially for forming the functional scope of the overall system (1).
2. The audio sound system for a motor vehicle as recited in Claim 1,
wherein
the memory (9) associated with a unit (3, 4, 5, 6, 7) is a part of this unit (3, 4, 5, 6, 7).
3. The audio sound system for a motor vehicle as recited in Claim 1,
wherein
the memory (9) associated with the unit (3, 4, 5, 6, 7) is part of a computer unit (10) that is connected to the unit (3, 4, 5, 6, 7) via the bus system (8) and that is spatially separated from the other units (2, 3, 4, 5, 6,

- 7).
4. The audio sound system for a motor vehicle as recited in Claim 3,
wherein
the memory (9) associated with the unit (3, 4, 5, 6, 7)
is developed in the computer unit (10) so as to be
capable of having modified functional scopes written into
it.
5. The audio sound system for a motor vehicle as recited in
one of Claims 3 through 4,
wherein
the computer unit (10) is detachably connected to the
system (1) via a prepared interface in the bus system
(8).
6. The audio sound system for a motor vehicle as recited in
one of the preceding claims,
wherein
the control unit (2), the input unit (3) and the display
unit (4) are connected to one another in such a way that
the operating menus required for operating the overall
system (1) are representable in accordance with the
functional scope of the overall system (1) via the
display unit (4) and the system (1) may be operated with
the aid of the input unit (3) on the basis of the
representations on the display unit (4).
7. The audio sound system for a motor vehicle as recited in
Claim 6,
wherein
the input unit (3) and the display unit (4) are combined
in a single unit (3, 4).
8. The audio sound system for a motor vehicle as recited in

Claim 7,

wherein

the display unit (4) is subdivided into individual segments, which are spatially associated with individual keys of the input unit (3) and which represent the operating function assigned respectively to the associated key, and the assignment of the operating function of the keys and the representation of the operating function on the individual segments is selected by the control unit (2) on the basis of the functional scope of the overall system (1).

9. The audio sound system for a motor vehicle as recited in one of the preceding claims,

wherein

in addition to the audio data, other multimedia data, in particular video data, may be transmitted, and corresponding units (11) for generating these multimedia data, in particular DVD players, and corresponding units for representing these multimedia data, in particular displays, are provided.

10. The audio sound system for a motor vehicle as recited in one of the preceding claims, in particular Claim 9,

wherein

multiple units (5, 11) are provided in the system for generating audio and/or multimedia data.

11. The audio sound system for a motor vehicle as recited in one of the preceding claims,

wherein

the system (1) multiple amplifier units (6) are provided [sic] for amplifying the audio source data, which are spatially associated respectively with one or multiple loudspeakers (7) and are connected to these in such a way

that these are exclusively controlled by the specifically amplified audio data.

12. The audio sound system for a motor vehicle as recited in one of the preceding claims, wherein the system (1) has a timer, by which, following the expiration of a specified time span, the formation of the functional scope of the overall system (1) from the functional scopes of the individual units (2, 3, 4, 5, 6, 7, 11) is developed to be triggerable.
13. The audio sound system for a motor vehicle as recited in Claim 12, wherein the specified time span for forming the functional scope of the overall system (1) [~~is~~] developed to be adjustable.
14. The audio sound system for a motor vehicle as recited in one of the preceding Claims 1 through 11, wherein the system (1) is developed in such a way that when switching on the overall audio sound system (1) or one individual unit (2, 3, 4, 5, 6, 7, 11), the formation of the functional scope of the overall system (1) from the functional scopes of the individual units (2, 3, 4, 5, 6, 7, 11) is thereby triggerable.
15. The audio sound system for a motor vehicle as recited in one of the preceding claims, wherein the output of the status of the functional scopes of the overall system (1) and/or of individual and/or all units (2, 3, 4, 5, 6, 7, 11) via the display unit (4) is triggerable via the operating unit (3).

16. The audio sound system for a motor vehicle as recited in one of the preceding claims, wherein the formation of the functional scope of the overall system (1) from the functional scopes of the individual units (2, 3, 4, 5, 6, 7, 11) is triggerable via the operating unit (3).
17. A use of the audio sound system (1) for a motor vehicle as recited in one of the preceding claims in an automobile camper, a house or in an apartment.
18. A method [for] defining the functional scope of an audio sound system (1) as recited in one of the preceding Claims 1 through 16, wherein in the event of a modification of the system (1), in particular by adding another unit (5, 11) for generating source data, and in the associated modification of the functional scope of the system (1), the control unit (2) is provided by the individual units (2, 3, 4, 5, 6, 7, 11) with their unit-specific functional scope from the memories (9) associated with these units (2, 3, 4, 5, 6, 7, 11) and combines these unit-specific functional scopes in their entirety or partially into a new overall functional scope of the overall system (1), and subsequently the control unit (2) controls the individual units in accordance with this overall functional scope and the generated source data are accordingly assigned to the individual corresponding units (2, 3, 4, 5, 6, 7, 11) in the system.
19. The method [for] defining the functional scope of an audio sound system as recited in Claim 18, wherein

the control unit (2), in accordance with the overall functional scope, supplies the input (3) and the display unit (4) with data in such a way that the user of the sound system (1) is able individually to adjust the individual parameters of the functions of the system (1) such as for example the volume, bass, treble, fader, balance, equalizer, etc.

20. The method **[for]** defining the functional scope of an audio sound system as recited in Claim 18 and/or 19, wherein
- the control unit (2), in accordance with this overall functional scope, supplies the input unit (3) and the display unit (4) with data in such a way that the user of the sound system (1) is able to call up via corresponding operating menus the individual functions of the individual units (2, 3, 4, 5, 6, 7, 11) for generating source data of the system such as for example activating/deactivating play, track jump, repeat, fast forward, rewind, frequency change, frequency band change, mute, traffic report, starting station scan, activating/deactivating RDS functions etc.

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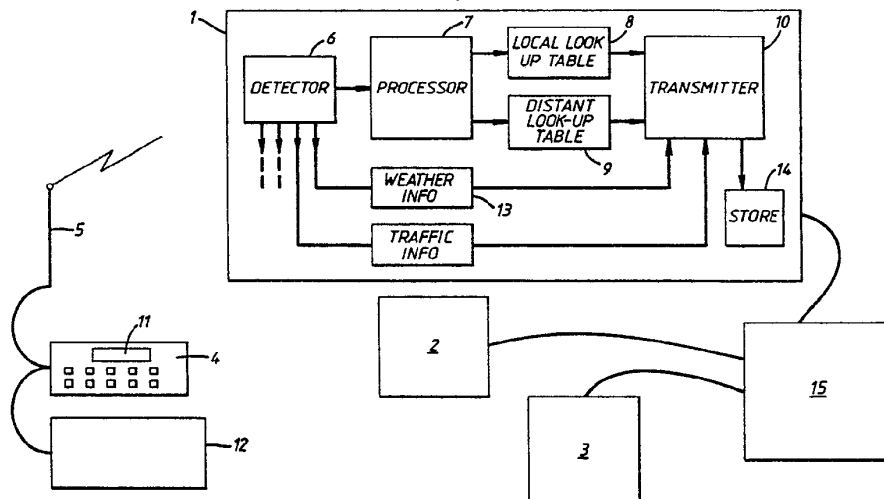
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Information distribution system.

In a system in accordance with the invention, a cordless telephone base station 1 or telepoint, is modified to enable navigational information and other data to be stored in stores 8, 9 and 13. The information may be accessed via a cordless telephone handset 4 and displayed at 11 or 12.



Xerox Copy Centre

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INFORMATION DISTRIBUTION SYSTEM

This invention relates to an information distribution system and more particularly, but not exclusively, to a system which is suitable for use in road vehicle navigation.

A number of road vehicle navigation systems have been proposed but difficulties have been experienced in establishing them. The proposed systems fall into two classes. In the first class, the navigation equipment is carried by the vehicle and is autonomous, and in the second class, communication is required between co-operating fixed installations and on-board equipment.

An autonomous navigation system is one in which apparatus carried by a vehicle functions without reference to external equipment. In one such system, the apparatus includes a digitised road map of the country which is used in conjunction with compass and odometer information to give navigational directions. Even a simple autonomous system is complex and hence relatively expensive, and thus only a small market exists for systems of this type.

In the second class of navigation system, equipment carried by the vehicle co-operates with a network of transponders distributed over a region. Although the apparatus carried by the vehicle itself may be cheaper than that associated with an autonomous system, complicated and expensive computer controlled equipment is necessary to enable the system to be implemented. Also, until an extensive infrastructure exists covering at least part of the country, this type of system is not viable.

The present invention seeks to provide an information distribution system which is relatively easy and inexpensive to implement.

According to the invention there is provided an information distribution system comprising: a cordless telephone base station which includes storage means arranged to store navigational information additional to that required to operate its telephone service; and means capable of accessing the stored information.

Although the invention is particularly applicable to the distribution of information relating to navigation, it should be understood that in its broadest aspect the invention is applicable to the distribution of all classes of information.

A great advantage of a system in accordance with the invention is that, when the second generation of cordless telephones (known as CT2) become available, there will be a rapid expansion in what are termed "telepoints". A telepoint consists of one or more base stations fitted in a public place for use by members of the public carrying a portable cordless telephone handset. Telepoints need

not necessarily form part of a CT2 network; they may also conform to other operating specifications. It is envisaged that an extensive network of cordless telephone base stations will be set up. These may include stored information such as weather reports, local traffic information and any other data which people may wish to access.

Where the information relates to navigation, the base stations can be incorporated into a navigation system, thus avoiding the need to set up a dedicated nationwide distribution of transponders for use in a navigation system alone. The navigational information stored at the base station may be merely a road junction number for example, but more usefully it would include detailed information regarding a junction where the base station is located and the most favourable road to take for a given destination. There may be more than one base station at a junction or its approaches, particularly where the road layout is complicated. Where the information is not related to navigational uses, it may still be advantageous to locate the base station near a road junction for easy access by vehicle occupants of stored information.

It is preferred that the means for accessing the stored information is a cordless telephone handset. As the CT2 network becomes well established, many vehicles will carry a CT2 handset for use as a telephone. This is highly advantageous in establishing, in particular, a navigation system in accordance with the invention as many people already owning handsets for telephone use would be willing to subscribe to a navigation system which would not require the purchase of additional equipment.

It is preferred that the means for accessing the stored additional information is connectable to an aerial carried by a road vehicle, thus increasing the range over which the information may be accessed and enabling amplification of any audible information received from the base station. It is also preferred that the means for accessing the information is connectable to a display device which is arranged to visually display the accessed information, for example on a vehicle dash-board, although the means for accessing may itself incorporate a display. In a particularly advantageous embodiment of the invention, means are included which are capable of audibly conveying accessed information to an operator. This may be achieved by including a voice synthesiser at the telephone base station. The person requiring information from the base station would simply interrogate the base station using the means for accessing the stored information and the required information would be transmitted to him both in visual and audible form.

It is preferred that the stored information at the base station is more detailed for local surroundings than for more distant locations. This permits a relatively small storage capacity to be used whilst ensuring that adequate data is available to an enquirer. This feature is particularly advantageous where the information is navigational information, giving details of preferred routes to a desired destination, for example.

It is preferred that means are included for updating the stored information. This may then be used to take into account any road-works or other problems or changes which might arise. Advantageously, the stored information is up-dated by a remote communication terminal.

Preferably, means are included for transmitting to the base station information regarding a desired destination. This may then be used by the base station to provide information concerning a correct route for a vehicle to follow. However, the base station which holds navigational data might merely transmit information relating to all roads at a junction rather than transmitting only the information specific to a particular destination.

Advantageously, the information to be accessed is represented by a numerical code, as this permits a conventional telephone handset to be used. Possibly, the code may be the post code of a destination, but advantageously, the numerical code is representative of a map reference where the information is related to a destination. If it is wished to provide for an alpha input, the handset may be fitted with an additional digital input/output terminal to be used with an external key-pad. The code may be input into the accessing means and stored for easy retrieval when it is wished to interrogate a base station.

It is preferred that means are included at the base station for automatically logging each accession of the stored information. This enables provision to be made for charging for use of the service.

It is preferred that a plurality of base stations are distributed as a network over a region. It may be advantageous that where the stored information is up-dated at one base station, it is automatically up-dated at another.

One way in which the invention may be performed is now described by way of example, with reference to the accompanying drawing, in which the sole Figure schematically illustrates an information distribution system in accordance with the invention.

With reference to the Figure, a system in accordance with the invention which can be used for road vehicle navigation and to distribute information relating to other matters comprises a plurality of cordless telephone base stations 1, 2 and 3, only some of which are shown, which are distributed

throughout the country. Each base station 1, 2 and 3 is a telepoint which has been modified to incorporate a store containing navigational and other additional information to that which it requires for its operation as part of the telephone service, a micro-processor and a voice-synthesizer. There may be more than one base station associated with a junction, this being especially useful where the road layout is complex.

When a driver approaches a junction which is indicated, for example by a symbol on a road sign, to have a modified telepoint, he may access the stored information to determine which road to take if he requires navigational assistance or other additional information held at the telepoint. In this embodiment of the invention, the means for accessing the stored information is a cordless telephone handset 4, but it could be a dedicated unit.

For navigational use, at the beginning of his journey, the driver keys in a code on the handset 4 representing his desired destination, the code being numerical and based on map references. When he reaches a junction having a base station 1, he presses a button which causes the stored destination code and a handset identification code to be transmitted, communication being established between the handset 4 and the base station 1 via the vehicle's radio aerial 5. The transmission also includes an indication that destination information is required. This is detected at 6 and applied to the storage and processing circuits concerned with navigation data. A processor 7 determines whether the destination required is a local one, using the first two digits of the destination code. If it is, the code is applied to a look-up table 8 which lists destination codes against appropriate local navigational information, the whole code being used to retrieve the stored data. If the destination is distant, only the first two digits of the code are required to retrieve the requested information from a second look-up table 9. The accessed information is passed to a transmitter 10 which includes a voice synthesiser. The transmission is received by the handset 4 in the vehicle and is presented audibly and visually via a display 11 provided on the handset 4. In this equipment, the handset 4 is also connected to a larger display 12 on the dash-board of the vehicle for the convenience of the driver. The driver then uses the retrieved information to select the correct turning.

The base station 1 also stores other types of information. If a person wishes to access weather report information, he keys in the appropriate code on the handset 4. The detector 6 at the base station 1, on receipt of this code, directs the information request to another storage means 13, and again, the retrieved data is transmitted at 10.

The base station 1 records the identification

code associated with the handset 4 at a store 14 when data is accessed. This may be recorded on a tape which is collected and used to calculate charges for use of the system, or may be transmitted to a remote communication terminal 15.

Road works and accidents for example, may alter the best choice of routes to a given destination. The remote communication terminal 15 included in the system may be such that it is able to access the look-up tables 8, 9 and 13 to enter revised and up-dated information. In a more sophisticated version of the system, information sent to one base station 1 which would also affect the directions given by a second base station 2 is automatically also transmitted to the second base station 2. In one version of the system, each base station is able to transmit information to the remote communication terminal 15. For example, some indication of the number of vehicles travelling along a particular route may be given to enable any appropriate changes in directional information to be made.

Claims

1. An information distribution system comprising: a cordless telephone base station (1,2,3) which includes storage means (8,9,13) arranged to store information additional to that required to operate its telephone service; and means (4) capable of accessing the stored additional information.

2. A system as claimed in claim 1 wherein the means capable of accessing the stored additional information is a cordless telephone handset (4).

3. A system as claimed in claim 1 or 2 wherein the stored additional information (8,9) is navigational information.

4. A system, as claimed in claim 3 wherein the navigational information concerns road vehicle navigation.

5. A system as claimed in any preceding claim wherein the base station is located in the vicinity of a road junction.

6. A system as claimed in claim 5 and including a plurality of base stations in the vicinity of a road junction.

7. A system as claimed in any preceding claim wherein the means (4) capable of accessing the stored information is connectable to an aerial (5) carried by a road vehicle.

8. A system as claimed in any preceding claim wherein the means (4) capable of accessing the information includes a display device (11) arranged to visually display accessed information.

9. A system as claimed in any preceding claim wherein the means (4) capable of accessing the information is connectable to a display device (12) arranged to visually display accessed information.

10. A system as claimed in any preceding claim and including means (10) capable of audibly conveying accessed information to an operator.

11. A system as claimed in any preceding claim wherein the base station includes a voice synthesizer (10) arranged to articulate accessed information.

12. A system as claimed in any preceding claim wherein the stored additional information is more detailed for local information (8) than for that relating to more distant locations (9).

13. A system as claimed in any preceding claim and including means (15) for up-dating the stored additional information.

14. A system as claimed in claim 13 wherein the stored information is up-dated by means of a remote communication terminal (15).

15. A system as claimed in any preceding claim and including means (4) for transmitting to the base station information regarding a desired destination.

16. A system as claimed in any preceding claim wherein the information to be accessed is represented by a numerical code.

17. A system as claimed in any preceding claim wherein the means (4) capable of accessing includes storage means for storing data regarding information to be accessed.

18. A system as claimed in any preceding claim and including means (14) for automatically logging each accession of the stored information.

19. A system as claimed in any preceding claim and including means for transmitting to the base station an identification code associated with the means capable of accessing.

20. A system as claimed in any preceding claim wherein the base station includes means for transmitting information to a remote communication terminal (15).

21. A system as claimed in claim 20 wherein information transmitted to the remote communication terminal (15) includes identification codes associated with means for accessing stored information.

22. A system as claimed in claim 20 or 21 wherein information transmitted to the remote communication terminal (15) includes data relating to traffic travelling to a particular destination.

23. A system as claimed in any preceding claim and including a plurality (1,2,3) of base stations distributed as a network over a region.

24. A system as claimed in claim 23 wherein up-dated information to one of the base stations is automatically up-dated in another.

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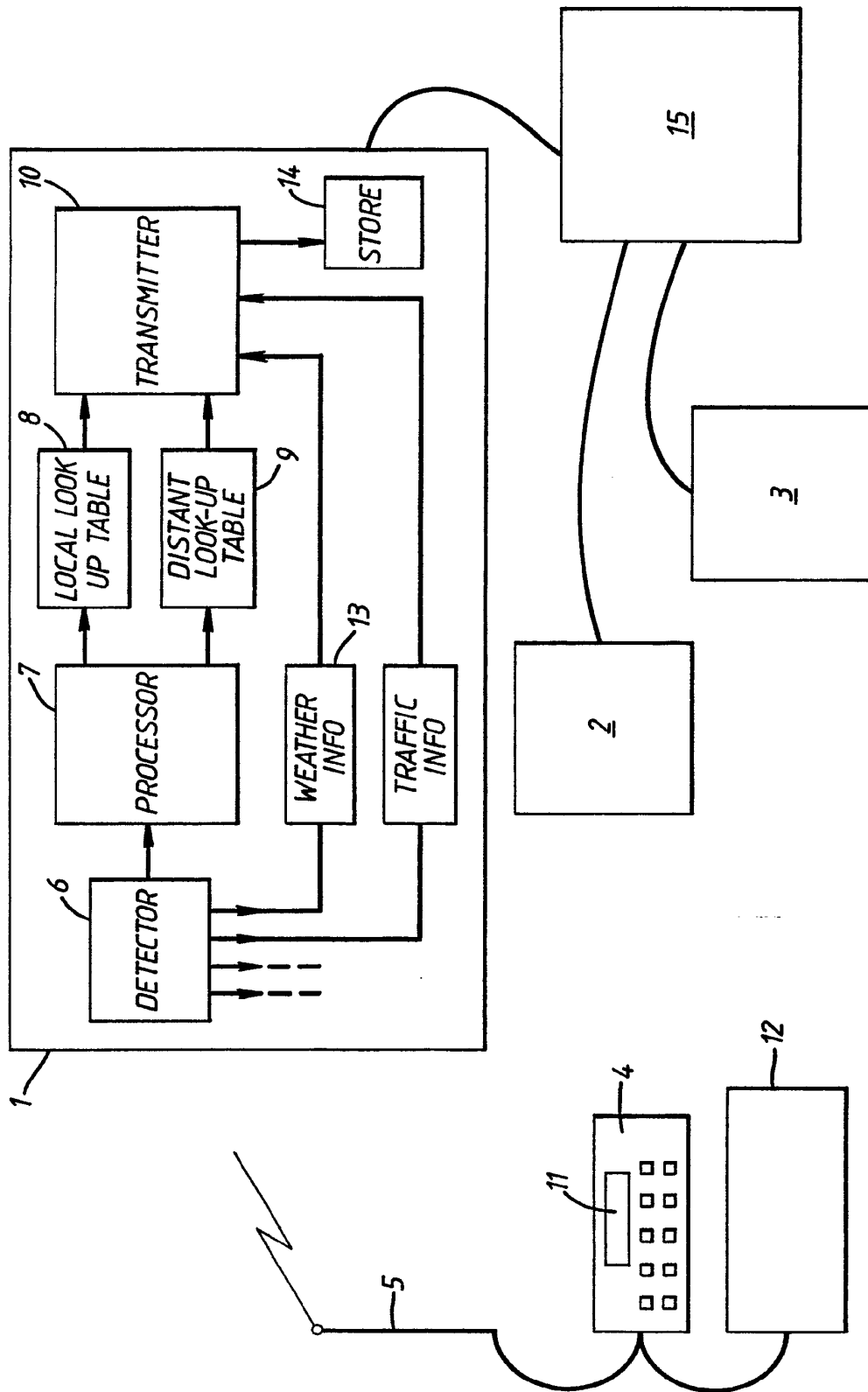
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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| X | EP-A-0 199 266 (SIEMENS) * Whole document * | 1-7,13-15,20,22,23 | G 08 G 1/09 H 04 Q 7/04 |
| Y | --- | 8-10,18,19,21 | |
| Y | GB-A-2 163 282 (KWAKU BOATENG) * Abstract; page 2, lines 42-65 * | 8,9,10 | |
| Y | EP-A-0 110 099 (BOSCH) * Abstract; claims 1,13-16 * | 18,19,21 | |
| X | PATENT ABSTRACTS OF JAPAN, vol. 10, no. 213 (E-422)[2269], 25th July 1986; & JP-A-61 52 040 (NEC CORP.) 14-03-1986 * Whole document * | 1,2,8 | |
| A | NACHRICHTENTECHNISCHE ZEITUNG (NTZ), vol. 40, no. 6, June 1987, pages 444-449; K. EHLERS: "Das Autoradio als Kern eines mobilen Kommunikationszentrums" * Page 448, left-hand column, line 33 - page 449, right-hand column, last line * | 1-10 | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.4) |
| | | | G 01 C G 08 G H 04 Q H 04 B |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 23-05-1989 | Examiner KOLBE W.H. |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

EPO FORM 1503 03/82 (P0401)

PUB-NO: EP000333330A1
DOCUMENT-IDENTIFIER: EP 333330 A1
TITLE: Information distribution system.
PUBN-DATE: September 20, 1989

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|----------------------|----------------|
| PUDSEY, DAVID GRAHAM | N/A |

ASSIGNEE-INFORMATION:

| NAME | COUNTRY |
|-----------------|----------------|
| MARCONI GEC LTD | GB |

APPL-NO: EP89301584
APPL-DATE: February 17, 1989

PRIORITY-DATA: GB08803785A (February 18, 1988)

INT-CL (IPC): G08G001/09 , H04Q007/04

EUR-CL (EPC): G01C021/26 , G08G001/0968 ,
H04M001/725

US-CL-CURRENT: 455/FOR.205 , 455/FOR.246

ABSTRACT:

CHG DATE=19990617 STATUS=O> In a system in

accordance with the invention, a cordless telephone base station 1 or telepoint, is modified to enable navigational information and other data to be stored in stores 8, 9 and 13. The information may be accessed via a cordless telephone handset 4 and displayed at 11 or 12.

