(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 599 330 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **93119058.1**

(51) Int. Cl.5: **H04H 1/00**

(22) Date of filing: **25.11.93**

(30) Priority: **27.11.92 JP 341173/92**
**12.02.93 JP 47376/93**

(43) Date of publication of application:
**01.06.94 Bulletin 94/22**

(84) Designated Contracting States:
**DE FR GB**

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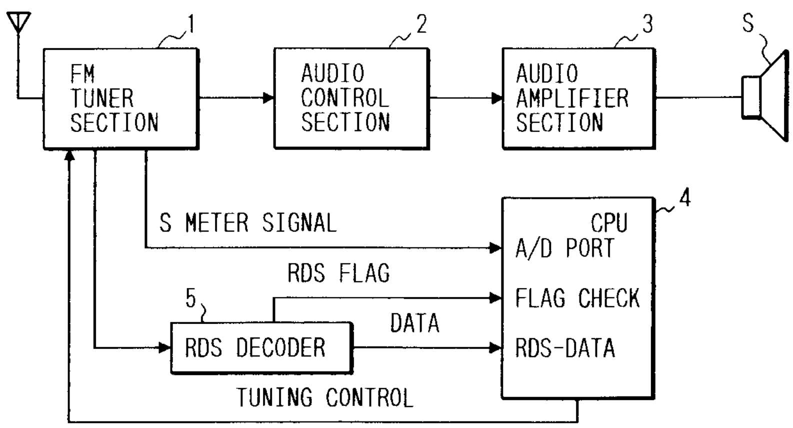
(54) **RDS receiver.**

(57) An RDS receiver which automatically selects the highest one in broadcast signal field strength of a plurality of radio stations broadcasting one and the same program according to AF codes corresponding to the radio stations included in RDS data in a radio data system. In the RDS receiver, one of the plurality of radio stations broadcasting one and the same program is automatically selected by a CPU (4), according to the AF codes included in the RDS data which are received by an FM tuner section (1). Before this automatic selecting operation, it is detected whether or not the broadcast signal of an AF code radio station being received suffers from adjacent frequency interference by an RDS decoder (5), and a value of the S meter signal of the AF code radio station is forcibly zeroed by a transistor (Q) when the RDS decoder (5) detects that the broadcast signal of the AF code radio station suffers from adjacent frequency interference.

FIG. 1

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## BACKGROUND OF THE INVENTION

### Field of the Invention

This invention relates to an RDS (radio data system) receiver.

### Description of the Related Art

RDS receivers have been widely used for instance in Europe. The RDS receiver has an AF (alternative frequency) switching function; that is, when is being moved, it is able to receive one and the same program continuously while switching the receiving frequencies.

RDS data transmitted from radio stations, being modulated in a multiplex mode, include data on an AF list which is a list of different frequencies with which one and the same program is broadcasted. The RDS receiver momentarily receives the broadcast signal of an aimed one of the frequencies registered in the AF list, and detects its field strength with a signal strength meter (hereinafter referred to as "an S meter", when applicable). The field strength thus detected is compared with that of the broadcast signal which is being received at present, and the signal higher in field strength is selected.

In the above-described RDS receiver, the S meter is wide in receiving signal band. Therefore, the RDS receiver is disadvantageous in the following points: If interference of adjacent frequency signals occurs while the signal of a frequency is being received which is low in field strength, then it may be erroneously determined to be high in field strength by the effect of the interference, as a result of which a frequency switching operation is carried out to select the signal. Furthermore, if, when the broadcast signal of a radio station is being received, interference of adjacent frequency signals advances, then it is erroneously determined that the broadcast signal is high in field strength, as a result of which it becomes impossible to switch the radio station over to another radio station whose broadcasting frequency is registered in the AF list even if the broadcast signal of the latter radio station is higher in field strength.

In order to eliminate the above-described difficulties, for instance Japanese Patent Unexamined Publication No. Hei. 1-208030 has disclosed the following method: The broadcast signal of a radio station of which the frequency is registered in the AF code list (hereinafter referred to as "a first radio station", when applicable), and the broadcast signal of another radio station (hereinafter referred to as "a second radio station", when applicable) of which the frequency is within ±100 kHz of the broadcasting frequency of the first radio station are received, and the field strength of the broadcast signal of the first radio station is adjusted according to the field strength of the broadcast signal of the second radio station.

As was described above, in the method, it is necessary to receive the broadcast signal of the second radio station of which the frequency is close to that of the broadcast signal of the first radio station which is registered in the AF code list. Hence, the method is disadvantageous in that selection of a radio station takes time; that is, the RDS device is low in response. In addition, it is necessary to store data on a number of radio stations; that is, it is necessary to use a large capacity memory.

## SUMMARY OF THE INVENTION

Accordingly, an object of this invention is to eliminate the above-described difficulties accompanying a conventional RDS receiver.

In attaining the above object, the invention provides an RDS receiver which automatically selects the highest one in broadcast signal field strength of a plurality of radio stations broadcasting one and the same program according to AF codes corresponding to the radio stations included in transmission data in a radio data system, including receiving means for receiving the transmission data, automatic tuning means for automatically selecting one from among the plurality of radio stations broadcasting one and the same program according to the AF codes included in the transmission data which are received by the receiving means, interference detecting means for detecting whether or not the broadcast signal of an AF code radio station being received suffers from adjacent frequency interference before the automatic selecting operation by the automatic tuning means, and decreasing means for decreasing a value of data on the field strength of the broadcast signal of the AF code radio station when the interference detecting means detects that the broadcast signal of the AF code radio station suffers from adjacent frequency interference.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate the embodiments of the invention and, together with the description, serve to explain the objects, advantages and principles of the invention. In the drawings,

FIG. 1 is a block diagram showing the arrangement of an RDS receiver according to a first embodiment of the invention;

FIG. 2 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 1;

FIG. 3 is a block diagram showing the arrangement of an RDS receiver according to a second embodiment of the invention;

FIG. 4 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 3;

FIG. 5 is a block diagram showing the arrangement of an RDS receiver according to a third embodiment of the invention;

FIG. 6 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 5;

FIG. 7 is a block diagram showing the arrangement of an RDS receiver according to a fourth embodiment of the invention; and

FIG. 8 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 7.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, preferred embodiments of the invention will be described with reference to the accompanying drawings.

FIG. 1 is a block diagram showing an RDS receiver according to a first embodiment of the invention. An RDS broadcast signal received by an FM tuner section 1 is applied through an audio control section 2 and an audio amplifier section 3 to a loudspeaker S, where it is reproduced as sounds.

