

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 713 301 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

22.05.1996 Bulletin 1996/21

(51) Int Cl.⁶: H04H 1/00

(21) Application number: 95308292.2

(22) Date of filing: 20.11.1995

(84) Designated Contracting States:
DE FR GB(30) Priority: 18.11.1994 JP 285363/94
30.08.1995 JP 222037/95(71) Applicant: KABUSHIKI KAISHA TOSHIBA
Kawasaki-shi, Kanagawa-ken 210 (JP)

(72) Inventors:

- Yamada, Masatoshi,
c/o Intellectual Property Div.
Minato-ku, Tokyo (JP)

- Koga, Takashi, c/o Intellectual Property Div.
Minato-ku, Tokyo (JP)

(74) Representative: Muir, Ian R. et al
HASeltine LAKE & CO.
Hazlitt House
28 Southampton Buildings
Chancery Lane
London WC2A 1AT (GB)

(54) **Method and system for transmitting supplementary data signals with an audio signal as a subaudible signal**

(57) A signal transmitter for transmitting signals including at least an audio signal, the signal transmitter includes a multiplexer for multiplexing a digital data signal on a part of an audio frequency band of the audio

signal and a frequency modulator or a phase modulator for modulating the digital data by a burst state carrier in the audio frequency band.

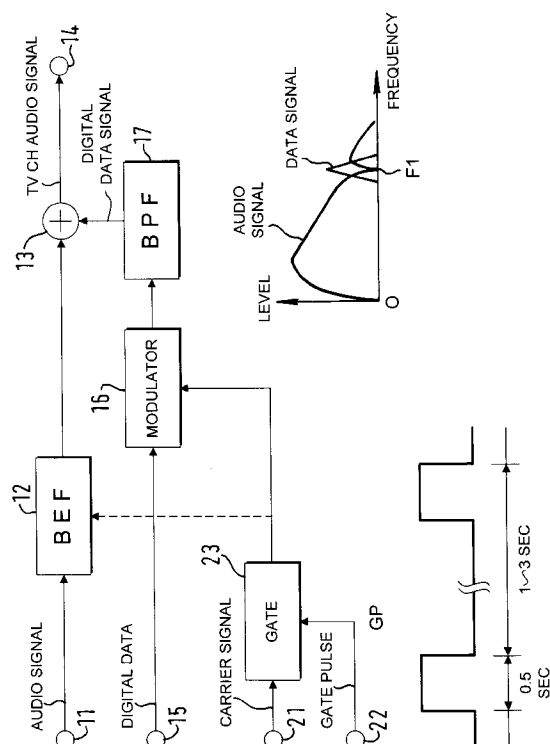


FIG.2a

Description

The present invention relates to a signal transmitter and a receiver, and more particularly to a signal transmitter which transmits digital data by multiplexing them on a transmitting signal and a receiver for receiving the digital data.

Conventionally, there is a system that a signal is transmitted and received by multiplexing an additional signal with a signal for transmitting and receiving. For example, USP 4.807.031 transmits a television signal and digital data simultaneously by multiplexing the digital data with the television signal and transmitting and receiving them.

A principle of the digital data transmitting receiving system is that, for example, it transmits the data by distinguishing "0" or "1", in accordance with when the luminance modulation is performed to a raster forming a horizontal scanning line at every lines mutually in a scanning field of the video signal. 0 and 1 is for when the luminance modulation is not performed. In the receiver, the data are distinguished if the raster luminance is modulated or not by using a photo diode.

A block diagram of the data receiving apparatus is shown in FIGURE 1. In FIGURE 1, the data receiving apparatus comprises a converter 1016 for detecting a raster brightness from the television and a receiving circuit 1056 for demodulating the detected signal to the digital data. The raster luminance modulated signal is detected in a photo-diode 1018 in the converter 1016, and amplified in an amplifier 1058. The amplified signal draws out the energy in the brightness modulating frequency 7.867 kHz band by bandpass filters 1060 and 1062, and smoothed in a total frequency rectifier 1064. A level comparator 1066 demodulates the digital data by comparing the smoothed signal with the reference voltage. The received digital data is again modulated in an IR modulator 1068 to emit IR energies 1032a, 1032b and 1032c by IREDs 1026, 1028 and 1030 for providing signals to other apparatus in a wireless manner.

However, the above mentioned system has several drawbacks to obtain a data at the data receiver. For example, since the data representation at the receiver is performed by the change of raster luminance the data receiving sensitivity is affected by adjustment condition of the luminance or an ambient light, and it results a high rate of the data error. Further the receiver itself is affected by an ambient light such as a fluorescent lighting to result a high rate of the received data error or a malfunction. Further, since the system modulates the raster luminance it is impossible to be adapted for liquid crystal displays.

Such a system for transmitting a specified service information must be constructed so as that a viewer is prohibited watches or listens a broadcast program or a CM (commercial message) is not received without being any person there when the information is transmitted. However, it was not considered so far.

Further, as the data service system using the conventional broadcasting system there are an emergency broadcasting at a natural diameter using a audio sub-channel of a television sound multiplexing broadcasting or a news, a stock and a weather forecast using a teletext.

However, these system as mentioned above need a modification of the television receiver itself and is enable to make a use of the conventional television receiver. Other systems using an audio sub-channel for a television channel sound multiplexing broadcasting occupies the full of the transmission band of the audio sub-channel. A monaural type television receiver is enable to obtain a data. Still other systems using a teletext need to install an expensive data signal extracting and demodulating apparatus in the receiver since it transmits a data by inserting a digital data for a vertical blanking time so it is enable to obtain a data by using the conventional general television receiver.

As described above, conventional data service systems need to modify the television receiver itself to receive the data. Although if the modification has been carried out there still remains a problem that the system using the sound multiplexing broadcasting is limited a audio sub-channel. Further, in case of a data transmission and receiving system by a raster luminance modulation an optical data representation means is easily affected by the surrounding disturbance, and it causes a problem of a reliability for obtaining the data.

Furthermore, according to the conventional data transmitting and receiving system the data was able to received without watching a broadcast program or a CM with which the digital data is multiplexed, and a privilege which should be given to only people having watched a specified broadcast program or a CM was able to obtain unfairly.

It is, therefore, an object of the present invention to provide a signal transmitter and receiver which is able to realize simply and inexpensively and have a high reliance for obtaining the data without an improvement of the conventional receiver itself.

Further, the present invention has an object to provide a signal transmitter and receiver which is able to transmit and receive a digital data effectively without giving any interference or regulation to the conventional transmitted signal.

In order to achieve the above object, a signal transmitter and receiver according to one aspect of the present invention includes a transmitter for transmitting at least an audio signal and a receiver for receiving the transmitted signal transmitted from the transmitter, has means for multiplexing a digital signal on a part of an audio frequency band in the transmitter and for extracting the digital data signal from the reproduced audio signal in the receiver.

Accordingly, it is possible to transmit and receive the digital data effectively without giving any interference or limitation to the conventional transmitted signal.

Furthermore, the present invention has an object to provide a signal receiving apparatus which prohibits the data reception in the absence of the viewer's positive reaction in response to specified data transmitted by multiplexing on a broadcast program or a CM.

In order to achieve the above object, the data receiving apparatus according to the second aspect of the present invention for receiving a transmitting signal includes a data extractor for extracting the multiplexed digital data, a memory for storing the data extracted by the extractor and an indicator for indicating a preservation of the data to the memory.

According to the second aspect of the present invention for storing the data only when the indication for preserving the data is shown when the digital data is received, it is possible to receive the data only when the viewer stays around the signal receiver.

Additional objects and advantages of the present invention will be apparent to persons skilled in the art from a study of the following description and the accompanying drawings, which are hereby incorporated in and constitute a part of this specification.

For a better understandings of the present invention and many of the attendant advantages thereof, reference will now be made by way of example to the accompanying drawings, wherein:

FIGURE 1 is a circuit diagram for explaining a conventional signal receiving apparatus;

FIGURE 2 is a drawing showing one embodiment of the first aspect of the present invention;

FIGURE 3 is a drawing showing another embodiment of the first aspect of the present invention;

FIGURE 4 is a drawing showing still another embodiment of the first aspect of the present invention;

FIGURE 5 is a drawing showing an example of devices employing the present invention;

FIGURE 6 is a circuit diagram for explaining one embodiment of the signal receiving apparatus according to the second aspect of the present invention;

FIGURE 7 is a circuit diagram for explaining first another embodiment of the second aspect of the present invention;

FIGURE 8 is a circuit diagram for explaining second another embodiment of the second aspect of the present invention;

FIGURE 9 is a circuit diagram for explaining third another embodiment of the second aspect of the present invention; and

FIGURE 10 is a circuit diagram for explaining fourth another embodiment of the second aspect of the present invention.