Electronic Acknowledgement Receipt

| | |
|---|----------------------------------|
| EFS ID: | 6463401 |
| Application Number: | 12495190 |
| International Application Number: | |
| Confirmation Number: | 2380 |
| Title of Invention: | Method For Content Delivery |
| First Named Inventor/Applicant Name: | Russell W. White |
| Customer Number: | 21906 |
| Filer: | Mark J. Rozman/Stephanie Petreas |
| Filer Authorized By: | Mark J. Rozman |
| Attorney Docket Number: | AFF.004C7US |
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| Filing Date: | 30-JUN-2009 |
| Time Stamp: | 18:01:14 |
| Application Type: | Utility under 35 USC 111(a) |

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File Listing:

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| 1 | Information Disclosure Statement (IDS) Filed (SB/08) | AFF004C7USSupplDSsuppreex amart.pdf | 609227 429bb837db9089c508dc55c5302b3c1f325 bb2eb | no | 4 |

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| 2 | Foreign Reference | AFF004ForeignDocumentDE19651308.pdf | 1189949 6bd581be5b56f273237b3635a61536fa999738e4 | no | 34 |
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| 3 | Foreign Reference | AFF004USForeignDocEP33330.pdf | 1239880 2e318561d1ea9ce58ef760939d87694a4eb2523a | no | 9 |
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| 13 | NPL Documents | AFF004NPLDocOfficeActiondated11-9-07inSerialNo10947744.pdf | 198387 c652f780054ae62ba3ae971323eff7e602714c9d | no | 8 |
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CONFIRMATION NO. 2380

21906
TROP, PRUNER & HU, P.C.
1616 S. VOSS ROAD, SUITE 750
HOUSTON, TX 77057-2631

PUBLICATION NOTICE



Title:Method For Content Delivery
Publication No.US-2009-0264110-A1
Publication Date:10/22/2009

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The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | 12495190 |
| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

| U.S. PATENTS | | | | | | | Remove |
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| Examiner Initial* | Cite No | Patent Number | Kind Code ¹ | Issue Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | |
| | 1 | 6622083 | | 2003-09-16 | Knockheart, et al. | | |

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| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | Application Number | 12495190 |
| | Filing Date | 2009-06-30 |
| | First Named Inventor | Russell W. White, et al. |
| | Art Unit | |
| | Examiner Name | Unassigned |
| | Attorney Docket Number | AFF.004C7US |

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|------------|------------------|---------------------|------------|
| Signature | /Mark J. Rozman/ | Date (YYYY-MM-DD) | 2009-09-11 |
| Name/Print | Mark J. Rozman | Registration Number | 42117 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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| Application Number: | 12495190 |
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| Confirmation Number: | 2380 |
| Title of Invention: | Method For Content Delivery |
| First Named Inventor/Applicant Name: | Russell W. White |
| Customer Number: | 21906 |
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| | 1 | EP 1 146 674 A2 | EP | | 2001-10-17 | Mazda Motor Corporation | | <input type="checkbox"/> |
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| | 2 | YAMAHA CORPORATION, "Yamaha Music Sequencer, QY70, Owner's Manual," Chapters 1-11, 1997. | <input type="checkbox"/> |
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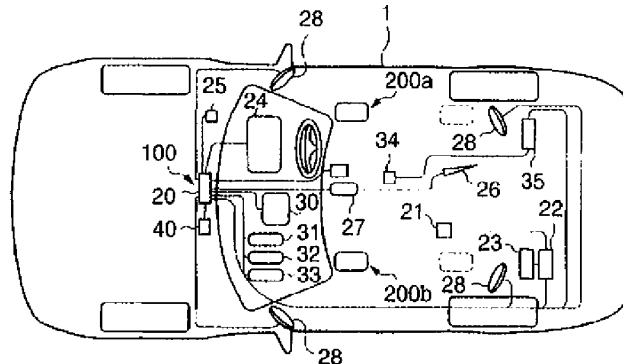
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(54) System and method for reproducing audio data, method and apparatus for reproducing audio data to be used in a vehicle and computer readable storage medium for storing a computer program

(57) An audio apparatus for a vehicle made up of a carmounted audio apparatus 100 and portable audio apparatuses 200a and 200b transmits/receives contents data such as music via radio communication. As a communication system for this in-car radio communi-

cation, a short-distance data communication system is used, which allows the apparatuses to recognize and authenticate one another and perform data communication with one another in the vehicle. Received music data is reproduced/output in real time.

FIG. 1



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Description**FIELD OF THE INVENTION**

[0001] The present invention relates to the field of an audio apparatus that provides contents such as music in a vehicle such as an automobile.

BACKGROUND OF THE INVENTION

[0002] In the field of an automobile, a typical example of vehicle, an audio apparatus has come into widespread use in recent years allowing passengers to enjoy various contents such as music in a vehicle.

[0003] In such a conventional audio apparatus, a passenger inserts a portable music storage medium such as a CD (compact disk), MD (mini-disk), cassette tape into the audio apparatus and enjoys music of his/her choice by replaying/outputting it from data stored in the music storage medium.

[0004] However, an audio apparatus using such a music storage medium is burdensome because the passenger needs to take the storage medium storing music to be replayed in the vehicle into the vehicle every time the passenger gets on the vehicle.

[0005] Thus, the Japanese Patent Laid-Open No. 11-30986, etc. proposes a technology for directly receiving digitized music data from the outside through an audio apparatus using a music distribution service and enjoying the music data in the vehicle without using a music recording medium.

[0006] Here, the technology described in the Japanese Patent Laid-Open No. 11-30986 will be summarized below.

[0007] The vehicle music data acquisition system described in this Publication consists of an information center that distributes music to vehicles and a vehicle capable of wirelessly communicating with the information center (see FIG. 2 of the relevant Publication) and the music distribution procedure in such a system configuration is explained with reference to FIG. 2 of the relevant Publication.

[0008] That is, the vehicle sends data about a music replaying condition in the own vehicle (including information to identify music of a distribution request) to the information center.

[0009] Upon reception of the data about the music replaying condition, the information center determines whether the requested music data exists in the information center or not and if the music data does not exist, the information center acquires the data on the Internet from the outside. Then, the information center creates music data with the amount of data reduced (compressed) based on the data about the music replaying condition and sends the music data created to the vehicle. The vehicle replays the music based on the received music data.

[0010] According to the audio apparatus using this

music distribution service, the passenger can enjoy any music at any time without the need to prepare any music storage medium. This allows the passenger to easily enjoy music of his/her choice in the vehicle, providing an effect of allowing the passenger to spend his/her time comfortably in the vehicle.

[0011] Furthermore, the technology described in the Japanese Patent Laid-Open No. 10-240207 will be summarized below.

[0012] This Publication describes a touch-screen type audio-visual replay digital system and a plurality of windows appearing on a display shows information on audio-visual contents that can be replayed.

[0013] The user can select a desired window from among a plurality of windows displayed to easily replay the audio-visual contents requested to be replayed.

[0014] On the other hand, recently, with the development of the Internet, music distribution services indirectly using the Internet are provided as described below, which allows the user to download digitized contents data such as music to an information storage medium such as a memory card and enjoy music of his/her choice easily.

[0015] Furthermore, recently, individuals often carry with them portable audio apparatuses and these portable audio apparatuses are also making it easier to enjoy music using music data stored in an information storage medium.

[0016] By the way, people go for a long-distance drive on a trip, etc., a plurality of passengers often gets on the vehicle, in which case, because preference of music varies from one person to another, it is preferred that these passengers be able to enjoy music of their respective choices and spend their time during the long-distance drive comfortably.

[0017] In a vehicle equipped with an audio apparatus using a conventional music storage medium, satisfying such as demand requires each passenger to record music of his/her choice to a music storage medium corresponding to the audio apparatus or purchase one and take the music storage medium into the vehicle.

[0018] As in the case of the Japanese Patent Laid-Open No. 11-30986, the audio apparatus using the music distribution service provided from the information center can freely obtain a variety of music data at any time by a required amount. This allows the passengers to freely enjoy music of their choice without the need to take the music storage medium into the vehicle.

[0019] The audio apparatus using the music distribution service provides such convenience, but on the other hand, because this audio apparatus receives music data from the outside by radio (wireless telephone line, etc.), it takes some time of communication to download music data of one piece of music for example. Therefore, if, for example, electromagnetic interference occurs while the music data is being downloaded during a drive, the audio apparatus is unable to reliably receive the music data of the relevant piece of music.

[0020] And in the case where the music data cannot be received reliably, it is necessary to receive the music data again. Thus, even the audio apparatus using the music distribution service is still not sufficient in respect of user friendliness.

[0021] Moreover, downloading music data from the music distribution service in the current communication environment entails a high communication cost, and so it is problematic in respect of cost, too.

[0022] Therefore, one possible method of enjoying music of one's choice reliably and at low cost without using such a music distribution service is to use music data included in a portable audio apparatus. This is because the portable audio apparatus that each passenger carries includes music data of his/her choice beforehand and using this music data allows the passenger to reliably enjoy music data of his/her choice in the vehicle.

[0023] However, the shape and mode of a portable audio apparatus varies from one model to another, and the wired connection port and the shape of its information storage medium also vary. For this reason, using this portable audio apparatus in the vehicle requires the passenger to set the audio apparatus in a mount preinstalled in the vehicle, connect it to an in-car audio apparatus via a cable or insert or remove the information storage medium to take the music data of portable audio apparatuses of all models into the in-car audio apparatus, which is difficult in practice.

[0024] Moreover, even if wired connection ports of portable audio apparatuses of all models and information storage media are standardized having a common shape and mode, there remains a possibility that the passenger will still need to set the audio apparatus in the mount and insert or remove the information storage media, which is a problem of requiring time and trouble.

[0025] Moreover, the conventional audio system above generally comprises a main unit that controls reproduction of musical pieces (contents) connected to a plurality of speakers via cables. Therefore, when an audio system is also mounted when the vehicle is purchased or when a desired audio system is mounted later, it is troublesome to lay cables for the audio system in a limited space of the vehicle.

[0026] Furthermore, also in the car cabin design stage, the degree of freedom in design may be reduced because it is necessary to consider locations of cables for the audio system and operability for cabling, etc.

[0027] Furthermore, in a conventional audio system, once a determined system configuration has been incorporated in the vehicle, subsequent changes to the system configuration are not easy. Thus, when the user wants to replay a CD (compact disk) in the main unit that is provided with only functions of a radio tuner and cassette tape recorder, a widespread method for meeting such a demand is to carry into the vehicle a portable CD player, a transmitter that FM-modulates an output signal and allows a radio tuner on the audio system side to receive the output signal or an adapter that reads the

output signal of the CD player through the head of the cassette tape recorder and thereby indirectly reproduces the output signal of the CD player through the audio system.

[0028] However, the above indirect reproduction method requires that a portable CD player and FM transmitter, etc. be carried into the vehicle and their locations be secured in a narrow car cabin, and restricts the original seating space for passengers, provides not good looking and also has a problem with the quality of musical pieces.

SUMMARY OF THE INVENTION

[0029] The present invention has been proposed to solve the conventional problems, and has as its main object to provide, even when a plurality of passengers gets on an automobile, for example, an audio system and its contents reproduction method, audio apparatus for a vehicle and its contents reproduction method, portable audio apparatus, computer program product and computer-readable storage medium capable of easily and reliably reproducing contents data in a portable audio apparatus carried by passengers inside the vehicle and outputting the contents data as sound so that passengers can enjoy music of their respective choices in the vehicle without the need to download contents data such as music and conversation from the Internet.

[0030] To solve the above problems, the present invention is constituted as follows.

[0031] That is, the present invention provides an audio system that reproduces contents information as sound in a vehicle, composed of portable audio apparatuses (200, 200a, 200b) carried by passengers of the vehicle and an audio apparatus (100) mounted in the vehicle, characterized in that the portable audio apparatuses include contents information retaining means (204) for retaining contents information and transmitting means (205) for transmitting the contents information to the audio apparatus at least by means of radio communication, and the audio apparatus includes receiving means (110) for receiving the contents information from the portable audio apparatuses at least by means of radio communication, and controlling means (101, 103) for reproducing the contents information received by the receiving means and at the same time outputting the reproduced information as sound from speakers (28) mounted in the vehicle.

[0032] In a preferred embodiment, it is preferred that the audio apparatus be provided with operation switches (24, 106-109) that allow entries by the passengers of the vehicle, operation signal transmitting means (110) for transmitting operation signals according to the operations of the operation switches to the portable audio apparatuses at least by means of radio communication, and the portable audio apparatuses be further provided with controlling means (203) for performing own operation control according to the operation signals received

from the audio apparatus at least by means of radio communication.

[0033] Furthermore, for example, the audio apparatus (100) mounted in the vehicle constructs a radio subsystem made up of audio controlling means (100A) equipped with a first radio communication apparatus (116) and speaker units (2A to 2D) equipped with a second radio communication apparatus (222), and the first and second radio communication apparatuses can perform radio communications based on a predetermined radio communication protocol, and it is preferred that the plurality of speaker units receive radio signals transmitted from the first radio communication apparatus of the audio controlling means by the second radio communication apparatus and reproduce the contents information contained in the received radio signals according to characteristic information individually set in each speaker unit.

[0034] To attain the same object, the present invention provides a contents reproduction method for an audio system that reproduces contents information as sound in the vehicle, comprising a system constructing step of constructing a communication system that carries out at least a radio communication, composed of portable audio apparatuses (200, 200a, 200b) carried by passengers of the vehicle and an audio apparatus (100) mounted in the vehicle. a contents information sending step of sending contents information retained beforehand in the portable audio apparatuses to the audio apparatus at least by means of radio communication, and a sound reproducing step of receiving and reproducing the contents information sent in the contents information sending step at least by means of radio communication and outputting the reproduced information as sound from speakers (28) mounted in the vehicle.

[0035] Furthermore, for example, the system constructing step includes a subsystem constructing step of constructing a radio subsystem made up of an audio control unit (100A) equipped with a radio communication apparatus that can perform radio communication based on a predetermined radio communication protocol and a plurality of speaker units (2A to 2D), and it is preferred that the audio reproducing step includes a first step of sending a radio signal containing contents information from the audio control unit and the plurality of speaker units include a second step of receiving the radio signals and reproducing the contents information included in the received radio signal as sound according to characteristic information individually set in each speaker unit.

[0036] To attain the same object, the present invention provides an audio apparatus for a vehicle (100) mounted in a vehicle to reproduce contents information as sound in the vehicle, comprising system constructing means (101, 110) for constructing a radio communication system composed of portable audio apparatuses (200, 200a, 200b) carried by passengers of the vehicle and the audio apparatus, receiving means (110) for re-

ceiving the contents information from the portable audio apparatuses at least by means of radio communication and controlling means (101, 103) for reproducing the contents information received by the receiving means and outputting the reproduced information as sound from speakers (28) mounted in the vehicle.

[0037] In a preferred embodiment, it is preferred that the system constructing means, when the plurality of portable audio apparatuses is identified, construct a radio communication system including the plurality of portable audio apparatuses and the controlling means control so that between the plurality of portable audio apparatuses, the contents information retained beforehand by the first portable audio apparatus is transferred to the second portable audio apparatus by radio communication and the contents information is reproduced as sound by the second portable audio apparatus.

[0038] Another method to attain the same object is a contents reproduction method for an audio apparatus for a vehicle (100) mounted in a vehicle that reproduces contents information as sound in the vehicle, comprising a system constructing step of constructing a radio communication system composed of portable audio apparatuses (200, 200a, 200b) carried by passengers of the vehicle and the audio apparatus, a receiving step of receiving the contents information from the portable audio apparatuses at least by means of radio communication and a sound reproducing step of reproducing the contents information received in the receiving step and outputting the reproduced information as sound from speakers (28) mounted in the vehicle.

[0039] The same object above can also be attained by an audio apparatus mounted in a vehicle (audio apparatus for a vehicle), program codes that instruct so that the operation of the audio apparatus is implemented and a computer-readable storage medium that stores these program codes, which make up the audio system in the above configuration.

[0040] The same object above can also be attained by a contents reproduction method of the audio apparatus (audio apparatus for a vehicle) corresponding to the contents reproduction method of the audio system in the configuration above, program codes that instruct so that the contents reproduction method is implemented in the audio apparatus for a vehicle and a computer-readable storage medium that stores these program codes.

[0041] Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together with

the description, serve to explain the principles of the invention.

Fig. 1 is an outlined plan view of an automobile using an audio apparatus of the present invention;

Fig. 2 is a system block diagram of an audio apparatus control system and radio communication system according to a first embodiment of the present invention;

Fig. 3 is a front view of an operation panel of an audio apparatus 100 in the first embodiment;

Fig. 4 is a flow chart of operation control of the audio apparatus 100 in the first embodiment;

Fig. 5 is an "AUDIO TOP MENU" screen shown on a display in the first embodiment;

Fig. 6 is a "reception MENU" screen shown on a display in the first embodiment;

Fig. 7 is an "AUDIO MENU" screen shown on a display in the first embodiment;

Fig. 8 is a flow chart of operation control of a portable audio apparatus 200 in the first embodiment;

Fig. 9 is an "erasure MENU" screen shown on a display in the first embodiment;

Fig. 10 is an "Internet MENU" screen shown on a display in the first embodiment;

Fig. 11 is a "Transfer MENU" screen shown on a display in the first embodiment;

Fig. 12 is a display screen in a first modification of the first embodiment;

Fig. 13 is an outlined plan view of an automobile using radio communication signals directed to seat positions in a second modification of the first embodiment;

Fig. 14 is an outlined plan view of an automobile using radio communication signals directed to mount positions in a third modification of the first embodiment;

Fig. 15 illustrates a configuration example with an audio apparatus according to a second embodiment mounted in the car cabin;

Fig. 16 illustrates a block configuration of components making up the audio apparatus according to the second embodiment and flows of radio signals between the components;

Fig. 17 is a flow chart of musical piece reproduction processing in an audio unit 100A in the second embodiment;

Fig. 18 is a flow chart of musical piece reproduction processing in speaker units 2A to 2D in the second embodiment;

Fig. 19A and Fig. 19B are flow charts of musical piece reproduction processing in a portable audio terminal 3 in the second embodiment;

Fig. 20 is a flow chart of musical piece reproduction processing in an audio unit 100A in a third embodiment;

Fig. 21 is a flow chart of musical piece reproduction processing in speaker units 2A to 2D in the third em-

bodiment;

Fig. 22A and Fig. 22B are flow charts of musical piece reproduction processing in a portable audio terminal 3 in the third embodiment; and

Fig. 23 illustrates a display example of a display 113 of the audio unit 100A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0043] Preferred embodiments of the present invention will now be described in detail in accordance with the accompanying drawings.

[First embodiment]

[0044] Embodiments of the present invention applied to an automobile, a typical example of vehicle, will now be described in detail in accordance with the accompanying drawings.

[0045] FIG. 1 is an outlined plan view of an automobile using an audio apparatus (audio system) of the present invention. As shown in FIG. 1, the automobile audio apparatus of this embodiment is generally constituted by a car-mounted audio apparatus 100 (hereinafter referred to as "audio apparatus 100") mounted in a vehicle 1 and portable audio apparatuses 200a and 200b carried into the vehicle by passengers.

[0046] In the following explanations, the portable audio apparatuses 200a and 200b will sometimes be collectively called a "portable audio apparatus 200".

[0047] The audio apparatus 100 is constructed of not only an audio function but also a navigation function and Internet communication function, etc. so as to perform a variety of information processing.

[0048] A concentrated control unit 20 for controlling the entire system of the audio apparatus of this embodiment is installed close to an instrument panel in the center of the vehicle 1. This concentrated control unit 20 is connected with various apparatuses mounted in the vehicle 1 in order to perform the functions, which will be described below.

(Navigation function)

[0049] The navigation function is intended to realize navigation functions such as route guidance to a preset desired destination and is constructed by a GPS (Global Positioning System) antenna 21 to detect the current position of the own vehicle installed in the vehicle 1, a navigation controller 22 to perform navigation control, a DVD-ROM changer 23 to read road map information, etc. stored in DVD-ROM, a display 24 that displays navigation information and allows input operations by passengers and a voice guide speaker 25 that outputs navigation information in voice, and these apparatuses are each connected to the concentrated control unit 20.

[0050] The navigation function in this embodiment is

provided with functions similar to those of a conventional navigation apparatus such as detecting the current position of the own vehicle, giving the passengers road information and traffic information and providing a route guide for the automobile.

(Internet communication function)

[0051] The Internet communication function is constructed by a telephone antenna 26 connected to the Internet over a radio telephone network, a cellular telephone 27 to transmit/receive Internet information, the display 24 that allows input operations by the passenger, car-mounted speakers 28 that output the information received on the Internet as voice information (hereinafter referred to as "speakers 28"), etc. and these apparatuses are also each connected to the concentrated control unit 20.

[0052] This embodiment transmits/receives Internet information using the cellular telephone 27, but it is also possible to provide a dedicated Internet transmission/reception section for the main unit of the audio apparatus 100 aside from the cellular telephone 27.

[0053] The Internet communication function of this embodiment is provided with functions such as receiving various kinds of information requested by the passengers by the audio apparatus 100 over the Internet and transmitting information from the vehicle to the outside by e-mail, etc.

(Audio function)

[0054] The audio function is constructed by an audio control unit 30 that controls the entire system of the relevant audio function, a CD drive 31 that reads CD music data, an MD drive 32 that reads MD music data, a memory drive 33 that reads music data of a memory card, speakers 28 that output music as sound in the vehicle, a car-mounted radio antenna 34 placed in the center of the vehicle to carry out radio communication with a plurality of cellular audio apparatuses 200a and 200b in the vehicle and a radio transmitter/receiver 35 that transmits/receives music data to/from the portable audio apparatuses 200a and 200b, and these apparatuses are each connected to the concentrated control unit 20.

[0055] As in the case of a conventional audio apparatus, this audio function is provided with functions such as reading contents data such as music, converted to digital data, stored in a CD, MD or memory card (hereinafter referred to as "music data"), generating reproduction signals according to the read music data and outputting the music data from the speakers 28 as music (hereinafter referred to as "reproduced output"), and also provided with a function of receiving AM/FM waves by an AM/FM tuner (not shown) and outputting AM/FM broadcasting signals from the speakers 28.

[0056] This audio function is also provided with a function of receiving digital music data using a music distri-

bution service of the Internet and reproducing and outputting as music from the speakers 28.

[0057] The audio function of the audio apparatus 100 is further capable of communicating with a plurality of the portable audio apparatuses 200a and 200b carried into the vehicle through in-car radio communications based on a predetermined communication system and provided with a function of receiving music data retained in the portable audio apparatuses 200a and 200b and reproducing and outputting as music from the speakers 28 in the vehicle.

[0058] Note, that the concentrated control unit 20 to which these apparatuses are connected is connected to a car-mounted LAN (local area network) unit 40 as shown in FIG. 1 and is constructed so as to perform information communication with other vehicle control apparatuses.

[0059] Next, the control system and radio communication system of the audio apparatus according to this embodiment will be explained with reference to the system block diagram in FIG. 2.

[0060] In FIG. 2, a system block of the audio apparatus 100 is shown on the Left side and a system block of the portable audio apparatus 200a is shown on the right side. FIG. 2 shows details of only the system block of one portable audio apparatus for convenience, but the system of the other portable audio apparatus is also constructed in the same way.

