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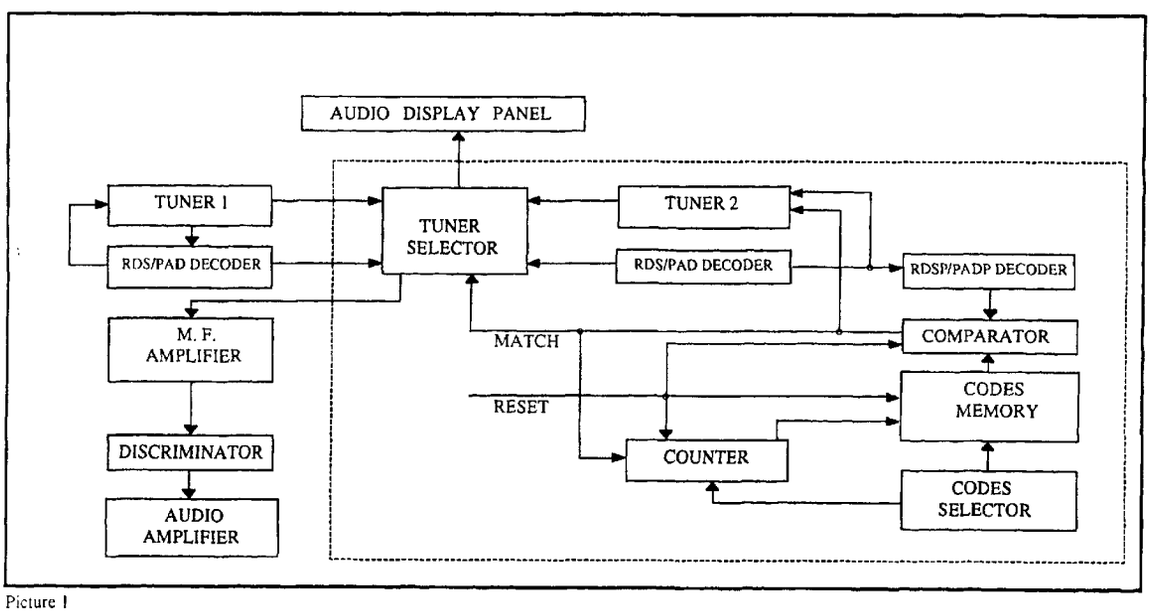
(54) System for transmission and reception of radio programmes carrying a prefixed code, allowing the automatic search of these programmes, irrespective of the transmitter which broadcasts these programmes: programme link system

(57) This is a system for transmitting, receiving and listening to a program/piece prefixed and identified by a code, whatever the station which transmits that program/piece may be, provided that it has to be preceded by the broadcast of the identification code of the program itself. As this code can be transmitted together with the actual RDS/PAD signal by adding only some bit in the end, the following description is, in short, based on the variations of the project, which the radio-receivers need to make use of this additional code for the automatic search of the program/piece.

BLOCK DIAGRAM ENCLOSED WITH AN APPLICATION FOR A PATENT ENTITLED:
SYSTEM FOR TRANSMISSION AND RECEPTION OF RADIO PROGRAMS/PIECES JOYNED TO A PREFIXED CODE WHICH ALLOWS THE AUTOMATIC SEARCH OF THIS PROGRAM/PIECE, QUITE APART FROM THE TRANSMITTER: PROGRAM LINK SYSTEM (PLS



Picture 1

EP 0 967 749 A2

Description

[0001] This is a system for transmitting, receiving and listening to a program/piece which is prefixed and identified by a code. One can achieve it whatever the station which transmits that program/piece may be, provided that it has to be preceded by the broadcast of the identification code of the program/piece itself.

[0002] You can transmit the code making use of the actual criterion for the transmission of the RDS/PAD signal adding, immediately afterwards, the identifying code of the transmitter (which we will call RDSE/PADE), a further code for the identification of the program/piece (which we will call RDSP/PADP), which will be present in the transmitted signal for all the duration of the program/piece itself (or a little more, if you want some spot to go before or after).
Therefore, the transmission of the identifying code of the program/piece doesn't require substantial alterations in the RDS/PAD system which is in use at the moment. But it is necessary to link the beginning of a prefixed program/piece to the insertion of its code after the RDS/PAD signal.
This code can have two or more digits according to as many programs as you want to put in the list of the programs which can be preset.
The transmitters which are interested in this project will have, obviously, to agree on and draw up a CODES / PROGRAMS / PIECES list which, then, the common communications channels used by the press specialized in radio programs will circulate to the users.