Referring now to FIGURES 2 to 5, a first aspect of the signal transmitter and receiver according to the present invention will be described in detail.

FIGURE 2 shows a whole construction of the signal transmitter and receiver according to the once embodiment of the present invention. An audio signal which is supplied to an input terminal 11 is supplied with a limited 7 KHz band for example in a band elimination filter (BEF) 12. An output of the BEF 12 is applied to a multiplexer (MPX) 13. The audio signal and a digital data (mentioned after) are multiplexed in the MPX 13 and the multiplex signal is output from an output terminal 14.

A digital data to be transmitted is applied to an input terminal 15 and a carrier is modulated in a modulator 16. The digital data signal output from the modulator 16 is limited its frequency band in a bandpass filter (BPF) 17 (BEF) and supplied to the MPX 13.

The carrier used in the modulator 16 is supplied from an input terminal via a gate 23. The gate 23 gates ON or OFF the passing of the carrier by a gate pulse GP supplied to an input terminal 22. For example, the circuit makes it pass by each 0.5 sec. at 1 to 3 sec. intervals. Accordingly, the carrier is supplied to the modulator 16 by being a burst shape.

The embodiment is using the burst state carrier, but it is needless to say that it can use a continuous carrier. Though a lot of variation will be possible as a gate pulse, the point is that the signal does not have a bad influence on other signals. Further, the BEF 12 limits a specified frequency region of the audio signal (the region where the digital data signal is multiplexed), however, it can depress only the period when the digital data signal is multiplexed by synchronizing with a timing of the gate pulse.

As described above, the television channel audio signal multiplexed with the digital data in the audio frequency band is transmitted with a television signal through a process of the television transmitter. On the other hand, the digital data signal is extracted from the reproduced audio signal at the receiver. In other words, a demodulated audio signal is output from a loudspeaker of a television receiver 31. The digital data signal is multiplexed on the demodulated audio signal frequency band. The demodulated audio signal is picked up by a microphone 41, amplified in an amplifier 42 and then extracted by a bandpass filter (BPF) 43. The extracted digital data signal is applied to a decoder 44. The decoder 44 carries out a demodulation by using a regenerated carrier. Then the demodulated data is supplied to an output terminal 45. Here, the regenerated carrier is obtained as described hereinafter. An output of the bandpass filter 43 is applied to a synchronous separator 46, where the carrier is detected, that is the timing of the gate pulse is detected, and then a switch 47 is controlled to turn ON or OFF. When the switch turns ON a modulation signal is supplied into a phase locked loop circuit (PLL) 48 from the bandpass filter 43. The phase locked loop circuit 48 compares the phase of the regenerated carrier which is generated continuously in the circuit with the modulation signal supplied there, and locks the phase of the regenerated carrier to the carrier of the

modulation signal.

FIGURE 3 shows a concrete embodiment of this invention.

In this embodiment a PSK (phase shift keying) system is used for modulating and demodulating the digital data. The same components as those shown in the embodiment mentioned above are assigned with the same marks. An audio signal is supplied to an input terminal 11, a digital data is supplied to an input terminal 15 and a gate pulse is supplied to an input terminal 22. A PSK modulator 121 comprises an oscillator 122 and a switch 123. The oscillator 122 outputs two carriers which reverse each other. The switch 123 selects one of the inverted phase carrier or non-inverted phase carrier according to whether the digital data is "0" or "1". The digital data signal output from the PSK modulator 121 is applied to the MPX 13 via a switch 125 which is turned ON by the gate pulse and a bandpass filter 126. Accordingly the multiplex signal of the digital data signal and the audio signal as shown in FIGURE 2 is able to be output from the output terminal 14.

The signal is transmitted with a television signal, reproduced at a television receiver, output from a loudspeaker and picked up by a microphone. An output of a microphone 41 is amplified in an amplifier 42 and applied to a bandpass filter 43. By the bandpass filter 43 the digital data signal mentioned above (PSK modulated wave) is extracted. The digital data signal is supplied to a synchronous separator 46 and a switch 131. A gate pulse with a regular period is reproduced in the synchronous separator 46. The switch 131 is controlled by the gate pulse. According to this, a PSK modulation component (digital data signal) is provided from the switch 131, and applied to a PSK demodulator 132. The PSK demodulator 132 comprises a carrier regenerator 133 and the MPX 134. The digital data is demodulated in and output from the multiplier 134 and supplied to a latch 135. The latch 135 latches a data reproduced in the period which synchronizes the gate pulse.

FIGURE 4 shows another example of a concrete embodiment of this invention.

In this embodiment a FSK (frequency shift keying) system is used for modulating and demodulation the digital data.

An audio signal is supplied to an input terminal 11, a digital data is supplied to an input terminal 15 and a gate pulse is applied to an input terminal 22. The FSK modulator 140 comprises oscillators 141 and 142 having different oscillating frequencies and a switch 143 which select one of the outputs of these oscillators 141 and 142. The switch 143 selects one of the carriers output from the oscillators 141 and 142 according to whether the digital data is "0" or "1". The output (the digital data signal) of the FSK modulator 140 is applied to the MPX 13 via a switch 125 turned ON by the gate pulse and a bandpass filter 126. Accordingly, the multiplex signal of the digital data signal and the audio signal as explained in FIGURE 2 is able to be obtained from the output

terminal 14.

The signal is transmitted with a television signal, reproduced at a television receiver, output from a loudspeaker and picked up by a microphone. An output of a microphone 41 is amplified in an amplifier 42 and applied to a bandpass filter 43. By the bandpass filter 43 the digital data signal mentioned above (FSK modulated wave) is extracted. The digital data signal is supplied to a synchronous separator 46 and a switch 131. A gate pulse with a regular period is reproduced in the synchronous separator 46. The switch 131 is controlled by the gate pulse. According to this, a FSK modulation component (digital data signal) is provided from the switch 131, and applied to a FSK demodulator 145. The FSK demodulator 145 comprises a delay unit 146, and output of the delay unit 146 and an exclusive OR gate 147. A demodulating data output from the FSK demodulator 145 is supplied to a latch 135. The latch 135 latches a data reproduced in the period which synchronizes the gate pulse. In this embodiment, if the modulation index of the FSK modulation is changed to 0.5 will be an MSK modulation. Since the frequency band of the modulated wave can be narrow ideally by using the MSK modulation it is possible to make obstruction to an audio signal smaller.

In the above mentioned system, the digital data receiver can be provided outside the television receiver, or it can also be provided in the television receiver. Further, the embodiment mentioned above uses the audio signal transmitting system of the television receiver, however, it is needless to say that it can be easily applied to the audio signal transmitting system of the radio.

Further, in the above explanation, the audio signal for the data demodulation is picked up by the microphone 41, however, the present invention is not limited to this, it is also needless to say that the audio signal can be obtained by inserting a jack to an audio output line.

According to a data service system which adapt the digital data transmitting and receiving system mentioned above the television receiver itself does not have to be changed, and also it never limits the audio channel of the sound multiplex broadcast. Further, it never impair the reliability of receiving the data by suffering a surrounding disturbance to the transmitting medium at the receiver such as a data transmitting and receiving system by the raster modulation.

Next, some examples of the data service which make a use of the digital data transmitting and receiving system mentioned above will be explained.

First, a special information from a broadcast program sponsor can be mentioned as a case of the transmission of the digital data mentioned above. For example, in the case that the broadcast program sponsor transmits a code for discounting a specified commodity (coupon code) in a commercial time, an audience receives the coupon code as watching the commercial. That is, the fact that the coupon code was received in-

dicates that the viewers have watched or listened the commercial. The viewers watch the coupon code on a display and take a note or make a memory to store the fact so as to be able to receive a discount service for commodities by presenting the coupon to a salesperson when they want to purchase the specified commodity. Next, an information from a broadcasting station can be also mentioned as an example of the service data. For example, when a scheduled time for broadcasting the broadcast program or a subscription for a recording are changed the changed data are transmitted. Further it is possible to transmit a data for a time signal with information (time set for VTR e.g.). It also be possible to transmit information about a disaster, earthquake, typhoon, and a tsunami wave to general viewers.

