

(19)



(11)

EP 3 396 876 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

28.06.2023 Bulletin 2023/26

(51) International Patent Classification (IPC):

H04H 60/44 (2008.01) **H04H 60/43** (2008.01)
H04H 20/40 (2008.01) **H04H 60/65** (2008.01)

(21) Application number: **18168290.7**

(52) Cooperative Patent Classification (CPC):

H04H 60/44; H04H 20/40; H04H 60/43;
H04H 60/65; H04H 2201/13

(22) Date of filing: **19.04.2018**

(54) **BROADCAST RECEIVER AND STATION LIST GENERATION METHOD**

RUNDFUNKEMPFÄNGER UND SENDERLISTE ERZEUGUNGSVERFAHREN

RÉCEPTEUR DE RADIODIFFUSION ET PROCÉDÉ DE GÉNÉRATION DE LISTE DE STATIONS

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR

• **SHIMIZU, Takeshi**

Saitama 330-0081 (JP)

(30) Priority: **28.04.2017 JP 2017089117**

(74) Representative: **J A Kemp LLP**

80 Turnmill Street
London EC1M 5QU (GB)

(43) Date of publication of application:

31.10.2018 Bulletin 2018/44

(56) References cited:

EP-A1- 2 493 098 EP-A2- 0 989 695
EP-A2- 1 434 371 EP-A2- 2 285 024
JP-A- 2001 196 954 JP-A- 2013 191 961
KR-A- 20130 047 980

(73) Proprietor: **Clarion Co., Ltd.**

Saitama 330-0081 (JP)

(72) Inventors:

• **OHNO, Nobuhiro**
Saitama 330-0081 (JP)

EP 3 396 876 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description**TECHNICAL FIELD**

5 [0001] The present invention relates to a broadcast receiver and a list generating method.

BACKGROUND ART

10 [0002] Radio broadcastings in which data related to broadcast programs are multiplexed on audio broadcast signals have been standardized and put into practice. For example, as one of such radio broadcastings, RDS (Radio Data System: IEC 62106 Edition 2.0, 2009-07) which is standardized by the European Broadcasting Union is known. In the RDS, digital data is multiplexed on analog FM broadcasting signals.

15 [0003] The RDS multiplexed data (hereinafter referred to as "RDS data") includes a PI (Programme Identification) Code, a PS (Programme Service Name) and the like. The PI code is a code for identifying a broadcasting station. The PS is data for displaying a character string of a maximum of 8 characters. Information displayed based on the PS is typically a name of a broadcasting station.

20 [0004] For example, Japanese Patent Provisional Publication No. 2016-111700 discloses a specific configuration of a broadcast receiver configured to receive RDS data. Upon receiving the RDS data, the broadcast receiver disclosed in extracts, from the received RDS data, frequency information of receivable broadcasting stations, and displays a list of receivable broadcasting stations based on the extracted frequency information. JP 2013/191961 A aims to improve usability in performing channel selection of a radio receiver. A radio receiver comprises a reception unit for receiving a data broadcast and broadcasting programs from a broadcast station; a list generation unit for generating a station list from the data broadcast acquired by the reception unit; and a control unit 8 to which an operation unit for accepting channel selection operation of the broadcast station received by the reception unit is connected. The control unit makes
25 the reception unit receive a broadcast station selected from the station list on the basis of channel selection operation accepted by the operation unit, when the number of receivable stations in the station list is equal to or larger than a predetermined number; and makes the reception unit perform reception using a frequency scan on the basis of the channel selection operation accepted by the operation unit, when the number of receivable stations in the station list is smaller than the predetermined number.

30 [0005] EP 2493098 A1 discloses an RDS receiver that reduces a band scanning time. It keeps and uses a previous list of receivable frequencies. PI and PS codes are only acquired if not in previous list of receivable frequencies.

35 [0006] EP 1434371 A2 discloses a system and a method for cycling through a range of receivable broadcast signals to continuously determine and update parameters regarding those broadcast signals. A priority is assigned to each broadcast signal based on its determined parameters. The parameters, the assigned priority and a signal quality is stored for each broadcast signal.

SUMMARY OF THE INVENTION

40 [0007] In the RDS, even if broadcast frequency is the same, that is, even if the broadcasting station is the same, there is a case where broadcasting is performed with a temporarily changed PI code, for instance, to broadcast different services at a certain time slot. In this regard, broadcast receivers adapted to the RDS identify broadcasting station using the PI code. Therefore, the broadcast receivers handle the RDS data before the change of the PI code and the RDS data after the change of the PI code as pieces of data corresponding to different broadcasting stations. As a result, two pieces of information respectively corresponding to the RDS data before the change of the PI code and the RDS data after the change of the PI code (e.g., two identical broadcasting station names) are redundantly displayed on the list. If
45 the number of such redundant display increases, it becomes difficult for a user to appropriately select a broadcasting station the user wants to listen to.

[0008] The present invention is made in view of the foregoing circumstances, and the object of the present invention is to provide a broadcast receiver and a list generating method suitable for decreasing the redundantly displayed number of pieces of information corresponding to the same broadcasting station on the list.

50 [0009] According to aspects of the present invention, there is provided a broadcast receiver as defined in appended claim 1.

[0010] According to further aspects of the present invention, the predetermined parameters may include a first parameter indicating preference of a user. In this case, the list generating means may determine that the piece of broadcast information to which the first parameter is assigned has a higher priority order. The first parameter may indicate that the
55 corresponding piece of broadcast information is stored in the storage means as preset information.

[0011] According to further aspects of the present invention, the determining means may determine that the plurality of the pieces of broadcast information stored in the storage means correspond to different broadcasting stations if their

country codes included in the PI codes are different. In this case, the registering means may register the plurality of pieces of broadcast information, determined to correspond to different broadcasting stations, in the station list.

[0012] According to aspects of the present invention, there is provided a list generating method as defined in appended claim 5.

[0013] According to aspects of the present invention, a broadcast receiver and a list generating method suitable for decreasing the redundantly displayed number of pieces of information corresponding to the same broadcasting station on the list are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a block diagram showing a configuration of a broadcast receiver according to an embodiment of the present invention.

Fig. 2A is a diagram showing an RDS station DB according to the embodiment of the present invention.

Fig. 2B is a diagram showing a non-RDS station DB not forming part of the present invention.

Fig. 3 is a flow chart of a list generating process executed in the embodiment of the present invention.

Fig. 4 shows a sub-routine of process step S12 shown in Fig. 3.

Fig. 5A is a diagram showing a table of records extracted as registration candidates at process step S11 shown in Fig. 3.

Fig. 5B is a diagram showing a station list, in the middle of generation, obtained as a result of the execution of process step S 12 shown in Fig. 3.

Fig. 6A is a diagram showing a table of records extracted as registration candidates at process step S13 shown in Fig. 3.

Fig. 6B is a diagram showing a station list, in the middle of generation, obtained as a result of the execution of process step S14 shown in Fig. 3.

Fig. 7A is a diagram showing a table of records extracted as registration candidates at process step S15 shown in Fig. 3.

Fig. 7B is a diagram showing a station list, in the middle of generation, obtained as a result of the execution of process step S16 shown in Fig. 3.

Fig. 8A is a diagram showing a table of records extracted as registration candidates at process step S13 shown in Fig. 3.

Fig. 8B is a diagram showing a completed station list obtained as a result of the execution of process step S18 shown in Fig. 3.

EMBODIMENTS FOR CARRYING OUT THE INVENTION

[0015] Hereinafter, embodiments of the present invention will be described while referring to the drawings. In the following, as an embodiment of the present invention, a broadcast receiver suitable for receiving RDS data will be described.

[0016] Fig. 1 is a block diagram showing a configuration of a broadcast receiver 1 (i.e., a receiver provided with a computer) according to an embodiment of the present invention. The broadcast receiver 1 is, for example, an onboard device mounted on a vehicle travelling on a road. As shown in Fig. 1, the broadcast receiver 1 has an antenna 10, a tuner 104, a radio signal processing circuit 106, an audio signal processing circuit 108, a power amplifier 110, a speaker 112, an RDS demodulator 114, a PLL (Phase Locked Loop) circuit 116, a microcomputer 118, an input interface 120 and a display 122.

[0017] It is noted that, in Fig. 1, only the main components necessary to describe the present embodiment are shown. Illustrations of generally known components such as a casing of the broadcast receiver 1 are omitted.

[0018] The broadcast receiver 1 is not limited to onboard devices. The broadcast receiver 1 may be, for example, a portable terminal such as a smartphone, a feature phone, a PHS (Personal Handy phone System), a tablet terminal, a laptop PC, a PDA (Personal Digital Assistant), a PND (Portable Navigation Device), a portable game machine and the like.

