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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04H 1/00 | A1

(11) International Publication Number: **WO 95/19668**

(43) International Publication Date: 20 July 1995 (20.07.95)

(21) International Application Number: PCT/US95/00578

(22) International Filing Date: 12 January 1995 (12.01.95)

(30) Priority Data:
08/181,394 12 January 1994 (12.01.94) US

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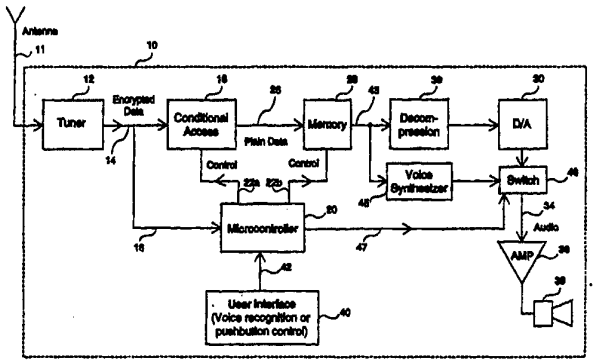
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(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A METHOD AND SYSTEM FOR AUDIO INFORMATION DISSEMINATION USING VARIOUS TRANSMISSION MODES



(57) Abstract

A system and method of information dissemination that permits the user to listen to the specific content of information when and where he or she wants to. A radio or television receiver system receives information from an FM subcarrier, a television vertical blanking interval transmission, a television separate audio program transmission or a dedicated channel and stores the transmitted information in a memory. A user interface allows selection from the memory of the stored information via a set of menus controlling a hierarchical database, so as to access particular items of information. Typically, the system includes RAM and/or a storage medium such as a digital audio tape, a magneto-optical mini-disk, a magnetic disk or optical disk, sufficient to store information for 10 hours of audio. A decompression device accepts the accessed compressed digital audio information items which may have been encrypted and transforms them into spoken speech. The user interface is either by voice or a single or multi-position switch allowing scanning through and selection from the menu items. The signal for such a device is generated by converting analog audio signals into a digital audio data stream which may be encrypted. The encrypted digital data stream is compressed and inserted on the radio or television carrier via an FM subcarrier, the television vertical interval or the separate audio program channel of a television transmitter. The system is also capable of transmitting alphanumeric data and converting this alphanumeric data to a voice form using a speech synthesizer.

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A METHOD AND SYSTEM FOR AUDIO INFORMATION DISSEMINATION USING VARIOUS TRANSMISSION MODES

CROSS REFERENCE TO RELATED APPLICATION

This is a Continuation-in-Part of application Serial No. 08/031763, filed 03/15/93 entitled RADIO RECEIVER FOR INFORMATION DISSEMINATION USING SUBCARRIER by John O. Ryan.

BACKGROUND

This invention relates to a radio or television broadcasting system for transmission of audio information to a specially adapted receiver which converts the selected transmitted audio information to a form usable by the user.

Numerous systems transmit information on FM radio subcarriers. See for instance, U.S. Patent 5,152,011 issued to Schwob, September 29, 1992. Also known is a single sideband communication system with FM data capability for transmission of analog voice signals. See U.S. Patent 4,852,086 issued to Eastmond et al., July 20, 1989.

Also known is FM radio sideband broadcasting to specially adapted computers for transmission for instance of news and financial information. Commercially available products available from Mainstream, Telemet, and DeskTop Data broadcast data over FM radio sidebands for receipt by personal computers equipped with special FM radio receivers and software. Typically information is transmitted in digital form, received, and stored in the computer memory for access by the computer user using menu driven software. The data is displayed on the computer screen in conventional alphanumeric form. One product in this category is News Edge, a news service available from DeskTop Data, Inc. of Waltham, Massachusetts which delivers a number of news and financial information services to a user via FM radio sideband. Software provided with the product scans incoming information and when the incoming information meets parameters set by the user, the information is saved to disk and/or displayed on the computer screen.

These systems have the disadvantage of requiring a personal computer as a platform, and providing information only on a computer screen. The usual computer skills are needed in order to operate such systems, which tend to be quite expensive.

Data can also be transmitted in the Vertical Blanking Interval of a TV transmission. The Federal Communications Commission has set aside several lines of the Vertical Blanking Interval for point to multipoint data transmission which may be sold to interested users.

An additional channel of communication for data or audio transmission is the Separate Audio Program channel available in television broadcasting.