FIGURES 5a to 5c are drawings showing a data processor for processing the demodulated data obtained in the receiver. FIGURE 5a shows that a receiver 401 explained in FIGURES 2 to 4 is provided in a housing 400, where a card shaped recording medium 402 for recording an output data is provided. The demodulation data is housed in the recording medium 402 when only a power supply of the system is put. FIGURE 5b shows a state that the recording medium 402 is drawn out of the receiver. The recording medium 402 is also used as a credit card at the salesperson. Here, the discount code of the commodity is recorded there so that the consumer can demand the discount of the commodity when they purchase the commodity. FIGURE 5c shows an example that the receiver 401 is provided in the housing 400, the card shaped recording medium 402 has a slit 420 for allowing the insertion or withdrawal of the medium 402, and a display 430 is defined. The receiver displays the coupon code recorded in the recording medium 402 on the display 430 by inserting the card shaped recording medium 402 in the receiver and push a read-key 431. According to this the viewers can know what coupon they have.

By the way, the viewers receive a discount service by presenting the recording medium 402 to a salesperson when they buy the commodities, after that the coupon code in the recording medium 402 is eliminated by the salesperson. So the salesperson has an apparatus to eliminate the coupon code in the recording medium.

As described above, the present invention can transmit the digital data effectively without giving any interference or regulation to the transmitted signal and also can receive the data accurately.

Embodiments of the second aspect of the present invention will be explained hereinafter in reference to the drawings FIGURES 6 to 10.

FIGURE 6 is a circuit diagram for showing a first embodiment of this invention. In FIGURE 6 a transmitting signal with which a digital data is multiplexed is supplied to an input terminal 1001 and applied to a data extractor 1003 via a switch 1005. The digital data is extracted from the transmitted signal in the data extractor 1003 and stored in a memory 1004. A control signal with

an indication for preserving a data or not is supplied to an input terminal 1002 and it controls the switch 1005.

Accordingly, when the indication to store a data is provided from the input terminal 1002 the signal with which the digital data is multiplexed is applied to the data extractor 1003 so as to extract the data and stored in the memory 1004, when the indication to store the data is not shown, the signal is not supplied to the data extractor 1003.

In this embodiment, the digital data multiplexed with the transmitting signal is able to be extracted and stored only when the indication to preserve the data is shown.

Further, in the above embodiments, the switch 5 is located between the input terminal 1 and the data extractor 3. However it can be located between the data extractor 3 and the memory 4. The memory 4 is not limited to be a semiconductor, but it can be any non-volatile memory means such as a magnetic recording medium.

Another embodiment of the second aspect of the present invention will be explained hereinafter referring to a circuit diagram in FIGURE 7. In this drawing the same components as these shown in FIGURE 6 are assigned with the same reference numerals.

In FIGURE 7 a transmitting signal with which a digital data is multiplexed is supplied to an input terminal 1001, the data is applied to a data extractor 1003. The digital data extracted in the data extractor 1003 is stored in a memory 1004.

The time counting unit 1007 counts a specific time since the data output from the data extractor 1003 is started to be stored in the memory 1004. The deleting signal generating unit 1006 generates a deleting signal for deleting the digital data stored in the memory after a specific time since the data is stored in the memory 1004 by a signal from the time counting unit 1007. The deleting signal is supplied to the memory 1004 via a switch 1005.

In an input terminal 1002 a control signal for showing whether it has an indication for preserving the data or not is supplied to so as to control the switch 1005. Accordingly, when the indication for storing the data for the specific time since the data is stored in the memory 1004 is not shown the deleting signal is supplied to the memory 1004 to delete the data. When the indication for storing the data is shown the deleting signal is not supplied to the memory 1004 so that the data is preserved as it is.

In this embodiment, since the digital data is deleted when the indication for preservation of the data is not shown, it will be possible to preserve the digital data only when the indication to preserve the data is shown.

Further, the switch is located between the deleting signal generating means 1006 and the memory 1004 in this embodiment. However, it can be located the time counting unit 1007 and the deleting signal generating unit 1006. Further the digital data extracted after that can be superscripted instead of deleting the digital data stored in the memory 1004.

A third embodiment of the second aspect of the present invention will be explained hereinafter referring to a circuit diagram in FIGURE 8. In FIGURE 8 a transmitting signal with which the digital data is multiplexed is supplied to an input terminal 1001, the data is applied to a data extractor 1003. The digital data extracted in the data extractor 1003 is stored in a memory 1004.

A comparator 1008 compares the digital data output from the data extractor 1003 with the data stored in the memory 1004. When these data are different they are displayed in a display device 1009.

In the broadcasting station, the same digital data is transmitted repeatedly in the same broadcast program or CM, other data is also transmitted repeatedly when the broadcast program or CM are changed. Transmitting the same data repeatedly is to receive the data whenever it fails the receiving in the receiver or in the broadcast program or CM.

In this embodiment since the data is always received and stored in the receiver and if the another data is received it is displayed in the display device, it is possible to let the viewer know about the change of the broadcast program or CM. and press the indication to preserve the data.

The display device 1009 is not limited its display means. It can be also be adapted to LED display device, a code display to an audio or display part or a character display.

A fourth embodiment of the second aspect of the present invention will be explained hereinafter referring to a circuit diagram in FIGURE 9. In FIGURE 9 a transmitting signal with which the digital data is multiplexed is supplied to an input terminal 1001, the data is applied to a data extractor 1003. The digital data extracted in the data extractor 1003 is stored in a memory 1004.

A comparator 1008 compares the digital data extracted in the data extractor 1003 with the data stored in the memory 1004. A time counting unit 1007 counts a specific time since the different data are applied to the comparator 1008, and displays a message to a display device 1009 in the meantime. And a deleting signal generator 1006 generates a deleting signal for deleting the digital data stored in the memory 1004 by a signal from the time counting unit 1007 after a specific time since the different data are input. The deleting signal is supplied to the memory 1004 via a switch 1005.

In an input terminal 1002 a control signal for showing whether it has an indication for preserving the data or not is supplied to, so as to control the switch 1005. When the indication for preserving the data for the specific time since the different data are stored in the memory 4 is not shown the data is deleted and when the indication is shown the data is preserved as it is.

Accordingly, the present invention can press the viewer for attention that if the data is preserved or not at the receiver, and it is possible to preserve the digital data only when the indication for preserving the data is shown.

FIGURE 10 is a circuit diagram for explaining a fifth embodiment of the second aspect of the present invention. In FIGURE 10 a transmitting signal with which the digital data is multiplexed is supplied to an input terminal 1001, the data is applied to a data extractor 1003. The digital data extracted in the data extractor 1003 is stored in a memory 1010 through a switch 1005.

A comparator 1008 compares the digital data extracted in the data extractor 1003 with the data stored in the memory 1004. A time counting unit 1007 counts a specific time since the different data are applied to the comparator 1008, and displays a message to a display device 1009 in the meantime. And, a deleting signal generator 1008 generates a deleting signal for deleting the digital data stored in the memory 1004 by a signal from the time counting unit 1007 after a specific time since the different data are input. The deleting signal is supplied to the memory 1004.

In an input terminal 1002 a control signal for showing whether it has an indication for preserving the data or not is supplied to, so as to control the switch 5. According to this, the present invention can preserve the digital data stored in the memory 1004 to the memory 1010 only when the indication for preserving the data is shown for a specific time since the different data are applied to the comparator 1008.

Accordingly, the present invention can press the viewer for attention that if the data is preserved or not at the receiver, and it is possible to preserve the digital data only when the indication for preserving the data is shown.

Next, an example for using the transmitting and receiving system of the digital data will be explained hereinafter. When the sponsor of the broadcast program transmits a code (coupon code) for discounting a specific commodity in the CM time by superposing with the CM viewer receives the coupon code as watching the CM. That the viewer received the coupon code proves that the viewer watched or listened the CM. The viewer is able to receive discount services by presenting the coupon code to the salesperson when the viewer buys the specific commodity by preserving the coupon code in the memory.

As described above, according to the present invention the data cannot received without any person there when the data multiplexed with the broadcast program or CM is received, so that the present invention can prevent that viewer who did not watch the broadcast program or CM with which the data is multiplexed can receive the data or receive a privilege unfairly which is to be given to the person who watch the broadcast program or CM.

As described above, the present invention can provide an extremely preferable signal transmitter and receiver.