[0061] The audio apparatus 100 is provided with a CPU 101 and this CPU 101 controls the system of the audio apparatus 100. A music source 102 is connected to the CPU 101. The music source 102 is constructed of an information storage unit (e.g., storage medium such as semiconductor memory) that stores music data received from the outside and retains music data of the audio apparatus 100.

[0062] Furthermore, an amplifier 103 is connected to the CPU 101 and the amplifier 103 amplifies and converts music information signals which are music data stored in a storage medium reproduced and generated by the CD drive 32, etc. and reproduces and outputs as music from the speakers 28.

[0063] Furthermore, the display 24 is connected to the CPU 101 of the audio apparatus 100 and the display 24 displays the control content of the audio apparatus 100 and music source music title data, etc. Furthermore, a car external music source reception circuit 104 is connected to the CPU 101 and the car external music source reception circuit 104 receives information from the Internet and AM or FM waves through a car-external antenna 105 (telephone antenna 26, etc.).

[0064] Furthermore, audio operation switches 107 such as a volume, a select switch, a replay button, a stop button, a fast-forward button, a rewind button and a selecting/determining switch 108 to select a cross cursor button or select button and an output changeover button 109 are connected to the CPU 101 via an operation system interface 106.

[0065] Furthermore, a transmission/reception module 110 is connected to the CPU 101 and the transmission/reception module 110 carries out in-car radio communication with the portable audio apparatuses 200a and 200b carried into the vehicle via an in-car radio antenna 34.

[0066] The portable audio apparatus 200a is constructed of an apparatus main unit 201a and a headphone 202b.

[0067] This apparatus main unit 201a is provided with a CPU 203 that controls the system of the portable audio apparatus 200a, and a music source 204, a transmission/reception module 205, a display 206, operation switches 208 such as a volume, a select switch, a replay button, a stop button, a fast-forward button and a rewind button, etc. and internal/external changeover switch 209 are further connected to this CPU 203 via an operation system interface 207.

[0068] The headphone 202a of the portable audio apparatus 201a is also provided with a transmission/reception module 210 for radio communications, which receives music data sent from the apparatus main unit 200a of the portable audio apparatus through radio communication to allow the passengers to enjoy music individually.

[0069] Note, that the number of portable audio apparatuses in this embodiment is only set to 2, but it is also possible to additionally set the number according to the number of passengers as shown with virtual lines in FIG. 2.

[0070] Moreover, it is also possible to construct the apparatus main unit 201a and headphone 202a as a single apparatus.

[0071] These audio apparatus 100 and portable audio apparatuses 200a and 200b transmit/receive music data, etc. to/from each other through in-car radio communication.

[0072] As an in-car radio communication system, this embodiment adopts a short-distance data communication system that allows the apparatuses to recognize and authenticate one another in the vehicle and perform data communication among one another. More specifically, as an example of a short-distance data communication system used within a short-distance of several tens of m, this embodiment carries out a so-called Bluetooth-based radio communication.

[0073] The short-distance communication system includes radio wave communication using a spread spectrum technology, optical communication and infrared communication, etc. This embodiment adopts a radio wave communication with less directivity. However, if it is possible to construct a network in which the music apparatus 100 functions as a master and the portable music apparatuses function as slaves during a communication, other communication systems can also be adopted.

[0074] Furthermore, music data transmitted/received is preferred to be compatible to all kinds of model and

transmitted/received in a short time, and therefore this music data is preferred to be transmitted/received, after being compressed as a data file based on a predetermined system and converted to compressed data.

[0075] Data compression systems available to this embodiment include MP3, Solid Audio, Liquid Audio, etc. Therefore, the audio apparatus 100 and portable audio apparatuses 200 are provided with general software or hardware capable of compressing to music data based on such a data compression system or decoding to a decoded signal at the time of reproduction.

[0076] Connecting the audio apparatus 100 and portable audio apparatus 200 through in-car radio communication and constructing a communication network (hereinafter referred to as "network") will allow each apparatus to transmit/receive music data and allow the audio apparatus 100 to control the portable audio apparatuses 200, etc.

[0077] FIG. 3 is a front view of an operation panel 50 of the audio apparatus 100 installed in the center of the instrument panel. The upper section is an operation panel 51 of the audio apparatus and the lower section is an air-conditioning-related operation panel 52. Here, the audio-apparatus-related operation panel 51 will be explained.

[0078] First, selection switches 53 for selecting a music source such as AM/FM and CD, etc. are provided in the upper section of the operation panel 50 and the music source output from the speakers 28 is determined according to the selection of these selection switches 53.

[0079] Below the selection switches 53 is a liquid crystal display panel 54. The liquid crystal display 54 displays a set temperature and in-car temperature or music information of the audio apparatus 100, etc.

[0080] Below the liquid crystal display 54 are slot openings 55, 56 and 57. Inserting various storage media such as a CD, MD or memory card into these slot openings 55, 56 and 57 allows the audio apparatus 100 to incorporate music data of music sources.

[0081] To the left of the slot openings 55 and 56 are screen changeover switches 58 to switch the display screen of the liquid crystal display 54. At the top is a navigation switch 58a to switch the display screen to a navigation screen, in the center is an audio switch 58b to switch the display screen to an audio screen and at the bottom is an audio top switch 58c to switch the display screen to an audio top menu screen of in-car radio communication.

[0082] The display 24 of the audio apparatus 100 is set on an instrument panel (not shown) close to a driver seat easily recognizable by the passengers and constructed to display an audio screen such as various kinds of information of the audio apparatus. Note, that the above-described liquid crystal display panel 54 can also be used as the display 24 of the audio apparatus 100.

[0083] To the right of the slot openings is a cross cur-

sor/determination button 108 to move the cursor on a display screen and determine a predetermined item.

[0084] Below the slot openings are audio operation switches 107 whereby the passengers can input audio operation signals such as replay, stop or volume. These audio operation switches 107 are a power volume switch, skip switch, etc. from the left. At the right end are output changeover switches 109 that allow the passenger to switch the output destination of the audio operation signal which is output by the passenger manipulating the audio operation switches 107 between the audio apparatus 100 and portable audio apparatuses 200.

[0085] Then, the action and method of operation of the audio apparatus according to this embodiment will be explained using FIG. 4 to FIG. 11.

[0086] First, the action of the audio apparatus 100 will be explained using the flow chart of operation control of the audio apparatus 100 shown in FIG. 4. This flow chart indicates the procedure of a software program executed by the CPU 101 and the control processing by the CPU 101 is started by an ignition ON of the vehicle 1, for example.

[0087] Initially, it is judged whether a power switch of the audio apparatus 100 (not shown) is ON or not (S10) and when the judgment result is NO, the process goes to Return and when the judgment result is YES, it is judged whether an external music source (each of the portable audio apparatuses 200) is replayed or not (S11).

[0088] If the result of the judgment (S11) as to whether the external music sources 200a and 200b are replayed or not is NO, music data of the music source 102 (CD, MD, memory card, etc.) of the audio apparatus 100 is directly reproduced and output from the speakers 28 as in the case of a normal audio apparatus (S12). On the other hand, if the judgment result is YES, the existence of any external music source (apparatus main units 201a and 201b of the portable audio apparatuses) and external speakers (headphones 202a and 202b of the portable audio apparatuses) carried into the vehicle is searched, and the external music source whose existence has been confirmed is connected to the audio apparatus 100 through an in-car radio communication (S13).

[0089] The search connection operation in S13 is started by the passenger operating the audio top switch 58c on the operation panel 51 of the audio apparatus 100. More specifically, the passenger makes an "AUDIO TOP MENU" shown in FIG. 5 appear on the display screen and selects and determines "External music source/external speaker search and reception" D1 with a cross cursor/determination button 108.

[0090] In this case, if the passenger selects/determines "External music source/external speaker search and reception" D1, the display screen is switched to the "Reception MENU" screen shown in FIG. 6 and a search radio wave is emitted from the in-car radio antenna 34 of the audio apparatus 100. This allows the audio appa-

ratus 100 to connect the apparatuses 201a and 201b of the portable audio apparatuses in the vehicle to the headphones 202a and 202b for a search.

[0091] At this time, installed in the center of the vehicle, the in-car radio antenna 34 can emit the search radio wave uniformly in the vehicle and detect the portable audio apparatuses 200 in the vehicle uniformly. Furthermore, even if portable audio apparatuses 200 owned by persons other than the passengers happen to exist outside near the vehicle, this reduces the probability of an erroneous search.

[0092] When the portable audio apparatuses 200a and 200b are detected and connected within a predetermined search time, the audio apparatus 100 and the plurality of portable audio apparatuses 200a and 200b send an identification address to each other and form a network through an in-car radio communication. Once the network is constructed, the "Reception MENU" screen looks as shown in FIG. 6.

[0093] For example, when the audio apparatus 100 finds and recognizes two portable audio apparatuses 200a and 200b in the vehicle, these apparatuses construct a communication system with the audio apparatus 100 as a master and the portable audio apparatuses 200a and 200b as slaves and recognize one portable audio apparatus 200a as an external player A and the other portable audio apparatus 200b as an external player B. Then, the "Reception MENU" screen shows the connection states in simplified expressions indicating the audio apparatus 100 as M and the portable audio apparatuses as PA and PB (D21). Note, that the "Reception MENU" screen also shows a list of music title data, etc. associated (correspondence established) with music data (contents data) of each apparatus connected (D22).

[0094] When the apparatuses have constructed the network by means of in-car radio communication, the passenger operates the cross cursor/determination button 108 to select/determine "Confirm" D23 on the "Reception MENU" screen and terminates the search connection operation.

[0095] However, if it is judged that the search/connection is insufficient, the passenger operates the cross cursor/determination button 108 to select/determine "Search" D24 to continue the search/connection. This ensures that the apparatuses are connected to construct the network.

[0096] Note, if the number of the portable audio apparatuses 200 in the vehicle changes, it is necessary to perform search/connection every time, but if the passenger selects/determines "Update" D25 on the "Reception MENU" screen, it is possible to set the audio apparatus 100 so as to automatically repeat search/connection at predetermined intervals.

[0097] After external music sources (apparatus main units of the portable audio apparatuses), external speakers (headphones) have been searched/connected (S13), a music source and output port are determined

on the "AUDIO MENU" screen (S14).

[0098] The music source/output port determination operation in S14 is carried out by the passenger operating the cross cursor/determination button 108 on the "AUDIO TOP MENU" screen to select/determine "Determine music replay/output destination" D1 and making the display screen show the "AUDIO MENU" screen shown in FIG. 7.

[0099] Here, the music source/output port determination operation in S14 will be explained more specifically. For example, if the passenger wants to replay the second music of the portable audio apparatus 200a identified as the external player A from the speakers 28, the passenger selects/determines "External player A" D11a in the "Source" selection area D11 on the "AUDIO MENU" screen. Then, a music data list D12 of the portable audio apparatus 200a of the external player A is displayed on the left. This music data list D12 shows music titles, artist names and data volumes, etc. and shows the content of the music data retained in the portable audio apparatus 200a.

[0100] The passenger operates the cross cursor/determination button 108 in this music data list D12 displayed to select/determine the "Second music" D12a. Then, the passenger selects/determines "Car-mounted SP" D13a in the "Output destination" selection area D13 (selection/determination content in FIG. 7).

[0101] When the passenger who carries the portable audio apparatus 200a of the external player A personally wants to replay all music pieces of the music data of the portable audio apparatus 200b of the external player B carried by another passenger through the own headphone, the passenger selects/determines "External player B" D11b in the "Source" selection area D11 on the "AUDIO MENU" screen and makes the music data list (not shown) of the portable audio apparatus 200b of the external player B appear and selects/determines the "External player B" D11b in the "Source" selection area D11 again. Thus, the passenger selects all music pieces of the portable audio apparatus 200b of the external player B and then selects/determines the "External player A" D13b in the "Output destination" selection area D13.

[0102] Thus, the passenger further performs operation of determining a music source, output port according to the request of a passenger and terminates the music source/output port determination operation.

[0103] The music source/output port determination operation according to the request of each passenger is performed in this way.

[0104] Note, when the passenger performs no music source determination operation in the above music source/output port determination operation, all music data pieces of the portable audio apparatuses are selected one after another starting from the external player A and all music data pieces of the portable audio apparatuses are reproduced/output from the speakers 28 or those portable audio apparatuses one after another.

Thus, if the passenger does not want to listen to any particular music but simply wants to listen to music as BGM, then the passenger need not perform any music source determination operation.

5 [0105] After the passenger determines the music source/output port on the "AUDIO MENU" screen, it is judged whether the selected music source is only a car-mounted source (music source of the audio apparatus 100) or not (S15).

10 [0106] If the judgment result in S15 is YES, it is judged whether the output destination is only the speakers 28 or not (S16).

15 [0107] On the other hand, if the judgment result in S15 is NO, the music data of the music selected from external music sources (portable audio apparatuses 200a and 200b) is received and the received music data is stored in an information storage unit (not shown) such as a semiconductor memory of the audio apparatus (S17). Then, it is judged whether the output destination set in S14 is the speakers 28 only or not (S16).

20 [0108] That is, if the external music sources (portable audio apparatuses 200a and 200b) are selected in the "Source" selection area D11, the music data sent from the portable audio apparatuses 200a and 200b are received by the audio apparatus 100 in real time and the received music data is immediately subjected to predetermined processing such as decoding and then reproduced and output.

25 [0109] Note, even if the external music sources (portable audio apparatuses 200a and 200b) are selected consecutively, control is performed such that the music data is transmitted/received in real time and reproduced/output.

30 [0110] Then, if the result of judgment in S16 as to whether the selected output destination is only the speakers 28 or not is YES, the selected music is reproduced and output from the speakers 28 in real time (S18). On the other hand, if the judgment result is NO, it is further judged whether the output destination is the speakers 28 and external speakers (headphones 202a, 202b) or not (S19).

35 [0111] If the judgment result in S19 is YES, the selected music (music previously selected by the passenger to be replayed) to be output from the speakers 28 is reproduced and output from the speakers 28 and the selected music to be output from the external speakers is sent to the selected external speakers (headphones 202a, 202b) (S20).

40 [0112] Thus, if the two output destinations of the music data, the speakers 28 and external player A, are selected/determined, the speakers 28 reproduce and output the music data of the portable audio apparatus 200a, which is the external player A, in real time and the headphone 202a of the external player A reproduces and outputs the music data of the portable audio apparatus 200b, which is the external player B, in real time.

45 [0113] In this case, the music data of the portable audio apparatus 200b, which is the external player B, can

also be sent directly from the portable audio apparatus 200b, which is the external player B, to the headphone 202a of the external player A in real time bypassing the car-mounted audio apparatus 100.

[0114] If the judgment result in S19 is NO, that is, if the output destination is only the external speakers, the music data of the selected music is sent to the selected external speakers (headphones 202a and 202b of the portable audio apparatuses) (S21).

[0115] Thus, if, for example, the above selection is made in "AUDIO MENU", the second music data is sent in real time from the portable audio apparatus 200a, external player A, to the audio apparatus 100, reproduced/output from the car-mounted speakers 28 and all music data pieces of the portable audio apparatus 200b, external player B, are sent in real time to the portable audio apparatus 200a, external player A, and reproduced/output in real time from the headphone 202b of the external player A.

[0116] Then, in the above control state, it is judged whether the passenger has operated the audio operation switch 107 or not (S22). If the audio operation switch 107 has been operated, an audio operation signal corresponding to the operation is output from the relevant switch.

[0117] If the judgment result in S22 is YES, an audio operation signal is output to the corresponding apparatuses according to the output changeover switch 109 that switches the output destination of the audio operation signal (S23).

[0118] Thus, when the passenger operates the fast-forward switch, if the audio apparatus 100 has been selected by the output changeover switch 109, the music reproduced and output from the speakers 28 is fast-forwarded. On the other hand, if the portable audio apparatus 200a of the external player A has been selected by the output changeover switch 109, the music reproduced and output from the headphone 202a of the portable audio apparatus is fast-forwarded.

[0119] If the judgment result in S22 is NO, that is, if the passenger has not operated the audio operation switches 107, the process directly shifts to Return.

[0120] Communication control and audio control of the audio apparatus 100 are carried out in this way.

[0121] Then, the operation of the portable audio apparatus 200 will be explained using the flow chart of operation control of the portable audio apparatus 200 shown in FIG. 8. This flow chart indicates the procedure of a software program executed by the CPU 203.

[0122] Here, the portable audio apparatus 200a, which is the external player A, will be explained, but the other portable audio apparatus will be operated in the same way.

[0123] First, it is judged whether the power of the portable audio apparatus 200a is ON or not (Q10) and if the judgment result is NO, the process shifts to Return and if the judgment result is YES, it is judged whether the internal/external changeover switch 209 of the portable

audio apparatus 200a is in an external output state or not (Q11).

[0124] If the result of the judgment about the external output state is NO, the music data (hereinafter referred to as "internal music data") of the music sources 204 (CD, MD, memory card, etc.) of the portable audio apparatus is output/reproduced from the headphone 202a as in the case of a normal portable audio apparatus (Q12).

[0125] On the other hand, the judgment result in Q11 is YES, the relevant portable audio apparatus 200 is connected and registered in the audio apparatus 100 in accordance with the aforementioned search/connection operation of the audio apparatus 100 (Q13). Thus, the portable audio apparatus 200a constitutes a network together with other apparatuses (audio apparatus 100, portable audio apparatus 200b) via in-car radio communication.

[0126] When the relevant portable audio apparatus 200 is connected to and registered in the audio apparatus 100, then it is judged whether the own portable audio apparatus 200a is selected by the passenger as the output destination through the selection signal received by the audio apparatus 100 (Q14).

[0127] Then, whether the judgment result in Q14 is YES or NO, it is judged whether there is any request for sending internal music data to the external apparatuses (audio apparatus 100 or other portable audio apparatus 200b) (Q15, Q16).

[0128] When it is judged that the own portable audio apparatus 200a is the output destination and there is a request for sending internal music data to the audio apparatus 100 or other portable audio apparatus 200b (hereinafter referred to as "external apparatuses"), the internal music data is sent to the external apparatuses in real time and at the same time, the music data of the external apparatuses (hereinafter referred to as "external music data") is received and reproduced/output from the headphone 202a of the portable audio apparatus in real time (Q17).

[0129] Thus, if, for example, the music source/output port is selected/determined on the "AUDIO MENU" screen as shown above, the music data retained in the portable audio apparatus 200a of the external player A is sent to the audio apparatus 100 and the passenger can replay the music data in the vehicle in real time and at the same time, the headphone 202a of the external player A receives in real time the music data retained in the portable audio apparatus 202b of the external player B and the passenger can personally replay the music data.

[0130] On the other hand, if it is judged in Q14 and Q15 that the own portable audio apparatus 200a is the output destination and there is no request for sending internal music data to the external apparatuses, the external music data is received and the headphone 202a reproduces and outputs the music data in real time (Q18).

[0131] Thus, in this case, the passenger can receive the music data of the audio apparatus 100 or music data of the other portable audio apparatus 200b in real time and personally enjoy the music data by the headphone 202a without sending the music data from the own portable audio apparatus 200a to the external apparatuses.

[0132] On the other hand, if it is judged in Q14 and Q16 that the own portable audio apparatus 200a is not the output destination and there is a request for sending internal music data to the external apparatuses, the internal music data is sent to the external apparatuses in real time (Q19).

[0133] Thus, in this case, no music is reproduced/output from the headphone 202a and it is not possible to personally enjoy music but it is possible to send the music data to the audio apparatus 100 or other portable audio apparatus 200b and enjoy in real time the music data retained in the own portable audio apparatus 200a using the speakers 28 or the headphones 202b of the other portable audio apparatuses.

[0134] Furthermore, if it is judged in Q14 and Q16 that the own portable audio apparatus 200a is not the output destination and there is no request for sending internal music data to the external apparatuses, either, then the internal music data and external music data are not transmitted/received and the portable audio apparatus 200a is held in a standby state (Q20).

[0135] In this case, the portable audio apparatus 200a neither reproduces/outputs from the headphone 202a nor sends the music data to the external apparatuses.

[0136] Then, in the above control state, it is judged whether the passenger has operated the audio operation switch 208 of the portable audio apparatus 200a or not (Q21).

[0137] If the judgment result in Q21 is YES, an audio operation signal according to the operation of the audio operation switches 208 is output to the corresponding audio apparatus (Q22).

[0138] For example, if the music data reproduced/output from the headphone 202a is the music data retained in the audio apparatus 100, an audio operation signal is sent to the audio apparatus 100. Furthermore, if the music data reproduced/output from the headphone 202a is the music data retained in the other portable audio apparatus, the audio operation signal is sent to the other portable audio apparatus 200b. In the case of the own music source 204, the own portable audio apparatus 200a is controlled as is.

[0139] On the other hand, if the judgment result in Q21 is NO, the portable audio apparatus 200a maintains its control state without sending the audio operation signal.

[0140] Then, it is judged whether the audio operation signal has been received from the external apparatuses or not (Q23).

[0141] If the judgment result in Q23 is YES, the audio operation of the internal music data is executed according to the received audio operation signal (Q24), and if the judgment result is NO, the control state is maintained

as is and the process shifts to Return.

[0142] Thus, if the audio operation signal is received from an external apparatus, the music data of the own portable audio apparatus 200a is subjected to audio-operations by the external apparatus (audio apparatus 100 or other portable audio apparatus 200b).

[0143] For example, it is possible to audio-operate the music data of the portable audio apparatus 200a by operating the audio operation switch 107 of the audio apparatus 100 or audio-operate the music data of the audio operation switches 208 of the portable audio apparatus 200b of the external player B by operating the audio operation switches 208 of the portable audio apparatus 200a of the external player A. Thus, operating the own portable audio apparatus without causing trouble to other passengers can freely and easily perform audio operations of the music that one enjoys.

[0144] Communication control and audio control of the portable audio apparatuses are carried out in this way.

[0145] Then, the operation of erasing music data retained in the audio apparatus 100, etc. will be explained.

[0146] This music data erasure operation erases the music data selected by the passenger from the information storage unit of the audio apparatus 100 and thereby can arrange music data of the information storage unit at the request of the passenger.

[0147] This erasure operation is carried out by the passenger operating the audio top switch 58c on the operation panel 51 of the audio apparatus 100, displaying the "AUDIO TOP MENU" screen shown in FIG. 9 on the display screen and selecting/determining "Erase received music" D4 with the cross cursor/determination button 108.

[0148] If the passenger selects/determines "Erase received music" D4, the display screen is switched to the "Erasure MENU" screen shown in FIG. 9, which displays the storage content of the music data and target apparatuses and erasure method.

[0149] From this "Erasure MENU" screen, if the passenger selects/determines the apparatus storing the music data to be erased in the "Target apparatus" selection area D41, the storage content of the corresponding apparatus is displayed in the "Memory data" display area D42.

[0150] The music data (contents data) is associated with the corresponding music title data (title data) and the audio apparatus 100 displays characters that represent the corresponding music titles in the "memory data" display area D42 according to the music title data. When the passenger selects/determines the music title of the music data to be erased with the storage content displayed in the "memory data" display area D42 and selects/determines the "Erase" D43, the music data that the passenger wants to erase is erased from the information storage unit of the corresponding apparatus.

[0151] For example, if the passenger wants to erase the first music of the information storage unit of the audio

apparatus 100, the processing of erasing music data is performed by selecting/determining the selection content shown in the "Erasure MENU" screen in FIG. 9.

[0152] Note, this embodiment also sets external players (external player A, external player B, etc.) in the "Target apparatus" selection area D41 so as to erase the storage content of the portable audio apparatuses 200a and 200b, too.