[0019] The broadcast receiver 1 is configured such that a broadcast radio wave received with use of the antenna 102 is input to the tuner 104. The microcomputer 118 controls the tuner 104 via the PLL circuit 116 to extract an RF (Radio Frequency) signal corresponding to a selected station from the received radio wave. Then the microcomputer 118 executes frequency conversion to convert the extracted RF signal to an IF (Intermediate Frequency) signal suitable for signal processing such as filtering. The tuner 104 outputs the IF signal obtained by the frequency conversion to the radio signal processing circuit 106.

[0020] As described above, the antenna 102, the tuner 104, the PLL circuit 116 and the microcomputer 118 collectively

function as a receiving means configured to receive a broadcast radio wave (broadcast signal) in which digital data is multiplexed.

[0021] The selected station is, for example, designated by a user operation on the input interface 120. Designation information of the selected station is memorized in a built-in memory of the microcomputer 118. The microcomputer 118 controls the tuner 104, via the PLL circuit 116, to execute a station selection operation in accordance with the information memorized in the built-in memory, for instance, immediately after the broadcast receiver 1 is powered on.

[0022] As the input interface 120, a variety of UIs (User Interface) such as a hardware UI, a software UI, or a combination of the hardware UI and the software UI are possible. In the present embodiment, the input interface 120 includes mechanical switch keys, membrane keys, a GUI (Graphical User Interface) provided along with a touch panel, a remote controller on which operation keys are mounted and the like.

[0023] The radio signal processing circuit 106 has an AD conversion circuit, an IF detection circuit, a noise canceller and a weak electric-field processing circuit. AD conversion is performed on the IF signal input to the radio signal processing circuit 106 at the AD conversion circuit and, after detecting an audio signal at the IF detection circuit, noise is removed at the noise canceller. Processing such as mute, high cut and separation control are performed on the audio signal according to reception state of the selected station by the weak electric-field processing circuit, and the processed audio signal is output to the audio signal processing circuit 108.

[0024] After performing predetermined audio signal processing such as DA conversion, the audio signal input to the audio signal processing circuit 108 goes through gain adjustment by the power amp 110 in accordance with a volume, and is output from the speaker 112 as sound.

[0025] For example, an S meter is built in the radio signal processing circuit 106. The S meter measures a detection voltage at the time of analog audio signal demodulation at a predetermined sampling period and output the detection voltage to the microcomputer 118. The above-mentioned detection voltage is a DC voltage proportional to a field strength of a received radio wave. That is, the detection voltage indicates the field strength of the received broadcast radio wave.

[0026] The signal detected at the radio signal processing circuit 106 is also output to the RDS demodulator 114. After a demodulation process by the RDS demodulator 114, the detected signal is decoded to RDS data at an RDS decoder 1182 in the microcomputer 118.

[0027] The microcomputer 118 has a data memory 118a. The microcomputer 118 stores the RDS data obtained by the decoding in the data memory 118a. The RDS data includes a PS (name of broadcasting station), an RT (Radio Text), an AF (Alternative Frequencies) list, a PI code, a PTY (Programme Type), a TP (Traffic Programme) and the like. That is, the RDS decoder 1182 functions as an extracting means configured to extract RDS data including the PI code (a code indicating a broadcasting station) and the PS (display information for displaying a name of the broadcasting station) from the broadcast signal.

[0028] The microcomputer 118 has a DB (Database) memory 118b. In the DB memory 118b, RDS station DB and non-RDS station DB are stored. Fig. 2A and Fig. 2B show an example of the RDS station DB and an example of the non-RDS station DB, respectively.

[0029] The microcomputer 118 executes a seek process in accordance with the user operation on the input interface 120 or periodically (e.g., at intervals of five minutes). In the seek process, each frequency channel is sequentially selected, and acquisition of pieces of information necessary for the RDS station DB and the non-RDS station DB (hereinafter referred to as "broadcast information") is tried.

[0030] The RDS station DB is a database concerning RDS stations that broadcast RDS data. As shown in Fig. 2A, the RDS station DB has records (i.e., records of pieces of broadcast information of RDS stations), each of which a part of the RDS data (i.e., the PI code and the PS), a seek time order, a station presence counter, a registration status, and a broadcast frequency (unit: MHz) with which the RDS data is broadcasted are associated with each other. In Fig. 2, a record number is assigned to each record for convenience of explanation.

[0031] The "seek time order" is a value determined in accordance with the order of time of last seeking of a broadcast frequency in the seeking process. The time is, for example, acquired using a clock provided to the microcomputer 118. A record of a newly sought broadcast frequency (i.e., a record having a broadcast frequency of which time at which seeking has last been executed is closer to the current time) is assigned a smaller value (e.g., "1"). In other words, a broadcast frequency of a record having a smaller "seek time order" value has a higher receivability. That is, the "seek time order" is a parameter indicating receivability of a broadcast frequency.

[0032] The "station presence counter" is incremented by 1 when a corresponding broadcast frequency is detected in the seeking process, and is decremented by 1 when a corresponding broadcast frequency is not detected in the seeking process. For example, the maximum value of the station presence counter is 3, and the minimum value is 0. A broadcast frequency having a higher counter value has a higher receivability. As an example, a broadcast frequency of which the station presence counter is 3 has been detected in all of the last three seeking processes. That is, "station presence counter" is also a parameter indicating receivability of a broadcast frequency.

[0033] The microcomputer 118 has a preset memory 118c. The microcomputer 118 can register one or more broadcasting stations (specifically, one or more pieces of broadcast information corresponding to one or more RDS stations

and/or one or more non-RDS stations) designated by die user operation on the input interface 120 to the preset memory 118c. It is noted that the registration of the broadcast information in the preset memory 118c means to write (i.e., memorize) the broadcast information or a link to the broadcast information (i.e., an address in the DB memory 118b) in the preset memory 118c.

[0034] The "registration status" is a parameter that indicates whether corresponding broadcast information is registered to the preset memory 118c. In other words, the "registration status" is a parameter indicating preference of a user. Pieces of broadcast information corresponding to records of which the registration status fields are "O" in Fig. 2 are registered to the preset memory 118c. Pieces of broadcast information corresponding to records of which the registration status fields are blank are not registered to the preset memory 118c. That is, a record of which the parameter indicating preference of a user is assigned has a higher priority order.

[0035] The non-RDS station DB is a database concerning FM stations which do not broadcast RDS data. Generally, digital data is not multiplexed on broadcastings from such FM stations. Therefore, as shown in Fig. 2B, the non-RDS station DB has records (records of pieces of broadcast information of non-RDS stations), each of which only the station presence counter, the registration status and the broadcast frequency of an FM station are associated with each other.

[0036] As described above, the microcomputer 118 functions as a storage means configured to accumulatively store the code extracted by the extracting means and a broadcast frequency of the broadcast signal in an associated manner as a piece of broadcast information, and to memorize the broadcast information as preset information.

[0037] The microcomputer 118 generates a station list using the RDS station DB and the non-RDS station DB. The microcomputer 118 stores the generated station list in a list memory 118d.

[0038] The station list is data in which the PI code, die PS and the broadcast frequency for each broadcasting station are associated with each other and listed. The microcomputer 118 display the station list (more specifically, the PSs being pieces of display information) on die display screen of die display 122.

[0039] As described above, the microcomputer 118 functions as a list generating means configured to generate a station list based on the RDS station DB and die non-RDS station DB (broadcast information stored in the storage means). Further, the microcomputer 118 and the display 122 collectively function as a displaying means configured to display the station list such as a list of PSs (a list of the names of the broadcasting stations).

[0040] A user can select a desired PS (i.e., a desired station) from the station list displayed on the display screen of the display 122. When the desired station is selected from die station list, the microcomputer 118 selects a memorized broadcast frequency associated with the selected desired station and outputs audio service of die selected desired station from the speaker 112.

[0041] A case where a station list is generated by simply using the RDS station DB (i.e., a case where broadcasting stations of which the station presence counters are other than zero are listed) will be described. As shown in Fig. 2A, the records of which the record numbers are 2, 3 and 8 have the same broadcast frequency (i.e., 100.4 MHz), but since the PI codes are different, they are registered as different records. Therefore, if the PS of each record is simply used, the PSs of these three records will be redundantly displayed. It is noted that the registration of die record means to write (memorize) the broadcast information configuring the record in the DB memory 118b.

[0042] Accordingly, in the broadcast receiver 1, a list generating (updating) process described below is executed to decrease the number of such redundant display.

[list generating process]

[0043] Fig. 3 is a flow chart of a list generating process executed by the microcomputer 118. The microcomputer 118 executes the list generating process in accordance with the user operation on the input interface 120 or periodically. It is noted that, to start execution of the list generating process, the microcomputer 118 delete the station list stored in the list memory 118d or temporarily hold it in another memory (e.g., as a temporal backup until the list generating process is completed).

[Fig. 3, S11 (registration candidates extraction)]

[0044] In process step S11, station list registration candidates are searched in order of the "seek time order" in the RDS station DB. In the process step S11, records of which the registration status fields in the RDS station DB are "O" (i.e., pieces of broadcast information of RDS stations which are registered to the preset memory 118c) are extracted as the registration candidates. It is noted that the registration of the broadcast information to the station list means to write (memorize) all or parts of the broadcast information or a link to all or parts of the broadcast information (i.e., an address in the DB memory 118b) in the list memory 118d.