While there have been illustrated and described what are at present considered to be preferred embodiments of the present invention, it will be understood by

those skilled in the art that various changes and modifications may be made, and equivalents may be substituted for elements thereof without departing from the true scope of the present invention. In addition, many modifications may be made to adapt a particular situation or material to the teaching of the present invention without departing from the central scope thereof. Therefore, it is intended that the present invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out the present invention, but that the present invention includes all embodiments falling within the scope of the appended claims.

The foregoing description and the drawings are regarded by the applicant as including a variety of individually inventive concepts, some of which may lie partially or wholly outside the scope of some or all of the following claims. The fact that the applicant has chosen at the time of filing of the present application to restrict the claimed scope of protection in accordance with the following claims is not to be taken as a disclaimer or alternative inventive concepts that are included in the contents of the application and could be defined by claims differing in scope from the following claims, which different claims may be adopted subsequently during prosecution, for example, for the purposes of a divisional application.

Claims

1. A signal transmitter for transmitting signals including at least an audio signal, characterized by that it is provided with:

multiplexing means for multiplexing a digital data signal on a part of an audio frequency band of the audio signals; and
frequency modulating means or phase modulating means for the digital data by a burst state carrier in the audio frequency band.
2. A signal transmitter as claimed in claim 1 characterized by that;

it is provided with a bandpass filter for limiting a frequency band on the audio frequency signal prior the superposition of the digital data signal.
3. A signal transmitter as claimed in claim 1 characterized by that:

the digital data signal is provided from means for MSK modulating the digital data with a carrier in the audio frequency band.
4. A signal transmitter as claimed in claim 1 characterized by that:

the audio signal transmitter includes a television broadcast transmitter.
5. A signal transmitter as claimed in claim characterized by that:

the audio signal transmitter includes a radio broadcast transmitter.
6. A signal receiver for receiving at least an audio signal, characterized by that it is provided with:

an audio signal demodulating unit provided in the receiver for demodulating the audio signal multiplexed with the digital signal on a part of the audio frequency band;
extracting means provided outside the receiver for extracting the digital data signal from the demodulated audio signal; and
means for demodulating the extracted digital data.
7. A signal receiver as claimed in claim 6 characterized by that:

the digital data signal extracting means extracts it from the audio signal demodulating unit of the receiver.
8. A signal receiver as claimed in claim 6 characterized by that the digital data signal extracting means has a microphone for picking up a voice output from a loudspeaker which audibly outputs the demodulated audio signal.
9. A signal receiver claimed in claim 6 characterized by that the data receiver includes a television receiver for receiving the audio signal.
10. A signal receiver claimed in claim 6 characterized by that the data receiver includes a radio receiver for receiving the audio signal.
11. A signal receiving apparatus for receiving a transmitting signal with which a digital data is multiplexed, characterized by that it is provided with:

data extracting means for extracting the digital data multiplexed with the transmitting signal;
memory means for storing the data extracted by the data extracting means; and
indication means for indicating a preservation of the data to the memory means.
12. A signal receiving apparatus for receiving a transmitting signal with which a digital data is multiplexed repeatedly, characterized by that it is provided with:

data extracting means for extracting the digital data multiplexed with the transmitting signal;
memory means for storing the data extracted by the data extracting means;

time counting means for counting a specific time since the storing of the data is started in the memory means; 5

deleting means for deleting the data recorded in the memory means after the specific time passes; 10

indication means for indicating whether the a preservation of the received digital data is stored in the memory means or not; and

means for extracting the data at all times and eliminating a data recorded in the memory means or stopping an overwrite when it is indicated to preserve the data for the specific time. 15

13. A signal receiving apparatus for receiving a transmitting signal with which a digital data is multiplexed repeatedly, characterized by that it is provided with: 20

data extracting means for extracting the digital data multiplexed with the transmitting signal;

memory means for storing the data extracted by the data extracting means; 25

comparing the data extracted by the extracting means with the data recorded in the memory means; and

output means for outputting a message based on the compared result of the comparing means when the received data differs from the stored data. 30

14. A signal receiving apparatus as claimed in claim 13 characterized by that it deletes the data from the memory means or stops the overwrite when it is indicated to preserve the data for the specific time after the message is shown. 35

40

15. A signal receiving apparatus as claimed in claim 13 characterized by that it stores the data in the memory mean into other memory means when it is indicated to preserve the data for the specific time after the message is shown. 45

16. A signal receiving apparatus as claimed in claim 15 characterized by that it deletes the data stored in the memory means or overwrites after passing the specific time after the message is shown. 50

17. A signal receiving apparatus for receiving a transmitted audio signal with which a digital data is multiplexed repeatedly on a part of an audio frequency band, characterized by that it is provided with: 55

data extracting means for extracting the multiplexed digital data from the audio signal;

memory means for storing the data extracted by the extracting means; and

indicating means for indicating to store the data in the memory means only when it is indicated to store the data.