[0153] As the erasure method, "Erase all received music pieces" D44 and "Erase all" D45 are set in addition to "Erase" D43. Here, "Erase all received music pieces" means a method of erasing all music data received from other apparatuses and stored and "Erase all" means a method of erasing all music data stored in the information storage unit of a desired apparatus together with music data stored independently.

[0154] After erasing the music data to be erased, selecting/determining "End" D46 terminates the erasure operation.

[0155] Then, the Internet operation will be explained, which receives digital music data from outside the vehicle and reproduces/outputs the music data as music from the speakers 28.

[0156] The Internet operation is carried out by the passenger operating the audio top switch 58c on the operation panel 51 of the audio apparatus 100, displaying the "AUDIO TOP MENU" screen shown in FIG. 5 on the display screen and selecting/determining "Receive music from Internet" D3 with a cross cursor/determination button.

[0157] When the passenger selects/determines "Receive music from Internet" D3, the display screen is switched to the "Internet MENU" screen shown in FIG. 10 and the apparatus is connected to the Internet.

[0158] The "Internet MENU" screen displays the music distribution service site screen and shows "Best hits in this week" D31, "Traditional Japanese music select" D32, etc. allowing the passenger to select music data from a variety of genre.

[0159] The passenger selects/determines the item of genre of his/her choice from this "Internet MENU" screen, selects/determines the music data of the music to be distributed and receives the music. Then, the audio apparatus 100 temporarily stores the received music data in the information storage unit and reproduces/outputs the music data as music from the speakers 28 according to the operation of the passenger.

[0160] In this way, using music distribution of the Internet makes it possible to replay a large amount of new music in the vehicle.

[0161] Then, a data transfer will be explained, which transfers music data stored in each apparatus to another apparatus and sends/receives music data between different apparatuses.

[0162] The data transfer operation is carried out by the passenger operating the audio top switch on the operation panel 51 of the audio apparatus 100, displaying the "AUDIO TOP MENU" screen shown in FIG. 5 on the

display screen and selecting/determining "Transfer received music" D5 with a cross cursor/determination button.

[0163] When the passenger selects/determines "Transfer received music" D5, the display screen is switched to the "Transfer MENU" screen shown in FIG. 11 and the transmitting apparatus, storage content of the music data, receiving apparatus and transfer method are shown.

[0164] Music data is transferred between different apparatuses by the passenger selecting/determining a desired item with the cross cursor/determination button 108 on the "Transfer MENU" screen.

[0165] For example, when the passenger wants to transfer the music data of the first music from the information storage unit of the audio apparatus 100 to a portable audio apparatus 200a of the external player A, the passenger selects/determines the "Car-mounted memory" D51a in the "Transmitting apparatus" selection area D51 as the selection content of the "Transfer MENU" screen, displays the car-mounted memory data D52, which is the storage content of the information storage unit of the audio apparatus 100 and selects/determines the music data D52a of the first music in the car-mounted memory data D52. Then, the passenger selects/determines the external player AD53a in the "Receiving apparatus" selection area D53.

[0166] After selecting/determining music data in this way, selecting/determining the "Transfer" D54 allows the music data of the first music to be transferred from the information storage unit of the audio apparatus 100 to the portable audio apparatus 200a of the external player A.

[0167] If the passenger wants to transfer all music data, the passenger selects/determines "Transfer all" D55 in the car-mounted memory data D52 instead of selecting/determining specific music, then all music data is transferred at a time.

[0168] After transferring music data, selecting/determining "End" D56 terminates the data transfer operation.

[0169] In this data transfer, selecting/determining external players in the "Transmitting apparatus" selection area D51 and the "Receiving apparatus" selection area D53 also allows a data transfer of music data between the selected plurality of portable audio apparatuses 200.

[0170] A data transfer being enabled between apparatuses, it is possible to easily exchange music data not only between the audio apparatus 100 and portable audio apparatuses 200 but also between the portable audio apparatuses. Thus, it is possible to freely exchange music data of preference between passengers or freely transfer music data of the audio apparatus 100 to a portable audio apparatus.

<First modification of first embodiment>

[0171] Then, Fig. 12 shows a display screen of this

modification.

[0172] In this modification, display screen D60 shows a screen changeover switch D61 (NAVI switch D61a, AUDIO switch D61b, AUDIO TOP switch D61c) that switches between the display screens, a cross cursor/determination button D62 that determines a predetermined item, an audio operation switch D63 to enter an audio operation signal and an output changeover switch D64 that switches the output destination of the audio operation signal and allows the passenger to perform audio operations from the display screen D60.

[0173] That is, this modification constructs the display screen D60 with a touch panel allowing the passenger to enter audio operations to the audio apparatus 100 by directly touching the screen.

[0174] In this modification, the method of input operations by the audio apparatus 100 and control content are mostly the same as those in the embodiment above.

[0175] That is, when the passenger selects the audio switch D61a with the screen changeover switch D61, the "AUDIO MENU" screen D65 appears in the center and for example, the passenger selects/determines the external player A in the "Source" selection area D66 on the AUDIO MENU" screen, the 4th music in the "Music title list" selection area D67 and the speakers 28 in the "Output destination" selection area D67 with the cross cursor/determination button D62, and thereby the audio apparatus 100 determines the reproduction/output destination of the music (see FIG. 15).

[0176] Then, when an audio operation signal of reproduction and stop, etc. of the music data according to the input operation of the passenger is output from the audio operation switch D63, the audio apparatus 100 outputs the audio operation signal to the corresponding apparatus according to the setting condition of the output changeover switch D64.

[0177] Note, when the AUDIO TOP switch D61c is selected, various selection processing screens are displayed on the display screen D60 as in the case of the embodiment above allowing selection operation.

[0178] As described above, this modification is constructed so that the passenger can perform audio operations by directly touching the display screen, thus making it possible to eliminate audio operation switches, etc. from the operation panel 51 of the audio apparatus 100 set in the instrument panel. This makes the configuration of the operation panel 51 compact and allows the passenger to directly operate the audio apparatus while watching the display screen, thus improving operability.

<Second modification of first embodiment>

[0179] Then, a different modification of the identification method of the portable audio apparatuses will be explained based on Fig. 13 and Fig. 14.

[0180] As shown in Fig. 13, this modification adopts a communication method capable of providing directivity for a radio signal sent from the in-car radio antenna

34, thereby identifying portable audio apparatuses that exist in the vehicle.

[0181] Fig. 13 is a drawing to explain that the audio apparatus 100 in this modification sends a plurality of radio communication signals with directivity from the in-car radio antenna 34 in accordance with each seating position of the vehicle 1, thereby mutually carries out radio communication with the portable audio apparatuses that exist in the vehicle and identifies those portable audio apparatuses.

[0182] In this modification, the in-car radio antenna 34 installed almost in the center of the vehicle emits radio communication signals with directivity L1, L2, L3 and L4 around in four directions corresponding to the seating positions 2, 3 and 4 and carries out radio communication with the portable audio apparatuses.

[0183] As shown by the hatching areas in Fig. 13, these radio communication signals L1, L2, L3 and L4 are sent from the in-car radio antenna 34 so as to irradiate the total areas of the seats 2, 3 and 4 at their respective predetermined irradiation angles. Adopting such a configuration, this modification is constructed to allow the passengers to be seated to reliably search the portable audio apparatuses 200a and 200b no matter where the passengers put the portable audio apparatuses 200a and 200b and carry out radio communication.

[0184] As these radio communication signals L1, L2, L3 and L4 are sent, the audio apparatus 100 detects the portable audio apparatuses 200a and 200b at their respective irradiated seating positions, automatically identifies the detected portable audio apparatuses as apparatuses forming a radio communication network in the vehicle and at the same time sets the identified portable audio apparatuses as the apparatuses to/from which music data can be transmitted/received.

[0185] For example, when the portable audio apparatus 200a is searched and connected, through the radio communication signal L1 corresponding to the driver seat 2, the portable audio apparatus 200a can be identified as "External player A", and when the portable audio apparatus 200b is searched and connected through the radio communication signal L2 corresponding to the assistant seat 3, the portable audio apparatus 200b can be identified as "External player B".

[0186] Thus, this modification allows portable audio apparatuses to be identified through radio communication signals with directivity.

<Third modification of first embodiment>

[0187] Fig. 14 is a drawing to explain that the audio apparatus 100 in this modification sends a radio communication signal with directivity from the in-car radio antenna 34 in accordance with the positions of mounts provided in the vehicle for the portable audio apparatuses, thereby mutually carries out radio communication with the portable audio apparatuses which exist in the

vehicle and identifies those portable audio apparatuses.

[0188] In this modification, the in-car radio antenna 34 installed almost in the center of the vehicle emits radio communication signals L11, L12, L13 and L14 with directivity in directions corresponding to the positions of mounts 5a, 5b, 5c and 5d of the portable audio apparatuses set in the vehicle and carries out radio communication with the portable audio apparatuses.

[0189] As shown in Fig. 14, the positions of the mounts 5a, 5b, 5c and 5d are predetermined in the vehicle. For this reason, the in-car radio antenna 34 in this modification focuses the irradiation angles of the radio communication signals L11, L12, L13 and L14 as shown in the hatching areas in the same figure and pinpoints the irradiation thereof on the mounts 5a, 5b, 5c and 5d. Moreover, the audio apparatus 100 in this modification is constructed to carry out radio communication only when the portable audio apparatuses 200a and 200b are set on the mounts.

[0190] Also, in this modification, when these radio communication signals L1, L2, L3 and L4 are transmitted, the audio apparatus 100 detects the portable audio apparatuses 200a and 200b at the seating positions irradiated, automatically identifies the detected portable audio apparatuses as apparatuses making up a radio communication network in the vehicle and at the same time sets the identified portable audio apparatuses as the apparatuses to/from which music data can be transmitted/received.

[0191] For example, when the portable audio apparatus 200a is searched and connected through the radio communication signal L11 that irradiates the mount 5a near the driver seat, the portable audio apparatus 200a is identified as "External player A", and when the portable audio apparatus 200b is searched and connected through the radio communication signal L12 that irradiates the mount 5b near the assistant seat, the portable audio apparatus 200b is identified as "External player B".

[0192] Thus, this modification allows portable audio apparatuses to be identified through radio communication signals with directivity.

[0193] As in the case of the above embodiment, it is possible to perform audio control on transmission/reception of music data, etc. by identifying the portable audio apparatuses 200 as shown in the second and third modifications explained above.

[0194] Thus, the identification method of these portable audio apparatuses makes it possible to visually check the position of a portable audio apparatus that has been connected to the car-mounted audio apparatus, thus improving operability.

[0195] As described above, the first embodiment and its modification have the following effects.

[0196] This embodiment first sends music data retained in the portable audio apparatuses 200a and 200b to the audio apparatus 100 via radio communication and reproduces/outputs the music data in real time through

the speakers 28 in the vehicle. This allows the music data retained in the relevant portable audio apparatuses to be reliably and easily reproduced/output from the speakers 28 via radio communication without the passengers bothering to set the portable audio apparatuses on the mounts.

[0197] This makes it possible to replay preferred music using music data in the portable audio apparatus that the passenger carries without downloading the music data from the Internet, thus improving operability and convenience and furthermore attaining cost reduction.

[0198] Especially, since the music data of the portable audio apparatuses 200 is reproduced/output in real time, it is not necessary to store a large volume of music data in the audio apparatus 100 and it is possible to reduce the volume of the information storage unit such as semiconductor memory necessary for the audio apparatus 100.

[0199] Furthermore, audio operations of the portable audio apparatuses 200a and 200b are possible by the passenger carrying out operations from the audio operation switches 107 of the audio apparatus 100. Thus, even if music data is retained in the portable audio apparatuses 200a and 200b, the passenger can carry out operations of the portable audio apparatuses 200a and 200b directly from the audio apparatus 100. Also when the driver carries out audio operations during driving, audio operations through the audio operation switches 107 of the audio apparatus 100 with high operability can also secure the safety.

[0200] Furthermore, this embodiment allows the passenger to freely select the mode of use of the portable audio apparatuses 200a and 200b in the vehicle by switching between a communication state in which music data is transmitted/received between the apparatuses 100, 200a and 200b, and a non-communication state without performing transmission/reception of music data between apparatuses using the internal/external changeover switch 209 of the portable audio apparatuses 200a and 200b.

[0201] Furthermore, this embodiment allows the passenger to visually check the physically invisible connection state of radio communication by visibly displaying the communication connection state of the audio apparatus 100 and portable audio apparatuses 200a and 200b through the connection situation D21 of the "Reception MENU" screen and reliably judge the connection state of the audio apparatus 100 and portable audio apparatuses 200a and 200b.

[0202] Furthermore, in this embodiment, if the passenger does not determine music source through the music source determination operation, all music data pieces of each portable audio apparatus are selected one by one and reproduced/output as music from the speakers 28 one by one, allowing the passenger to enjoy music data of all the portable audio apparatuses in the vehicle without selecting the music data every time.

[0203] Furthermore, this embodiment constructs a ra-

dio communication network made up of respective apparatuses by assigning identification addresses to a plurality of portable audio apparatuses 200a and 200b that exist within the radio communication range of the audio apparatus 100 and thereby identifying the apparatuses. This allows the audio apparatus 100 to reliably recognize which of the portable audio apparatuses 200a and 200b in such a radio communication network has sent the music data and control reproduction of the music.

[0204] Furthermore, in the second modification above, the portable audio apparatuses that exist at the seat positions are searched/connected by a plurality of radio communication signals with directivity in accordance with the seat positions in the vehicle, thus reliably identifying the portable audio apparatuses.

[0205] Especially, the passenger can visually check which portable audio apparatus at which passenger seat music data is transmitted/received to/from, thus improving operability.

[0206] Furthermore, in the third modification above, the portable audio apparatuses are identified through a plurality of radio communication signals with directivity in accordance with the positions of the mounts of the portable audio apparatuses provided in the vehicle, making it possible to identify the portable audio apparatuses when the portable audio apparatuses are set on the mount. Thus, the passenger can easily judge which portable audio apparatus on which mount music data is transmitted/received to/from and the audio apparatus 100 does not search/connect portable audio apparatuses other than those that exist on the mounts, preventing erroneous detection.

[0207] Furthermore, in this embodiment and its modification, the in-car radio antenna 34 is installed almost in the center of the vehicle, which can emit detection wave uniformly in the vehicle and can search/connect the portable audio apparatuses in the vehicle uniformly. Moreover, even if there are any portable audio apparatuses other than those of the passengers near and outside the vehicle, this embodiment and its modification can reduce the possibility of erroneous detection.

[0208] Furthermore, in this embodiment, the audio apparatus 100 receives a plurality of music data pieces sent from a plurality of portable audio apparatuses 200a and 200b, reproduces/outputs one music data piece as music from the speakers 28 and reproduces/outputs other music data pieces as music from the headphones of the portable audio apparatuses 200a and 200b. When a plurality of portable audio apparatuses 200a and 200b is connected by means of radio communication in the vehicle, different music data pieces are reproduced simultaneously from the speakers 28 and portable audio apparatuses 200a and 200b, and thereby passengers of the vehicle 1 can replay desired music individually.

[0209] Furthermore, in this embodiment, a plurality of portable audio apparatuses 200a and 200b are connected to the audio apparatus 100 with communication capability by means of radio communication, music data

retained in one portable audio apparatus 200b is sent to the other portable audio apparatus 200a and the relevant music data can be reproduced/output as music from the other portable audio apparatus 200a. This allows the passenger to replay the music data retained in the portable audio apparatus 200b of another passenger as music using the own portable audio apparatus 200a.

[0210] Furthermore, in this embodiment, when the passenger selects/determines "Search" D24 from the "Reception MENU" screen and performs connection operation only at the initial audio control, it is possible to eliminate the possibility of erroneous connection even if other portable audio apparatuses enter into the communication range of the audio apparatus 100 during music control such as when the vehicle is traveling, thereby preventing disturbance of control.

[0211] On the other hand, while "Update" D25 is selected/determined on the "Reception MENU" screen during audio control, the audio apparatus 100 in this embodiment automatically performs connection operation at predetermined time intervals and can thereby eliminate the need for the passenger to perform connection operation every time a new portable audio apparatus is connected.

[0212] The method of controlling the audio apparatus in the above embodiments and their modifications is implemented by the CPUs inside these apparatuses executing the control program stored in the concentrated control unit 20 that performs system control of the audio apparatus 100 and portable audio apparatus 200. etc. Furthermore, providing such a control program stored in a program storage medium separately will also allow the control unit of another audio apparatus, etc. to execute the above-described control processing.

[0213] The first embodiment has been explained so far. The present invention is not limited to this embodiment, but includes any cases where portable audio apparatuses are carried into the vehicle, music data retained in those portable audio apparatuses is sent to the audio apparatus mounted in the vehicle via in-house radio communication and replayed in real time from speakers mounted in the vehicle. Its detailed configuration can be changed as appropriate without departing from the spirit and scope thereof.

[Second embodiment]

[0214] Then, a second embodiment, which is based on the system configuration of the audio apparatus (audio system) according to the first embodiment above, will be explained. In the following explanations, overlapping explanations about the same configurations as those in the first embodiment will be omitted and explanations will be focused on characteristic sections of this embodiment

[0215] This embodiment is a modification of the first embodiment above and characterized by the configura-

tion of the apparatus mounted on the vehicle. This feature is summarized as follows: Instead of the subsystem made up of the audio apparatus 100 and speakers 28, etc. in the first embodiment, the second embodiment constructs a subsystem in the vehicle with an audio unit 100A and speaker units 2A to 2D, which will be described below, making it possible to carry out radio communication between components which make up the subsystem itself.

[0216] Fig. 15 illustrates a configuration example of an audio apparatus for a vehicle according to the second embodiment mounted in a car cabin.

[0217] In the same figure, a basic configuration of the audio apparatus for a vehicle according to this embodiment includes, in the car cabin of a vehicle 300, an audio unit 100A embedded in a center console, speaker units 2A to 2D embedded in accordance with the seats in the car cabin and can also include a portable audio terminal (portable audio apparatus) 3 according to the need of the passenger in addition to this basic configuration.

[0218] In this embodiment, a general configuration is used as an example in which the speaker units 2A and 2B are placed near the driver seat and assistant seat of the vehicle 300 and the speaker units 2C and 2D are placed behind the right and left rear seats, but the number and locations of the speaker units are not limited to the configuration example shown in Fig. 15 and can be determined as appropriate according to the layout and size, etc. of the seats in the car cabin.

[0219] Fig. 16 shows a block configuration of components making up the audio apparatus for a vehicle in the second embodiment and flows of radio signals between those components.

<Audio unit 100A>

[0220] First, the apparatus configuration of the audio unit 100A will be explained.

[0221] Reference numeral 112 denotes a plurality of operation switches 112 that allow the passenger to select contents such as music and voice to be replayed in the audio apparatus for a vehicle, set sound quality, sound volume, replay balance or select the replay unit such as CD and MD. Reference numeral 113 denotes a display that displays the setting state set by the operation switches 112 and the replay state set by the replay unit, etc. and can also be of a type provided with a touch panel so that the display also assumes part of the function of the operation switches 112 (a display example of the display 113 in this embodiment will be described later with reference to Fig. 23).

[0222] Reference numeral 114 denotes an external communication unit to acquire contents to be replayed by the audio apparatus for a vehicle from a communication apparatus outside the vehicle and it is possible to use a communication module capable of receiving data via a cable or by radio using infrared rays, etc. from

a radio communication apparatus connectable to a mobile communication network in the city or information apparatus such as a personal digital assistant (PDA) mobile computer.

[0223] Reference numeral 115 denotes an audio storage medium (memory) that stores contents acquired from the outside via the external communication unit 114 and can also be configured as detachable. This audio storage medium 115 stores contents information such as music compressed beforehand according to a system like MP3, Solid Audio, Liquid Audio.

[0224] Reference numeral 116 denotes a radio communication apparatus that carries out radio communication with the speaker units 2A to 2D and the portable audio terminal 3 according to a predetermined communication protocol and this embodiment performs radio communication based on a Bluetooth system, which is an example of a short-distance radio communication system used within a range of distance of several tens of m.

[0225] Reference numeral 117 is a replay unit that reads contents information such as music stored beforehand in a storage medium such as CD, MD or cassette tape. Reference numeral 111 denotes a microcomputer that controls each block of the audio unit 100A above and thereby provides contents reproduction by the speaker units 2A to 2D and portable audio terminal 3, which will be described later, and operates according to a control program stored in memory.

[0226] Here, when contents information is sent to the speaker units 2A to 2D, the audio unit 100A sends the contents information compressed according to a predetermined system. That is, the microcomputer 111 sends compressed contents information stored in the audio storage medium 115 in the same data format from the radio communication apparatus 116, but in the case of contents information read from the replay unit 117, the microcomputer 111 compresses the contents information in a predetermined format such as MP3. Solid Audio and Liquid Audio above (in the case of MD, the same data compression format stored in MD can be used) prior to transmission thereof.

[0227] Note, that the audio unit 100A is driven by a power supply supplied from a battery (not shown) of the vehicle 300. Moreover, the individual structure and basic function itself of each block of the audio unit 100A above are presently generally known, and therefore their details will be omitted in this embodiment.

<Portable audio terminal 3>

[0228] Then, an apparatus configuration of the portable audio terminal 3 will be explained.

[0229] Reference numeral 132 denotes a plurality of operation switches that allows the user to select contents music (musical piece) or contents such as voice to be replayed in the portable audio apparatus, set the replay state such as replay start, stop and fast-forward

of the selected contents, set sound quality, sound volume and replay balance. Reference numeral 133 denotes a display that displays the setting state and the replay state, etc. set by the operation switches 132.

[0230] Reference numeral 134 denotes an external communication unit to acquire contents to be replayed by the portable audio apparatus from a communication apparatus outside the vehicle and it is possible to use a communication module capable of receiving data via a cable or by radio using infrared rays, etc. from a radio communication apparatus connectable to a mobile communication network in the city or information apparatus such as a personal digital assistant (PDA) mobile computer.

[0231] Reference numeral 135 denotes a radio communication apparatus that carries out radio communication with the audio unit 100A and the speaker units 2A to 2D, according to the same predetermined communication protocol (Bluetooth system) as that of the audio unit 100A.

[0232] Reference numeral 136 denotes an audio storage medium (memory) that stores contents acquired from the outside via the external communication unit 134 and can also be configured as detachable. This audio storage medium 136 stores contents information such as music compressed beforehand according to a predetermined system like MP3, Solid Audio, Liquid Audio.

[0233] Reference numeral 137 denotes a speaker and/or headphone that outputs sound.

[0234] Reference numeral 131 denotes a microcomputer that controls each block of the portable audio terminal 3 above and thereby provides the replay function by the terminal as a single unit of replaying contents information stored in the audio storage medium 136 and provides contents replay by the speaker units 2A to 2D, which will be described later, and operates according to a control program stored in memory.

[0235] Here, when contents information is sent to the speaker units 2A to 2D, the portable audio terminal 3 sends the contents information compressed according to a predetermined system.

[0236] That is, the microcomputer 131 sends compressed contents information stored in the audio storage medium 136 in the same data format from the radio communication apparatus 135. When compressed contents information stored in the audio storage medium 136 is output as sound from the speakers (or headphones) 137, the microcomputer 131 decodes the compressed contents information according to the compression format and reproduces according to the decoded data.

[0237] Note, that the portable audio terminal 3 is driven by a power supply supplied from a battery (not shown) in the terminal. Moreover, the individual structure and basic function itself of each block of the portable audio terminal 3 above are presently generally known, and therefore their details will be omitted in this embod-

iment. Furthermore, the portable audio terminal 3 can also include a replay unit that reads contents information such as music pre-stored in a storage medium such as CD, MD or cassette tape.