The field strength of the broadcast signal received by the FM tuner section 1 is applied as an S meter signal to a CPU (central processing unit) 4, in which it is subjected to digital conversion. Thus, the field strength of the broadcast signal is detected.

RDS data received by the FM tuner section 1 are decoded by an RDS decoder 5, and applied to the CPU 4. At this time, an RDS flag is outputted from the RDS decoder 5, to allow the CPU 4 to confirm that the RDS data are available.

The CPU 4 performs an AF switching operation according to a predetermined program. That is, according to an AF list included in the RDS data, the broadcasting frequencies are switched to select a radio station broadcasting the same program with a higher field strength.

Furthermore, the embodiment is so designed that the AF switching operation is carried out correctly even if interference of adjacent frequency signals occurs.

It is known in the art that RDS data can be obtained when the field strength is of the order of about 15 to 30 dB. In the case where there is a radio station the of which the broadcast signal is high in field strength at an adjacent frequency, the sensitivity is decreased because of the AGC characteristic of the tuner, and the RDS data obtaining capability is lowered.

On the basis of the above-described fact, the CPU 4 determines it from the RDS flag supplied from the RDS decoder 5 whether or not the RDS data have been obtained, and detects whether or not the S meter signal is larger than the true value $V_a$ of field strength with which RDS data can be obtained.

In the case where no RDS data are obtained, and the S meter signal is larger than the true value $V_a$, it can be determined that there is an interfering radio station. Therefore, in this case, the value indicated by the S meter signal is forcibly regarded as zero, and the above-described AF switching operation is carried out.

In addition, even if the AF switching operation is carried out in the above-described manner, the previous broadcast signal may be received again which suffers from the interfering signal. That is, the field strength comparison must be achieved instantaneously when the frequencies are switched, and it is difficult to determine whether or not RDS data can be obtained in a short time. Therefore, the above-described decision with the S meter signal is rather difficult to achieve, so that the signal reception may be switched back.

Hence, in the case where it is determined that there is an interfering radio station near, the CPU 4 marks the frequency of the radio station in the AF list, and lowers the order of priority in switching the receiving frequency over to the frequency of the radio station.

The operation of the RDS receiver shown in FIG. 1 will be described with reference to FIG. 2.

An RDS broadcast signal is received (Step 10), and it is determined whether or not RDS data are available (Step 11). In the case where RDS data are available, broadcast signals from radio stations registered in the AF list are successively received; that is, the frequency switching operation is carried out according to the AF list (Step 12). When there is a better radio station which broadcasts the same program with a field strength higher than that of the receiving station (Step 13), then the broadcast signal of the better radio station is selected (Step 20). When there is no such a better radio station, then Step 10 is effected again.

In the case where no RDS data are available in Step 11, then current voltage value of the S meter signal is compared with the voltage value $V_a$ of the S meter signal when the field strength is high enough to obtain RDS data (Step 14). When, in Step 14, the voltage value of the S meter signal is equal to or smaller than $V_a$, it is determined that the voltage value of the S meter signal is correct, and the switching operation is carried out (Step 15), and it is detected whether or not there is a radio station higher than the receiving station in field strength (Step 16). When there is no radio station higher in field strength, Step 10 is effected again. When there is such a better radio station, Step 20 is effected; that is, the better radio station is selected.

When, in Step 14, the voltage value of the S meter signal is larger than $V_a$, the voltage value is forcibly regarded as zero (0), and the switching operation is carried out (Step 17). When there is a better radio station broadcasting the same program with a higher field strength (Step 18), the frequency of the receiving radio station in the AF list is marked, and the order of priority in switching the receiving frequency over to it is lowered (Step 19), and the broadcast signal of the better radio station higher in field strength is selected (Step 20). When there is no such a better radio station, Step 10 is effected again.

In the embodiment described above, the AF switching operation is carried out according to the signal receiving conditions, not only the field strength but also the degree of signal interference. Hence, the broadcast signal can be accurately switched over to that of a radio station higher than the receiving station in field strength. Further, the frequency of the radio station which has been interfered is marked, and the order of priority in switching the receiving frequency over to it is lowered. This method eliminates the difficulty that the radio station which has been interfered is selected again. Furthermore, unlike the conventional receiver, it is unnecessary to receive the broadcast signal of a radio station whose frequency is adjacent to the frequencies registered in the AF code list. Therefore, the RDS receiver is high in response, and needs not to have a large capacity memory.

Next, a second embodiment of the invention will be described with reference to FIGs. 3 and 4.

FIG. 3 shows the arrangement of an RDS receiver according to the second embodiment of the invention. In the second embodiment, it is detected whether or not RDS data are obtained, thereby to detect interference of adjacent frequency signals.

The RDS is a broadcasting system in which pulse modulation signals are superposed on an FM modulation signal in a multiplex mode by using a pilot signal of 57 kHz. Since the pilot signal is of high tone, 57 kHz, the demodulation frequency band must be sufficiently wide. In general, the filter characteristic of a demodulation band is proportional to the magnitude of signal strength; that is, it is wide with a high signal strength, and narrow with a low signal strength. Hence, the RDS data cannot be demodulated when the signal strength decreases to some extent. In the case of interference of adjacent frequency signals, or in the case where interference occurs with the receiving frequency, the sensitivity is decreased by AGC (automatic gain control), and therefore the signal strength can be lowered.

On the basis of the above-described two characteristics, it is detected whether or not the RDS data which has been demodulated is obtained, thereby to artificially detect whether or not there is an interfering radio station.

The second embodiment will be described concretely with reference to FIG. 3.

An RDS broadcast signal received by an FM tuner section 1 is applied through an audio control section 2 and an audio amplifier section 3 to a loudspeaker S, where it is reproduced as sounds.

The field strength of the broadcast signal received by the FM tuner section 1 is applied as an S meter signal to a CPU 4, in which it is subjected to digital conversion. Thus, the field strength of the broadcast signal is detected.

RDS data received by the FM tuner section 1 are decoded by an RDS decoder 5, and applied to the CPU 4. Upon detection of the RDS data, the RDS decoder 5 sets an RDS flag, and applies an RDS presence or absence signal to a transistor Q, so that the transistor Q is rendered conductive (on) when no RDS data is detected. When the transistor Q is rendered conductive (on), the S meter signal is grounded; whereas when the transistor Q is rendered non-conductive (off), the S meter signal is not grounded. That is, when no RDS data is detected, the S meter signal is decreased.