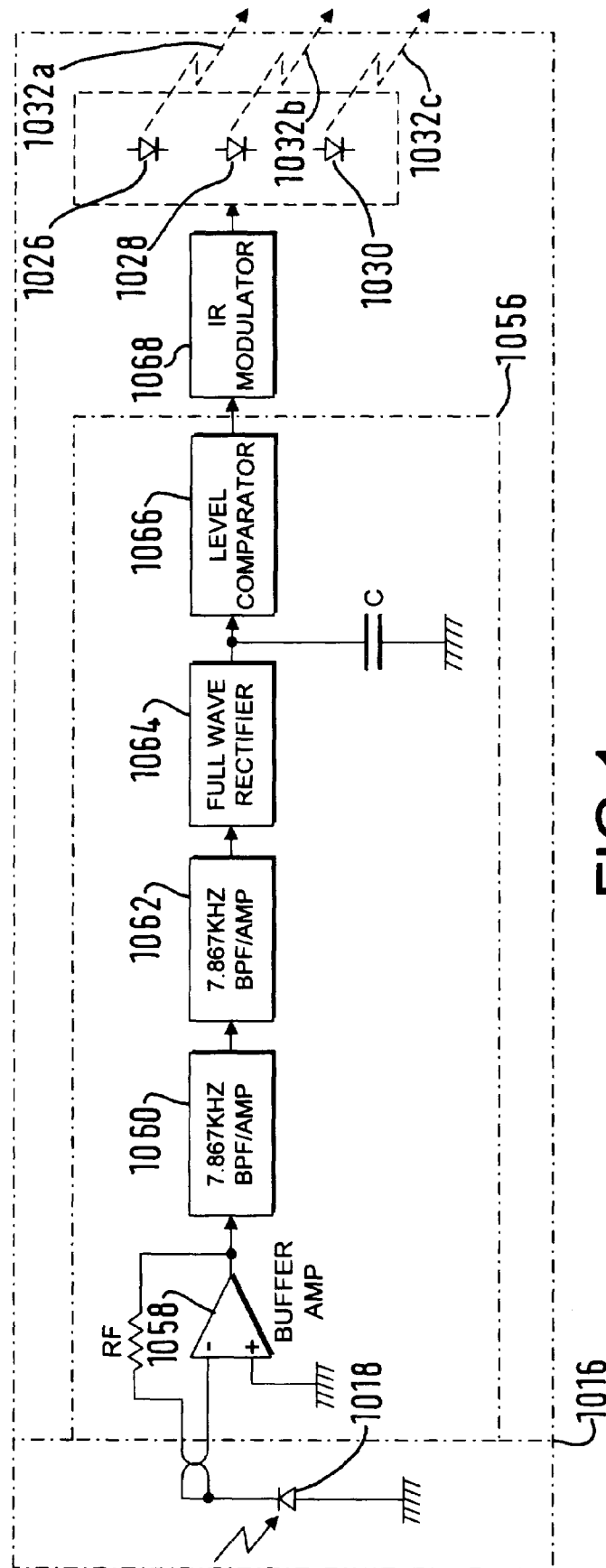


FIG.1

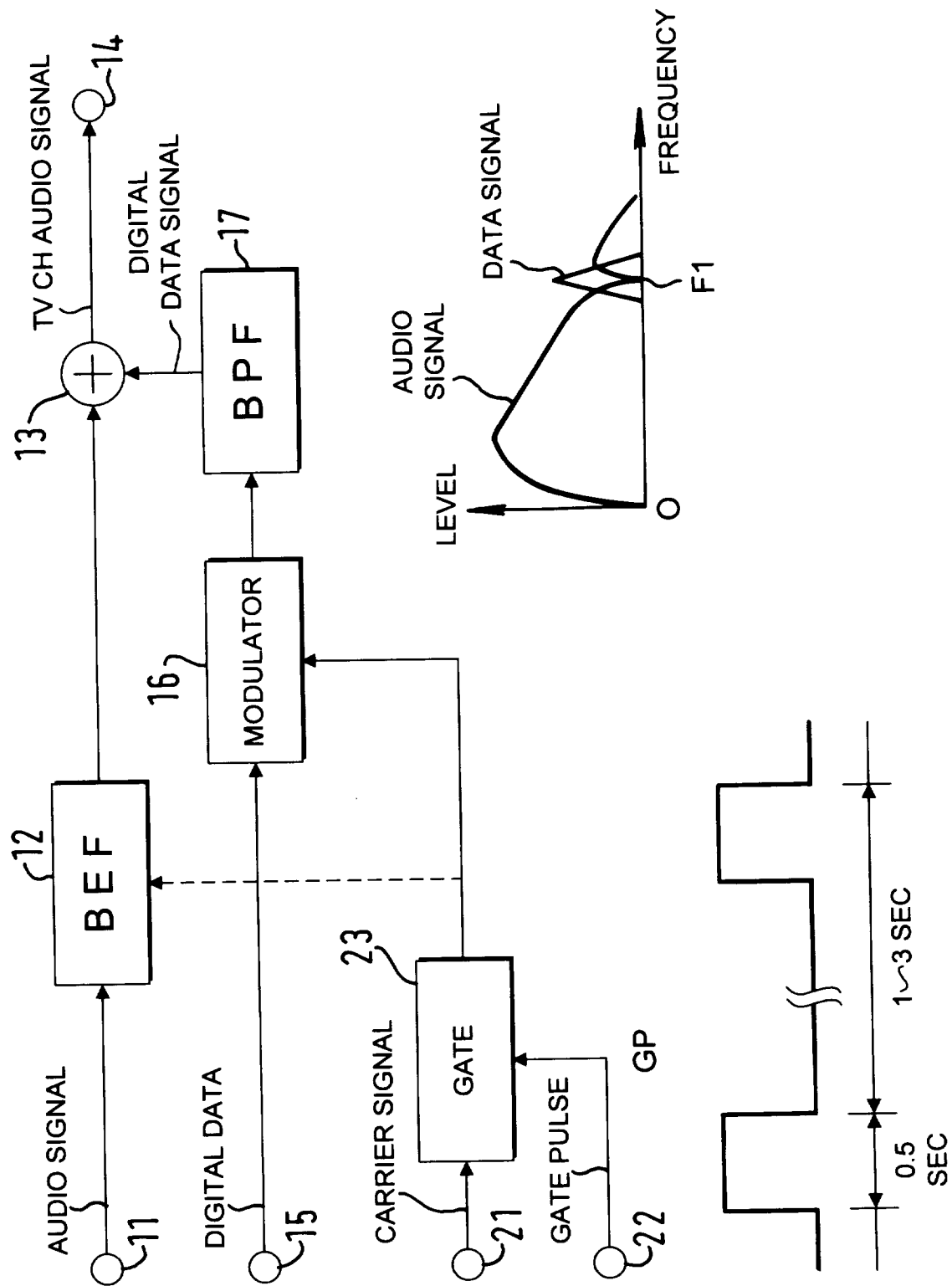
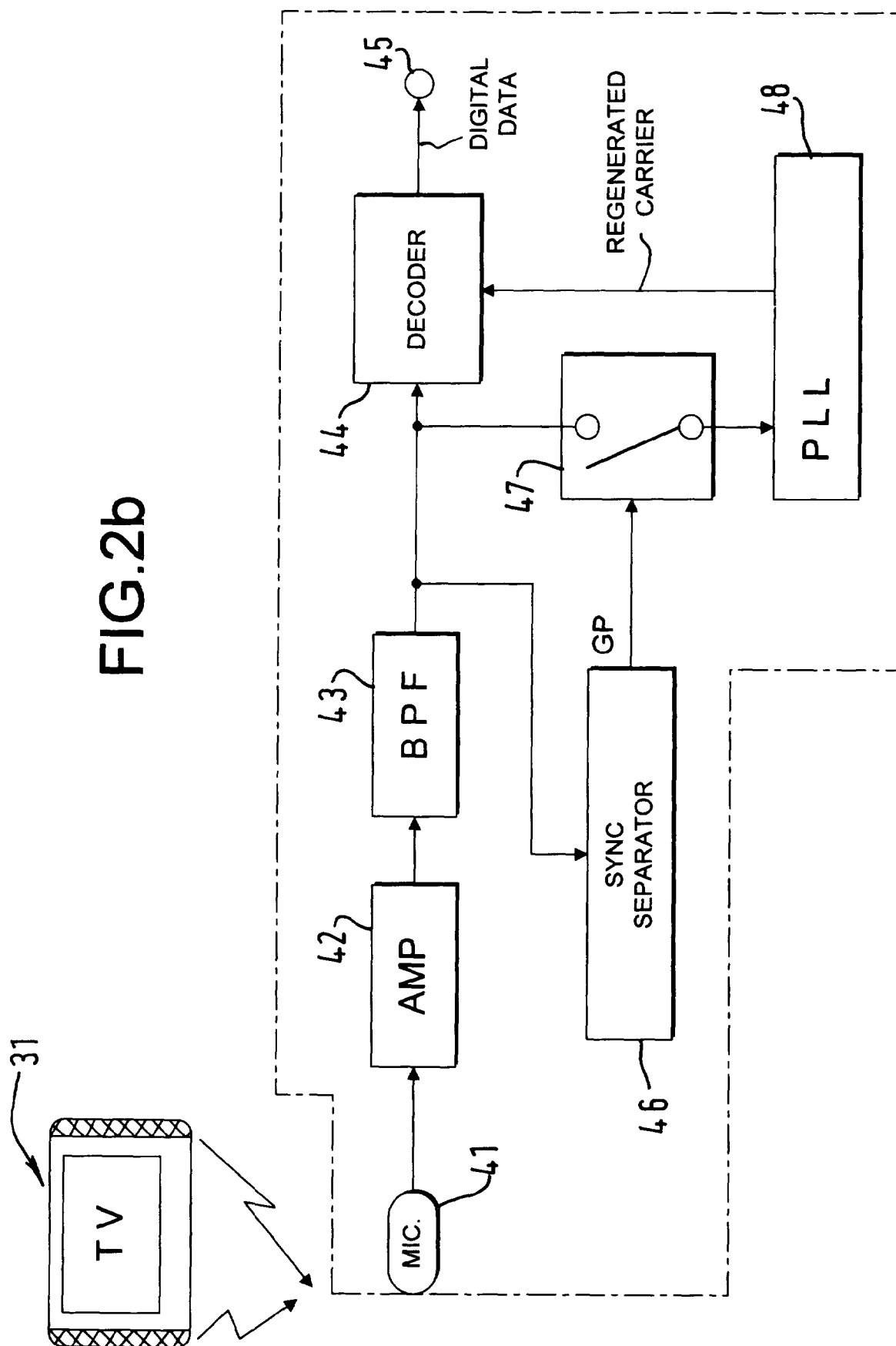