All of these systems have disadvantage that the listener or user of the data is restricted to a specific place or time to hear the information. The portable radio, be it hand held or in an automobile, also limits the user to getting only the information that is presently being transmitted.

SUMMARY

The system and method described below permits the user to listen to the specific content of information when and where he or she wants to. The present invention is directed to a method and system for information dissemination using various modes of transmission that satisfy the needs of such a user. The invention includes a system for receiving information via a tuner that extracts digitized alphanumeric data or compressed audio data from the Vertical Blanking Interval of a television station's video signal, the Separate Audio Program (SAP) signal from a television stations audio signal or a system for receiving the digitized alphanumeric data or compressed audio information via radio sidebands (subcarriers) which include an FM subcarrier of an FM broadcast signal. In addition, a suitable dedicated transmission facility could be used. Conditional access circuitry decrypts the previously encrypted digitized alphanumeric data or compressed audio data which is then stored in a random access memory. A user interface (either a simple manual or voice control) driving a hierarchy of menus allows a user to access the information by indicating his selections from the menus. The system then extracts the information from the database in decrypted form. A speech producing device including a decompression system and a digital to analog converter (D/A) or other speech producing devices convert the encrypted digitized audio information to an audio signal for provision to the user via a loud speaker or earphones.

This system may be stand alone or be a part of an existing radio receiver, sharing components of the radio receiver. One embodiment of the user interface is a

four way switch (the positions corresponding for instance to the cursor control keys on a computer) for selection from and scanning through menus listing various categories of information. Typically the system includes either volatile RAM memory or a non-volatile storage medium such as a digital audio tape, a magneto-optical mini-disk, a magnetic disk or optical disk, sufficient to store information for 10 or more hours of audio. The information is for example news, sports, weather, cultural information, advertisements, or commercial listings. The information is transmitted in encrypted digital form using data compression techniques which is readily stored. The use of encryption techniques controls access to the information data base as a whole or to selected parts that the user has contracted for.

Other features are user control over the speed at which the speech is output, and a channel skipping tuner for finding the particular FM radio station subcarrier, TV station vertical blanking interval or TV station SAP channel on which the service is provided. The speech producing device may be under either automatic or user control to produce different speeds of the voice output. This control of the speed of the voice could be one that changes the pitch or be one that changes the spacing between words. Also, the user has the opportunity to preselect database items, thereby to construct a personal profile so as to extract particular information without having to scan through all the menus.

BRIEF DESCRIPTION OF THE DRAWING

These and other features and other aspects of the present invention will become better understood with reference to the following description, appended claims and accompanying drawings where:

Figure 1 shows a block diagram of a receiving apparatus in accordance with the present invention; and

Figure 2 shows a block diagram of a transmission system in accordance with the present invention.

DETAILED DESCRIPTION

Figure 1 shows a receiving apparatus in accordance with one embodiment of the invention. A broadcast signal is received from an antenna 11 (as used in automobile or portable applications) which provides a received radio broadcast signal or television broadcast signal to a tuner 12. This tuner is either an FM subcarrier tuner of the type

well known in the art for extracting an FM broadcast subcarrier signal; a television tuner designed to produce the output of the Vertical Blanking Interval; a Separate Audio Program channel from a television broadcast signal or of a dedicated radio channel tuner. In the case of an FM subcarrier tuner, as is well known, the subcarrier signals are typically transmissions of digitized data on subcarriers leased from commercial FM stations. The Vertical Blanking Interval is already available for point to multipoint transmission. The tuner 12 provides on line 14 the extracted digitized audio data (which is typically encrypted) to conditional access circuitry 16.

A receiver sub-system converts the digitized and encrypted alphanumeric data and compressed digitized audio data on line 14 from the transmitter to an analog signal representing spoken words. The tuner 12 provides the data to the conditional access system 16 on line 14 and to microcontroller (controller) 20 (described below) on line 18.

Conditional access circuitry 16 ensures that the encrypted data on line 14 is decrypted only if the proper key or command has been provided, as described below. Conditional access circuitry 16 decrypts the received data (as authorized by microcontroller 20 over lines 22) and provide same on line 26 for storage to the memory 28 which may be conventional integrated circuit random access memory (RAM). In one embodiment the memory 28 comprises volatile RAM memory. In another embodiment memory 28 may consist of a non-volatile storage medium such as a digital audio tape, a magneto-optical mini-disk, a magnetic disk or an optical disk, with sufficient capacity to store information for 10 hours of audio.