The CPU 4 performs an AF switching operation according to a predetermined program. That is, according to an AF list included in the RDS data, the broadcasting frequencies are switched to select a radio station broadcasting the same program with a higher field strength.

The operation of the RDS receiver shown in FIG. 3 will be described with reference to FIG. 4.

An RDS broadcast signal is received (Step 21), and it is determined whether or not RDS data are available (Step 22A). In the case where RDS data are available, broadcast signals from radio stations registered in the AF list are successively received; that is, the frequency switching operation is carried out according to the AF list (Step 23). When there is a better radio station which broadcasts the same program with a field strength higher than that of the receiving station (Step 24), then the broadcast signal of the better radio station is selected (Step 28). When there is no such a better radio station, then Step 21 is effected again.

In the case where no RDS data are available in Step 22A, the voltage value of the S meter signal is forcibly zeroed by rendering the transistor Q conductive, and the switching operation is carried out (Step 25). When there is a better radio station broadcasting the same program with a higher field strength (Step 26), the frequency of the receiving radio station in the AF list is marked, and the order of priority in switching the receiving frequency over to it is lowered (Step 27), and the broadcast signal of the better radio station higher in field strength is selected (Step 28). When there is no such a better radio station, Step 21 is effected again.

In the RDS receiver designed as described above, the S meter signal may be increased for instance when interference of adjacent frequency signals occurs. If, in this case, it is determined from the non-detection of RDS data that there is interference of adjacent frequency signals, the transistor Q is rendered conductive (on), so that the S meter signal is forcibly zeroed. Thus, the radio stations are correctly traced. Further, unlike the conventional receiver, it is unnecessary to receive the broadcast signal of a radio station whose frequency is adjacent to the frequencies registered in the AF code list. Therefore, the RDS receiver is high in response, and needs not to have a large capacity memory.

FIG. 5 shows a third embodiment of the invention which detects interference of adjacent frequency signals on the basis of AFC (automatic frequency control).

In an FM detection, a stable tuning frequency can be detected with respect to a received frequency by AFC. In an FM signal of 100% modulation, frequency deviation of ±75 kHz from a received frequency occurs; however, the central frequency and the received frequency are made coincident with each other by AFC all the time.

If there is an interfering radio station, and the broadcast signal of the interfering radio station increases in the degree of modulation, the frequency deviation thereof affects the receiving frequency, so that the receiving frequency becomes non-uniform in frequency deviation. In this case, the frequency regarded as the central frequency is shifted by AFC, and the voltage output of AFC is varied.

Hence, the interfering radio station can be detected by detection of the variation in the voltage output of AFC.

The third embodiment will be described concretely with reference to FIG. 5, in which parts corresponding functionally to those which have been described with reference to FIG. 3 are therefore designated by the same reference numerals or characters.

The FM tuner section 1 applies an AFC voltage $V_{AFC}$ and a reference voltage $V_{ref}$ to a voltage comparator 6, where they are subjected to comparison. When the difference between those voltages is higher than a predetermined value $\underline{a}$, the voltage comparator 6 outputs an interfering radio station detection signal, which is applied to the transistor Q. When the transistor Q is rendered conductive (on) by the detection signal, the S meter signal from the FM tuner section 1 is forcibly zeroed.

FIG. 6 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 5.

In FIG. 6, after Step 21, it is determined whether or not $|V_{ref} - V_{AFC}|$ is higher than the predetermined value $\underline{a}$ (Step 22B). The other Steps are the same as those in FIG. 4 which have been described, and the explanation thereof will be omitted.

In the RDS receiver designed as described above, the S meter signal may be increased for instance when interference of adjacent frequency signals occurs. If, in this case, it is determined from the variation in the output voltage of AFC that there is interference of adjacent frequency signals, the transistor Q is rendered conductive (on), so that the S meter signal is forcibly zeroed. Thus, with the RDS receiver, the radio station tracing operation is carried out correctly. Also, in this embodiment, unlike the conventional receiver, it is unnecessary to receive the broadcast signal of a radio station whose frequency is adjacent to the frequencies registered in the AF code list. Therefore, the RDS receiver is high in response, and needs not to have a large capacity memory.

FIG. 7 shows a fourth embodiment of the invention in which an AC component of the S meter signal is utilized to detect interference of adjacent frequency signals.

It is known in the art that, when the degree of modulation of the broadcast signal of an interfering radio station increases to some extent, the received signal is disturbed by noises, so that the output sounds are distorted. It is also known in the art that, in this case, the disturbing noises appear, as an AC component, in the S meter signal. Hence, by detecting the AC component of the S meter signal, the interference of adjacent frequency signal can be detected.

The fourth embodiment of the invention will be described concretely with reference to FIG. 7, in which parts corresponding functionally to those which have been described with reference to FIG. 3 are therefore designated by the same reference numerals or characters.

The S meter signal outputted from the FM tuner section 1 is applied to a capacitor C, so that its AC component is extracted. The AC component is applied to an A/D (analog-to-digital) converter 7, where it is subjected to analog-to-digital conversion. The output of the converter 7 is applied to the transistor Q to render the latter Q conductive (on). When the transistor Q is rendered conductive (on), the S meter signal is zeroed. As was described above, when interference of adjacent frequency signals occurs, the disturbing noises are mixed, as an AC component, in the S meter signal. Hence, by extracting the AC component by using the capacitor C, and by applying it to the A/D converter, the interfering radio station can be detected.

FIG. 8 is a flow chart for explaining the operation of the RDS receiver shown in FIG. 7.

In FIG. 8, after Step 21, it is determined whether or not the AC component of the S meter signal is larger (Step 22C). The other Steps are the same as those in FIG. 4 which have been described, and the explanation thereof will be omitted.

In the RDS receiver designed as described above, the S meter signal may be increased for instance when interference of adjacent frequency signals occurs. If, in this case, the presence of interference of adjacent frequency signals is determined from the detection of the AC component of the S meter signal, then the transistor Q is rendered conductive (on), so that the S meter signal is forcibly zeroed. Thus, with the RDS receiver, the radio station tracing operation is carried out correctly. Also, in this embodiment, unlike the conventional receiver, it is unnecessary to receive the broadcast signal of a radio station whose frequency is adjacent to the frequencies registered in the AF code list. Therefore, the RDS receiver is high in response, and needs not to have a large capacity memory.