FIG.2a

FIG. 2b



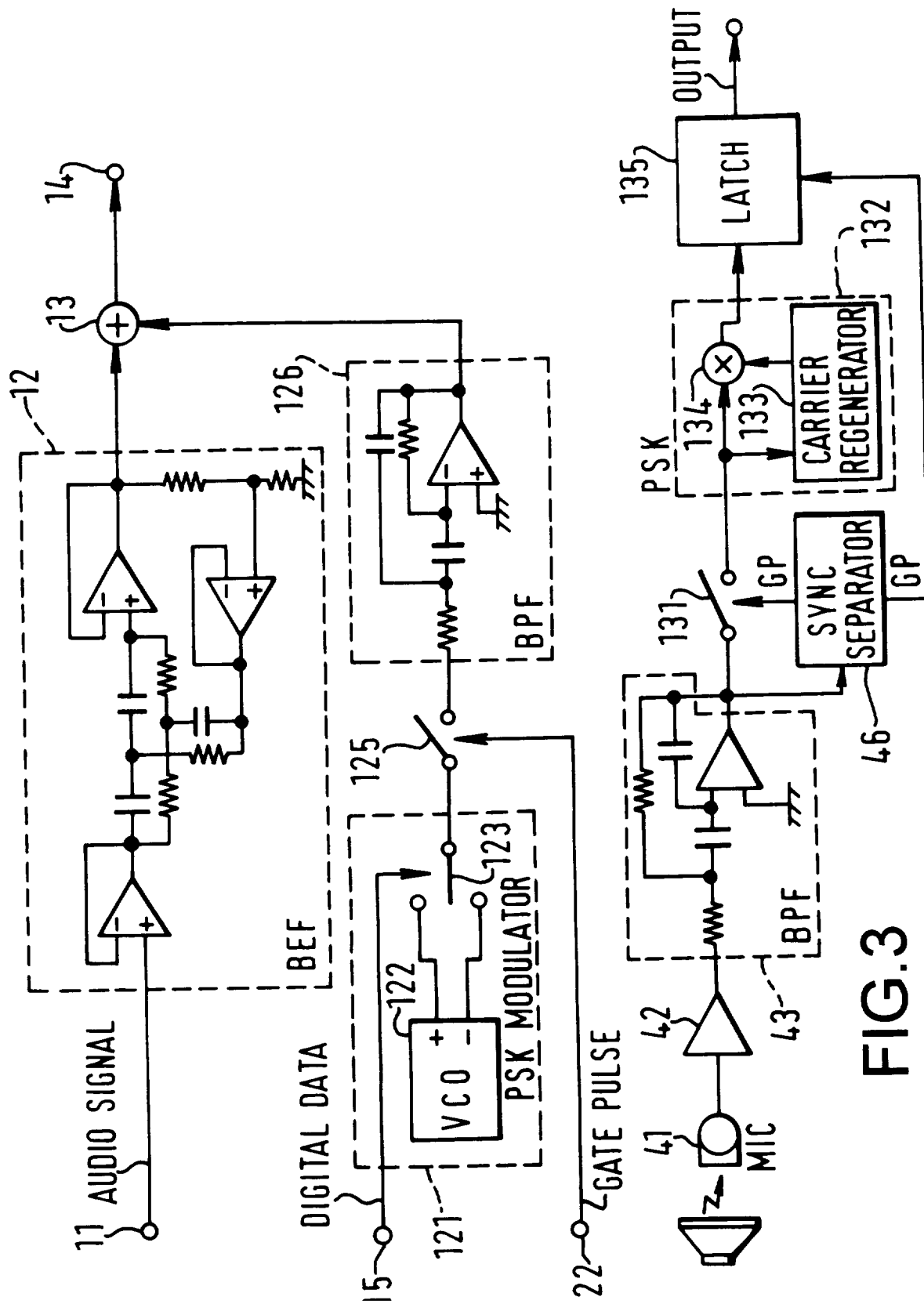


FIG. 3

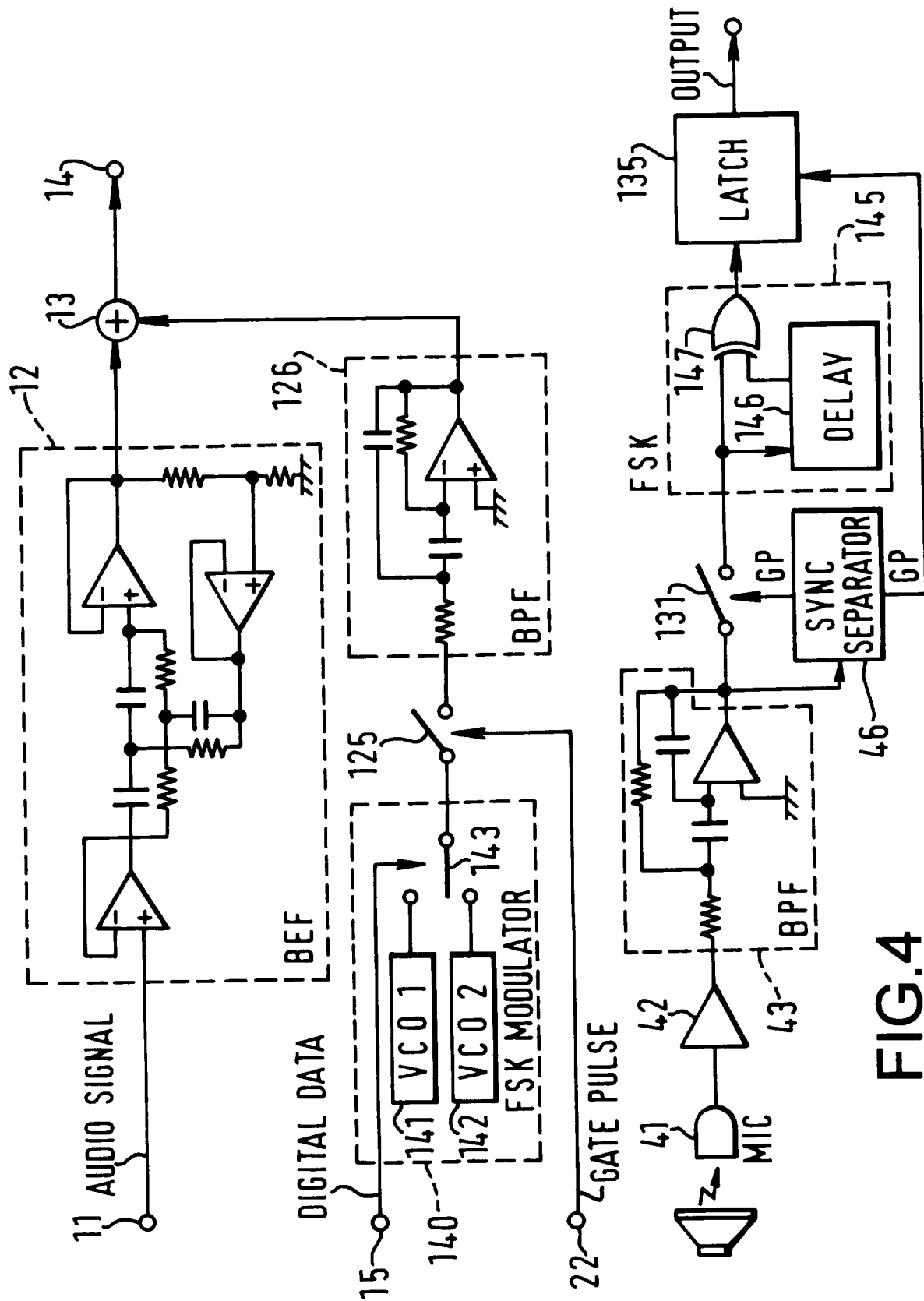


FIG.4

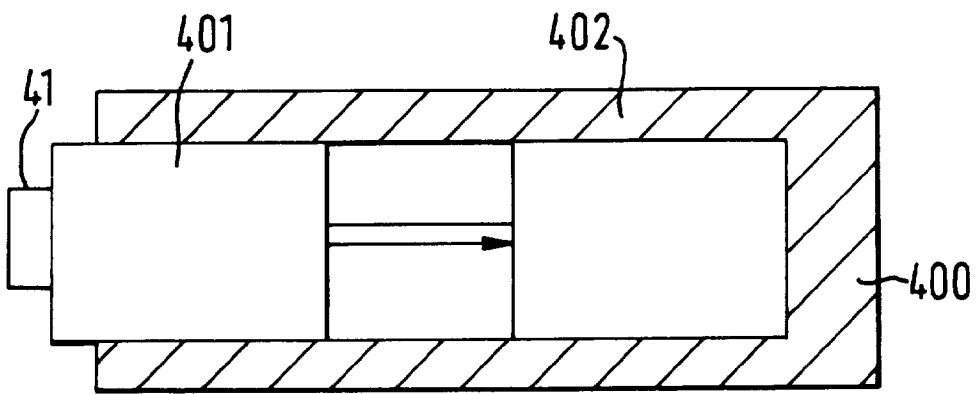


FIG. 5a