In order to provide the needed quantity of audio data in a reasonable time frame and to minimize the memory requirement, the original audio data is ideally passed through a data compression algorithm at the transmitting end to compress the data sufficiently for a narrow band data transmission channel. This data compression 57 is shown in Figure 2, and will be discussed later. The receiving apparatus has a companion decompression algorithm, in decompression circuitry 39, at the output of the memory 28 to provide the decompressed audio data to the digital to analog converter 30 for conversion of the digitized audio data to analog audio signals.

The conditional access system 16 and microcontroller 20 are described below. The encrypted compressed data output of the tuner 12 is accessed under control of microcontroller (microprocessor) 20 via control signals at lines 22, to determine which

particular items of data stored in memory 28 are to be provided via output line 43 to the decompression circuitry 39 via switch 45.

Much of the data that a user would access in such a system is in alphanumeric form that can be easily transmitted in that form and converted to audio via speech (voice) synthesis. Such data can be transmitted in alphanumeric form for bandwidth and speed considerations. In order to accommodate the dual transmission of alphanumeric data as well as audio data, switch 46 controlled by microcontroller 20 via control line 47 determines whether the system is responding to original alphanumeric data or compressed audio data. When alphanumeric data is being transmitted, the alphanumeric data is fed into a speech synthesizer 45 whose audio output is connected to switch 46 for connection of the audio output to audio amplifier 36 and loudspeaker 38.

In other embodiments, the received data is stored as encrypted data or in another convenient form and converted to a form usable by a speech producing device prior to being converted to speech. Each audio data item is "tagged" with an designation to allow retrieval of the stored encrypted audio data from the database.

User interface 40 inputs commands on line 42 to microcontroller 20 to determine which items of data from memory 28 are to be listened to.

The transmitted information is categorized, stored, and accessed in a conventional hierarchical database in memory 28 under control of microcontroller 20. User interface 40(either a simple manual or voice control) driving a hierarchy of menus allows a user to access the information by indicating his selections from the menus.

In one embodiment user interface 40 is a voice activated command system. For instance the device is turned on and initialized by the user's spoken "ON" command. It then responds by vocally announcing via loud speaker 38 the major database categories available e.g. "NEWS", "SPORTS", "ENTERTAINMENT", etc. When the desired category has been announced the user responds by saying "YES". The device then announces again the sub-categories of the selected major category, and the user again selects the desired sub-category with a spoken "YES" until the specific item needed is accessed. For example, the category and sub-category path to the latest news regarding the General Motors Corporation might be "NEWS ... BUSINESS .. NATIONAL .. AUTOMOTIVE .. GM." The path to a review of the recent movie Aladdin might be "ENTERTAINMENT .. HOLLYWOOD .. MOVIE REVIEWS .. ALADDIN."

Typically items will be reached after four or five "YES" responses from the user. In one embodiment three additional spoken commands by the user such as "BACK" "STOP" and "GO" are sufficient to provide the user effective and rapid control of the system.

In another embodiment a manual input device such as a switch assembly having for instance four positions (up, down, left, right) corresponding to the familiar cursor control on a computer, with each position indicating one of four commands, is provided for user manual operation. This switch may be adapted to attach to the steering wheel of an automobile, for use by the driver. The control is linked to the rest of the device by wire, infrared, or ultrasonically, as is a conventional television remote control.

Another version uses a one-position control switch. The user briefly depresses the switch to select the category or item as announced or to scan through the menus. Briefly depressing the switch while an actual data item is being read executes "stop." Depressing it again then executes "go." Holding the switch down for a second or two executes "back" at any time, to return to a predetermined point in the database.

For full effectiveness the information dissemination device needs to be on 24 hours a day. In order to conserve power the received data could be first stored in random access memory (RAM) which consumes little power and when the RAM is full dumped to a more permanent storage medium such as a digital audio tape, a magneto-optical mini-disk, a magnetic disk or an optical disk, sufficient to store information for 10 hours or more of audio. The speech producing portion of the system that may include a digital to analog converter that converts digitized and decompressed audio data into understandable and well modulated audio analog signals. The audio analog signals are provided on line 34 to a conventional audio amplifier 36 and hence to a loud speaker or earphones 38 to be listened to by the user. The tuner 12, microcontroller 20, conditional access circuitry 16 and memory 28 typically remain powered at all times (by battery power if necessary) to receive a continuous update of the broadcast database, and thereby to store current data in memory 28.