## Claims

1. An RDS receiver which automatically selects the highest one in broadcast signal field strength of a plurality of radio stations broadcasting one and the same program according to AF codes corresponding to the radio stations included in transmission data in a radio data system, comprising:

   receiving means (1) for receiving the transmission data;

   automatic tuning means (4) for automatically selecting one from among the plurality of radio stations broadcasting one and the same program according to the AF codes included in the transmission data which are received by said receiving means (1);

   interference detecting means (4, 5, 6 or 7) for detecting whether or not the broadcast signal of an AF code radio station being received suffers from adjacent frequency interference before the automatic selecting operation by said automatic tuning means; and

   decreasing means (4 or Q) for decreasing a value of data on the field strength of the broadcast signal of the AF code radio station when said interference detecting means detects that the broadcast signal of the AF code radio station suffers from adjacent frequency interference.

2. The RDS receiver according to claim 1, wherein said interference detecting means (4) detects whether or not the broadcast signal of the AF code radio station being received suffers from adjacent frequency interference on the basis of the transmission data and the data on the field strength of the broadcast signal of the AF code radio station which are outputted from said receiving means.

3. The RDS receiver according to claim 1, wherein said interference detecting means includes decoding means (5) for outputting a signal when the transmission data is not obtained.

4. The RDS receiver according to claim 3, wherein said decreasing means includes a transistor (Q) which is rendered conductive by the signal from said decoding means (5) whereby to decrease the value of the data on the field strength of the broadcast signal of the AF code radio station.

5. The RDS receiver according to claim 1, wherein said interference detecting means includes comparing means (6) for outputting a signal when the difference between an AFC voltage and a reference voltage which are supplied from said receiving means (1) is higher than a predetermined value.

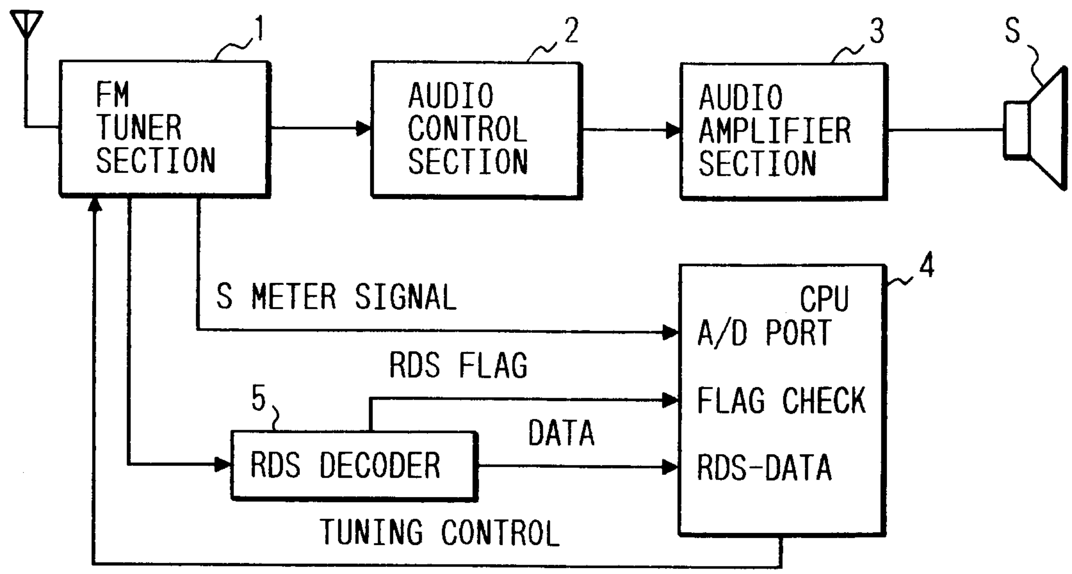
6. The RDS receiver according to claim 5, wherein said decreasing means includes a transistor (Q) which is rendered conductive by the signal from said comparing means (6) whereby to decrease the value of the data on the field strength of the broadcast signal of the AF code radio station.

7. The RDS receiver according to claim 1, wherein said interference detecting means includes converting means (7) for converting an AC component of the data on the field strength of the broadcast signal of the AF code radio station into a digital signal.

8. The RDS receiver according to claim 7, wherein said decreasing means includes a transistor (Q) which is rendered conductive by the digital signal from said converting means (7) whereby to decrease the value of the data on the field strength of the broadcast signal of the AF code radio station.

9. The RDS receiver according to claim 1, further comprising means (4) for marking the frequency of the AF code radio station and lowering the order of priority in switching the receiving frequency over to the frequency of the AF code radio station when said interference detecting means detects that the broadcast signal of the AF code radio station suffers from adjacent frequency interference.

FIG. 1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2
3
S
FM TUNER SECTION
AUDIO CONTROL SECTION
AUDIO AMPLIFIER SECTION
4
CPU
S METER SIGNAL
A/D PORT
RDS FLAG
5
FLAG CHECK
DATA
RDS DECODER
RDS-DATA
TUNING CONTROL

FIG. 3

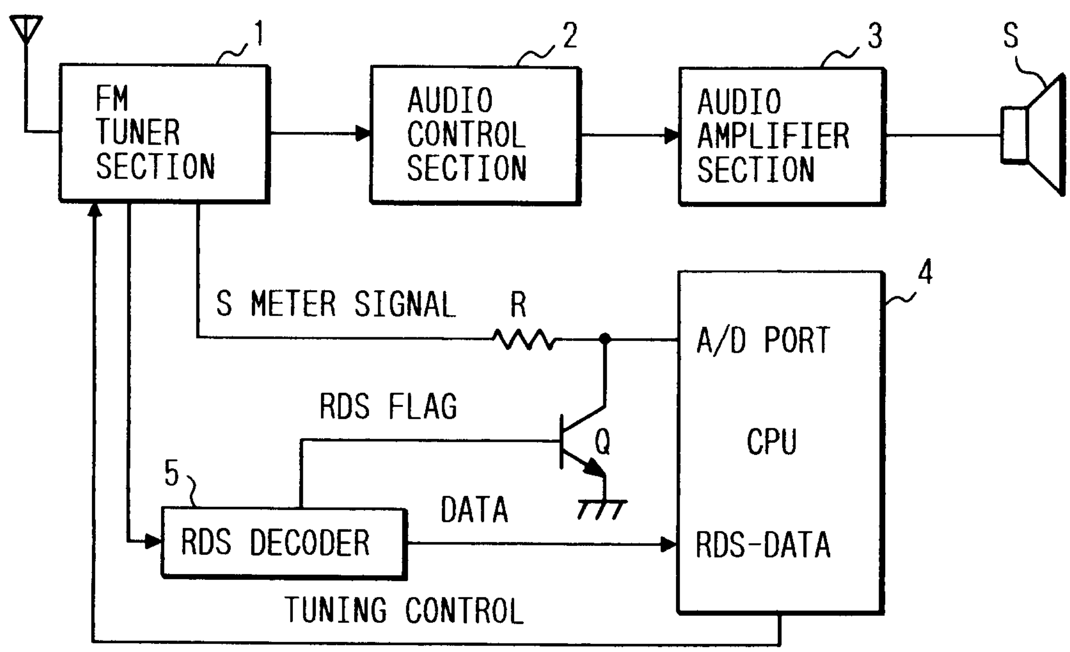

1
2
3
S
FM TUNER SECTION
AUDIO CONTROL SECTION
AUDIO AMPLIFIER SECTION
4
S METER SIGNAL
R
A/D PORT
RDS FLAG
Q
CPU
5
DATA
RDS DECODER
RDS-DATA
TUNING CONTROL