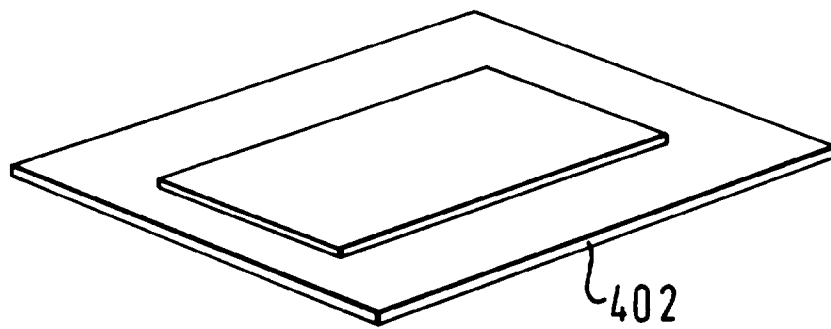


FIG. 5b

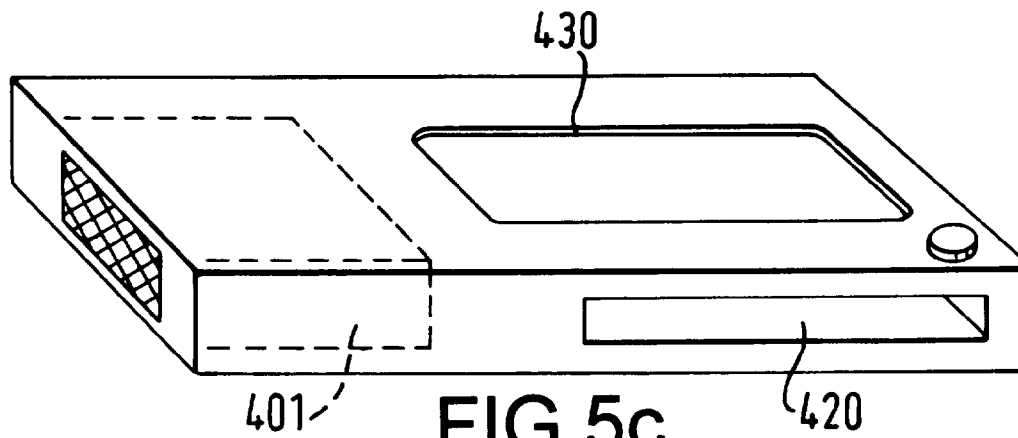


FIG. 5c

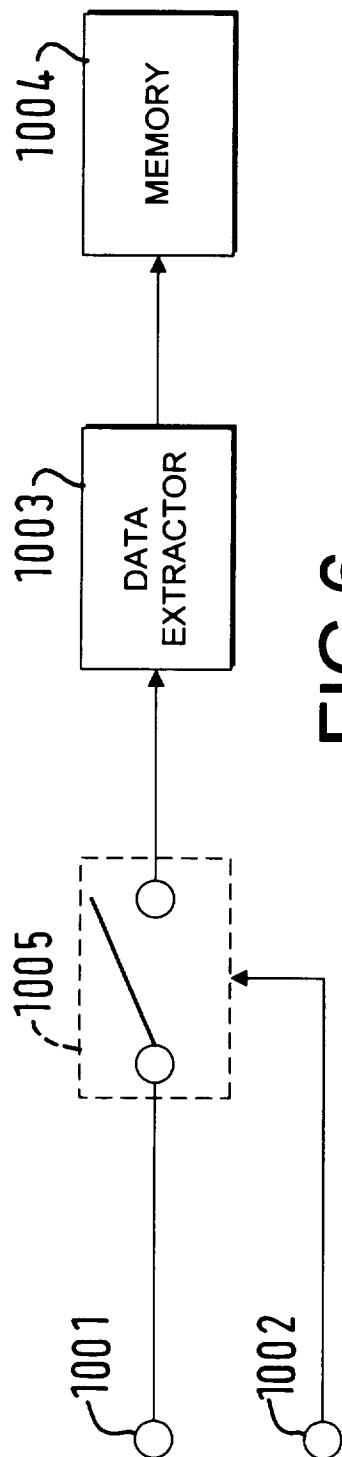


FIG. 6

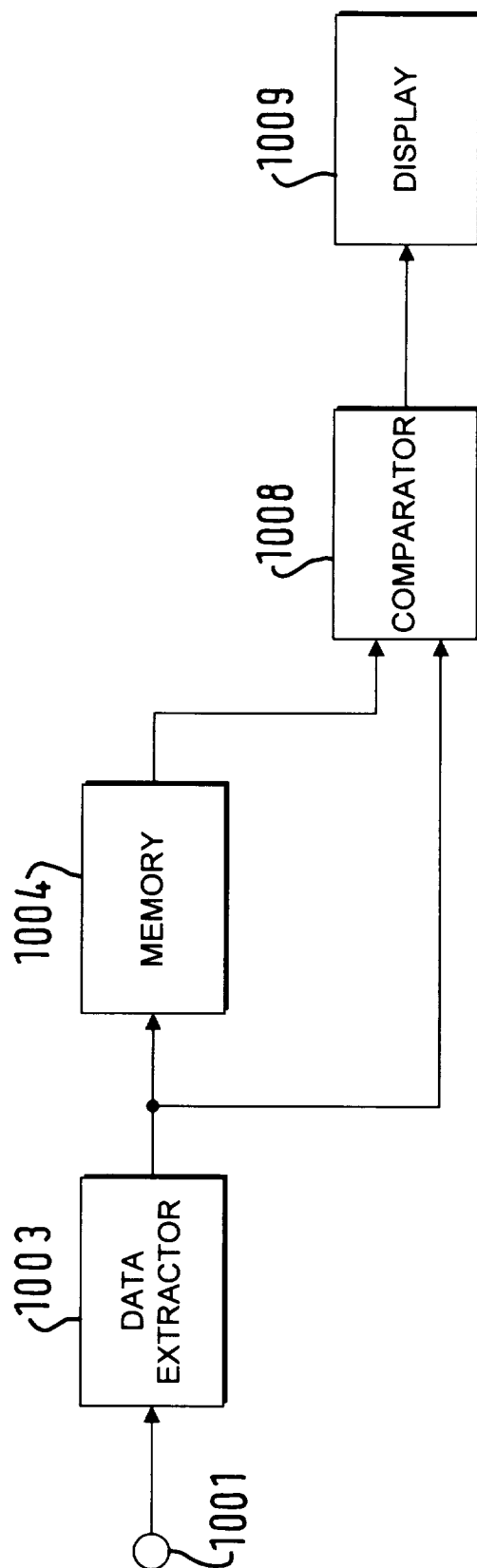