[0045] Fig. 5A shows a table of records extracted as the registration candidates at process step S11. In the present embodiment, as shown in Fig. 5A, records of which record numbers are 1, 3 and 8 are extracted as the registration candidates.

[Fig. 3, S12 (list registration process)]

[0046] In process step S12, the registration to the station list is executed using the records extracted as the registration candidates at the process step S11 (registration candidates extraction). Fig. 4 shows a subroutine of the list generating process.

[Fig. 4, S12a]

[0047] In process step S12a, it is determined whether process steps from S12b have been executed on all the records extracted as the registration candidates at the process step S11 (registration candidates extraction). If it is determined that there remains one or more records on which the process steps from S12b have not been executed (S12a: NO), a record is selected from among the unprocessed records in accordance with the order of the "seek time order," and the process steps from S12b are executed on the selected record.

[0048] In the present embodiment, the process steps from S12b are executed on record number 3 (seek time order = 2), record number 1 (seek time order = 6) and record number 8 (seek time order = 7) in this order. Upon completion of execution of the process steps from S12b on the three records (S12a: YES), the subroutine ends and process steps from S13 shown in Fig. 3 are executed.

[Fig. 4, S12b]

[0049] In the process step S12b, it is determined whether the station presence counter of the record selected at the process step S12a is other than zero (i.e., 1 - 3). In short, it is determined whether receivability is high or not.

[0050] If it is determined that the station presence counter of the selected record is zero (S12b: NO), it is likely to be difficult to receive a broadcast frequency of the selected record. Therefore, the broadcast information of the selected record is not registered to the station list and the process returns to the process step S12a. If it is determined that the station presence counter of the selected record is one of 1 - 3 (S12b: YES), the process proceeds to process step S12c.

[Fig. 4, S12c]

[0051] In the process step S12c, it is determined whether broadcast information corresponding to the same broadcasting station as that of the broadcast information of the selected record is already registered to the station list. It is noted that, in the present embodiment, pieces of the broadcast information having the same broadcast frequency are determined to be pieces of the broadcast information corresponding to the same broadcasting station. That is, the microcomputer 118 functions as a determining means configured to determine that a plurality of pieces of broadcast information correspond to the same broadcasting station if their broadcast frequencies are the same.

[0052] If it is determined that broadcast information corresponding to the same broadcasting station as that of the broadcast information of selected record is already registered to the station list (S12c: YES), the broadcast information of the selected record is not registered to the station list, and the process goes back to the process step S12a. If it is determined that broadcast information corresponding to the same broadcasting station as that of the broadcast information of the selected record is not registered to the station list (S12c: NO), the process proceeds to process step S12d.

[Fig. 4, S12d]

[0053] In the process step S12d, the broadcast information of the selected record which has been determined to be not registered to the station list is registered to the station list. Specifically, parts of the broadcast information configuring the record, that is, the PI code, the PS and the broadcast frequency, are memorized in the list memory 118d. That is, the microcomputer functions as a registering means configured to register only one of the plurality of pieces of broadcast information, which are determined to correspond to the same broadcasting station, in the station list. Upon registering the broadcast information of the selected record to the station list, the process goes back to the process step S12a.

[0054] Fig. 5B illustrates a station list, in the middle of generation, obtained as a result of the execution of the process step S12.

[0055] The station presence counter of record number 3 is 3 (S12b: YES). Also, at the time the process step S12 (list registration process) is executed on the record number 3, no broadcast information is registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 3 is registered to the station list (See list number 0 in Fig. 5B.).

[0056] The station presence counter of record number 1 is 2 (S12b: YES). Also, at the time the process step S12 (list registration process) is executed on the record number 1, broadcast information having the broadcast frequency of 103.8 MHz is not registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 1 is

registered to the station list (See list number 1 in Fig. 5B.).

[0057] The station presence counter of record number 8 is 2 (S 12b: YES). However, at the time the process step S12 (list registration process) is executed on the record number 8, the broadcast information having the broadcast frequency of 100.4 MHz is already registered to the station list (See list number 0 of Fig. 5B.).

[0058] Specifically, the PI code for the record number 8 is "C8A1," and the PI code for the list number 0 (record number 3) is "C2A1." Since these two records have different PI codes, they are both registered to the RDS station DB as different records. However, since pieces of broadcast information of the two records have the same broadcast frequency, they actually correspond to the same broadcasting station.

[0059] Therefore, in the present embodiment, pieces of broadcast information that have different PI codes but have the same broadcast frequency are regarded as pieces of broadcast information corresponding to the same broadcasting station. Accordingly, for the record number 8, it is determined that the broadcast information corresponding to the same broadcasting station is already registered to the station list (See list number 0 in Fig. 5B.) (S 12c: YES), and thus the broadcast information of the record number 8 is not registered to the station list (See Fig. 5B.).

[0060] As an additional remark, in the present embodiment, broadcast information of a record of which the receivability is higher than that of the record number 8 (i.e., the broadcast information of the record number 1) is preferentially registered to the station list.

[0061] As described above, the microcomputer 118 determines that, even if the PI codes are different, a plurality of pieces of broadcast information stored in the DB memory 118b are determined to correspond to the same broadcasting station if they have the same broadcast frequency, and registers only one of the plurality of pieces of broadcast information determined to correspond to the same broadcasting station to the station list (i.e., the other of the plurality of pieces of broadcast information are excluded from the registration subjects).

[Fig. 3, S12 (registration candidates extraction)]

[0062] In process step S12, station list registration candidates are searched in order of the "seek time order" in the non-RDS station DB. In the process step S13, records of which the registration status fields in the non-RDS station DB are "O" (i.e., pieces of the broadcast information of non-RDS stations which are registered to the preset memory 118c) are extracted as the registration candidates.

[0063] Fig. 6A shows a table of records extracted as the registration candidates at process step S13. In the present embodiment, as shown in Fig. 6A, a record of which record number is 13 is extracted as the registration candidate.

[Fig. 3, S14 (list registration process)]

[0064] In process step S14, broadcast information of the record extracted as the registration candidate at the process step S13 (registration candidates extraction) is registered to the station list. It is noted that, if the station presence counter is zero, the record is not registered to the station list.

[0065] Fig. 6B illustrates a station list, in the middle of generation, obtained as a result of the execution of the process step S14. The station presence counter of record number 12 is 3. Therefore, as shown in Fig. 6B, the broadcast information of the record number 13 is registered in the list.

[Fig. 3, S15 (registration candidates extraction)]

[0066] In process step S15, station list registration candidates are searched in order of the "seek time order" in the RDS station DB. In the process step S15, records of which the registration status fields in the RDS station DB are blank (i.e., RDS stations which are not registered to the preset memory 118c) are extracted as the registration candidates.

[0067] Fig. 7A shows a table of records extracted as the registration candidates at process step S15. In the present embodiment, as shown in Fig. 7A, records of which record numbers are 0, 2, 4 - 7, 9 and 10 are extracted as the registration candidates.

[Fig. 3, S16 (list registration process)]

[0068] In process step S16, the registration to the station list is executed using the records extracted as the registration candidates at the process step S15 (registration candidates extraction). It is noted that the registration process executed in the process step S16 is the same as that of the process step S12 (list registration process). Specific description of the process step S16 is omitted to avoid redundant description in the specification.

[0069] Fig. 7B illustrates a station list, in the middle of generation, obtained as a result of the execution of the process step S16. In the following, description will be made while referring to the subroutine shown in Fig. 4.

[0070] The station presence counter of record number 0 is 3 (S12b: YES). Also, at the time the process step S16 (list

registration process) is executed on the record number 0, no broadcast information having the broadcast frequency of 104.5 MHz is registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 0 is registered to the station list (See list number 3 in Fig. 7B.).

[0071] The station presence counter of record number 5 is 3 (S12b: YES). However, at the time the process step S16 (list registration process) is executed on the record number 5, the broadcast information having the broadcast frequency of 103.8 MHz is already registered to the station list (See list number 1 in Fig. 7B.). Therefore, for the record number 5, it is determined that the broadcast information corresponding to the same broadcasting station is already registered to the station list (S12c: YES), and thus the broadcast information of the record number 5 is not registered to the station list (See Fig. 7B.).

[0072] The value of the station presence counter of the record number 5 is greater than that of the list number 1 (record number 1) that has the same broadcast frequency of 103.8 MHz. However, in the present embodiment, broadcast information that is registered to the preset memory 118c is given priority over broadcast information that has greater station presence counter value. Therefore, the broadcast information of the record number 1 is registered to the station list (See list number 1 in Fig. 7B.), and the broadcast information of the record number 5 is not registered to the station list. It is noted that, in other embodiments, records having greater station presence counter values may be preferentially registered to the station list.