[0003] Concerning the reception, on the contrary, it is necessary to provide the radio receiver set with appropriate circuits which allow the correct use of the system.

[0004] The block diagram in the picture 1 reports, in a very schematic way, those which are the basic elements of a radio receiver today: a tuner (1), a decoder of the RDS/PAD signal which, in turn, controls the tuner (1), a medium frequency amplifier, a discriminator for the audio signal revelation and, therefore, the low frequency preamplification and amplification phases which control the loudspeaker. There is, obviously, a luminous display which visualizes the current information.

[0005] The same picture, in the dotted square, reports the more blocks required to receive and use the RDSP/PADP system with the relative interconnections: a second tuner (2), a decoder of the RDS/PAD signal (which will be able to decodify the RDSP/PADP signal), a code selector with its memory and a counter, a comparator and a tuner selector.

[0006] When you turn the apparatus on, the tuner selector is in a stand by position and allows the signal which is tuned by the tuner 1 to pass toward the medium frequency and the listening circuits (and it allows the indications toward the luminous display too), as it normally happens in actual radio receivers. At the same time, the Tuner 2 starts its automatic search and begins to explore all the frequencies of the selected band.
At every received frequency, the system decodifies the RDS/PAD signal, separates the RDSP/PADP signal and presents it to a comparator which compares it with that coming from the preset programs/pieces selector. This comparation happens, obviously, for every frequency tuned during the automatic search of the Tuner 2. Only if the two signals coincide the comparator activates a MATCH signal which, in turn, sets the following functions :

1. It cuts the automatic search of the Tuner 2 off, jamming it on the frequency which contains, in RDS/PAD, the preset RDSP/PADP code; this frequency can concern, obviously, any transmitter, quite apart from what you are listening to by means of the Tuner 1;

2. It makes the tuner selector switch over in order to present to the luminous display the information concerning the Tuner 2 and to the MF and audio circuits the program/piece received by the Tuner 2, which corresponds to the program/piece prefixed by the user and selected through the program/piece selector in order to allow you to listen to it in loudspeaker.

[0007] At the end of the program/piece, the transmitter stops transmitting the RDSP/PADP signal, so the comparator switches the MATCH signal off. Because of this:

1. The tuner selector doesn' t work any more and so the data and the program/piece the user was previously listening to will appear on the display and in the loudspeaker again;

2. The Tuner 2 releases itself so that it can start the automatic search again;

3.The counter of the program/piece selector goes on in order to present to the comparator the second program/piece selected by the user.

[0008] At this point the process will happen again (as we have already described) until a selected program/piece is present on the comparator.

[0009] Obviously if there aren' t selected programs/pieces everything works like a normal receiver tuned to the transmitter defined by the Tuner 1; on the contrary, the Tuner 2 will explore all the band of frequencies continuosly; but in the comparator there isn' t any preset code, so the MATCH signal will never be activated and everything remains standing in this form.

[0010] So, as a consequence of the market range in which the receiver goes and takes position, the number of the presetable programs/pieces changes. If this number increases you have also to increase the memory size of the programs/pieces selector and, consequently, the maximum range of the counter.

[0011] As these codes can be transmitted and received in the form of digital signals, you have to remember that you can get 4 codes with 2 bit, 8 codes with 3 bit and so on, according to the following formula:

$$C = 2^n$$

with:

C = number of codes
n = number of bit

[0012] So the counter has to have a number of bit equivalent to n, whereas the selector memory has to have a size equivalent to C x n bit, organized in C words, each one being n bit long.

[0013] You can practically carry out the preselection of the codes concerning the programs/pieces you want to listen to by means of keys which are already available in the majority of the radio receivers present on the market and equipped with the RDS/PAD system.

[0014] In fact, there is a MODE key to which you can add a further electronic position which lets the receiver acquire preset codes and store these codes in memory using the keys which are already available to tune in the most frequent listening transmitters (there are usually 6 or more keys).

[0015] An only additional control is necessary to clear the memory contents of the preset programs/pieces codes (RESET key); you have to use this control in the two following cases:

1. The user doesn' t want to preset programs/pieces, but he means to use the receiver in standard conditions;

2. The user is listening to a preset program/piece, but he wants, for any reason, to come back to the standard working without waiting for the program/piece end.