<Speaker units 2A to 2D>

[0238] Then, an apparatus configuration of the speaker units 2A to 2D will be explained.

[0239] Reference numeral 222 denotes a radio communication apparatus that receives a radio signal, etc. including contents (e.g. musical piece) from the audio unit 100A or portable audio terminal 3 according to the same predetermined communication protocol (Bluetooth system) as that of the audio unit 100A and portable audio terminal 3 and sends the radio signal received from the own speaker unit to the other speaker units at the request of other speaker units as will be described later.

[0240] Reference numeral 223 denotes a speaker that outputs contents such as musical piece reproduced from the radio signal received by the radio communication apparatus 222. Reference numeral 221 denotes a microcomputer that controls the radio communication apparatus 222 and speakers 223 above and thereby provides the function of communication with other speaker units and contents reproduction as will be described later and operates according to a control program stored in memory.

[0241] When the contents information compressed in a predetermined format is received from the audio unit 100A or portable audio terminal 3, the microcomputer 221 of the speaker units 2A to 2D decodes the contents information according to the protocol corresponding to the compression format and reproduces sound from the speaker 223 according to the decoded data.

[0242] Note, that the speaker units 2A to 2D are driven by a power supply supplied from a battery (not shown) of the vehicle 300. Moreover, the individual structure and basic function itself of each block of each speaker unit are presently generally known, and therefore their details will be omitted in this embodiment.

[0243] The arrowed lines in Fig. 16 conceptually show flows of radio signals transmitted/received between components such as the audio unit 100A, portable audio terminal 3 and speaker units 2A to 2D above.

[0244] The radio signals at least transmitted/received to implement this embodiment include signals (hereinafter referred to as "music signals") including information of contents (e.g., music) commonly sent to the speaker units (including the portable audio terminal 3), signals including individual audio replay characteristic information (hereinafter referred to as "audio replay characteristic signals") of each speaker unit corresponding to desired sound quality, sound volume, replay balance, etc. set by the passengers using the audio unit 100A and signals including sync information (hereinafter referred to as "sync signals") of individual sound out-

put timing by the speaker units 2A to 2D.

[0245] These radio signals include not only the information content above to be sent but also identification information to identify the transmission source and transmission destination and predetermined transmission error determination codes, etc.

[0246] Note, that the radio communication system used in each component is not limited to Bluetooth, but any system can also be used if it allows high-speed and large volume data transfer in such a way that there will be no delay in transmission of contents information to be reproduced in a space of the vehicle room in which the audio apparatus for a vehicle is mounted.

[0247] In this embodiment, contents information is transmitted/received to/from the speaker units 2A to 2D compressed in the predetermined format above. However, if the radio communication system used allows high-speed and large volume data transfer, by sending music signals including decoded contents information from the audio unit 100A or portable audio terminal 3, a hardware or software module for implementing decoding processing can be omitted from the speaker units 2A to 2D.

<Contents reproduction>

[0248] Then, the contents reproduction operation implemented when the above components each act will be explained with reference to Fig. 17 to Fig. 19A and Fig. 19B and Fig. 23.

[0249] Note, that the audio apparatus for a vehicle according to this embodiment can reproduce various kinds of contents (conversation, sports replay, news, etc.), but in the following explanations, most general musical pieces (music) will be taken as an example of typical contents.

[0250] First, a basic music reproduction operation in this embodiment will be outlined.

[0251] Fig. 23 shows a display example of the display 113 of the audio unit 100A. When the passenger wants reproduction of musical pieces using the audio apparatus for a vehicle, the passenger operates the power switch and thereby makes the audio unit 100A display the setting screen in Fig. 23.

[0252] In this display screen, the passenger selects some desired music source from among a plurality of types of music sources to be replayed and registers the external player as required. Here, the music source denotes the source of information to replay musical pieces.

[0253] In the example shown in Fig. 23, CD is selected and the external player 1 is selected. Furthermore, in this embodiment, the portable audio terminal 3 is selected to be identifiable with an identification number, etc. as the external player 1 through the setting operation by the passenger from a screen (not shown) and when music signals are sent from the relevant terminal and audio unit 100A, the priority order in which the music signals should be replayed is sel.

[0254] Then, according to the music source selection operation above, a list of CD musical pieces inserted in the replay unit 117 (CD player, in this case) beforehand is automatically displayed in the left area of the display and the passenger selects musical pieces to be replayed using the cursor key, etc. near the right end of the audio unit 100A.

[0255] Furthermore, the passenger can set audio replay characteristics such as sound quality, sound volume and replay balance (including the setting of a pseudo-silenced state, which will be described later) during voice output from the speaker units 2A to 2D individually for each speaker unit using the operation switches 112, which are not shown in Fig. 23 (Note, if no setting is performed, predetermined default settings are used).

[0256] Then, when the passenger performs operations such as "Replay", "Fast-forward" and "Stop" as required, the audio unit 100A sends music signals including information on the selected musical pieces and control signals including control information such as stop and fast-forward to the speaker units 2A to 2D and sends audio replay characteristic signals including audio replay characteristic information set by the passenger (or default) to each speaker unit individually.

[0257] Then, the speaker units 2A to 2D reproduce the music signals received from the audio unit 100A according to the audio replay characteristic signals and control signals received in the same way and outputs a replay signal created by reproduction as sound from the speakers 223.

[0258] At this time, in this embodiment, since the portable audio terminal 3 is registered as the external player 1 as shown above, if the relevant terminal is inside or near the car cabin of the vehicle 300, the headphone 137 can also reproduce the musical pieces of the same contents as those of the relevant speaker unit.

[0259] Moreover, in the order of reproduction of musical pieces previously set by the passenger from the audio unit 100A, for example, if the audio unit 100A is higher than the portable audio terminal 3, it is possible to output the musical pieces included in the music signals from the speaker units 2A to 2D by sending the music signals from the relevant terminal when the music signals are not sent from the relevant unit yet. In this case, the portable audio terminal 3 also sends an audio replay characteristic signal according to the setting regarding the replay characteristics set by the user from the relevant terminal. The music replay priority information set by this passenger can be sent from the audio unit 100A to each speaker unit at predetermined or undetermined intervals as a control signal including the priority information.

[0260] If the contents to be reproduced is a musical piece, for example, a delimitation (unit) of the amount of information when the music signal is sent from the audio unit 100A (or portable audio terminal 3) can be a unit of one musical piece or a plurality of musical pieces or a unit of a predetermined time of a few seconds or so to

divide one musical piece into a plurality of portions. In the case of radio broadcasting, the unit is preferred to be a shorter time unit to secure real-time broadcasting. Any way, design can be conducted in such a way as to arrange the amount of information to be sent in predetermined units according to factors such as over what extent of time the frequency band used in the adopted radio communication system can be occupied by the audio apparatus for a vehicle according to this embodiment.

[0261] Fig. 17 is a flow chart of musical piece reproduction processing in the audio unit 100A in the second embodiment and shows the control procedure executed by the microcomputer 111 according to a control program pre-stored in memory.

[0262] In the same figure, in step S201: it is judged whether any of operation switches 112 is operated and if the judgment result is YES (operated), the process goes to step S205 and if the judgment result is NO (not operated), the process goes to S202.

[0263] Step S202 to step S204: Since none of the operation switches 112 is operated, the setting state of an internal flag F that indicates whether the audio unit 100A sends a radio signal or not is judged (step S202), and if this judgment results in F=1 (the radio signal is sent), it is judged whether a stop signal to stop the transmission of the radio signal from the relevant unit has been received from the portable audio terminal 3 or not (step S203), and if F=0 (transmission of the radio signal is stopped), the process returns to step S201.

[0264] Then, if the judgment in step S203 is NO (when no stop signal has been received), the process goes to step S208 to continue the transmission of the radio signal and if the judgment in step S203 is YES (the stop signal has been received), the internal flag is set to F=0 (step S204) and the process returns to step S201.

[0265] Step S205: The type of the operation switch whose operation has been detected in the judgment in step S201 from among the operation switches 112 is judged and if the operated switch is a switch related to audio replay ("Replay" switch illustrated in Fig. 23), the process goes to step S206 and if the operated switch is a switch related to replay stop ("Stop" or "Pause" switch illustrated in Fig. 23), the process goes to step S206, and if the operated switch is a switch related to the audio characteristic setting (switch not shown which allows the audio replay characteristic above), the process goes to step S211.

[0266] Step S206 and step S207: Since the audio unit 100A has instructed reproduction, a stop signal is sent to the relevant terminal (step S206) to prohibit a radio signal from being sent from the portable audio terminal 3 and the internal flag is set to F=1 (radio signal is sent) (step S207).

[0267] Step S208 to step S210: Before the switch about audio replay ("Replay" switch) is operated, the above selected musical pieces on the display in Fig. 23 are read from the audio storage medium 115 (or storage

medium inserted into the replay unit 117), music signals including information on the musical piece (information of compressed data format) are created (step S208), the created music signals are sent in a predetermined unit together from the radio communication apparatus 116 according to a predetermined communication protocol (step S209) and the process returns to step S201.

[0268] Then, when the operation of the switch about replay stop ("Stop" switch) is detected in step S205, the internal flag is set to F=0 (transmission of the radio signal is stopped) (step S210) and the process returns to step S201.

[0269] That is, when the transmission of the music signal is started according to the operation of the "Replay" switch, the transmission of the music signals each containing a predetermined unit amount of information of the musical pieces continues until all selected musical pieces are sent until the operation of the switch about replay stop is detected.

[0270] Note, when the "Pause" switch is operated, the internal flag is held to F=1 (radio signal is sent), the transmission of the music signals can be temporarily stopped.

[0271] Step S211: When the operation of the switch about the setting of the audio characteristics is detected in step S205, the internal flag F setting state is judged (step S211), and if this judgment is F=1 (radio signal is sent), the process goes to step S212 to send the audio replay characteristic signal according to the relevant setting and if F=0 (transmission of the radio signal is stopped), the process returns to step S201.

[0272] Step S212 to step S214: In order to realize a desired sound field according to the operation of the switch about the operated audio characteristic setting, the setting information on the replay characteristic such as sound quality, sound volume and replay balance of the speaker units 2A to 2D of memory (not shown) in the microcomputer 111 is updated (step S212, step S213), the audio replay characteristic signal according to the updated setting information is individually sent to each speaker unit (step S214) and the process returns to step S201.

[0273] Here, the memory, which is not shown, of the microcomputer 111, stores location information of all the speaker units 2A to 2D and setting information on the audio replay characteristics to realize a general sound field at those locations (for example, when the relevant audio apparatus for a vehicle is mounted in the vehicle 300).

[0274] The setting information above is pre-stored as a default setting and the relevant setting information in step S212 and step S213 can be updated for the setting items such as sound quality, sound volume and replay balance except the location information of the relevant speaker units. Thus, no matter what characteristic is set, musical pieces are replayed with an optimal sound field according to the installation location of the speaker units 2A to 2D.

[0275] Moreover, the setting of the audio replay characteristic (sound field setting) using the operation switches 112 in the audio unit 100A includes choices like setting of sound volume to zero, setting for generating a pseudo-silenced state or setting for generating sound stripped of a specific frequency component, etc. for a desired speaker unit of the four speaker units.

[0276] The reason why these settings are possible in this embodiment is that as described above, the setting information about the audio replay characteristic includes location information of all the speaker units 2A to 2D, and so it is possible to realize replay characteristics taking into account the other speaker units when one speaker unit tries to replay sound with a desired sound field.

[0277] That is, in order to generate a pseudo-silenced state at a seat corresponding to a specific speaker unit, it is possible to change the phase of the sound output from the speaker unit opposite to the phase of the sound output from another speaker unit within the range in which the voice reaches the seat corresponding to the speaker unit and set the volume level based on the relevant location information. Furthermore, in order to generate sound stripped of a specific frequency component, it is possible to apply filtering before the speaker unit outputs the replay signal from the speaker 223.

[0278] Therefore, the setting information that can realize such a replay signal is sent to each speaker unit through the audio replay characteristic signal according to the setting of the audio replay characteristics in the audio unit 100A.

[0279] Fig. 18 is a flow chart of musical piece replay processing in the speaker units 2A to 2D in the second embodiment and shows the control procedure executed by the microcomputer 221 of each speaker unit according to a control program pre-stored in memory.

[0280] In the same figure, in step S221 and step S222: it is judged whether an audio replay characteristic signal directed to the own speaker unit has been received from the audio unit 100A (step S221) and if the judgment result is NO (the relevant signal is not received), the process goes to step S223 and if the judgment result is YES (the relevant signal has been received), the audio replay characteristics of the own speaker unit are updated according to the setting information included in the received audio replay characteristics signal (step S222) and the process goes to S223.

[0281] Step S223, step S224: It is judged whether a musical signal is received from the audio unit 100A or portable audio terminal 3 or not (step S223), and if the judgment result is NO (the relevant signal is not received), the process returns to step S221. When the judgment result in step S223 is YES (the relevant signal has been received), it is judged whether the received musical signal is not sent from either one component of the audio unit 100A or portable audio terminal 3 or both are a plurality of types of musical signals including the musical signals sent from an external player, which is

not set on the display screen in Fig. 23 or not (step S224).

[0282] Step S225: As the audio unit 100A sets priority, each speaker unit at least receives a transmitted control signal and thereby priority in replaying musical signals is set, and therefore if the judgment result in step S224 is YES (musical signals are received from a plurality of types of sources), any one of the plurality of types of received musical signals is selected according to the preset priority in this step (step S225) and the process goes to step S228.

[0283] Step S226, step S227: When the judgment result in step S224 is NO (a plurality of types of musical signals has not been received), it is judged whether no musical signal has been received (step S226) and if this judgment result is NO (one musical signal has been received within a predetermined time), the process goes to step S228. On the other hand, if the judgment result in step S226 is YES (when no musical signal has been received beyond the predetermined time), a control signal requesting a transfer of the musical signal is sent to the other speaker units (three speaker units other than the own speaker unit because in this embodiment, the musical information itself of a predetermined unit included in the musical signal has a content common to all the speaker units) and when the musical signals are transferred from the other speaker units to the own speaker unit in response to the control signal, the musical signals are received (step S227) and the process goes to step S228.

[0284] Step S228: It is judged whether special processing should be applied during sound output, for example, whether a child seat is attached to the seat corresponding to the own speaker unit, or whether a pseudo-silenced state is set.

[0285] More specifically, it is possible to judge whether a child seat is attached to the seat corresponding to the own speaker unit, for example, using a general system such as a detection system based on the output signal of an ultrasonic sensor provided in the car cabin or a detection system that detects a signal transmitted from an oscillator provided at the child seat from an antenna embedded in each seat and detects the child seat based on the size of the detected signal, and it is possible to receive a control signal including information expressing the detection state from the audio unit 100A at predetermined or undetermined intervals.

[0286] Furthermore, it is possible to judge whether a pseudo-silenced state is set or not by referencing the audio replay characteristic updated in step S222.

[0287] Step S229: Since it is judged in step S228 that special processing is required, in this step, a musical signal including an amount of information of a predetermined unit whose reception is detected in step S223 (or acquired from another speaker unit) is decoded according to a decoding protocol that conforms to the protocol at the time of compression and converted to a replay signal (that is, a signal of opposite phase realizing a

pseudo-silenced state, signal of sound level 0 or signal with a predetermined frequency component filtered out, etc.) with reference to the audio replay characteristic updated in step S222 according to a desired sound field set by the audio unit 100A. This allows the passenger seated on a specific seat to drive the speaker unit corresponding to the seat in a condition according to his/her preference, for example, to set the speaker unit in a pseudo-silenced state in the case of a seat to which a child seat is attached or set the speaker unit to only output sound that will not adversely affect the child.

[0288] Step 230: Since it is judged in step S228 that special processing is not required, in this step, a musical signal including an amount of information of a predetermined unit whose reception is detected in step S223 (or acquired from another speaker unit) is decoded according to a decoding protocol that conforms to the protocol at the time of compression and converted to a replay signal with reference to the audio replay characteristic updated in step S222 according to a desired sound field set by the audio unit 100A.

[0289] Step S231 and step S232: At the time of reception of the musical signal received this time or based on a sync signal common to the speaker units sent by a predetermined speaker unit, the timing of outputting the replay signal created in step S229 or step S230 from the speaker 223 of the own speaker unit is adjusted (step S231) and the relevant replay signal is output as sound from the speaker 223 (step S232) at the adjusted output timing and the process returns to step S221.

[0290] Fig. 19A and Fig. 19B are flow charts of the music replay processing in the portable audio terminal 3 according to the second embodiment and show the control procedure carried out by the microcomputer 131 according to a control program pre-stored in memory.

[0291] In the same figure, in step S241: It is judged whether any of the operation switches 132 has been operated, and if the judgment result is YES (operated), the process goes to step S250 and if the judgment result is NO (not operated), the process goes to step S242.

[0292] Step S242, step S243: It is judged whether a musical signal has been received from the audio unit 100A, and if the judgment result is NO (the relevant signal has not been received), the process goes to step S247 and if the judgment result is YES (the relevant signal has been received), the setting state of an internal flag F2 that indicates whether reception of the musical signal from the outside (audio unit 100A) is possible or not (step S243) is judged, and if the judgment result is F2=0 (reception of the relevant signal is prohibited), the process goes to step S247 and if F2=1 (reception of the relevant signal is allowed), the process goes to step S244.

[0293] Step S244 to step S246: Since the setting state of the internal flag F2 is F2=1, the received musical signal is converted to a replay signal (step S244) according to the replay characteristic preset by the user of the portable audio terminal 3, the replay signal is output as

sound to the speaker (headphone) 137 (step S245), the setting state of an internal flag F1 that indicates whether the musical signal including the musical piece information read from the audio storage medium 136 by the relevant terminal should be sent independently or not is set to F1=0 (transmission of the relevant signal is prohibited) (step S246) and the process goes to step S247.

[0294] Step S247 to step S249: The setting state of an internal flag F0 that indicates whether a radio signal is sent from the portable audio terminal 3 or not is judged (step S247) and if the judgment result is F0=1 (the radio signal is sent), it is judged whether a stop signal instructing that the transmission of the radio signal from the relevant terminal should be stopped has been received from the audio unit 100A or not (step S248) and if F0=0 (transmission of the radio signal is stopped), the process returns to step S241.

[0295] If the judgment result in step S248 is NO (the stop signal has not been received), the process goes to step S254 to continue the transmission of the radio signal and if the judgment result is YES (when the stop signal has been received), the internal flag F0 is set to F0=0 (step S249) and the process returns to step S241.

[0296] Step S250: The type of the operation switch of the operation switches 132, which is detected to have been operated in the judgment in step S241, is judged and if the operated switch is the switch about audio replay ("Replay" switch), the process goes to step S251, and if it is the switch about replay stop ("Stop" or "Pause" switch), the process goes to step S258, and if it is the switch about mode setting, the process goes to step S259, and if it is the switch about audio characteristic setting, the process goes to step S265.

[0297] Step S251 and step S252: Since the operation switch of the portable audio terminal 3 has instructed a replay, the setting state of the internal flag F1 is judged and if this judgment result is F1=0 (transmission of the musical signal from the relevant terminal is prohibited), the process goes to step S253, and if F1=1 (transmission of the musical signal from the relevant terminal is allowed), a stop signal is sent to the relevant unit to prohibit the radio signal from being sent from the audio unit 100A (step S252) and the process goes to step S253.

[0298] Step S253: The internal flag F0 is set to F0=1 (radio signal is sent) and the process goes to step S208.

[0299] Step S254: Before the switch about audio replay ("Replay" switch) is operated, the musical piece selected by the user is read from the audio storage medium 136 and a musical signal including the information on the musical piece is created.

[0300] Step S255 to step S258: The setting state of the internal flag F1 is judged (step S255), and if the judgment result is F1=0 (transmission of the musical signal from the relevant terminal is prohibited), the musical signal created in step S254 is output as sound to the speaker (headphone) 137 of the relevant terminal (step S256) and if F1=1 (transmission of the musical signal from the relevant terminal is allowed), the musical signals creat-

ed in step S254 are arranged in a predetermined unit and sent from the radio communication apparatus 135 according to a predetermined communication protocol (step S257) and the process returns to step S241.

[0301] Then, when an operation of the switch about replay stop ("Stop" switch) is detected in step S250, the internal flag F0 is set to F0=0 (transmission of the radio signal is stopped) (step S258) and the process returns to step S241.

[0302] That is, when the internal flag F0=0 (transmission of the radio signal is stopped) if the internal flag F1=1, once the transmission of the musical signals is started according to the operation of the "Replay" switch until an operation of the switch about replay stop is detected, musical signals each including a predetermined unit amount of musical piece information are sent until all the selected musical pieces are sent. Furthermore, if the "Pause" switch is operated while the musical signals are being sent, it is possible to temporarily stop the transmission of the musical signals while holding the internal flag F0=1 (radio signal is sent). Then, when the internal flag F1=0, the musical pieces independently replayed by the portable audio terminal 3 are output from the speaker (headphone) 137.

[0303] Step S259 to step S261: Since an operation of the switch about mode setting is detected in step S250, it is judged whether the operation has set the transmission switch to ON (step S259), and the state of the internal flag F1 that indicates whether transmission of the musical signals from the relevant terminal is possible or not is set according to the judgment (F1=1 when the relevant switch is ON; step S260, F1=0 when the relevant switch is OFF; step S261).

[0304] Step S262 to step S264: Since an operation of the switch about mode setting is detected in step S250, it is judged whether the operation has set the reception switch to ON (step S262), and the state of the internal flag F2 that indicates whether reception of the musical signals from the audio unit 100A is possible or not is set according to the judgment (F2=1 when the relevant switch is ON; step S263, F2=0 when the relevant switch is OFF; step S264).

[0305] Step S265, step S266: When an operation of the switch about audio characteristic setting is detected in step S250, the setting states of the internal flags F0 and F1 are judged and if F0=F1=1, the process goes to step S268 and if F0=0, or F0=1 and F1=0, the process returns to step S241.

[0306] Step S267 to step S269: In order to realize a desired sound field according to the operation of the operated switch about the audio characteristic setting and in order to realize a desired sound field according to the setting information on the replay characteristics such as sound quality, sound volume and replay balance of the speaker units 2A to 2D of memory (not shown) in the microcomputer 131, the setting information on the replay characteristics such as sound quality, sound volume and replay balance of the speaker units 2A to 2D

of memory (not shown) in the microcomputer 131 is updated (step S267, step S268), and the audio replay characteristic signal according to the updated setting information is sent to each speaker unit individually (step S269) and the process returns to step S241.

[0307] According to this embodiment described above, it is possible to discard cables connecting the audio unit 100A and speaker units 2A to 2D and make mounting of each component in the car cabin easier. This eliminates the need for the designer of the vehicle to consider the cabling locations or operability of cabling, thus improving the degree of freedom of design.

[Third embodiment]

[0308] Then, a third embodiment, which is based on the audio apparatus for a vehicle according to the second embodiment above, will be explained. In the following explanations, overlapping explanations about the same configurations as those in the second embodiment will be omitted and explanations will be focused on characteristic sections of this embodiment.

[0309] In the speaker units shown in Fig. 15, this embodiment groups, for example, the speaker units 2A and 2B corresponding to the driver seat and assistant seat and the speaker units 2C and 2D corresponding to the right and left rear seats, and replays musical pieces differing from one group to another. When such grouping is set, it is possible to allow the passengers to arbitrarily set a group including at least one speaker unit from the operation switches 112 of the audio unit 100A and from a predetermined display screen (not shown) using the display 113.

[0310] Furthermore, this embodiment allows the passenger to select a musical piece source or a musical piece to be replayed for every group set by the passenger by displaying the display screen illustrated in Fig. 23 for every group.