[0073] The station presence counter of record number 7 is 3 (S12b: YES). Also, at the time the process step S16 (list registration process) is executed on the record number 7, no broadcast information having the broadcast frequency of 92.6 MHz is registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 7 is registered to the station list (See list number 4 in Fig. 7B.).

[0074] The station presence counter of record number 10 is 3 (S12b: YES). Also, at the time the process step S16 (list registration process) is executed on the record number 10, no broadcast information having the broadcast frequency of 103.3 MHz is registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 10 is registered to the station list (See list number 5 in Fig. 7B.).

[0075] The station presence counter of record number 9 is 2 (S12b: YES). Also, at the time the process step S16 (list registration process) is executed on the record number 9, no broadcast information having the broadcast frequency of 106.2 MHz is registered to the station list (S12c: NO). Therefore, the broadcast information of the record number 9 is registered to the station list (See list number 5 in Fig. 7B.).

[0076] The station presence counter of record number 2 is 1 (S12b: YES). However, at the time the process step S16 (list registration process) is executed on the record number 2, the broadcast information having the broadcast frequency of 100.4 MHz is already registered to the station list (See list number 0 in Fig. 7B.). Therefore, for the record number 2, it is determined that the broadcast information corresponding to the same broadcasting station is already registered to the station list (S12c: YES), and thus the broadcast information of the record number 2 is not registered to the station list (See Fig. 7B.).

[0077] The station presence counter of record number 6 is 1 (S12b: YES). However, at the time the process step S16 (list registration process) is executed on the record number 6, the broadcast information having the broadcast frequency of 103.3 MHz is already registered to the station list (See list number 5 in Fig. 7B.). Therefore, for the record number 6, it is determined that the broadcast information corresponding to the same broadcasting station is already registered to the station list (S12c: YES), and thus the broadcast information of the record number 6 is not registered to the station list (See Fig. 7B.).

[0078] The station presence counter of record number 4 is 0 (S12b: NO). for the record number 4, since the receivability is low, the broadcast information is not registered to the station list (See Fig. 7B.).

[Fig. 3, S17 (registration candidates extraction)]

[0079] In process step S17, station list registration candidates are searched in order of the "seek time order" in the non-RDS station DB. In the process step S17, records of which the registration status fields in the non-RDS station DB are blank (i.e., pieces of the broadcast information of non-RDS stations which are not registered to the preset memory 118c) are extracted as the registration candidates.

[0080] Fig. 8A shows a table of records extracted as the registration candidates at the process step S17. In the present embodiment, as shown in Fig. 7A, records of which record numbers are 11 and 12 are extracted as the registration candidates.

[Fig. 3, S18 (list registration process)]

[0081] In process step S18, broadcast information of the records extracted as the registration candidates at the process step S17 (registration candidates extraction) are registered to the station list. It is noted that, if the station presence counter of a record is zero, the broadcast information of the record is not registered to the station list. Upon completion

of execution of the process step S18, the generation of the station list completes.

[0082] Fig. 8B illustrates a complete station list obtained as a result of the execution of the process step S18. The station presence counters of record numbers 11 and 12 are both 3. Therefore, as shown in Fig. 8B, the broadcast information of the record numbers 11 and 12 are registered in the list. The generation of the station list is thereby completed.

[0083] As shown in Fig. 8B, in the station list, only one piece of broadcast information is registered for one broadcast frequency (i.e., for one broadcasting station). Therefore, redundant display of the same broadcasting station is reduced. As a result, it becomes easier for a user to appropriately select a broadcasting station the user wants to listen to from the station list.

[0084] On the display screen of the display 122, the PS (typically a broadcasting station name) being the display information is displayed. In the example shown in Fig. 8B, there are three "BBC 3CR" and two "Heart." For example, to improve convenience of a user in selecting a broadcasting station, branch numbers may be added to the same PS when displaying (e.g., "BBC 3CR-1" and "BBC 3CR-2").

[0085] On the display screen of the display 122, the PI code and the broadcast frequency are displayed along with the PS.

[0086] The first character of the PI code is a country code. In the above-described embodiment, a case where a station list is generated using pieces of data from RDS stations having the same country code "C" (i.e., from RDS stations in the same country). Hereinafter, a case where a vehicle on which the broadcast receiver 1 travels near a national border will be considered. In this case, by executing the seeking process, it is possible that pieces of RDS station data having the same broadcast frequency but having different country codes are stored in the RDS station DB. As an example, pieces of broadcast information including the following data sets are stored in the RDS station DB.

(1)PI code: C2A1	PS: Classic	Frequency: 100.4 MHz
(2)PI code: D2A1	PS: Heart	Frequency: 100.4 MHz

[0087] If the country codes are different, even if the broadcast frequencies are the same, there is a case where different services are broadcasted. In this case, the determination result of the process step S 12c shown in fig. 4 may exceptionally be NO.

[0088] That is, even if a piece of broadcast information that have the same broadcast frequency as that of a piece of broadcast information of the selected record is included in pieces of broadcast information that are already registered to the station list, if those pieces of broadcast information have different country codes, as an exception handling, they are regarded as pieces of broadcast information corresponding to different broadcasting stations. Therefore, in the process step S12c shown in Fig. 4, it is determined that no broadcast information corresponding to the same broadcasting station as that of the broadcast information of the selected record is registered to the station list. As a result, for example, the broadcast information including the data set (1) and the broadcast information including the data set (2) indicated above are both registered to the station list. By executing this exception handling, it becomes possible to register two or more pieces of broadcast information having the same broadcast frequency but corresponding to different broadcasting stations to the station list.

Claims

1. A broadcast receiver (1), comprising:

a receiving means (102, 104, 116, 118) configured to execute a seek process in which each frequency channel is sequentially selected and to, at each respective selected frequency channel, try to receive a Radio Data System broadcast signal in which digital data is multiplexed, the multiplexed data including a Programme Identification code, hereinafter referred to as a PI code, for identifying a broadcasting station, wherein, for a same broadcasting station operating at a same broadcast frequency, there is a case where broadcasting is performed with said PI code temporarily changed to a different PI code in order to broadcast different services at a certain time slot;

an extracting means (1182) configured to extract the respective PI codes indicating the respective broadcasting stations from the broadcast signal received by the receiving means (102, 104, 116, 118) and configured to extract display information, for displaying a name of the broadcasting station, from the broadcast signal received by the receiving means (102, 104, 116, 118);

a storage means (118b) configured to accumulatively store the respective PI codes extracted by the extracting means (1182), the broadcast frequencies of the respective broadcast signals and the display information in an

associated manner as respective pieces of broadcast information, and to store a plurality of predetermined parameters indicating priority orders of the pieces of broadcast information, the predetermined parameters including a station presence counter indicating receivability of the corresponding broadcast frequency by the receiving means, the station presence counter being incremented by 1 when the corresponding broadcast frequency is detected in the seek process and being decremented by 1 when a corresponding broadcast frequency is not detected in the seek process, a broadcast frequency having a higher counter value having a higher receivability; and

a list generating means (118) configured to generate a station list from the respective pieces of broadcast information stored in the storage means (118) and to store the generated station list in a list memory (118d), the station list including respective pieces of broadcast information, the list generating means having:

a determining means (118) configured to determine that different pieces of broadcast information correspond to the same broadcasting station if their broadcast frequencies are the same; and

a registering means (118) configured to register pieces of broadcast information to the station list and, when the determining means (118) determines different pieces of broadcast information to correspond to the same broadcasting station, to register to the station list only one of the different pieces of broadcast information which are determined to correspond to the same broadcasting station wherein the list generating means (118) is configured to select the only one of the different pieces of broadcast information to be the piece of broadcast information that has the highest receivability according to the station presence counter; and

a displaying means (118, 122) configured to display the station list generated by the list generating means (118) as a list of the names of the broadcasting stations together with respective PI codes and broadcast frequencies.

2. The broadcast receiver according to claim 1, wherein:

the predetermined parameters include a first parameter indicating preference of a user, and the list generating means (118) is configured to determine that the piece of broadcast information to which the first parameter is assigned has a higher priority order.

3. The broadcast receiver according to claim 2, wherein the first parameter indicates that the corresponding piece of broadcast information is stored in the storage means as preset information.

4. The broadcast receiver according to any one of claims 1 to 3, wherein:

the determining means (118) is configured to determine that pieces of broadcast information stored in the storage means (118) correspond to different broadcasting stations if their country codes included in the PI codes are different; and

the registering means (118) is configured to register the pieces of broadcast information, determined to correspond to different broadcasting stations, in the station list.