In both cases, the RESET key activation cancels the memory, clears the counter and switches the MATCH signal off, so the receiver returns to the standard condition, as we have previously described.

[0016] In short, the system, apart from allowing the normal use of a radio receiver set, that is the tuning in any transmitter of the selected band (manually or by means of the automatic search), also permits to tune in any broadcasting station which is transmitting a desired program/piece preset by means of a prefixed code, which is transmitted by the transmitter together with the RDS/PAD signal and which identifies the program/piece itself unequivocally.
Obviously, in this last case, the tuning can be only automatic, as the broadcasting station which transmits the desired program/piece is a priori unknown.
Naturally the system is not addressed only to the mobile receivers for which the RDS/PAD concept has been introduced, but it can be extended to the fixed installations too, so it allows to benefit by an automatic search concerning programs/pieces rather than frequencies.

[0017] Obviously, in relation to the market range to which the receiver is directed, the PLS function can be activated even if the user is using other sound sources (c. d. ,cassettes) or if the apparatus is in a stand-by condition.

[0018] Note that you have not to associate or mix PLS up with the PTY system, which already exists, as the latter is based on the search of a kind of program selected by a defined list, which is in the radio itself; this list according to the producers, contains a restricted number of preset generic programs, so that the user can make a very restricted choice and the transmitters can' t carry the desired combinations to make their programs personal out at all:

EXAMPLES OF SUBJECTS CODIFIED IN PTY

- SPORT- VARIED - NEWS - POP M. - DRAMA - EDUCATION -.....-

[0019] On the contrary, the PLS function, is based on the search of a numerical code in which you have previously keyd; you can use:

A type codes, objectively combined for the selection of programs and pieces on all the transmitters;
B types codes, differently combined by the single transmitters to select and make specific programs and pieces personal;

A TYPE CODES	B TYPE CODES
THE TOP TWENTY ALBUMS IN ITALY	PROGRAMS OF RADIORAI 1 OF THE 25th OF FEBRUARY
1) Zucchero 331	At 06.16 a.m. All'ordine del giorno 1531
2) Fiorella Mannoia 332	At 06.21 a.m. Settimocielo 1652
3) Biagio Antonacci 333	At 06.30 a.m. Italia istruzioni per l' uso 1642
4) Roberto Vecchioni 334	At 07.33 a.m. Questione di soldi 1611
5) Mina/Celentano 335	At 08.43 a.m. Golem 1211
6) U 2 336	At 09.00 a.m. **GR 1 Cultura 1666**
7) Cher 441	At 09.05 a.m. Radio arch' io 1555
8) Laura Pausini 442	At 10.00 a.m. Millevoci lettere 1613
9) 5Five 443	At 10.13 a.m. **GR 1 Cultura 1666**
10) Mariah Carey 444	At 11.00 a.m. GR I Scienza 1667
11)883 445	At 11.17 a.m. Radioacolori 1254
12) Nek 446	At 12.05 am. Come vanno gli affari 1264
.....	.....

[0020] Actually, by means of PTY, you can only search for musical genres (jazz, country) or types of programs (sport, drama, education). In practice, the limit of PTY system is that if the user means to listen the football match of the italian national team transmitted by Radiorai 1, he has to select " sport " in the PTY list; the radio begins to search and if just in that moment several transmitters are transmitting a basketball match and / or a program about boxing apart from the football match the radio the radio will pick up these too and so it is very probably that if the transmitter which broadcasts the basketball match or the boxing match is before Radiorai 1, the football match will be neglected, just as according to the PTY system, " sport " means not only the football match but also the basketball match or the program about boxing.

[0021] On the contrary, with the PLS system, since the transmitter would assign to the football match of that day that preset identifying code, the tuner would linger only over the football match leaving out the other sports.

[0022] The same thing happens for a program like " Alto gradimento " transmitted by Radiorai 2;
By means of the PTY system you can identify it only as a type of VARIED program, so that the tuner will pick up also other programs of that kind;
On the contrary, by means of the PLS system, you can achieve a punctual and sure tuning.

[0023] One could go on giving an example of a record company which means to launch a new record of an artist in three months time and to let listen to only a piece for the first time; you can achieve that by means of the PLS system.