When using the Vertical Blanking Interval to transmit data, it is possible to transmit at a rate of 2 megabits per second on 6 Vertical Blanking Interval lines each with a 50 microseconds duration to provide a 24,000 bit per second channel with a 50% error correction overhead. In one version the device of Figure 1 is a portable unit (similar to a portable radio) and includes the user voice or manual interface. In another

embodiment the device of Figure 1 is built into a conventional portable radio or automobile radio, sharing where possible common components.

In one embodiment user interface 40 has a speed control to determine the output speed of speech output. The Digital to analog converter 30 or the voice synthesizer 45 may receive information faster than normal speaking speed. It is well known that people can understand speech at faster than normal speech rates. Thus the user by pushing a button on the receiver unit or providing the proper verbal command increases the speech speed, so as to obtain information faster, analogous to skimming printed material. This speeding up can use well known techniques that change the pitch or eliminate the gaps between words. A similar slowing down approach can be used in case the user wants to carefully note what is being said, for example while taking notes.

In the embodiment using a voice activated user interface 40, the number of commands provided is limited (for instance to 5 to 10) and hence a relatively simple commercially available voice input recognition circuit is sufficient.

In another embodiment, the user interface for an automobile-based system is associated with a heads-up display, expected to be available in various automobiles in the near future. This provides visual display of the database menu items analogous to a computer screen, to allow faster access to the database menus.

Advantageously, by transmitting and storing the audio data in a compressed form (even though encrypted), the required bandwidth of the transmission channel is vastly reduced, as are the memory requirements, thereby substantially reducing the component cost. When used in FM subcarrier transmission, the typical transmission speed is one kilobaud. This is sufficient to download in approximately one hour the needed data to memory 28.

In use, after purchase of the unit the user programs it to the frequencies of the local stations providing the transmissions. There may be multiple such stations in one area, due to the limited transmission distance of FM radio and TV signals. A channel skipping feature (as is now available commercially in various radios) in one embodiment included in microcontroller 20 seeks out stations having a particular signature or frequency, to maintain reception even when moving from the transmission area of one station carrying the service to the transmission area of a second station carrying the

service. It would take less than a minute for the system to scan the entire FM band or TV band looking for the signature transmission.

The data encryption/access is accomplished in several ways. In one embodiment a simple addressed on/off command is transmitted (without data encryption) to disable individual units belonging to people who have not paid the required monthly subscription fee to receive the service. The encryption can be used to provide access to the entire data base or to individual parts of the data base.

In a more sophisticated encryption system where it is believed there is a problem of manufacture and sale of unauthorized units, then proper data encryption is used, requiring receipt of a key and decryption of the data with decryption circuitry. Hence unauthorized units without such dedicated decryption circuitry would not be operative at all.

In one embodiment of an encryption system, (analogous to pay-per-view cable TV encryption), decryption keys are delivered by radio transmission. Each individual receiver unit has a unique "hidden" key of for instance 40 to 50 binary digits in read only memory. Each unit also has a "public" non hidden serial number. All transmitted data is conventionally encrypted using a master key which is changed periodically, both to force users to pay for the service and to enhance security. Each receiver unit must receive a master key to decrypt the data transmission.

The master key is transmitted to each unit as follows:

Periodically, the transmission of the data is interrupted to transmit key information. The key information is a series of packets, one packet for each individual receiver unit, with each packet including (1) an address field which is the public serial number of a particular unit; followed by (2) a second field which is the current master key encrypted with the unique "hidden key" of the unit having that particular serial number.

The receivers look for these packets (which are denoted by a particular signature or occur at particular times to avoid confusion with the data). When a particular unit receives the packet including its own address (public serial number), it stores and decrypts the subsequent encrypted master key field, thereby obtaining the master key, in order to decrypt subsequent encrypted data.

In a second encryption system embodiment, a uniquely encrypted master key for each individual receiver is physically delivered to each user periodically (such as once a month). The key could be entered into each unit by a keypad, or the key could be embodied in an electronically readable card or device inserted into a suitable port in the receiver.

In another embodiment, voice synthesizer 45 is controlled to provide a variety of particular voices. These voices are selected by the user, i.e. to be male/female or other voices, or the system is programmed via microcontroller 20 to select different voices for different types of or categories of information.