5. A list generating method executed by a receiver provided with a computer, comprising:

a receiving step of executing a seek process in which each frequency channel is sequentially selected and, at each respective selected frequency channel, trying to receive a Radio Data System broadcast signal of a predetermined format in which digital data is multiplexed, the multiplexed data including a Programme Identification code, hereinafter referred to as a PI code, for identifying a broadcasting station, wherein, for a same broadcasting station operating at a same broadcast frequency, there is a case where broadcasting is performed with said PI code temporarily changed to a different PI code in order to broadcast different services at a certain time slot;

an extracting step of extracting the respective PI codes, indicating the respective broadcasting stations, from the broadcast signal received in the receiving step and of extracting display information for displaying a name of the broadcasting station from the broadcast signal received in the receiving step;

a storing step of storing, in a predetermined storage medium, the respective PI codes extracted in the extracting step, the broadcast frequencies of the respective broadcast signals and the display information as respective pieces of broadcast information in an associated manner and storing a plurality of predetermined parameters indicating priority orders of the plurality of pieces of broadcast information in the predetermined storage medium, the predetermined parameters including a station presence counter indicating receivability of the broadcast

frequency by the receiver, the station presence counter being incremented by 1 when the corresponding broadcast frequency is detected in the seek process, and being decremented by 1 when a corresponding broadcast frequency is not detected in the seek process, a broadcast frequency having a higher counter value having a higher receivability;

a generating step of generating a list from the respective pieces of broadcast information stored in the predetermined storage medium, and to store the generated station list in a list memory, the station list including respective pieces of broadcast information, wherein it is determined that different pieces of broadcast information stored in the predetermined storage medium correspond to the same broadcasting station if their broadcast frequencies are the same;

a registering step of registering pieces of broadcast information to the station list and, when it is determined that different pieces of broadcast information correspond to the same broadcasting station, registering to the station list only one of the different pieces of broadcast information which are determined to correspond to the same broadcasting station, the only one of the different pieces of broadcast information being selected to be the piece of broadcast information that has the highest receivability according to the station presence counter; and

a display control step of displaying the list generated in the generating step on a display device as a list of the names of the broadcasting stations together with respective PI codes and broadcast frequencies.

6. The list generating method according to claim 5, wherein:

the predetermined parameters include a first parameter indicating preference of a user, and in the generating step, the piece of broadcast information to which the first parameter is assigned is determined to have a higher priority order.

7. The list generating method according to claim 6, wherein the first parameter indicates that the corresponding piece of broadcast information is stored in the predetermined storage medium as preset information.

8. The list generating method according to any one of claims 5 to 7, wherein, in the generating step:

it is determined that pieces of broadcast information stored in the storage medium are of different broadcasting stations if their country codes included in the PI codes are different; and the pieces of broadcast information, determined to be of different broadcasting stations, are registered in the list.

Patentansprüche

1. Rundfunkempfänger (1), umfassend:

ein Empfangsmittel (102, 104, 116, 118), das konfiguriert ist, um einen Suchprozess auszuführen, in dem jeder Frequenzkanal sequentiell ausgewählt wird, und um bei jedem jeweiligen ausgewählten Frequenzkanal zu versuchen, ein Funkdatensystem-Rundfunksignal zu empfangen, in dem digitale Daten gemultiplext sind, wobei die gemultiplexten Daten einen Programmidentifizierungscode, im Folgenden als ein PI-Code bezeichnet, zum Identifizieren einer Rundfunkstation einschließen, wobei für eine gleiche Rundfunkstation, die auf einer gleichen Rundfunkfrequenz arbeitet, ein Fall vorliegt, in dem eine Rundsendung mit dem PI-Code durchgeführt wird, der vorübergehend in einen unterschiedlichen PI-Code geändert wird, um unterschiedliche Dienste in einem bestimmten Zeitfenster zu rundzusenden;

ein Extrahierungsmittel (1182), das konfiguriert ist, um die jeweiligen PI-Codes, die die jeweiligen Rundfunkstationen angeben, aus dem durch das Empfangsmittel (102, 104, 116, 118) empfangenen Rundfunksignal zu extrahieren, und das konfiguriert ist, um Anzeigeinformationen zum Anzeigen eines Namens der Rundfunkstation aus dem durch das Empfangsmittel (102, 104, 116, 118) empfangenen Rundfunksignal zu extrahieren;

ein Speichermittel (118b), das konfiguriert ist, um die jeweiligen PI-Codes, die durch das Extrahierungsmittel (1182) extrahiert werden, die Rundfunkfrequenzen der jeweiligen Rundfunksignale und die Anzeigeinformationen in einer zugeordneten Weise als jeweilige Stücke von Rundfunkinformationen akkumulativ zu speichern, und um eine Vielzahl von vorbestimmten Parametern zu speichern, die Prioritätsreihenfolgen der Stücke von Rundfunkinformationen angeben, wobei die vorbestimmten Parameter einen Stationspräsenzzähler einschließen, der eine Empfangbarkeit der entsprechenden Rundfunkfrequenz durch das Empfangsmittel angibt, wobei der Stationspräsenzzähler um 1 inkrementiert wird, wenn die entsprechende Rundfunkfrequenz in dem Suchprozess erkannt wird, und um 1 dekrementiert wird, wenn eine entsprechende Rundfunkfrequenz in dem Suchprozess nicht erkannt wird, wobei eine Rundfunkfrequenz, die einen höheren Zählerwert aufweist, eine höhere

Empfangbarkeit aufweist; und

ein Listenerzeugungsmittel (118), das konfiguriert ist, um eine Stationsliste aus den jeweiligen in dem Speichermittel (118) gespeicherten Stücken von Rundfunkinformationen zu erzeugen und um die erzeugte Stationsliste in einem Listenspeicher (118d) zu speichern, wobei die Stationsliste jeweilige Stücke von Rundfunkinformationen einschließt, wobei das Listenerzeugungsmittel aufweist:

ein Bestimmungsmittel (118), das konfiguriert ist, um zu bestimmen, dass unterschiedliche Stücke von Rundfunkinformationen der gleichen Rundfunkstation entsprechen, wenn ihre Rundfunkfrequenzen die gleichen sind; und

ein Registrierungsmittel (118), das konfiguriert ist, um Stücke von Rundfunkinformationen in der Stationsliste zu registrieren und um, wenn das Bestimmungsmittel (118) unterschiedliche Stücke von Rundfunkinformationen bestimmt, die derselben Rundfunkstation entsprechen, in der Stationsliste nur ein einziges der unterschiedlichen Stücke von Rundfunkinformationen zu registrieren, von denen bestimmt wird, dass sie der gleichen Rundfunkstation entsprechen, wobei das Listenerzeugungsmittel (118) konfiguriert ist, um das einzige der unterschiedlichen Stücke von Rundfunkinformationen als das Stück von Rundfunkinformationen auszuwählen, das gemäß dem Stationspräsenzzähler die höchste Empfangbarkeit aufweist; und ein Anzeigemittel (118, 122), das konfiguriert ist, um die durch das Listenerzeugungsmittel (118) erzeugte Stationsliste als eine Liste der Namen der Rundfunkstationen zusammen mit jeweiligen PI-Codes und Rundfunkfrequenzen anzuzeigen.

2. Rundfunkempfänger nach Anspruch 1, wobei:

die vorbestimmten Parameter einen ersten Parameter einschließen, der eine Präferenz eines Benutzers angibt, und

das Listenerzeugungsmittel (118) konfiguriert ist, um zu bestimmen, dass das Stück von Rundfunkinformationen, dem der erste Parameter zugewiesen ist, eine höhere Prioritätsreihenfolge aufweist.

3. Rundfunkempfänger nach Anspruch 2, wobei der erste Parameter angibt, dass das entsprechende Stück von Rundfunkinformationen in dem Speichermittel als voreingestellte Informationen gespeichert ist.

4. Rundfunkempfänger nach einem der Ansprüche 1 bis 3, wobei:

das Bestimmungsmittel (118) konfiguriert ist, um zu bestimmen, dass Stücke von Rundfunkinformationen, die in dem Speichermittel (118) gespeichert sind, unterschiedlichen Rundfunkstationen entsprechen, wenn ihre in den PI-Codes eingeschlossenen Ländercodes unterschiedlich sind; und

das Registrierungsmittel (118) konfiguriert ist, um die Stücke von Rundfunkinformationen, die bestimmt werden, unterschiedlichen Rundfunkstationen zu entsprechen, in der Stationsliste zu registrieren.