[0311] Fig. 20 is a flow chart of music replay processing in the audio unit 100A in the third embodiment, and since the basic processing configuration is almost the same as the flow chart in Fig. 17 described in the second embodiment, the characteristic processing in this embodiment will be explained.

[0312] In this embodiment, the audio unit 100A needs to send musical signals differing from one preset group to another. Therefore, in this embodiment, when an operation of the switch about audio replay is detected in step S106 before a stop signal is sent to the portable audio terminal 3 in step S108, a selected musical piece is set for every preset group in step S107 prior to setting the internal flag F to 1.

[0313] Then, in step S110 and step S111, musical piece information for every group is read from the audio storage medium 115, etc., their respective musical signals are created and those musical signals are sent to each speaker unit that makes up each group by a predetermined unit amount. At this time, the audio unit

100A includes the identification information of the group to which each speaker unit belongs in the musical signal to be sent.

[0314] Furthermore, when the audio replay characteristic is allowed to be set for every group, it is possible to send an audio replay characteristic signal according to the setting in step S115 and step S116.

[0315] Fig. 21 is a flow chart of music replay processing in the speaker units 2A to 2D in the third embodiment, and since the basic processing configuration is almost the same as the flow chart in Fig. 18 described in the second embodiment. The characteristic processing in this embodiment will be explained.

[0316] When a plurality of types of musical signals is received in step S124, in step S125, the speaker units 2A to 2D perform processing of selecting musical signals according to preset replay priority in the same way as in the second embodiment and at the same time selects a musical signal from among the received musical signals, including the identification information of the group to which the own unit belongs.

[0317] Then, when it is not possible to receive musical signals in step S126, it is necessary to select the musical signal including the identification information of the group to which the own speaker unit belongs from among the musical signals received as a result of requesting other speaker units for musical signals in step S127. Or when another speaker unit of the group to which the own speaker unit belongs can be recognized by a plurality of musical signals received so far, it is possible to directly request another speaker unit that belongs to the same group to transfer the musical signal.

[0318] Fig. 22A and Fig. 22B are flow charts of music replay processing in the portable audio terminal 3 in the third embodiment, and since the basic processing configuration is almost the same as the flow charts in Fig. 19A and Fig. 19B described in the second embodiment, the characteristic processing in this embodiment will be explained.

[0319] As in the case of the above-described audio unit 100A, the portable audio terminal 3 needs to send musical signals differing from one preset group to another in this embodiment. Therefore, when an operation of the switch about audio replay is detected in step S151 and the judgment result in step S152 is the internal flag F1=1 (transmission of musical signals from the relevant terminal is allowed), this embodiment sets musical pieces selected for every preset group in step S153 before a stop signal is sent to the audio unit 100A in step S154.

[0320] Then, in step S156 and step S159, musical piece information for every group is read from the audio storage medium 136, etc., their respective musical signal are created and those musical signals are sent to each speaker unit that makes up each group by a predetermined unit amount. At this time, the portable audio terminal 3 includes the identification information of the group to which each speaker unit belongs in the musical signal to be sent.

[0321] Furthermore, when the audio replay characteristic is allowed to be set for every group, as in the case of the above-described audio unit 100A, it is possible to send an audio replay characteristic signal according to the setting in step S170 and step S171.

[0322] This embodiment allows individual passengers to listen to contents according to their preference in set group units and is ideally applicable to a vehicle with a large room such as a wagon car and bus.

[0323] The second and third embodiments above describe the audio unit 100A as a stationary type as shown in Fig. 15, but the present invention is not limited to such a system configuration. If the audio unit 100A is implemented as a terminal that the passenger can carry with him/her, that terminal can be carried into the vehicle by the passenger, making it possible to transfer musical signals to be replayed to a plurality of speaker units via radio communication as described above, eliminating a troublesome operation required in the above stationary type audio unit 100A to secure (transfer) musical piece information to the audio unit 100A before musical pieces are replayed, etc., thus improving operability.

[0324] The second and third embodiments above provide an easy-to-mount audio apparatus for a vehicle, its contents reproduction method and sound reproduction apparatus.

[0325] That is, the second and third embodiments above can discard cables connecting the audio unit 100A and a plurality of speaker units 2A to 2D and simplify mounting in the vehicle. This eliminates the need for the designer of the vehicle to consider cabling locations, thus increasing the degree of freedom of design.

[0326] Furthermore, according to the third embodiment above, the speaker units 2A to 2D are located in accordance with the seats of the vehicle 300 and by sending a radio signal including contents different from those for the other speaker units to the speaker unit corresponding to a specific seat, it is possible to allow individual passengers to listen to contents according to their preference.

[0327] Furthermore, the second and third embodiments above can reproduce contents with an optimal sound field according to the locations of the speaker units 2A to 2D.

[0328] Furthermore, the second and third embodiments above can generate a pseudo-silenced state or output sound stripped of a specific frequency component.

[0329] Furthermore, the second and third embodiments above allow the passenger seated on a specific seat to drive the speaker unit corresponding to the seat in a condition according to his/her preference, for example, set the speaker unit to only output sound that will not adversely affect the child in the case of a seat to which a child seat is attached.

[0330] Furthermore, in the second and third embodiments above, the audio unit 100A is made portable and can be carried into the vehicle, making it possible to

transfer contents to be replayed to a plurality of speaker units via radio communication, eliminating a troublesome operation to transfer contents to the apparatus on the vehicle side, etc.

[0331] Furthermore, when a radio signal is sent, the second and third embodiments above send contents to be sent through the radio signal by dividing the contents by a predetermined unit amount of information to a plurality of speaker units. This makes it possible to efficiently send contents according to the time during which the frequency band available to radio communications can be occupied.

[0332] Furthermore, according to the second and third embodiments above, even if radio signals are sent from, for example, a stationary unit in the car cabin and a portable unit as the radio signals from the audio unit 100A, the same contents received from any one unit can be reproduced by a plurality of speaker units.

[0333] As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the claims.

Claims

1. An audio system that reproduces contents information as sound in a vehicle, comprising:

a portable audio apparatus (200, 200a, 200b) carried by a passenger of said vehicle; and an audio apparatus (100) mounted in said vehicle,

characterized in that said portable audio apparatus comprises:

contents information retaining means (204) for retaining contents information; and transmitting means (205) for transmitting said contents information to said audio apparatus at least by means of radio communication, and said audio apparatus comprises:

receiving means (110) for receiving said contents information from said portable audio apparatus at least by means of radio communication; and

controlling means (101, 103) for reproducing said contents information received by said receiving means and outputting the reproduced information as sound from a speaker (28) mounted in said vehicle.

2. The audio system according to claim 1, **characterized in that** said audio apparatus further comprises:

an operation switch (24, 106 to 109) that allows the passenger of said vehicle to input an operation of said audio system; and operation signal transmitting means (110) for transmitting an operation signal corresponding to the operation of said operation switch to said portable audio apparatus at least by means of radio communication, and said portable audio apparatus further comprises controlling means (203) for controlling the own operation according to said operation signal received from said audio apparatus at least by means of radio communication.

3. The audio system according to claim 1 or 2, **characterized in that** at least any one of said audio apparatus and said portable audio apparatus further comprises selecting means capable of selecting a communication execution state in which contents information is transmitted between both apparatuses or a non-communication execution state in which contents information is not transmitted.
4. The audio system according to one of the preceding claims, **characterized in that** at least said audio apparatus further comprises displaying means (24) for visibly displaying the state of communication between said audio apparatus and said portable audio apparatus.
5. The audio system according to one of the preceding claims, **characterized in that** said audio apparatus identifies said portable audio apparatus that exists in a predetermined radio communication area of said audio apparatus and further comprises system constructing means (101, 110) for constructing a radio communication system made up of the identified portable audio apparatus and said audio apparatus, and said audio apparatus acquires said contents information from the portable audio apparatus identified by said system constructing means.
6. The audio system according to claim 5, **characterized in that** said audio apparatus further comprises instructing means capable of, when a plurality of contents information pieces is received from a plurality of portable audio apparatuses identified by said system constructing means, instructing simultaneous reproduction of the plurality of contents information pieces, and said controlling means, when simultaneous reproduction is instructed by said instructing means, outputs at least any one contents information piece from among the plurality of contents information pieces whose simultaneous reproduction is instructed from said speaker and at the same time remotely controls said plurality of portable audio ap-

paratuses so that the other contents information pieces are reproduced by at least any one of the plurality of portable audio apparatuses identified by said system constructing means.

7. The audio system according to claim 5 or 6, **characterized in that** said receiving means can receive contents information from the plurality of portable audio apparatuses identified by said system constructing means,

said audio apparatus further comprises setting means capable of, when a plurality of contents information pieces is received from the plurality of portable audio apparatuses identified by said system constructing means, setting priority of the plurality of portable audio apparatuses in order to set the order of reproducing those contents information pieces, and

said controlling means, when the priority is set by said setting means, sequentially performs control that contents information received from one portable audio apparatus is output as sound from the speaker mounted in said vehicle on said identified plurality of portable audio apparatuses according to said priority.

8. The audio system according to claim 5, 6 or 7, **characterized in that** said system constructing means, for the purpose of identifying said portable audio apparatuses detected in said vehicle, which is said predetermined radio communication area, assigns individual identification addresses and constructs said radio communication system with all portable audio apparatuses, which have been assigned identification addresses, and said audio apparatus.

9. The audio system according to claim 5, 6, 7 or 8, **characterized in that** said system constructing means transmits a first radio signal with directivity in said vehicle and identifies said portable audio apparatus that exists in said predetermined radio communication area (L1 to L4, L11 to L14) based on a second radio signal received from said portable audio apparatus according to the transmission of the radio signal.

10. The audio system according to claim 9, **characterized in that** said predetermined radio communication area (L1 to L4) corresponds to a seat position (2, 3, 4) placed in said vehicle.

11. The audio system according to claim 9 or claim 10, **characterized in that** said predetermined radio communication area (L11 to L14) corresponds to a position (5a to 5d) of the mount of said portable audio apparatus placed in said vehicle.

12. The audio system according to any one of claims 9

to 11, **characterized in that** said system constructing means sends a first radio signal from a radio antenna (34) installed almost in the center of said vehicle.

13. A contents reproduction method of an audio system that reproduces contents information as sound in a vehicle, **characterized by** comprising:

a system constructing step of constructing a communication system constructed of a portable audio apparatus (200, 200a, 200b) carried by a passenger of said vehicle and an audio apparatus (100) mounted in said vehicle that performs at least radio communication;

a contents information transmitting step of transmitting contents information pre-stored in said portable audio apparatus to said audio apparatus at least by means of radio communication; and

a sound reproducing step of receiving and reproducing said contents information sent in said contents information transmitting step by said audio apparatus at least by means of radio communication and outputting the reproduced information as sound from a speaker (28) mounted in said vehicle.

14. The contents reproduction method according to claim 13, **characterized by** further comprising:

an operation inputting step allowing the passenger of said vehicle to input an operation of said audio system;

an operation signal transmitting step of transmitting an operation signal according to the operation input in said operation inputting step to said portable audio apparatus at least by means of radio communication; and

a reproducing step in which said portable audio apparatus reproduces contents information retained in the portable audio apparatus in response to said operation signal received from said audio apparatus at least by means of radio communication.

15. The contents reproduction method according to claim 13 or 14, **characterized in that** said radio communication system is constructed in said system constructing step only at the beginning of audio control.

16. The contents reproduction method according to claim 13, 14 or 15, **characterized in that** said radio communication system is constructed in said system constructing step at a predetermined time interval.

17. The contents reproduction method according to any one of claim 13, claim 15 and claim 16, **characterized in that** in order to identify said portable audio apparatus detected in said vehicle as a predetermined radio communication area, said system constructing step assigns individual identification addresses and constructs said radio communication system with all portable audio apparatuses with the identification addresses assigned and said audio apparatus.

18. An audio apparatus for a vehicle (100) mounted in a vehicle that reproduces contents information as sound in said vehicle, **characterized by comprising:**

system constructing means (101, 110) for constructing a radio communication system constructed of a portable audio apparatus (200, 200a, 200b) carried by a passenger of the vehicle and said audio apparatus;

receiving means (110) for receiving said contents information from said portable audio apparatus at least by means of radio communication; and

controlling means (101, 103) for reproducing said contents information received by said receiving means and outputting the reproduced information as sound from a speaker (28) mounted in said vehicle.

19. The audio apparatus for a vehicle according to claim 18, **characterized in that** said system constructing means constructs, when a plurality of said portable audio apparatuses is identified, a radio communication system including the plurality of portable audio apparatuses, and

said controlling means, between said plurality of portable audio apparatuses, transfers contents information retained in a first portable audio apparatus to a second portable audio apparatus via radio communication and controls so that the contents information is reproduced as sound in said second portable audio apparatus.

20. A contents reproduction method of an audio apparatus for a vehicle (100) mounted in said vehicle to reproduce contents information as sound in said vehicle, **characterized by comprising:**

a system constructing step of constructing a radio communication system constructed of a portable audio apparatus (200, 200a, 200b) carried by a passenger of said vehicle and said audio apparatus;

a receiving step of receiving said contents information from said portable audio apparatus at least by means of radio communication; and

a sound reproducing step of reproducing said contents information received in said receiving step and outputting the reproduced information as sound from a speaker (28) mounted in said vehicle.

21. The contents reproduction method according to claim 20, **characterized in that**, when a plurality of said portable audio apparatuses is identified in said system constructing step, a radio communication system including the plurality of portable audio apparatuses is constructed, and

said sound reproducing step, between said plurality of portable audio apparatuses, transfers contents information retained in a first portable audio apparatus to a second portable audio apparatus via radio communication and controls so that the contents information is reproduced as sound in said second portable audio apparatus.

22. The audio system according to one of claims 1 to 12, **characterized in that** the audio apparatus (100) mounted in said vehicle constructs a radio subsystem in said vehicle made up of audio controlling means (100A) equipped with a first radio communication apparatus (116) and a plurality of speaker units (2A to 2D) equipped with a second radio communication apparatus (222).

said first and second radio communication apparatuses can carry out radio communications based on a predetermined radio communication protocol, and

said plurality of speaker units receives a radio signal sent from the first radio communication apparatus of said audio controlling means by said second radio communication apparatus and reproduces contents information included in the received radio signal according to characteristic information individually set for each speaker unit.

23. The audio system according to claim 22, **characterized in that** said audio controlling means can perform a setting by which said plurality of speaker units is divided into a plurality of groups made up of at least one speaker unit and sends a radio signal including contents information differing among the set plurality of groups.

24. The audio system according to claim 22 or 23, **characterized in that** said plurality of speaker units is provided in accordance with seats in the vehicle, and

said audio controlling means sends to a speaker unit corresponding to a specific seat, a radio signal including contents information different from the contents information for the other speaker units.

25. The audio system according to claim 22, 23 or 24 **characterized in that** said audio controlling means sends a first radio signal including the same contents information to said plurality of speaker units and sends a second radio signal including said characteristic information to each speaker unit individually, and
said plurality of speaker units applies sound field processing based on individual characteristic information included in said second radio signal to the contents information included in said first radio signal and then outputs the contents information as sound.
26. The audio system according to claim 25, **characterized in that** said characteristic information includes information on the locations of all said plurality of speaker units and sound field processing at those locations, and
said plurality of speaker units performs sound field processing taking into account the other units based on said characteristic information prior to outputting sound from the own unit.
27. The audio system according to any one of claims 22 to 25, **characterized in that** said plurality of speaker units is provided in accordance with the seats in said vehicle, and
said audio controlling means controls a speaker unit from among said plurality of speaker units that corresponds to a specific seat so as to be able to reproduce sound with sound volume, sound quality or sound field different from the other speaker units.
28. The audio system according to claim 27, **characterized in that** a seat in said vehicle is provided with detecting means for detecting whether any child seat is attached, and
said audio controlling means designates a seat where said detecting means has detected the presence of a child seat as said specific seat and controls the speaker unit corresponding to the seat so as to be able to reproduce sound with sound volume, sound quality or sound field different from the other speaker units.
29. The audio system according to one of the claims 22 to 28 **characterized in that** said audio controlling means is a portable terminal (3).
30. The audio system according to one of the claims 22 to 29 **characterized in that** when said radio signal is sent, said audio controlling means sends contents information to be sent through the radio signal, by dividing the contents information by a predetermined unit amount of information to said plurality of speaker units.
31. The audio system according to claim 30, **characterized in that** said plurality of speaker units comprises synchronization means for, when the contents information divided into said predetermined unit amounts of information received through said radio signal is reproduced, mutually synchronizing the output timing among the speaker units.
32. The audio system according to one of claims 22 to 31 **characterized in that** when a plurality of types of radio signals sent from different sources is received, said plurality of speaker units reproduces contents information included in any one of the radio signals based on preset priority.
33. A portable audio apparatus (3) in the audio system according to claim 22 that comprises a third radio communication apparatus (135) that receives a radio signal sent from the first radio communication apparatus of said audio controlling means and can reproduce sound at least through a headphone based on the radio signal received by the radio communication apparatus.
34. The contents reproduction method according to one of claims 13 to 17, **characterized in that** said system constructing step includes, as an audio apparatus (100) mounted in said vehicle, a subsystem constructing step of constructing a radio subsystem made up of an audio control unit (100A) and a plurality of speaker units (2A to 2D) each equipped with a radio communication apparatus that can carry out radio communication based on a predetermined radio communication protocol, and
said audio reproducing step includes:
a first step of sending a radio signal including contents information from said audio control unit; and
a second step of receiving said radio signal from said plurality of speaker units and reproducing the contents information included in the received radio signal as sound according to the characteristic information individually set for each speaker unit.
35. The contents reproduction method according to claim 34, **characterized in that** said first step divides said plurality of speaker units into a plurality of groups made up of at least one speaker unit and sends a radio signal including contents information differing among those groups from said audio control unit.
36. The contents reproduction method according to claim 34 or 35, **characterized in that** in said first step, said audio control unit sends a first radio signal including the same contents information to said plu-

rality of speaker units and sends a second radio signal including said characteristic information to the speaker units, and

in said second step, said plurality of speaker units applies sound field processing based on the individual characteristic information included in said second radio signal to the contents information included in said first radio signal individually and then outputs the contents information as sound.

37. The contents reproduction method according to any one of claims 34 to 36, **characterized in that** said plurality of speaker units is preset in accordance with the seats in the vehicle, and

said sound reproducing step controls a speaker unit from among said plurality of speaker units that corresponds to a specific seat by said audio control unit so as to be able to reproduce sound with sound volume, sound quality or sound field different from the other speaker units.

38. The contents reproduction method according to one of claims 34 to 37, **characterized in that** when said radio signal is sent from said audio control unit in said first step, the contents information to be sent through the radio signal is divided by a predetermined unit amount of information and sent to said plurality of speaker units.

39. The contents reproduction method according to one of claims 34 to 38, **characterized in that** when said plurality of speaker units receives a plurality of types of radio signals sent from different sources in said second step, contents information included in any one of the radio signals is reproduced based on preset priority.

40. A computer program product that provides instructions that implement the operation of the audio apparatus for a vehicle according to claim 18 or claim 19.

41. A computer program product that provides instructions that implement the contents reproduction method according to claim 20 or claim 21 with an audio apparatus for a vehicle.

42. A computer-readable storage medium that stores a program code that implements the operation of the audio apparatus for a vehicle according to claim 18 or claim 19.

43. A computer-readable storage medium that stores a program code that implements the contents reproduction method according to claim 20 or claim 21 with an audio apparatus for a vehicle.