[0024] One could give also the example of the pieces of the San Remo Festival or Festivalbar to which you can associate identifying codes, and the extension of the PLS system to the service of Rai " Cis viaggiare informati " too, giving a specific permanent code to it.

[0025] Concerning marketing aspects, the PTY function appears vague and not flexible, as it regards codes prefixed by the producer, which one can' t bring up to date at all; therefore thr PTY system doesn' t manage to involve the interest and the active participation of the transmitters, of the other media and of all the firms that mean to advertise their goods.
By means of the PLS system, on the contrary, you can involve:

1) the interest of those who mean to advertise their goods, as they can choose to put in some jingles of theirs (which last not many seconds) before the beginning of the preselected piece and / or program so the selector user is subjected to listen to the advertising;
2) the interest of the transmitters, which will earn by means of the jingles assigned to pieces or programs;
3) the interest of mass-media (the best music magazines and radio-television programs , Internet), involved in making the codes or any others initiatives concerning the PLS system known;
4) the interest of the record companies which if they would, could manage a part of the codes concerning the promotional launch of a new record or singer;

[0026] Besides note that many radio networks transmit on frequencies which are different for towns or reception areas, so the user is forced to search for the transmitter concerning his own town. Infact some transmitters advertising themselves in the most important newspapers in the country indicate explicitly to search for the frequency either on the web site or even by calling a phone free. Other transmitters, on the contrary, compile the " boring " list.
The PLS system solves the above mentioned problems considerably, as it simplifies both the advertising matters of the frequencies and the searching matters of the users.
Infact, this system, associates an identifying code (A type) to every transmitter, for example " Radio x " (PLS 7), " Radio y " (PLS 8), etc. so if the user is in Milan or Palermo he will be able to listen to " Radio x " keying simply 7 in his own radio and so he needn' t know the frequency concerning that town at all costs.
If a user who comes from Milan and has tuned " Radio x " in the button 5 on his own car radio turns by chance the car radio on in Palermo, he will note that the button 5 doesn' t correspond to " Radio x " any more but perhaps to another transmitter or even to anything.
The RDS system in this case, is not useful as the car radio should be on for the duration of the whole journey so as to allow the automatic frequency passages according to the area;
On the contrary by means of the PLS system, you have only to key in 7 and in few seconds the car radio tunes itself automatically in the frequency of " Radio x " concerning the city of Palermo.

[0027] So, by means of the PLS system, you will get to all the networks easily so as to solve the problem of the variety of the frequencies at last creating a system of identification which is " only " for every single transmitter concerning the whole area, quite apart from the reception area.

[0028] Besides you have to note that a considerable percentage of car accidents happens because of absent-mindedness mistakes and among these there is searching for a favourite transmitter, program or piece. Undoubtedly, by means of the PLS system and thanks to the flexibility of the search you can avoid absent-mindedness mistakes (which might be fatal) after you have set the programs you want out.

[0029] In short, you can maintain that the PLS system can be defined as an " interactive system " thanks to which the transmitters and the users are be able to communicate among themselves more easily.

Claims

1. Concept of transmission / reception of a specific radio program/piece to which has been associated a code which can be combined differently and continually by the single transmitters. This code identifies a radio program/piece not in its typology but in its specific quality and singularity; it is transmitted together with the RDS/PAD signal, allowing the automatic search of the particular program/piece itself, using a double Tuner system chosen by a signal which, in turn, is the result of a comparison between the transmitted code and that preset by the user.

2. The same concept mentioned above, which also uses the conventional RDS/PAD signal in order to search the most suitable transmitter for the reception of the selected program/piece.

3. The same concept expressed by the points 1 and 2, but with the selection of the Tuner you have to listen to manually made by the user.