5. Listenerzeugungsverfahren, das durch einen mit einem Computer versehenen Empfänger ausgeführt wird, umfassend:

einen Empfangsschritt zum Ausführen eines Suchprozesses, in dem jeder Frequenzkanal sequentiell ausgewählt wird und bei jedem jeweiligen ausgewählten Frequenzkanal versucht wird, ein Funkdatensystem-Rundfunksignal eines vorbestimmten Formats zu empfangen, in dem digitale Daten gemultiplext werden, wobei die gemultiplexten Daten einen Programmidentifikationscode, im Folgenden als ein PI-Code bezeichnet, zum Identifizieren einer Rundfunkstation umfassen, wobei für eine gleiche Rundfunkstation, die auf einer gleichen Rundfunkfrequenz arbeitet, ein Fall vorliegt, in dem die Rundsendung mit dem PI-Code durchgeführt wird, der vorübergehend in einen unterschiedlichen PI-Code geändert wird, um unterschiedliche Dienste in einem bestimmten Zeitfenster rundzusenden;

einen Extrahierungsschritt zum Extrahieren der jeweiligen PI-Codes, die die jeweiligen Rundfunkstationen angeben, aus dem in dem Empfangsschritt empfangenen Rundfunksignal und zum Extrahieren von Anzeigeinformationen zum Anzeigen eines Namens der Rundfunkstation aus dem in dem Empfangsschritt empfangenen Rundfunksignal;

einen Speicherschritt zum Speichern, in einem vorbestimmten Speichermedium, der jeweiligen PI-Codes, die in dem Extrahierungsschritt extrahiert werden, der Rundfunkfrequenzen der jeweiligen Rundfunksignale und der Anzeigeinformationen als jeweilige Stücke von Rundfunkinformationen in einer zugeordneten Weise und zum Speichern einer Vielzahl von vorbestimmten Parametern, die Prioritätsreihenfolgen der Vielzahl von Stücken von Rundfunkinformationen in dem vorbestimmten Speichermedium angeben, wobei die vorbestimmten

Parameter einen Stationspräsenzzähler einschließen, der die Empfangbarkeit der Rundfunkfrequenz durch den Empfänger angibt, wobei der Stationspräsenzzähler um 1 inkrementiert wird, wenn die entsprechende Rundfunkfrequenz in dem Suchprozess erkannt wird, und um 1 dekrementiert wird, wenn eine entsprechende Rundfunkfrequenz in dem Suchprozess nicht erkannt wird, wobei eine Rundfunkfrequenz, die einen höheren Zählerwert aufweist, eine höhere Empfangbarkeit aufweist;

einen Erzeugungsschritt zum Erzeugen einer Liste aus den jeweiligen Stücken von Rundfunkinformationen, die in dem vorbestimmten Speichermedium gespeichert sind, und um die erzeugte Stationsliste in einem Listenspeicher zu speichern, wobei die Stationsliste jeweilige Stücke von Rundfunkinformationen einschließt, wobei bestimmt wird, dass unterschiedliche Stücke von Rundfunkinformationen, die in dem vorbestimmten Speichermedium gespeichert sind, der gleichen Rundfunkstation entsprechen, wenn ihre Rundfunkfrequenzen die gleichen sind;

einen Registrierungsschritt zum Registrieren von Stücken von Rundfunkinformationen in der Stationsliste und, wenn bestimmt wird, dass unterschiedliche Stücke von Rundfunkinformationen der gleichen Rundfunkstation entsprechen, Registrieren in der Stationsliste von nur einem einzigen der unterschiedlichen Stücke von Rundfunkinformationen, von denen bestimmt wird, dass sie der gleichen Rundfunkstation entsprechen, wobei das einzige der unterschiedlichen Stücke von Rundfunkinformationen als das Stück von Rundfunkinformationen ausgewählt wird, das gemäß dem Stationspräsenzzähler die höchste Empfangbarkeit aufweist; und

einen Anzeigesteuerungsschritt zum Anzeigen der in dem Erzeugungsschritt erzeugten Liste auf einer Anzeigevorrichtung als eine Liste der Namen der Rundfunkstationen zusammen mit den jeweiligen PI-Codes und Rundfunkfrequenzen.

6. Listenerzeugungsverfahren nach Anspruch 5, wobei:

die vorbestimmten Parameter einen ersten Parameter einschließen, der die Präferenz eines Benutzers angibt, und

in dem Erzeugungsschritt bestimmt wird, dass das Stück von Rundfunkinformationen, dem der erste Parameter zugewiesen ist, eine höhere Prioritätsreihenfolge aufweist.

7. Listenerzeugungsverfahren nach Anspruch 6, wobei der erste Parameter angibt, dass das entsprechende Stück von Rundfunkinformationen in dem vorbestimmten Speichermedium als voreingestellte Informationen gespeichert ist.

8. Listenerzeugungsverfahren nach einem der Ansprüche 5 bis 7, wobei in dem Erzeugungsschritt:

bestimmt wird, dass Stücke von Rundfunkinformationen, die in dem Speichermedium gespeichert sind, von unterschiedlichen Rundfunkstationen sind, wenn ihre in den PI-Codes eingeschlossenen Ländercodes unterschiedlich sind; und

die Stücke von Rundfunkinformationen, die als von unterschiedlichen Rundfunkstationen bestimmt werden, in der Liste registriert werden.

Revendications

1. Récepteur de radiodiffusion (1), comprenant :

un moyen de réception (102, 104, 116, 118) configuré pour exécuter un processus de recherche dans lequel chaque canal de fréquence est sélectionné séquentiellement et, à chaque canal de fréquence sélectionné respectif, pour tenter de recevoir un signal de diffusion de système de données radio dans lequel des données numériques sont multiplexées, les données multiplexées comportant un code d'identification de programme, ci-après dénommé code PI, permettant d'identifier une station de diffusion, dans lequel, pour une même station de diffusion fonctionnant à une même fréquence de diffusion, il existe un cas où une diffusion est effectuée avec ledit code PI temporairement modifié en un code PI différent afin de diffuser différents services à un certain créneau temporel ;

un moyen d'extraction (1182) configuré pour extraire les codes PI respectifs indiquant les stations de diffusion respectives à partir du signal de diffusion reçu par le moyen de réception (102, 104, 116, 118) et configuré pour extraire des informations d'affichage, permettant d'afficher un nom de la station de diffusion, à partir du signal de diffusion reçu par le moyen de réception (102, 104, 116, 118) ;

un moyen de stockage (118b) configuré pour stocker de manière cumulative les codes PI respectifs extraits

par le moyen d'extraction (1182), les fréquences de diffusion des signaux de diffusion respectifs et les informations d'affichage d'une manière associée en tant que qu'éléments d'informations de diffusion respectifs, et pour stocker une pluralité de paramètres prédéterminés indiquant des ordres de priorité des éléments d'informations de diffusion, les paramètres prédéterminés comportant un compteur de présence de station indiquant la capacité de réception de la fréquence de diffusion correspondante par le moyen de réception, le compteur de présence de station étant incrémenté de 1 lorsque la fréquence de diffusion correspondante est détectée dans le processus de recherche et étant décrémentée de 1 lorsqu'une fréquence de diffusion correspondante n'est pas détectée dans le processus de recherche, une fréquence de diffusion ayant une valeur de compteur plus élevée ayant une capacité de réception plus élevée ; et

un moyen de génération de liste (118) configuré pour générer une liste de stations à partir des éléments d'informations respectifs de diffusion stockés dans le moyen de stockage (118) et pour stocker la liste de stations générée dans une mémoire de liste (118d), la liste de stations comportant des éléments d'informations de diffusion respectifs, le moyen de génération de liste ayant :

un moyen de détermination (118) configuré pour déterminer que des éléments d'informations de diffusion différents correspondent à la même station de diffusion si leurs fréquences de diffusion sont identiques ; et un moyen d'enregistrement (118) configuré pour enregistrer des éléments d'informations de diffusion dans la liste de stations et, lorsque le moyen de détermination (118) détermine que différents éléments d'informations de diffusion correspondent à la même station de diffusion, pour enregistrer dans la liste de stations seulement un des différents éléments d'informations de diffusion qui sont déterminés comme correspondant à la même station de diffusion, dans lequel le moyen de génération de liste (118) est configuré pour sélectionner le seul élément des différents éléments d'informations de diffusion comme étant l'élément d'informations de diffusion qui a la capacité de réception la plus élevée selon le compteur de présence de station ; et

un moyen d'affichage (118, 122) configuré pour afficher la liste de stations générée par le moyen de génération de liste (118) en tant que liste des noms des stations de diffusion conjointement avec les codes PI et fréquences de diffusion respectifs.

2. Récepteur de radiodiffusion selon la revendication 1, dans lequel :

les paramètres prédéterminés comportent un premier paramètre indiquant la préférence d'un utilisateur, et le moyen de génération de liste (118) est configuré pour déterminer que l'élément d'informations de diffusion auquel le premier paramètre est attribué a un ordre de priorité plus élevé.

3. Récepteur de radiodiffusion selon la revendication 2, dans lequel le premier paramètre indique que l'élément d'information de diffusion correspondant est stocké dans le moyen de stockage en tant qu'informations prédéfinies.

4. Récepteur de radiodiffusion selon l'une quelconque des revendications 1 à 3, dans lequel :

le moyen de détermination (118) est configuré pour déterminer que des éléments d'informations de diffusion stockés dans le moyen de stockage (118) correspondent à différentes stations de diffusion si leurs codes de pays inclus dans les codes PI sont différents ; et

le moyen d'enregistrement (118) est configuré pour enregistrer les éléments d'informations de diffusion, déterminés comme correspondant à différentes stations de diffusion, dans la liste de stations.