FIG. 2

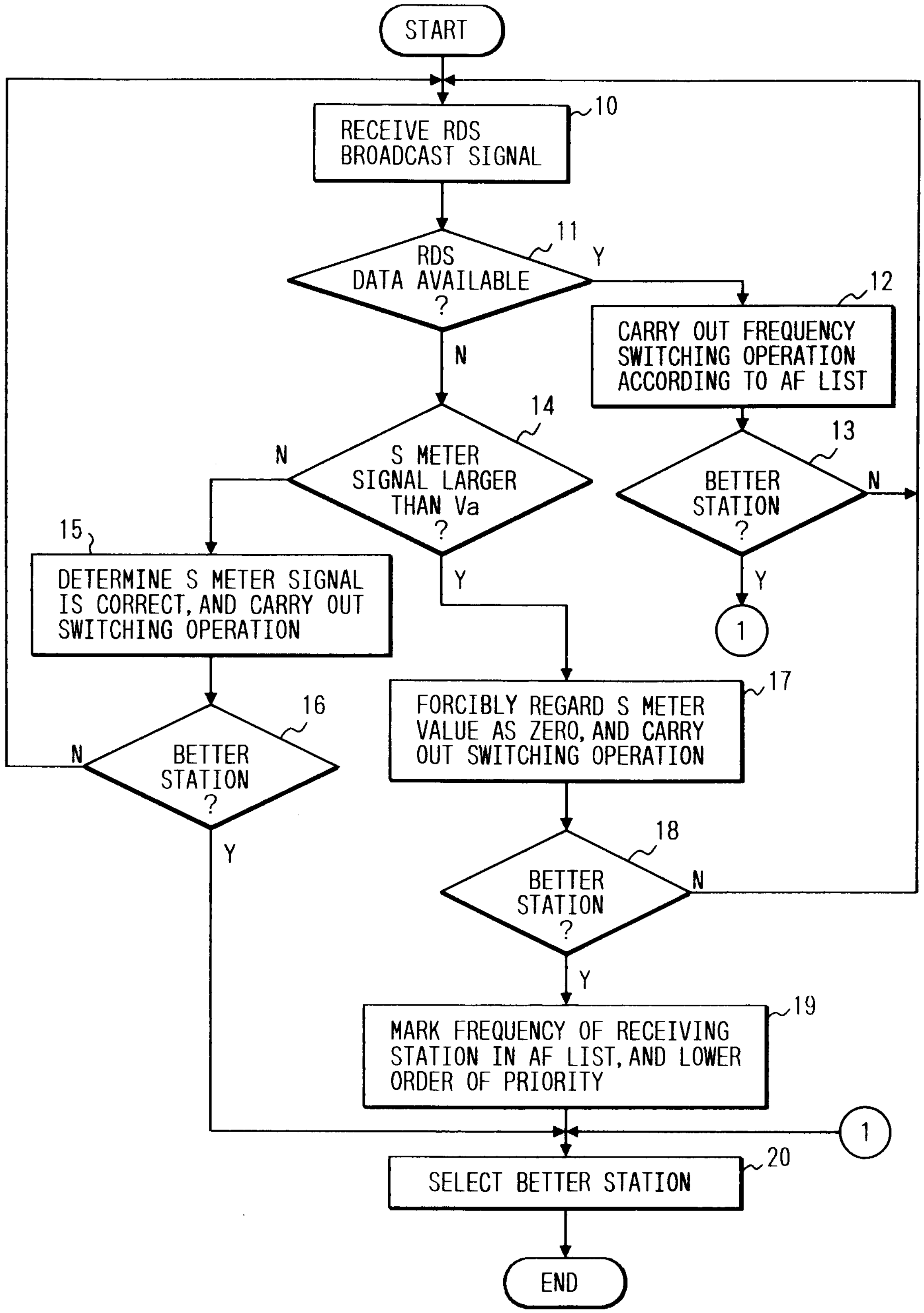

START
RECEIVE RDS BROADCAST SIGNAL
10
RDS DATA AVAILABLE ?
11
Y
N
CARRY OUT FREQUENCY SWITCHING OPERATION ACCORDING TO AF LIST
12
S METER SIGNAL LARGER THAN Va ?
14
BETTER STATION ?
13
N
Y
1
DETERMINE S METER SIGNAL IS CORRECT, AND CARRY OUT SWITCHING OPERATION
15
FORCIBLY REGARD S METER VALUE AS ZERO, AND CARRY OUT SWITCHING OPERATION
17
BETTER STATION ?
16
BETTER STATION ?
18
MARK FREQUENCY OF RECEIVING STATION IN AF LIST, AND LOWER ORDER OF PRIORITY
19
SELECT BETTER STATION
20
END