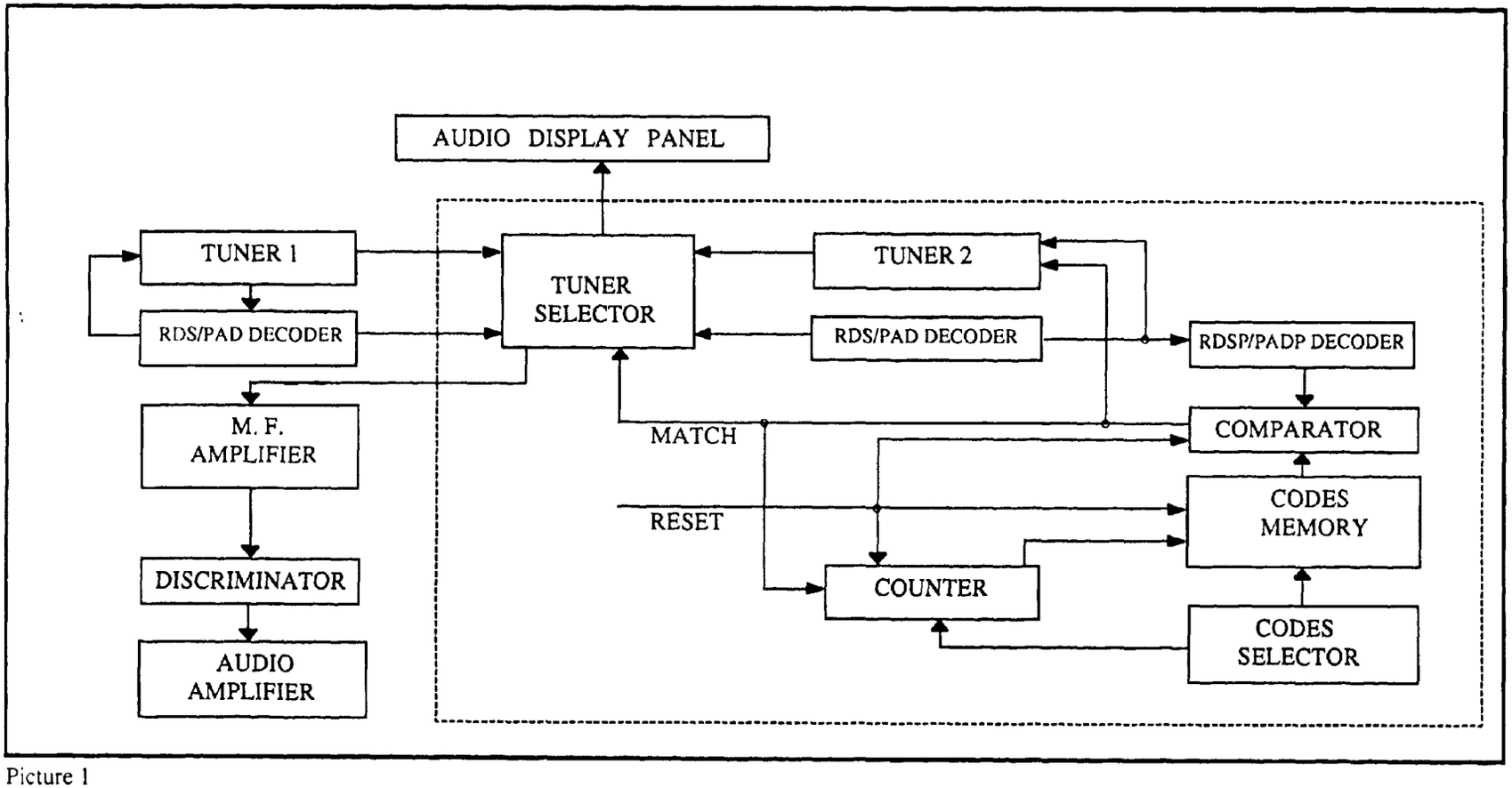
4. The same concept expressed by the points 1, 2 and 3, but realized with the two Tuners integrated in a single Integrated Circuit (chip).

5. The same concept expressed by the points 1, 2 and 3, but realized with all the parts in a single Integrated Circuit.

6. The same concept expressed by the points 1, 2 and 3, but realized with all the additional parts (compared to a traditional radio receiver) integrated in an only Integrated Circuit.

7. The same concept expressed by the previous points, but realized setting the additional parts up (compared to a traditional radio receiver) in a shape which is discreet or integrated (also partially) on one or more cards which you have to use like " ADD-ON " in the radio receivers which are already on the market.

BLOCK DIAGRAM ENCLOSED WITH AN APPLICATION FOR A PATENT ENTITLED:
SYSTEM FOR TRANSMISSION AND RECEPTION OF RADIO PROGRAMS/PIECES JOYNED TO A PREFIXED CODE WHICH ALLOWS THE AUTOMATIC SEARCH OF THIS PROGRAM/PIECE, QUITE APART FROM THE TRANSMITTER: PROGRAM LINK SYSTEM (PLS



Picture 1

EP 0 967 749 A2