5. Procédé de génération de liste exécuté par un récepteur doté d'un ordinateur, comprenant :

une étape de réception consistant à exécuter un processus de recherche dans lequel chaque canal de fréquence est sélectionné séquentiellement et, au niveau de chaque canal de fréquence sélectionné respectif, à tenter de recevoir un signal de diffusion de système de données radio d'un format prédéterminé dans lequel des données numériques sont multiplexées, les données multiplexées comportant un code d'identification de programme, ci-après dénommé code PI, permettant d'identifier une station de diffusion, dans lequel, pour une même station de diffusion fonctionnant à une même fréquence de diffusion, il existe un cas où une diffusion est effectuée avec ledit code PI temporairement modifié en un code PI différent afin de diffuser différents services à un certain créneau temporel ;

une étape d'extraction consistant à extraire les codes PI respectifs, indiquant les stations de diffusion respectives, à partir du signal de diffusion reçu dans l'étape de réception et à extraire des informations d'affichage permettant d'afficher un nom de la station de diffusion à partir du signal de diffusion reçu à l'étape de réception ;

une étape de stockage consistant à stocker, dans un support de stockage prédéterminé, les codes PI respectifs extraits dans l'étape d'extraction, les fréquences de diffusion des signaux de diffusion respectifs et les informations d'affichage en tant qu'éléments d'informations de diffusion respectifs d'une manière associée et à stocker une pluralité de paramètres prédéterminés indiquant des ordres de priorité de la pluralité d'éléments d'informations de diffusion dans le support de stockage prédéterminé, les paramètres prédéterminés comportant un compteur de présence de station indiquant une capacité de réception de la fréquence de diffusion par le récepteur, le compteur de présence de station étant incrémenté de 1 lorsque la fréquence de diffusion correspondante est détectée dans le processus de recherche, et étant décrémentée de 1 lorsqu'une fréquence de diffusion correspondante n'est pas détectée dans le processus de recherche, une fréquence de diffusion ayant une valeur de compteur plus élevée ayant une capacité de réception plus élevée ;

une étape de génération consistant à générer une liste à partir des éléments d'informations de diffusion respectifs stockés dans le support de stockage prédéterminé, et pour stocker la liste de stations générée dans une mémoire de liste, la liste de stations comportant des éléments d'informations de diffusion respectifs, dans lequel il est déterminé que différents éléments d'informations de diffusion stockés dans le support de stockage prédéterminé correspondent à la même station de diffusion si leurs fréquences de diffusion sont identiques ;

une étape d'enregistrement consistant à enregistrer des éléments d'informations de diffusion dans la liste de stations et, lorsqu'il est déterminé que différents éléments d'informations de diffusion correspondent à la même station de diffusion, à enregistrer dans la liste de stations seulement un des différents éléments d'informations de diffusion qui sont déterminés comme correspondant à la même station de diffusion, le seul élément des éléments d'informations de diffusion différents étant sélectionné comme étant l'élément d'informations de diffusion qui a la capacité de réception la plus élevée selon le compteur de présence de station ; et

une étape de commande d'affichage consistant à afficher la liste générée dans l'étape de génération sur un dispositif d'affichage en tant que liste des noms des stations de diffusion conjointement avec des codes PI et fréquences de diffusion respectifs.

6. Procédé de génération de liste selon la revendication 5, dans lequel :

les paramètres prédéterminés comportent un premier paramètre indiquant la préférence d'un utilisateur, et dans l'étape de génération, l'élément d'informations de diffusion auquel le premier paramètre est attribué est déterminé comme ayant un ordre de priorité plus élevé.

7. Procédé de génération de liste selon la revendication 6, dans lequel le premier paramètre indique que l'élément d'informations de diffusion correspondant est stocké dans le support de stockage prédéterminé en tant qu'informations prédéfinies.

8. Procédé de génération de liste selon l'une quelconque des revendications 5 à 7, dans lequel, dans l'étape de génération :

il est déterminé que des éléments d'informations de diffusion stockés dans le support de stockage sont des stations de diffusion différentes si leurs codes de pays inclus dans les codes PI sont différents ; et les éléments d'informations de diffusion, déterminés comme étant de stations de diffusion différentes, sont enregistrés dans la liste.

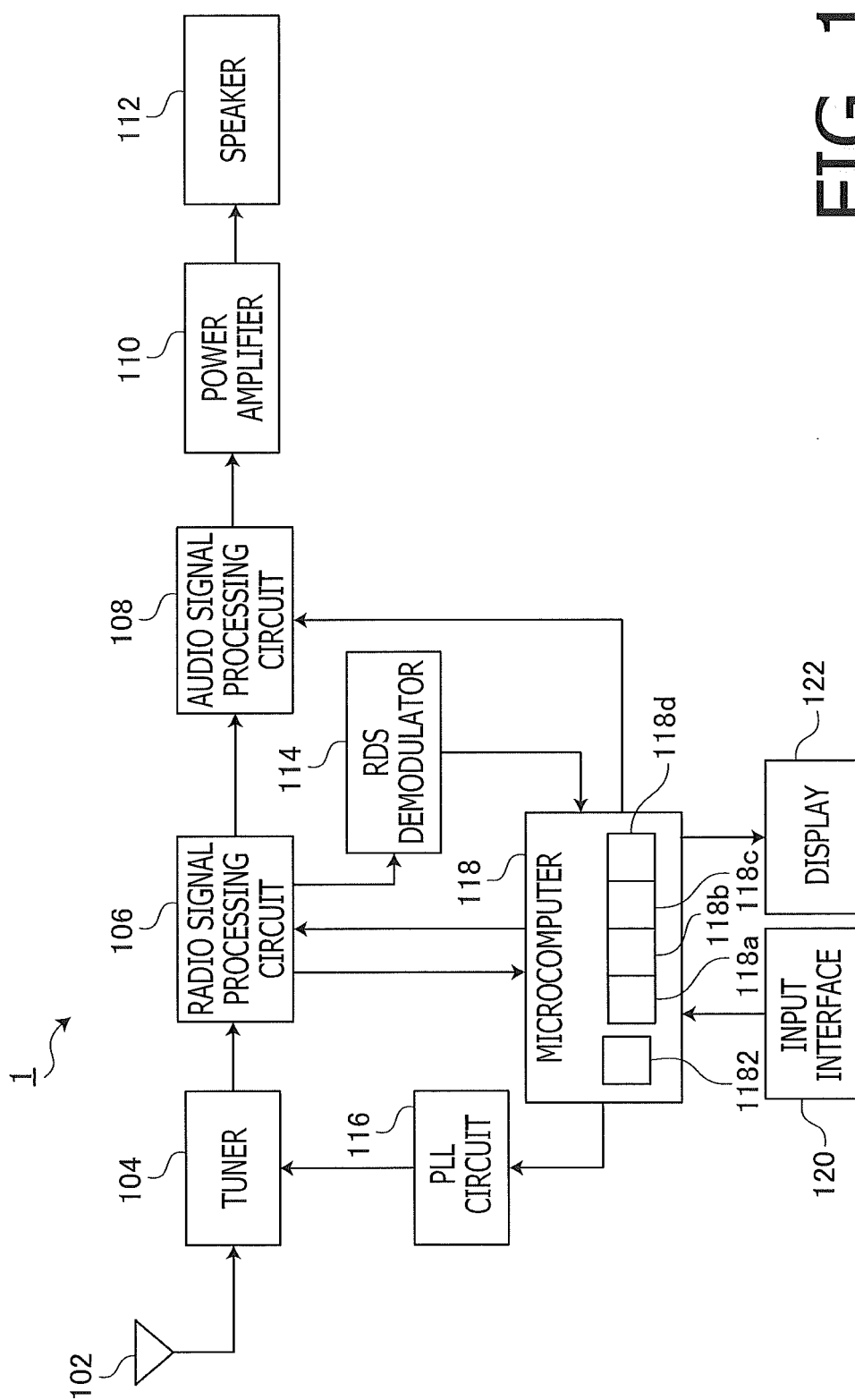


FIG. 1

RECORD No.	PI CODE	PS	SEEK TIME ORDER	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
0	C717	BBC 3CR	1	3		104.5
1	C617	BBC 3CR	6	2	○	103.8
2	C7A1	Classic	9	1		100.4
3	C2A1	Classic	2	3	○	100.4
4	C204	BBC 4R	11	0		92.8
5	C217	BBC 3CR	3	3		103.8
6	C363	Heart	10	1		103.3
7	C203	BBC 3CR	4	3		92.6
8	C8A1	Classic	7	2	○	100.4
9	C460	Heart	8	2		106.2
10	C763	Heart	5	3		103.3

FIG. 2A

RECORD No.	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
11	3		98.1
12	3		99.1
13	3	○	87.8