FIG. 4

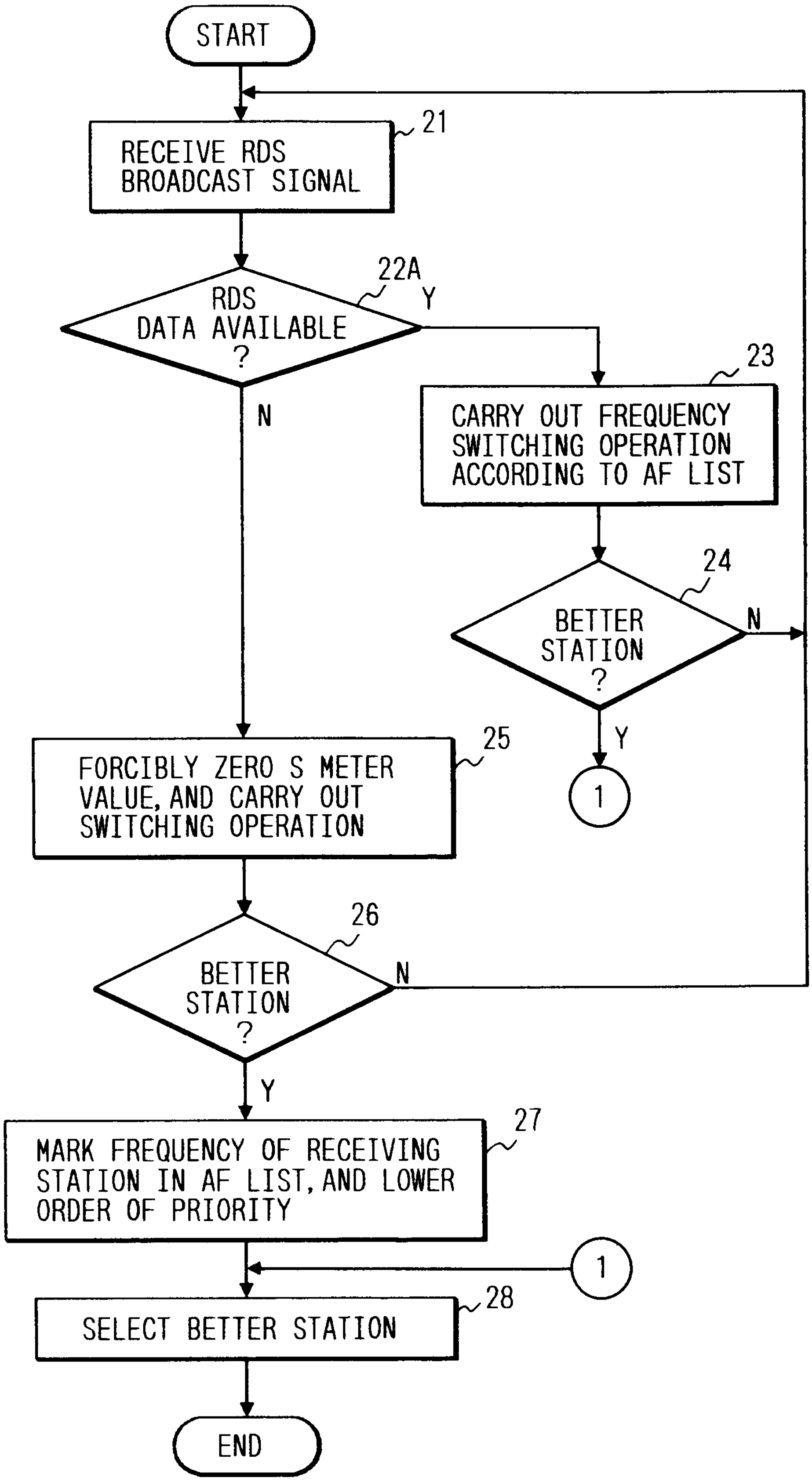

START
RECEIVE RDS BROADCAST SIGNAL
21
RDS DATA AVAILABLE ?
22A
Y
N
CARRY OUT FREQUENCY SWITCHING OPERATION ACCORDING TO AF LIST
23
BETTER STATION ?
24
N
Y
1
FORCIBLY ZERO S METER VALUE, AND CARRY OUT SWITCHING OPERATION
25
BETTER STATION ?
26
N
Y
MARK FREQUENCY OF RECEIVING STATION IN AF LIST, AND LOWER ORDER OF PRIORITY
27
1
SELECT BETTER STATION
28
END

FIG. 5

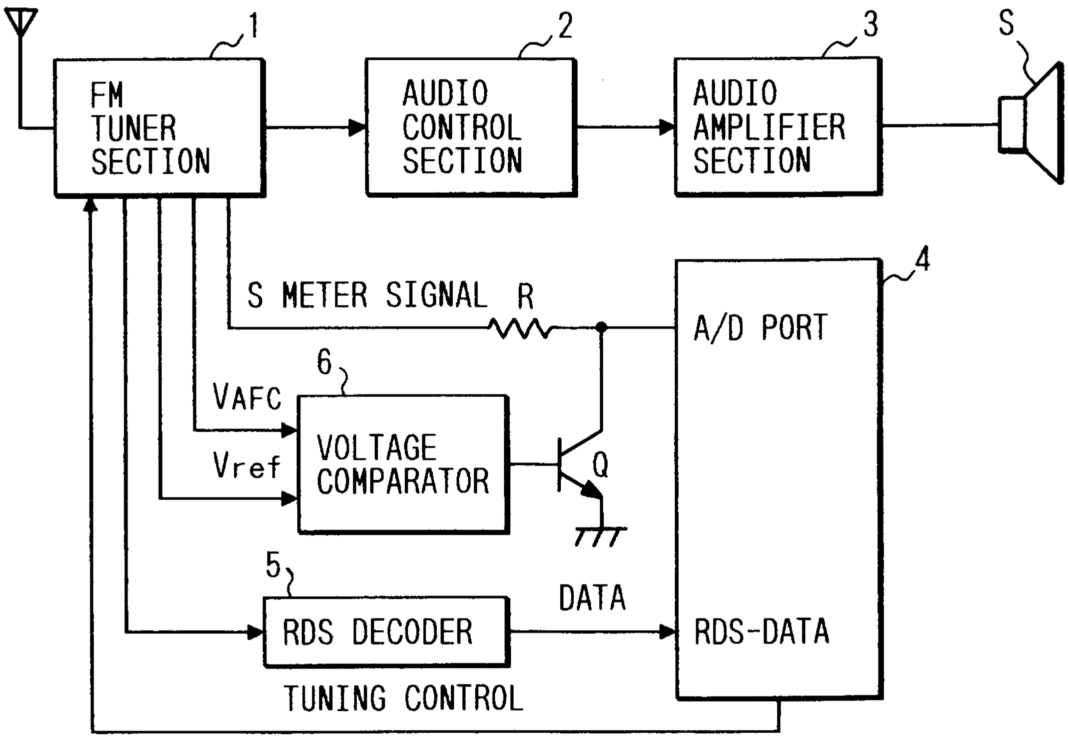

1
2
3
S
FM TUNER SECTION
AUDIO CONTROL SECTION
AUDIO AMPLIFIER SECTION
4
S METER SIGNAL
R
A/D PORT
6
VAFC
Vref
VOLTAGE COMPARATOR
Q
5
RDS DECODER
DATA
RDS-DATA
TUNING CONTROL