FIG. 8

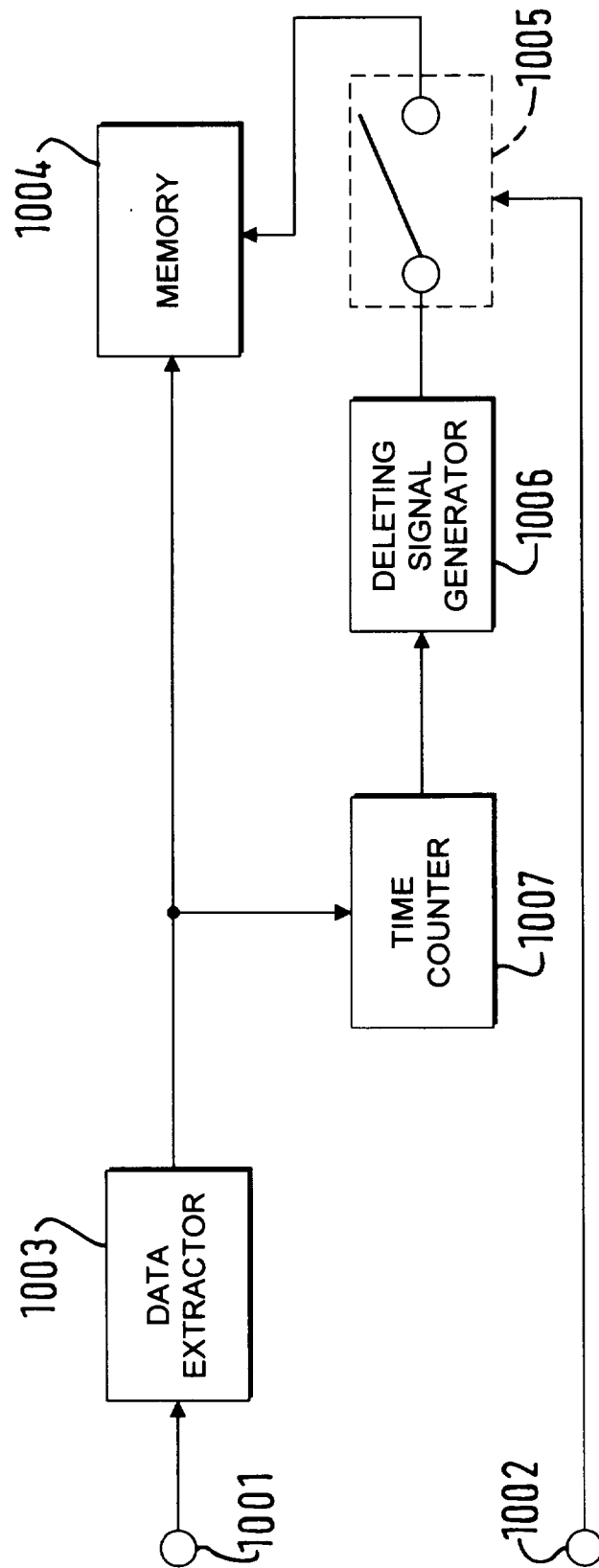


FIG. 7

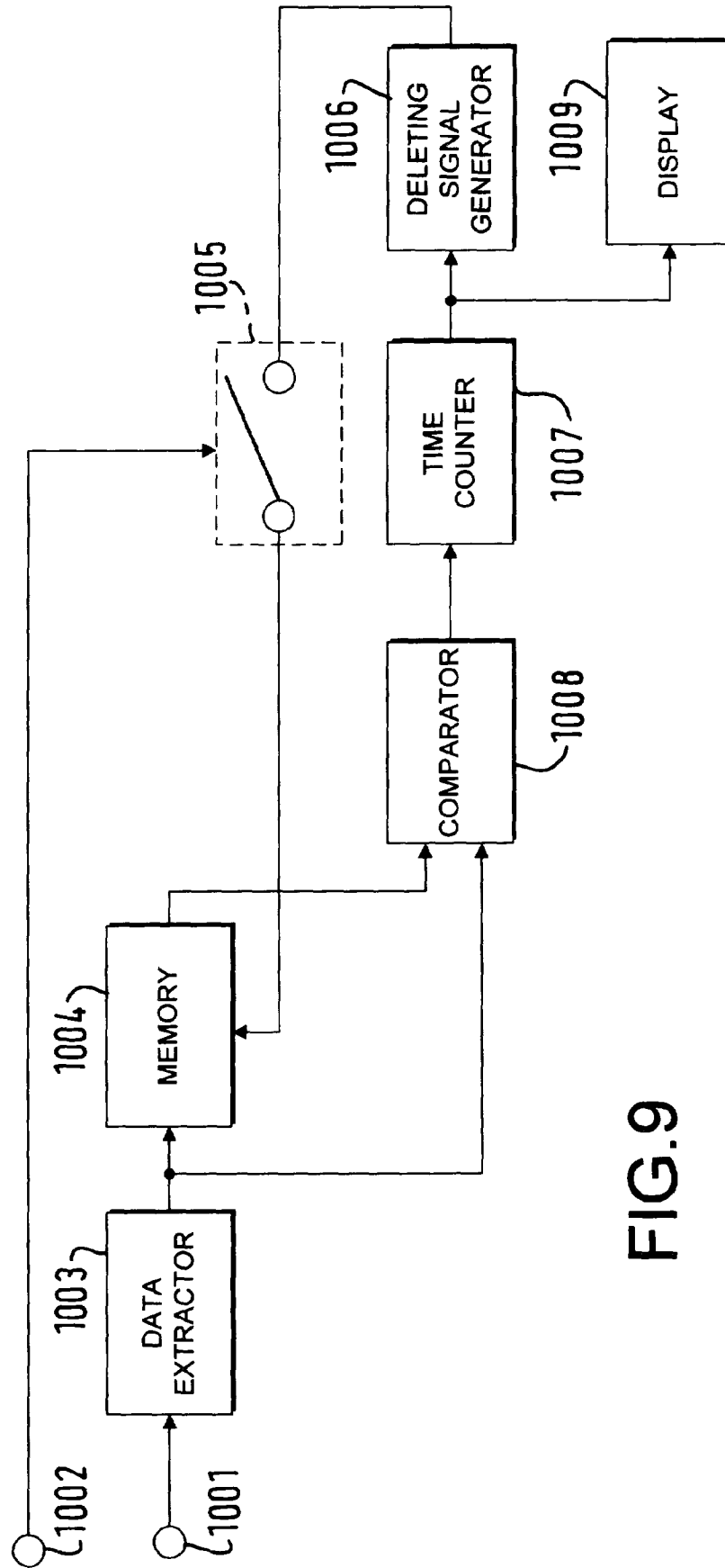


FIG.9

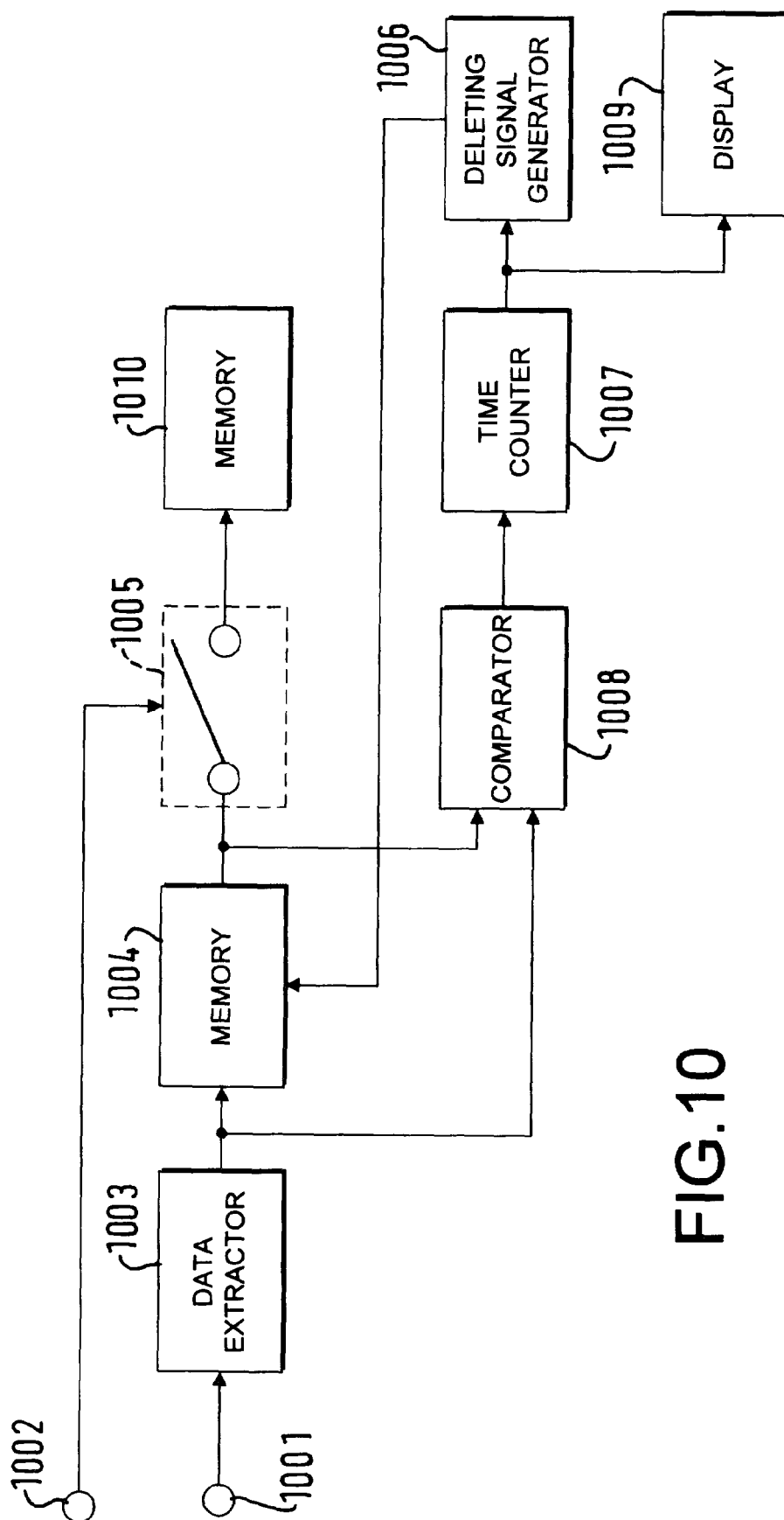


FIG.10