FIG. 2B

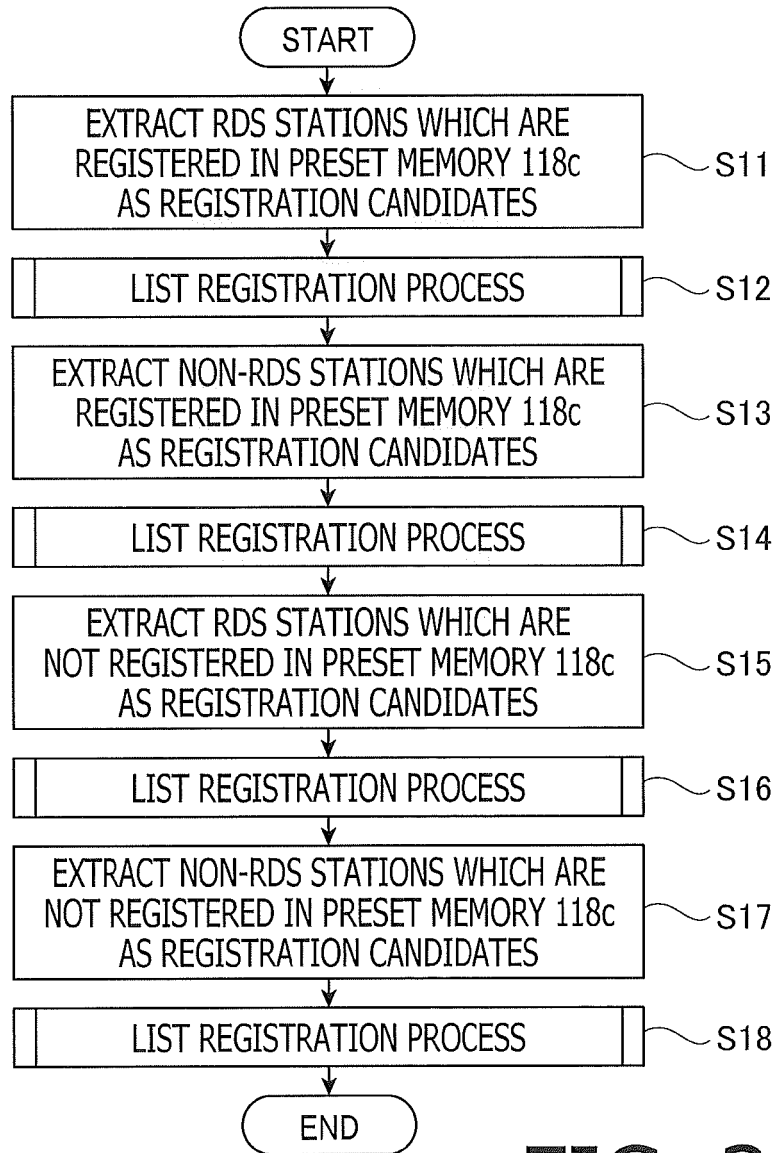


FIG. 3

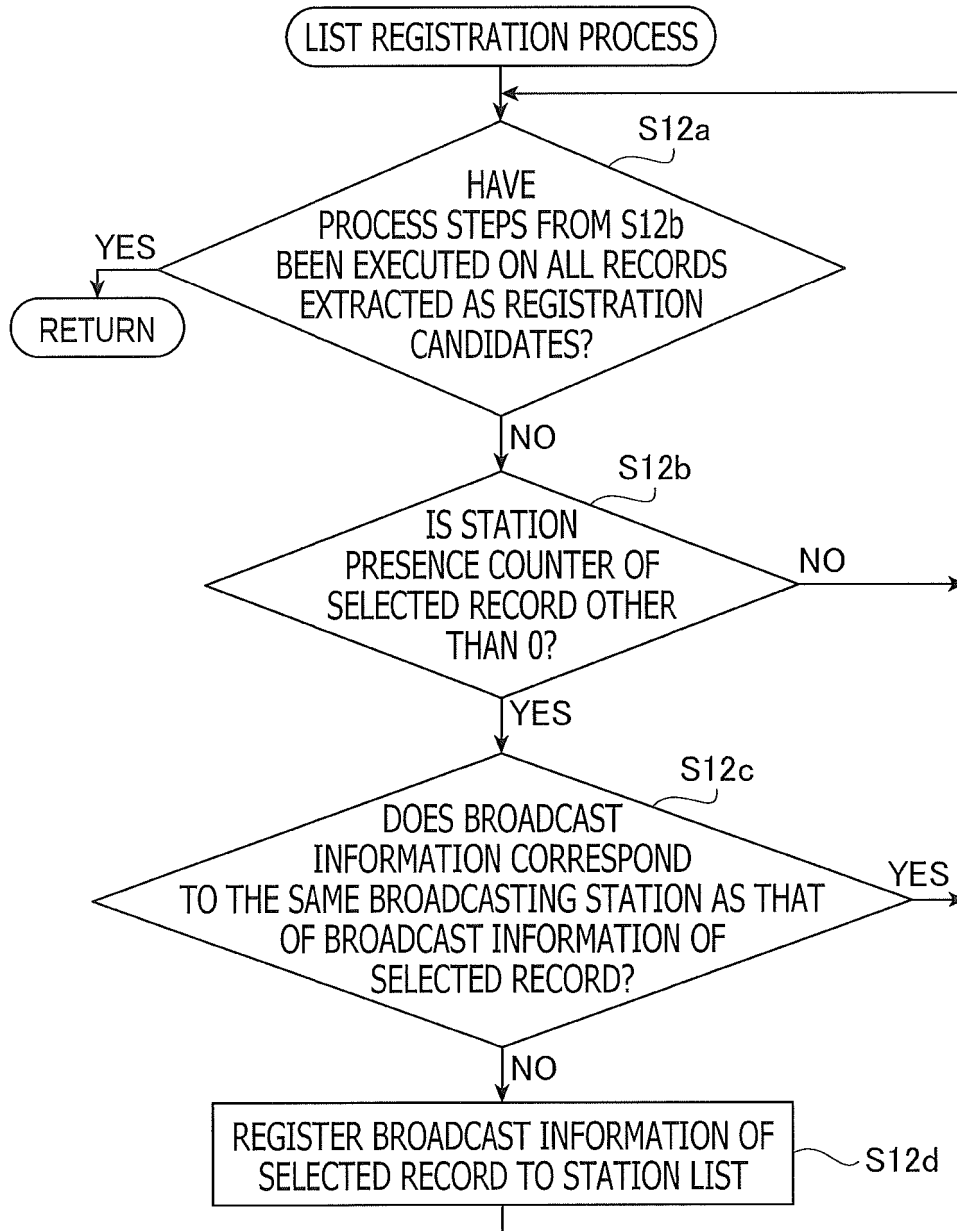


FIG. 4

RECORD No.	PI CODE	PS	SEEK TIME ORDER	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
1	C617	BBC 3CR	6	2	○	103.8
3	C2A1	Classic	2	3	○	100.4
8	C8A1	Classic	7	2	○	100.4

FIG. 5A

LIST No.	PI CODE	PS	BROADCAST FREQUENCY
0	C2A1	Classic	100.4
1	C617	BBC 3CR	103.8
2			
3			
4			
5			
6			
7			
8			
9			
10			
⋮	⋮	⋮	⋮

FIG. 5B

RECORD No.	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
13	3	○	87.8

FIG. 6A

LIST No.	PI CODE	PS	BROADCAST FREQUENCY
0	C2A1	Classic	100.4
1	C617	BBC 3CR	103.8
2	---	---	87.8
3			
4			
5			
6			
7			
8			
9			
10			
⋮	⋮	⋮	⋮

FIG. 6B

RECORD No.	PI CODE	PS	SEEK TIME ORDER	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
0	C717	BBC 3CR	1	3		104.5
2	C7A1	Classic	9	1		100.4
4	C204	BBC 4R	11	0		92.8
5	C217	BBC 3CR	3	3		103.8
6	C363	Heart	10	1		103.3
7	C203	BBC 3CR	4	3		92.6
9	C460	Heart	8	2		106.2
10	C763	Heart	5	3		103.3

FIG. 7A

LIST No.	PI CODE	PS	BROADCAST FREQUENCY
0	C2A1	Classic	100.4
1	C617	BBC 3CR	103.8
2	---	---	87.8
3	C717	BBC 3CR	104.5
4	C203	BBC 3CR	92.6
5	C763	Heart	103.3
6	C460	Heart	106.2
7			
8			
9			
10			
⋮	⋮	⋮	⋮

FIG. 7B

RECORD No.	STATION PRESENCE COUNTER	REGISTRATION STATUS	BROADCAST FREQUENCY
11	3		98.1
12	3		99.1

FIG. 8A

LIST No.	PI CODE	PS	BROADCAST FREQUENCY
0	C2A1	Classic	100.4
1	C617	BBC 3CR	103.8
2	---	---	87.8
3	C717	BBC 3CR	104.5
4	C203	BBC 3CR	92.6
5	C763	Heart	103.3
6	C460	Heart	106.2
7	---	---	98.1
8	---	---	99.1
9			
10			
⋮	⋮	⋮	⋮

FIG. 8B

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2016111700 A [0004]
- JP 2013191961 A [0004]
- EP 2493098 A1 [0005]
- EP 1434371 A2 [0006]