FIG. 7

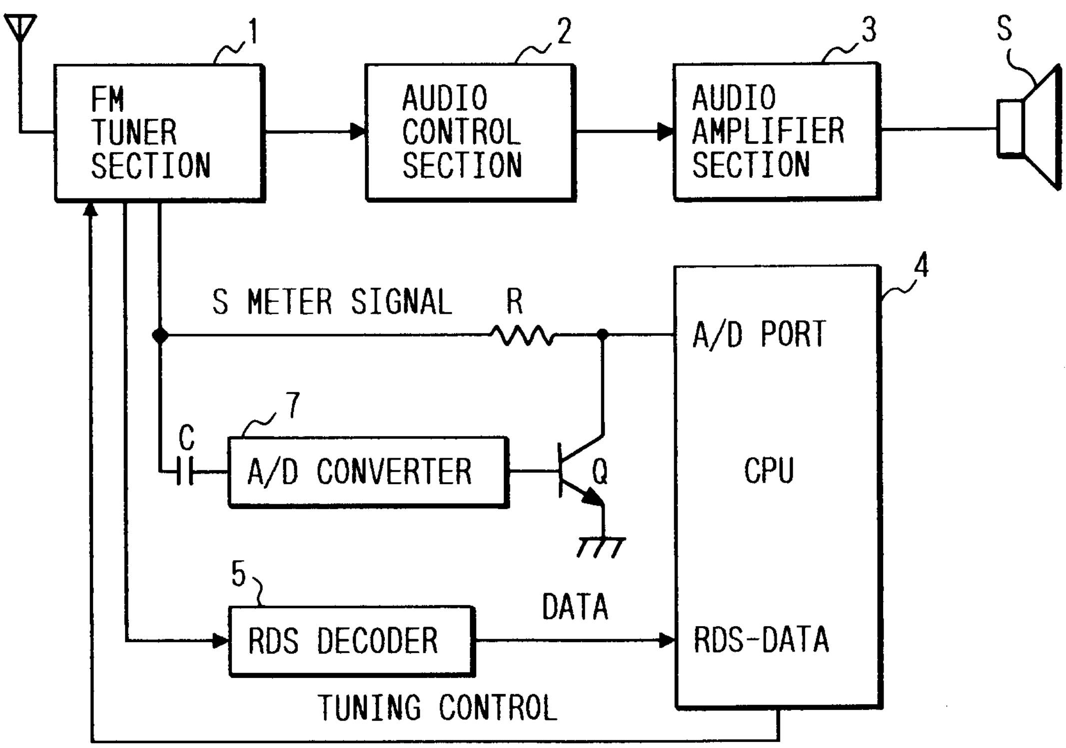

1
2
3
S
FM TUNER SECTION
AUDIO CONTROL SECTION
AUDIO AMPLIFIER SECTION
4
S METER SIGNAL
R
A/D PORT
7
C
A/D CONVERTER
Q
CPU
5
RDS DECODER
DATA
RDS-DATA
TUNING CONTROL