FIG. 1

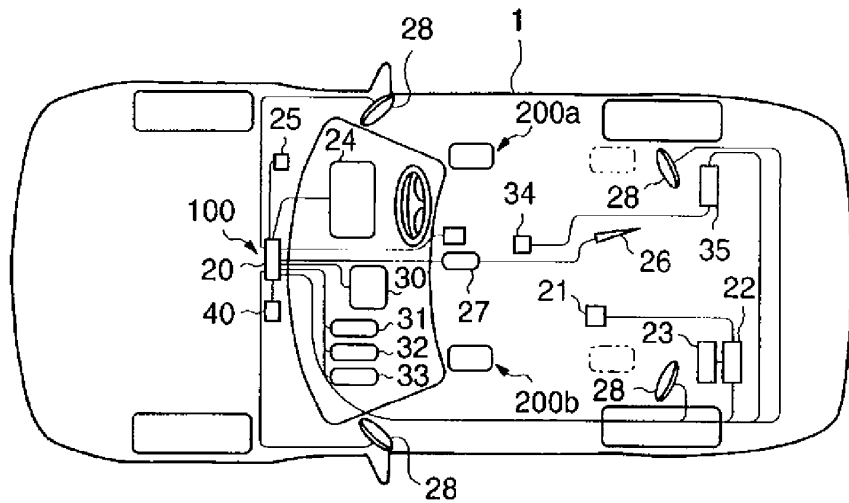


FIG. 2

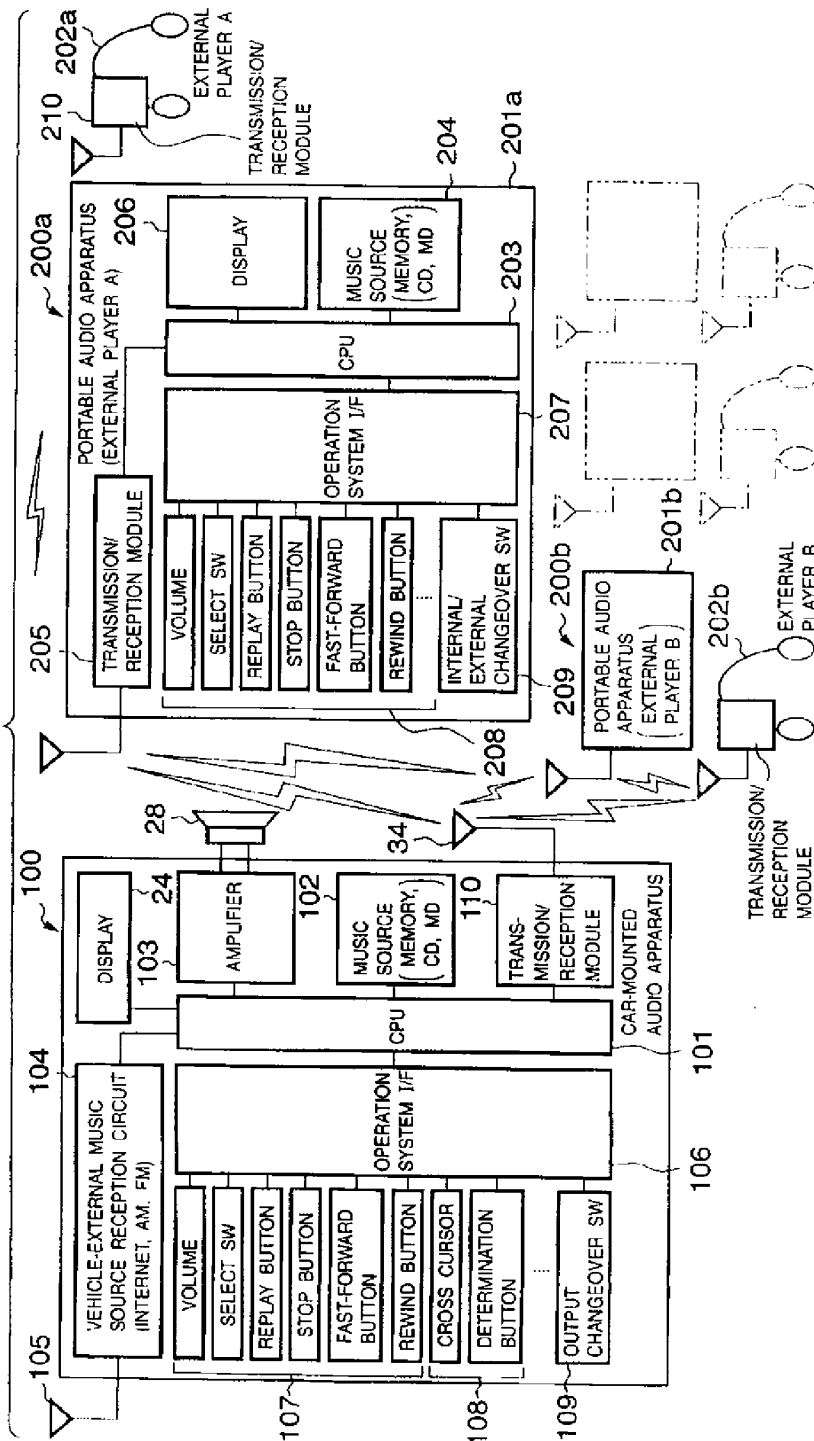


FIG. 3

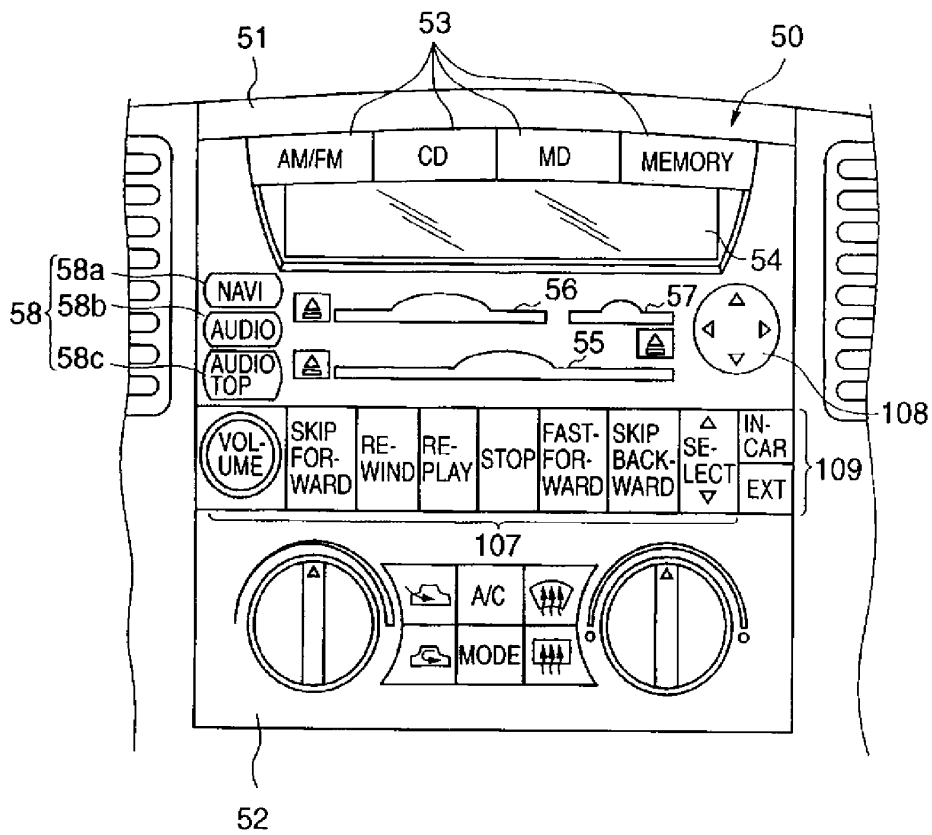


FIG. 4

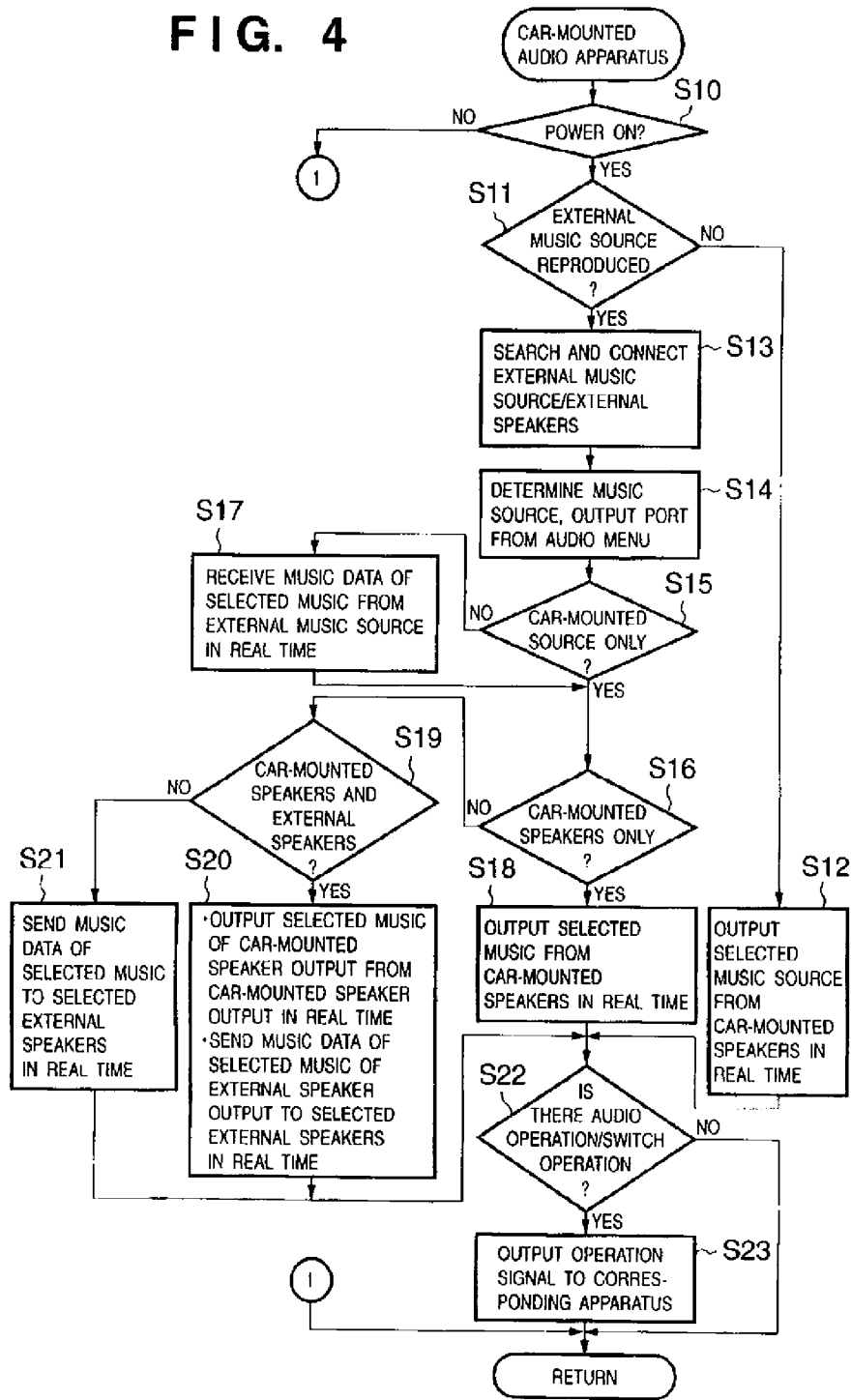


FIG. 5

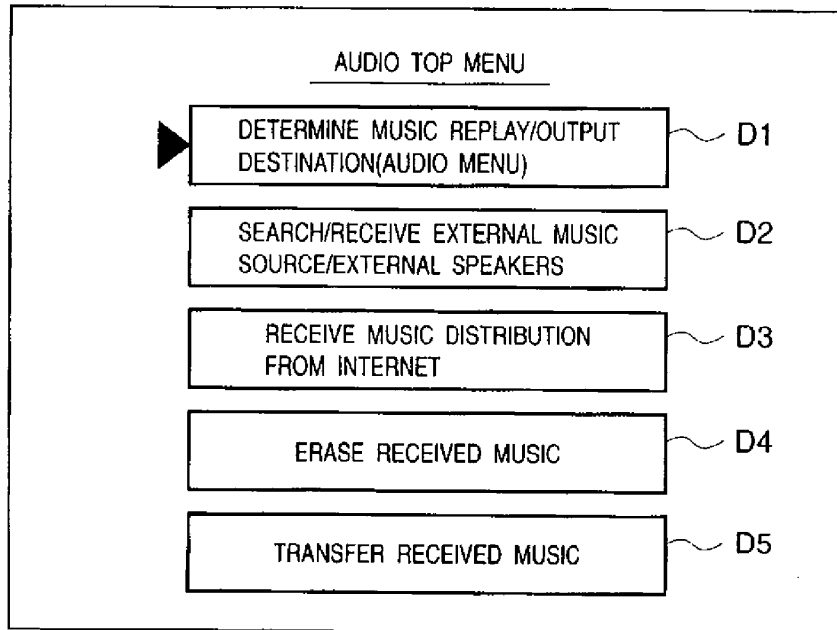


FIG. 6

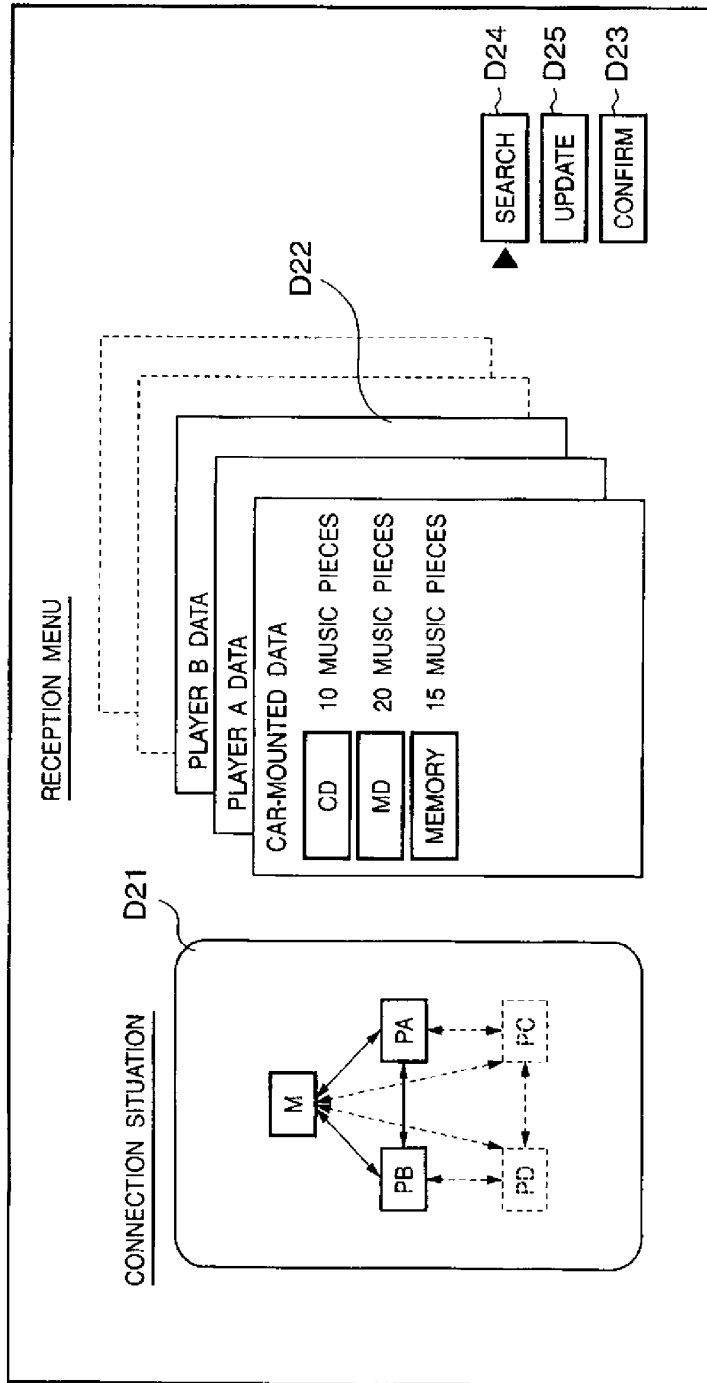


FIG. 7

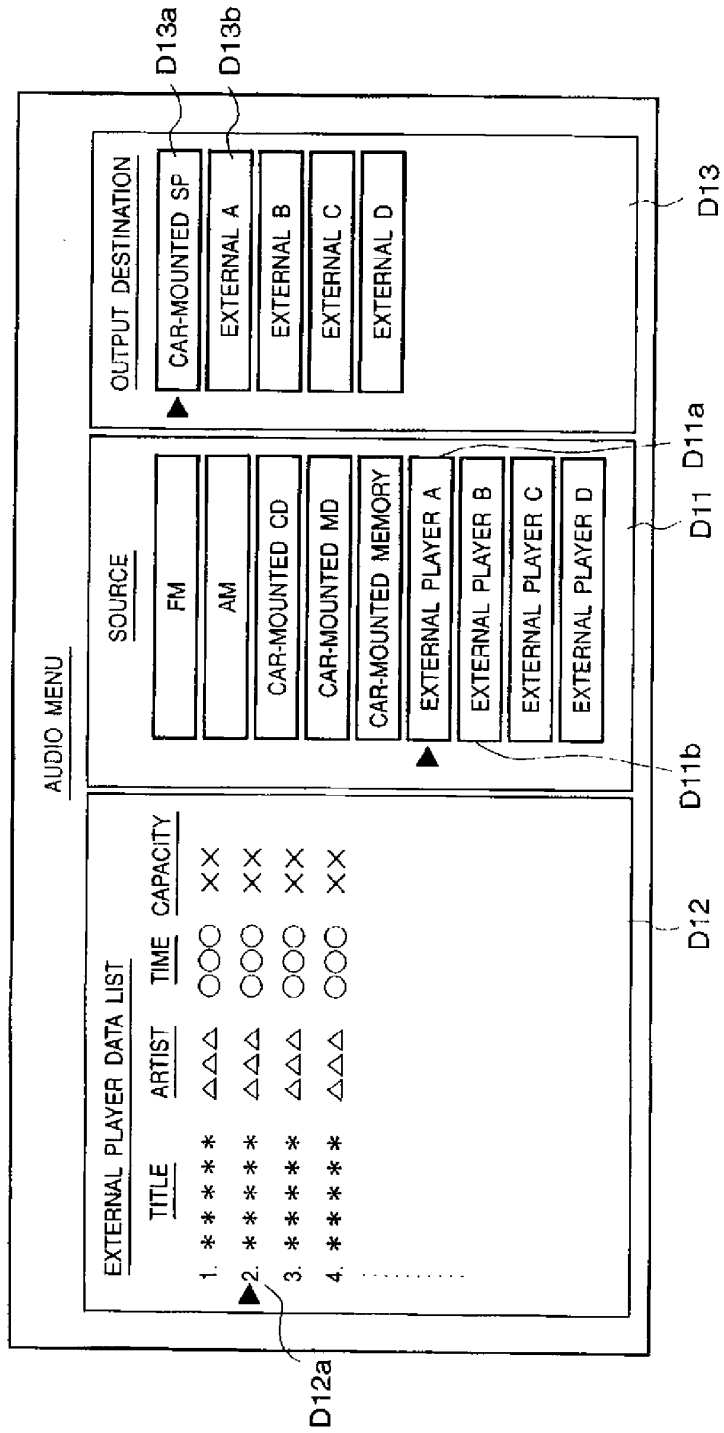


FIG. 8

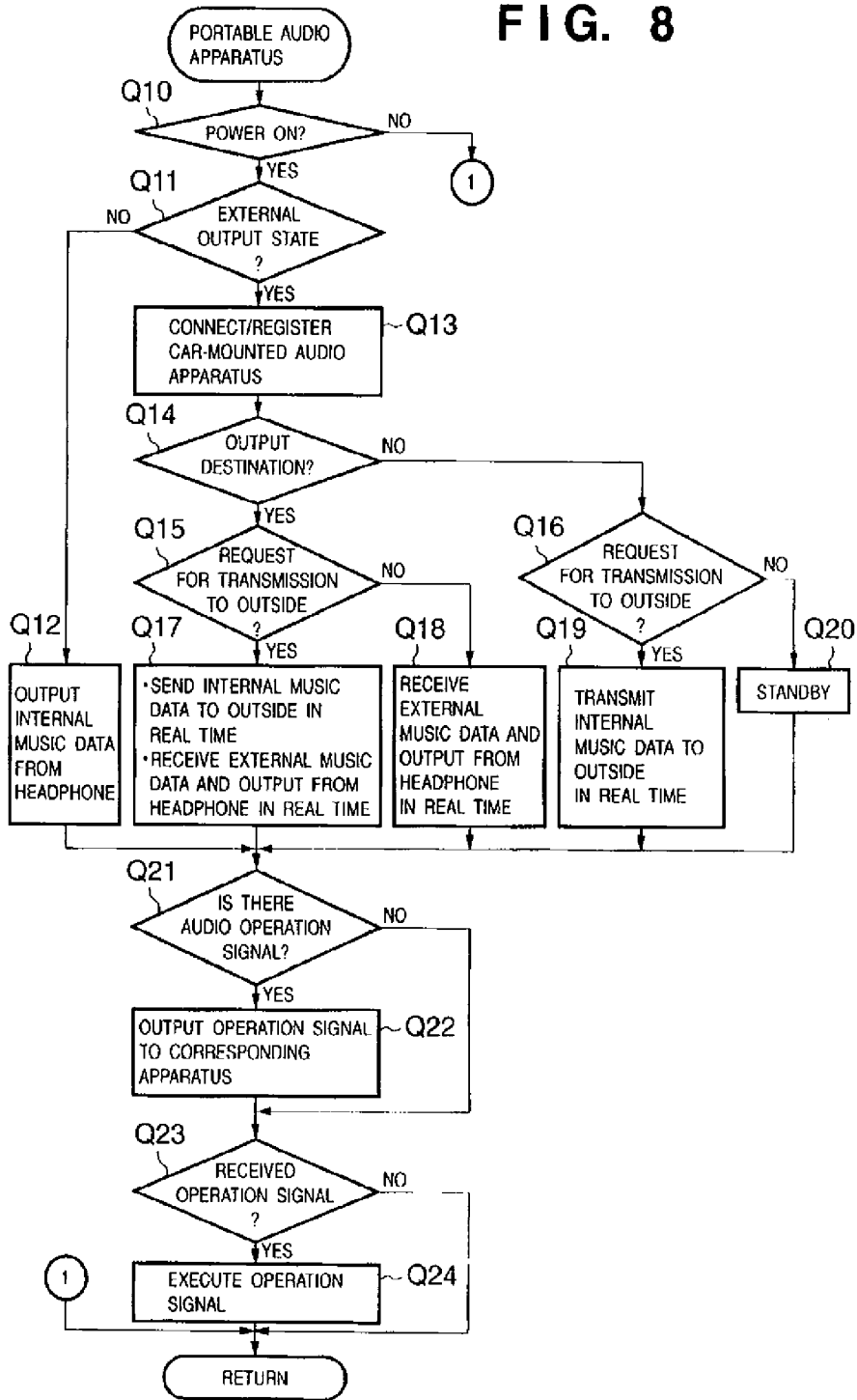


FIG. 9

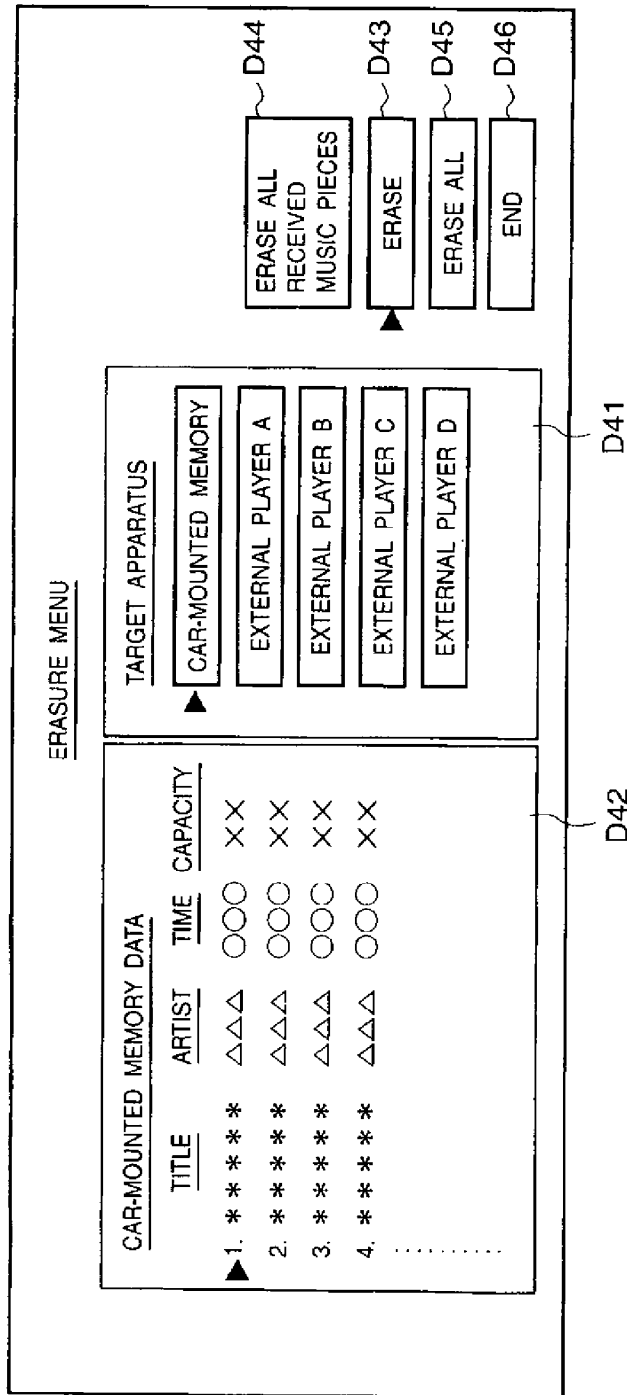


FIG. 10