FIG. 6

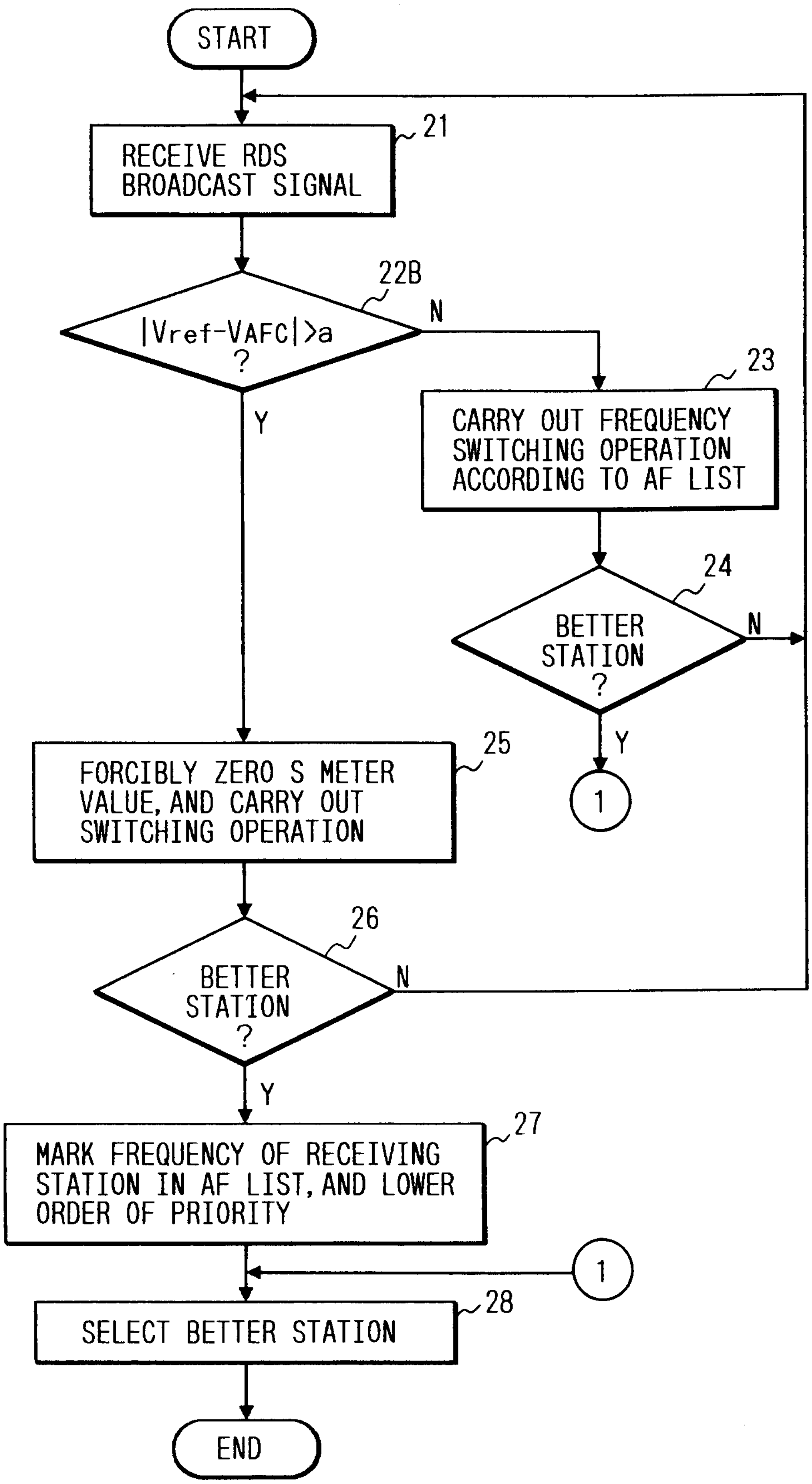
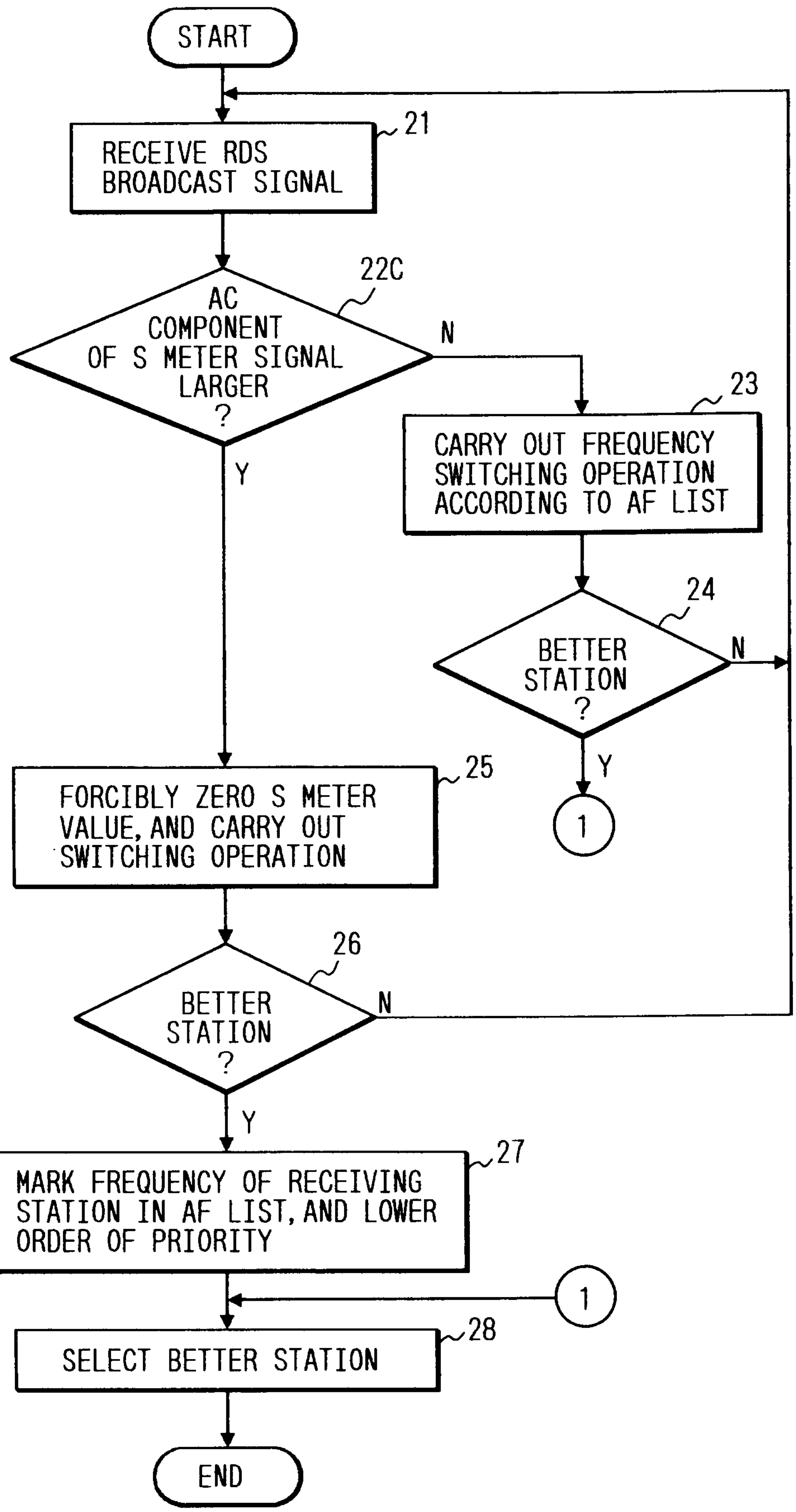

START
21
RECEIVE RDS BROADCAST SIGNAL
22B
|Vref-VAFC|>a ?
N
Y
23
CARRY OUT FREQUENCY SWITCHING OPERATION ACCORDING TO AF LIST
24
BETTER STATION ?
N
Y
1
25
FORCIBLY ZERO S METER VALUE, AND CARRY OUT SWITCHING OPERATION
26
BETTER STATION ?
N
Y
27
MARK FREQUENCY OF RECEIVING STATION IN AF LIST, AND LOWER ORDER OF PRIORITY
1
28
SELECT BETTER STATION
END

FIG. 8


START
RECEIVE RDS BROADCAST SIGNAL
21
AC COMPONENT OF S METER SIGNAL LARGER ?
22C
N
Y
CARRY OUT FREQUENCY SWITCHING OPERATION ACCORDING TO AF LIST
23
BETTER STATION ?
24
N
Y
1
FORCIBLY ZERO S METER VALUE, AND CARRY OUT SWITCHING OPERATION
25
BETTER STATION ?
26
N
Y
MARK FREQUENCY OF RECEIVING STATION IN AF LIST, AND LOWER ORDER OF PRIORITY
27
1
SELECT BETTER STATION
28
END

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 93 11 9058

## 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.5) |
|---|---|---|---|
| A | EP-A-0 275 527 (TELEFUNKEN FERNSEH UND RUNDFUNK G.M.B.H.)<br>* column 1, line 10 - column 6, line 18; claims 1,8; figures 2,3 *<br>--- | 1 | H04H1/00 |
| A | EP-A-0 443 436 (GRUNDIG E.M.V.)<br>* column 1, line 1 - column 3, line 50; claims 1,3 *<br>--- | 1 | |
| A | WO-A-88 08223 (H.U.C. ELEKTRONIK G.M.B.H.)<br>* page 3, line 29 - page 5, line 7; claims 4,5; figure 4 *<br>* page 9, line 1 - line 20 *<br>--- | 1 | |
| A | DE-A-38 32 455 (PIONEER ELECTRONIC CORP.)<br>* column 1, line 1 - column 5, line 35; claim 1; figure 3 *<br>----- | 1 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

H04H

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 15 February 1994 | De Haan, A |

CATEGORY OF CITED DOCUMENTS

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