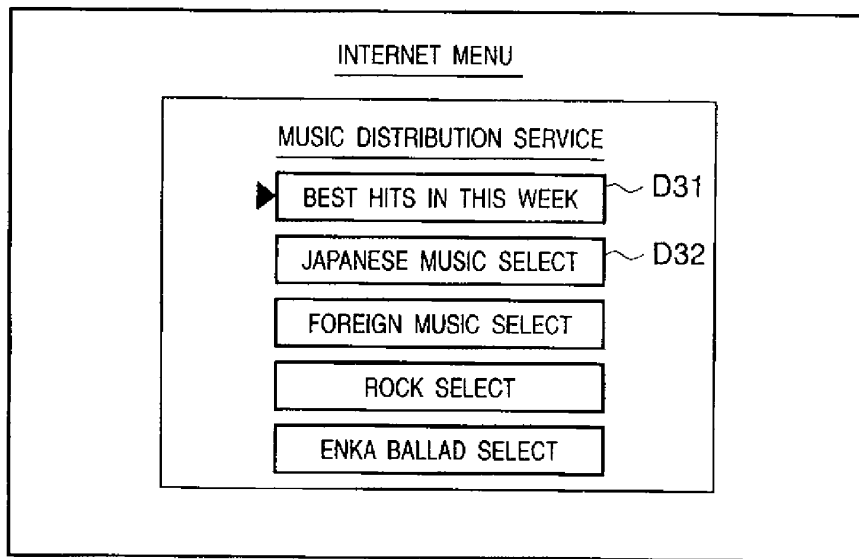


FIG. 11

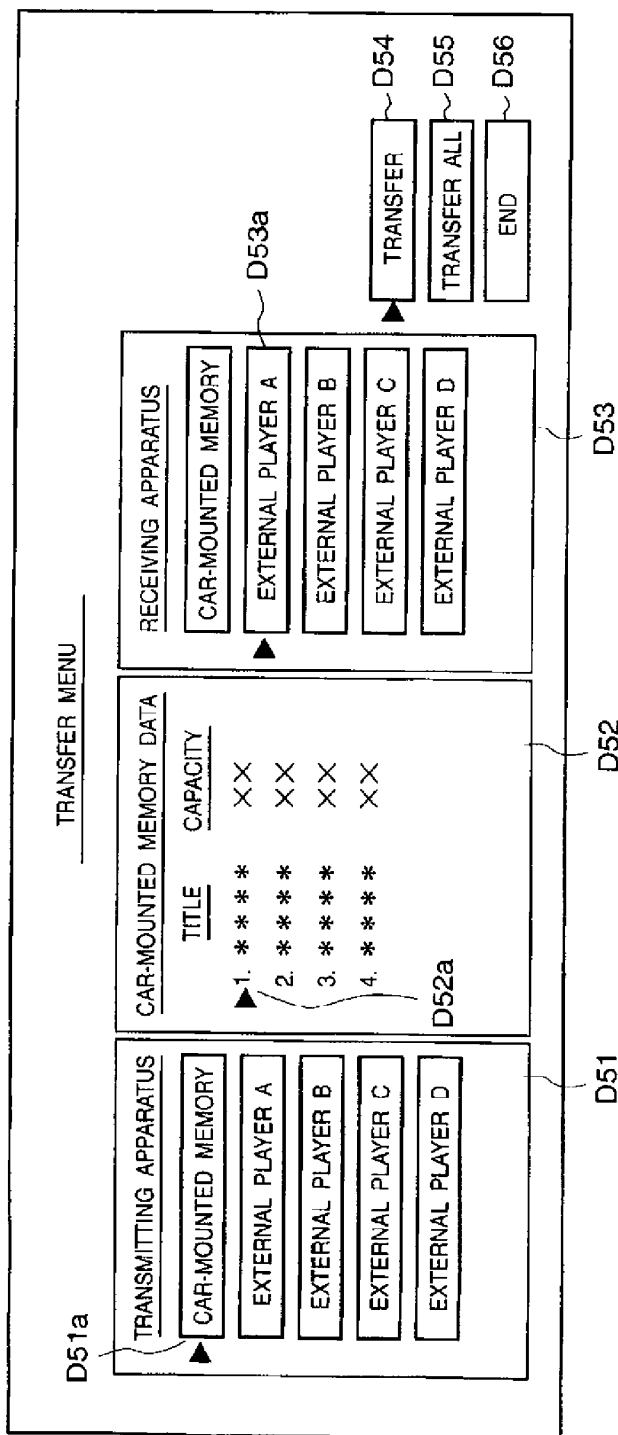


FIG. 12

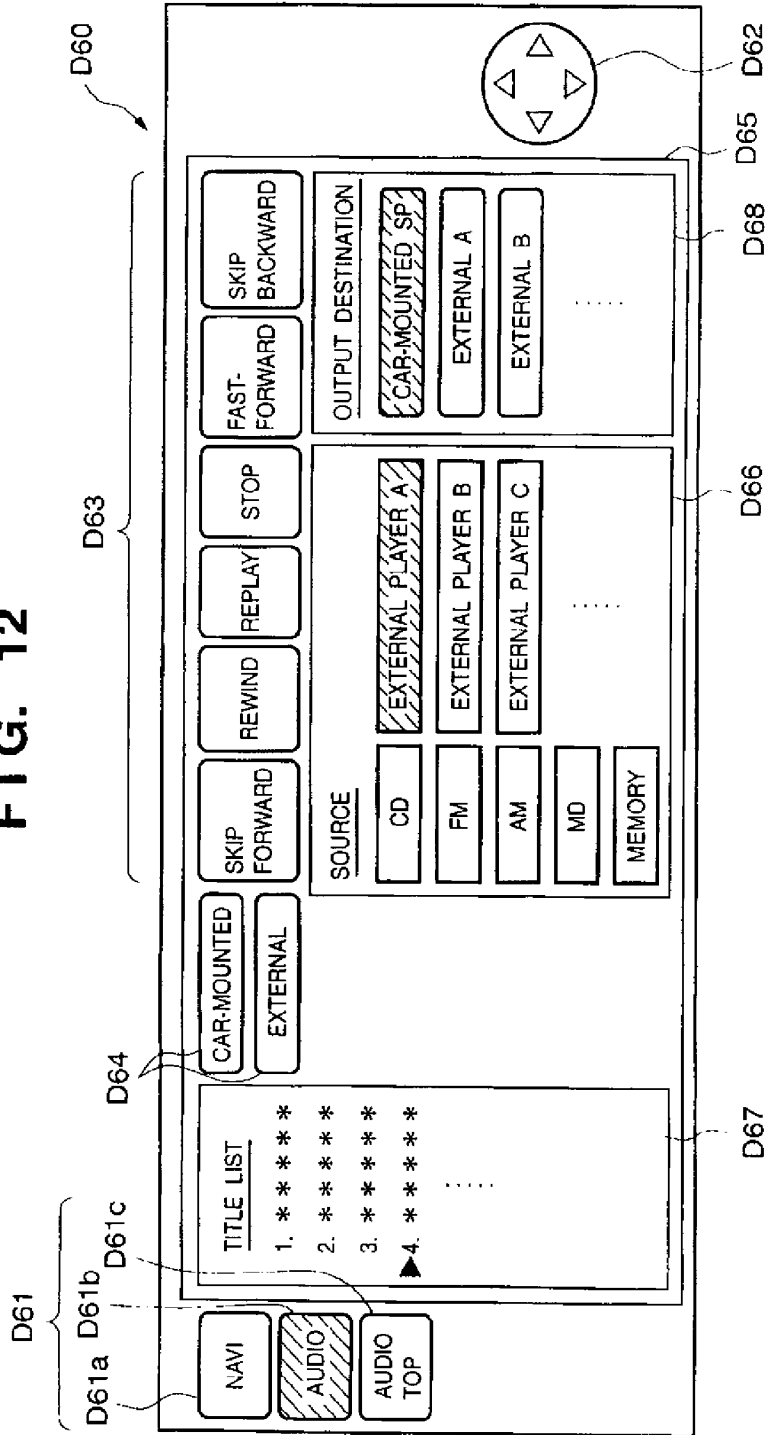


FIG. 13

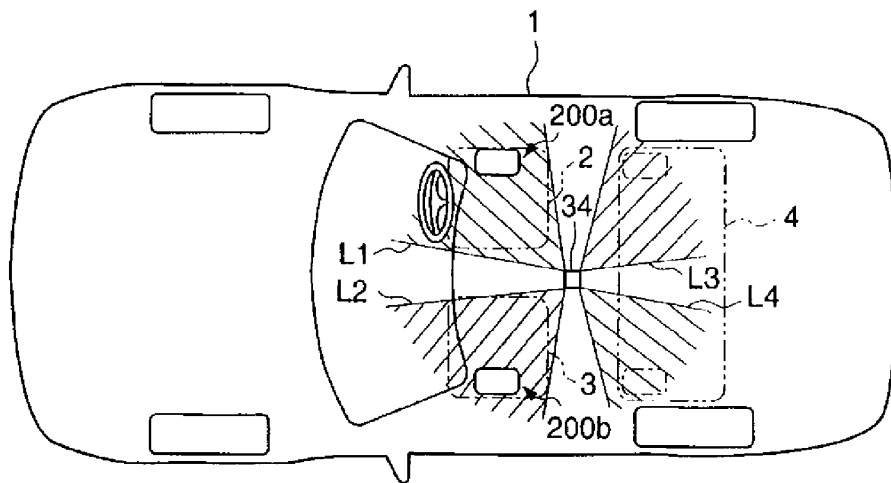


FIG. 14

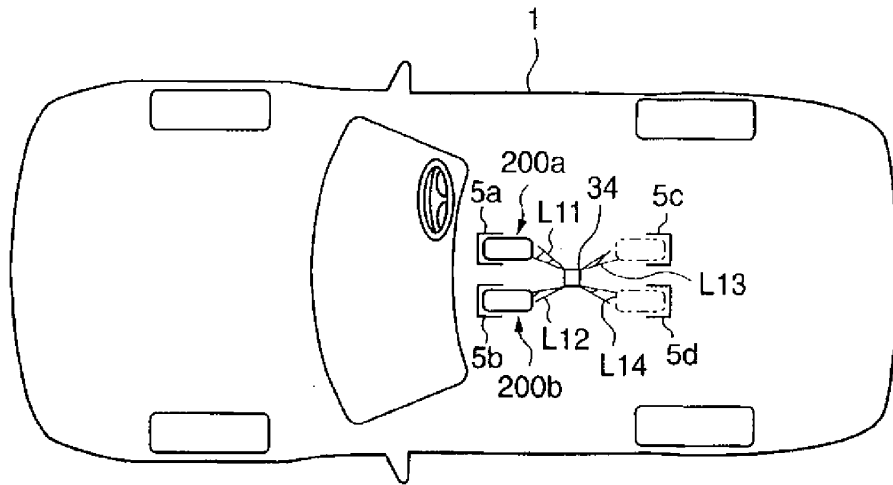


FIG. 15

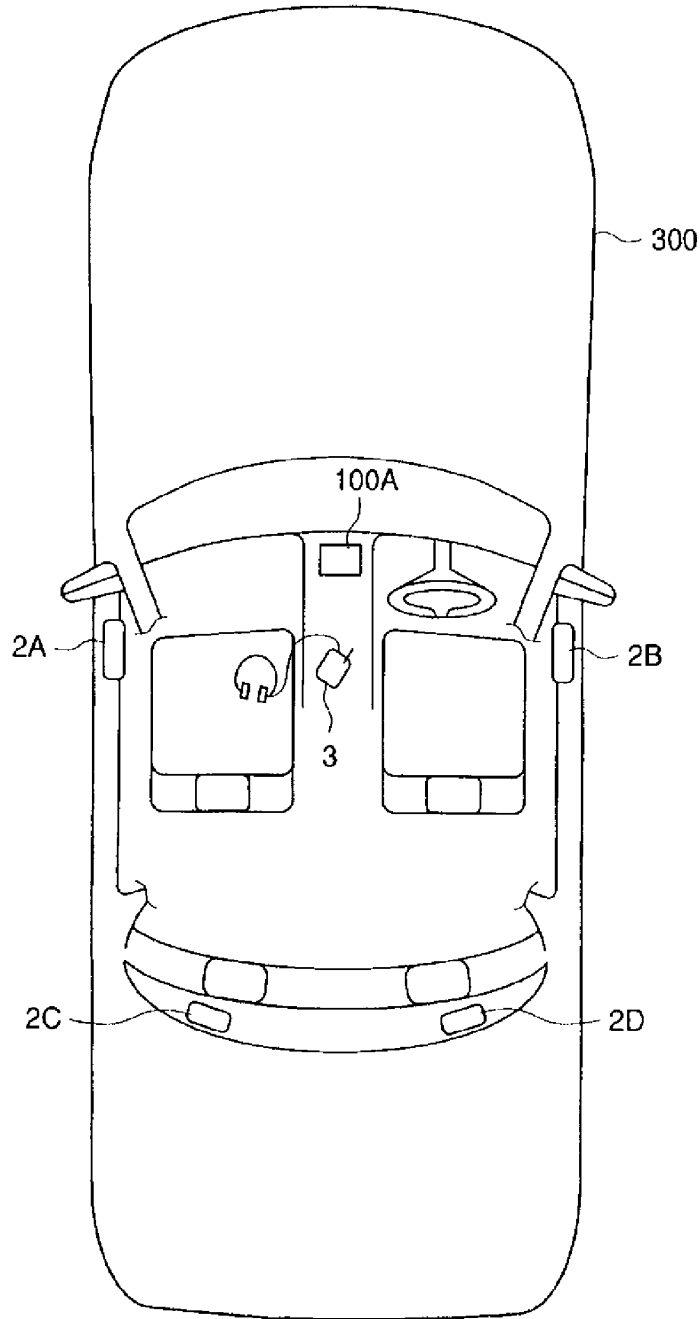


FIG. 16

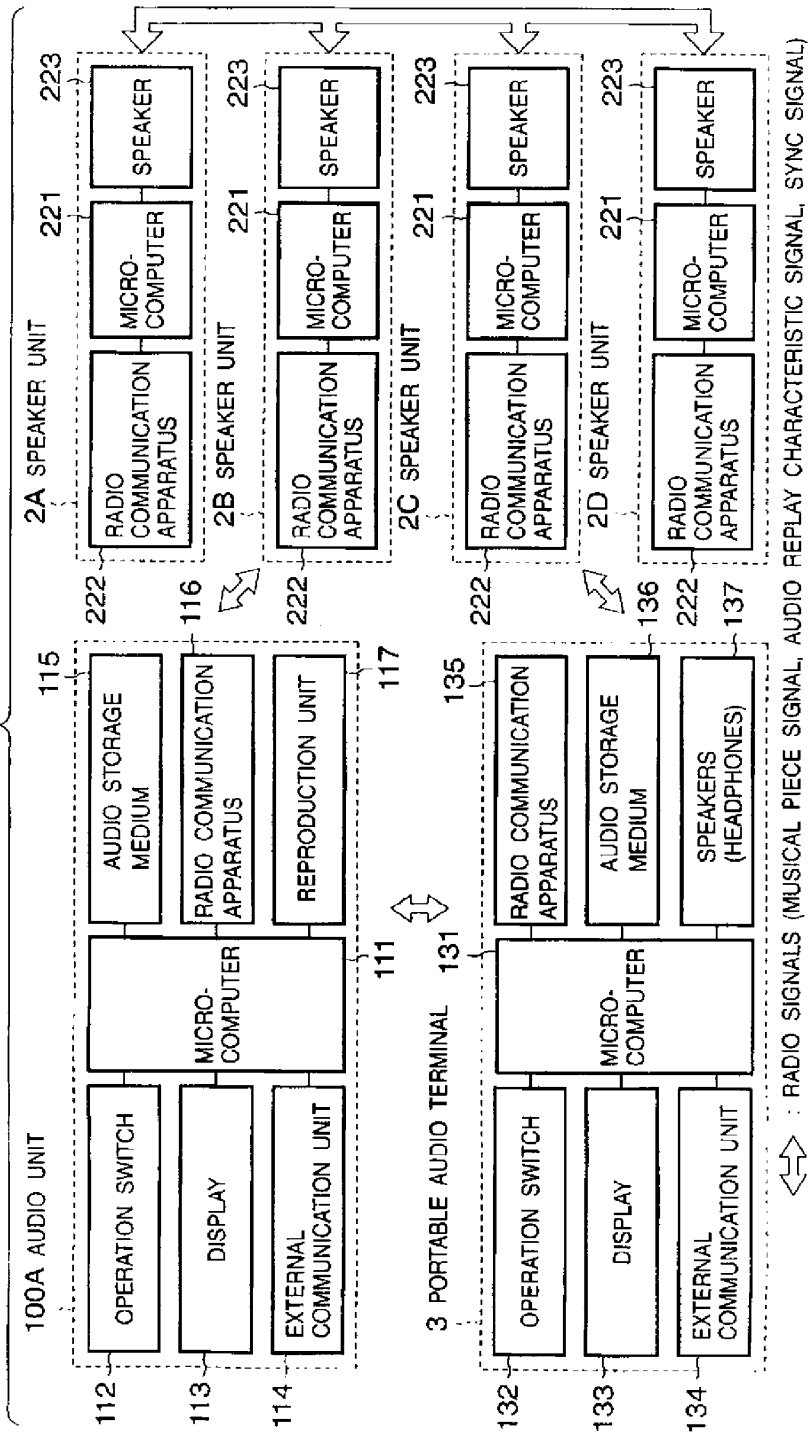


FIG. 18

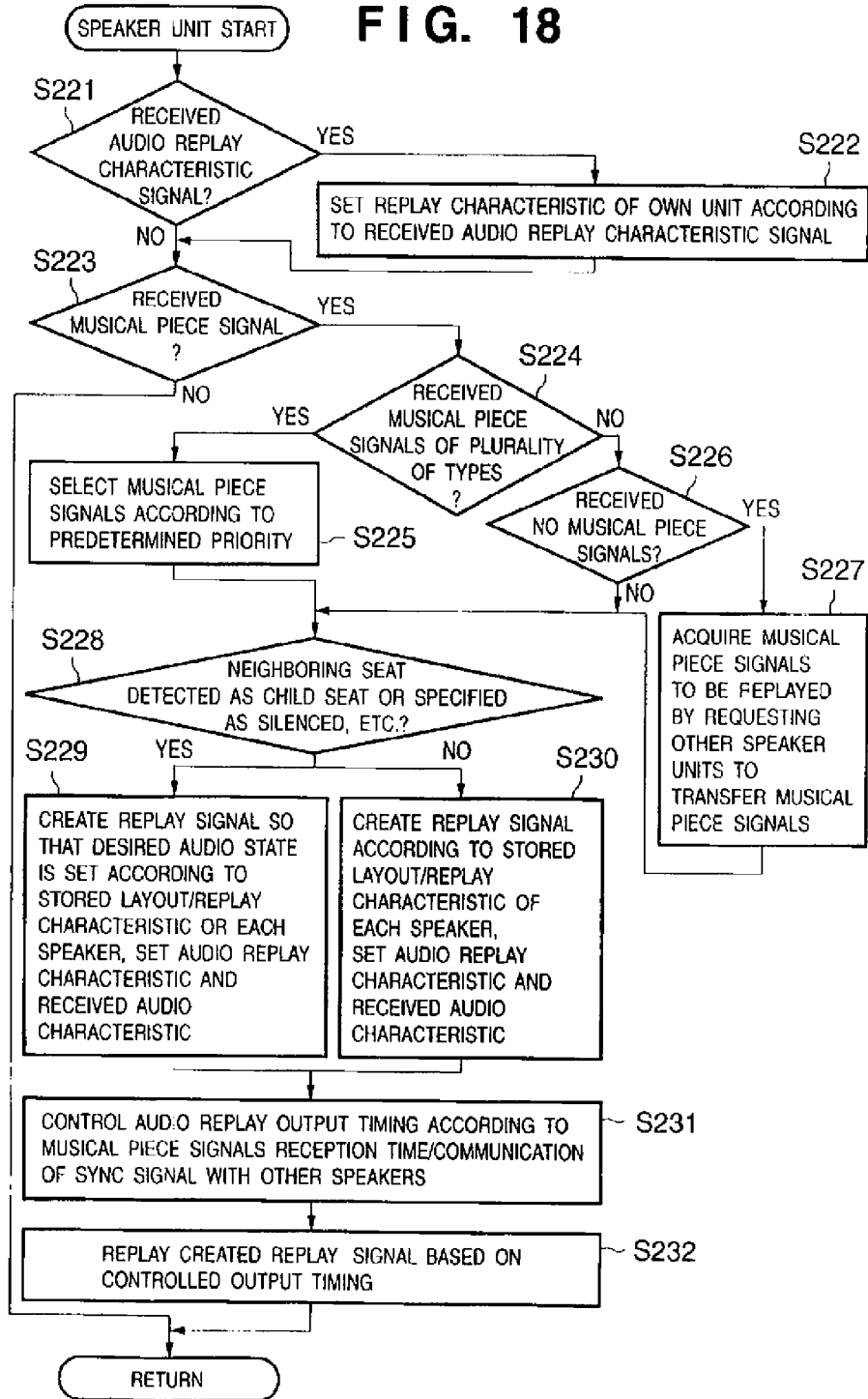


FIG. 19A

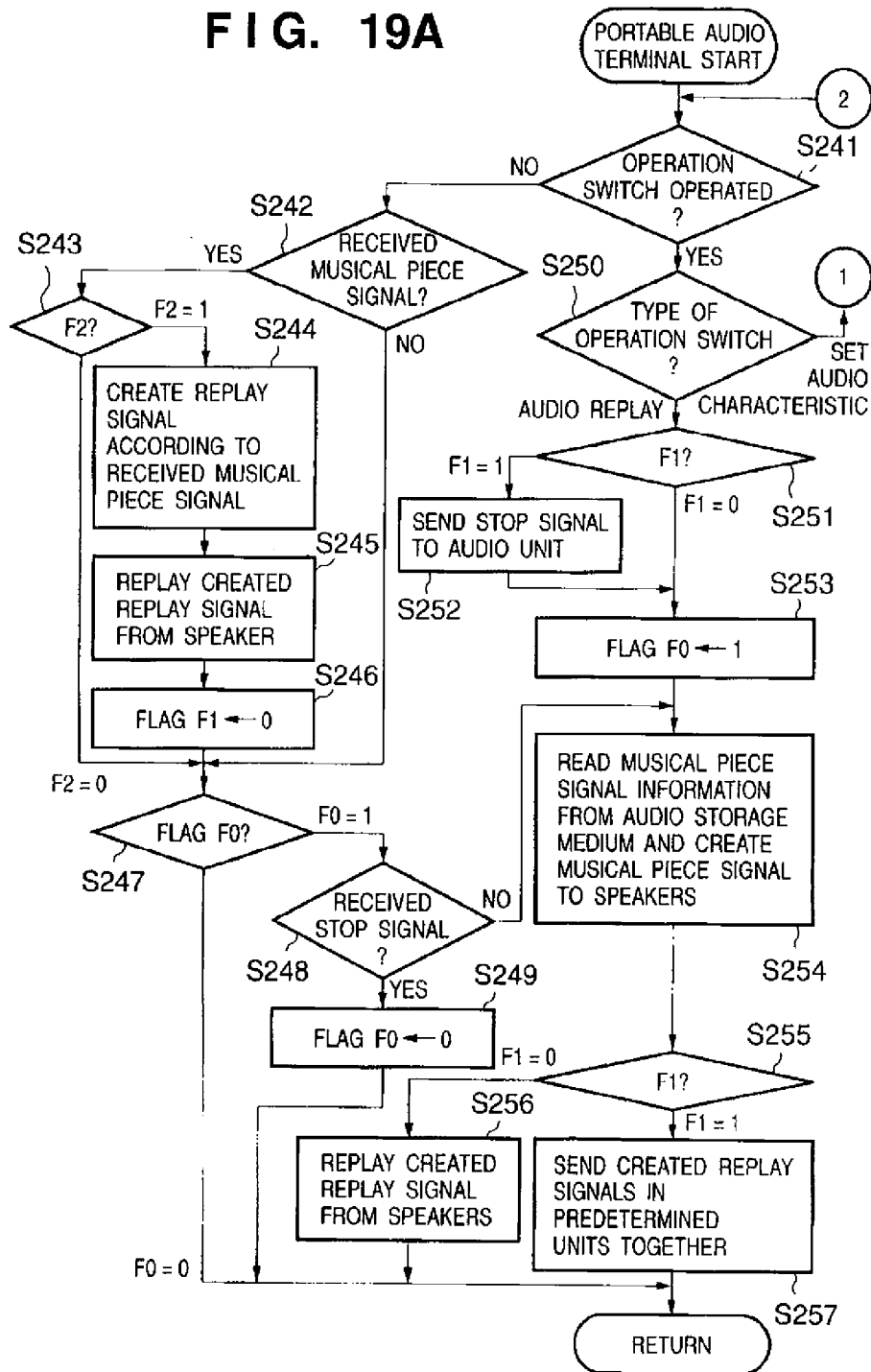


FIG. 19B