The device of Figure 1 as incorporated in a conventional radio or television receiver uses the antenna of the radio or television receiver. The tuner 12 may be in addition to the conventional radio or television tuner or could be part of the radio or television tuner. The other blocks of Figure 1 (with the exception of amplifier 36 and loud speaker 38) are unique to this system and are added components to a conventional radio or television receiver.

Another embodiment may encompass all of the elements of the receiver except the control and audio elements in a device stored in the trunk of an automobile similar to CD music systems, with an output mini radio transmitter tuned to an unused FM or AM radio channel. This radio transmitter output would be coupled to the standard automobile radio antenna for outputting of the audio signal to the user.

Another embodiment of the receiver may provide for the reception and storage of the received data on a home base unit wherein the received data is stored on the disk storage as discussed above and the disk is played back on the portable automobile unit. A further embodiment of this feature could encompass a home base unit containing all the features of an automobile unit and can be unplugged from the home base and plugged into the automobile unit for continuing use while the user is in the automobile.

The transmitting portion of the system is illustrated in Figure 2 indicating the following steps. The Data Generating portion 51 contains the usual human elements of News and Information Gathering 55 with the News and Information Classification and Formatting 56, i.e. a data producing sub-system. For the audio transmission, this news and information is spoken into a conventional microphone connected to the electronics portions beginning with the A/D converter 60 which converts the analog audio signals to

a digital audio. The digitized audio is compressed for bandwidth considerations in data compressor 57. The compressed digitized audio is encrypted in encryptor 58 according to key distribution instructions from a Billing/ Subscriber unit 59. The Encrypted digital audio establishes a data base of digitized audio data.

When it is advantageous to use alphanumeric information from News and Classification Formatting element 56, the alphanumeric information is put in a form for transmission and encrypted by Data Encryption circuitry 64. Switch 61 which can be controlled by an operator determines whether the system transmits compressed digitized audio or alphanumeric information. The Data from Switch 61 is sent by a transmission path such as a dedicated telephone line 63 to a transmission station such as an existing radio and television station 50.

In order to provide the needed quantity of audio data in a reasonable time frame the audio data must be passed through a data compression algorithm at the transmitting end to compress the audio data sufficiently for a narrow band data transmission channel. This data compression is shown as 57 in Figure 2.

In addition to data compression, since the transmission facility is not transmitting the information in a "live" fashion as with most broadcasting facilities, it can maximize the use of the available bandwidth of transmission by not only using the above mentioned data compression techniques, but can transmit the data at a rate unrelated to the speed of speech. The speed of transmission of the data can be faster than the "real time" speech when bandwidth considerations permit. In addition, the speed of transmission can be slower than the "real time" speech if a narrower bandwidth is available. This variation in transmission speed affects the time required to transmit a given amount of information. The completed data on line 63 is inserted into the FM subcarrier, Separate Audio Program channel or the television vertical blanking interval transmission channel chosen using a data insertion device 62 for transmission by Transmitter 53 via antenna 54, in addition to conventional program generation element 52.

In order to accommodate the fact that some subscribers may not have their units on when certain data is transmitted, it is apparent that the sending facility will need to update the data base from time to time during the day even if no new information has been generated. The data for a particular story or article will need to have a date stamp

to indicate to the user the currency of the information. These and other logistical features will become apparent with the use of the system.

The above description is illustrative and not limiting; further modifications will be apparent to one of ordinary skill in the art.

CLAIMS

I claim:

1. A receiver adapted to receive data in a broadcast signal comprising:

a tuner for extracting the data from the broadcast signal;

a memory coupled to the tuner for storing the extracted data;

a user interface for providing a set of menus describing the data, and for indicating selections from the set of menus;

a controller coupled to the memory and to the user interface for selecting data from the memory in response to the indicated selections and providing the selected data; and

a speech producing sub-system for converting the selected data to an analog signal.

2. The device of Claim 1, wherein the tuner is an FM broadcast radio station carrier tuner.

3. The device of Claim 1, wherein the tuner is a television broadcast station carrier tuner.

4. The device of Claim 3, wherein the tuner extracts the data from a vertical blanking interval of the broadcast television station carrier.

5. The device of Claim 3, wherein the tuner is a Separate Audio Programming channel tuner.

6. The device of Claim 1, wherein the data stored in the memory is a database.

7. The device of Claim 1, wherein the memory comprises RAM memory and non-volatile storage.

8. The device of Claim 7, wherein the non-volatile memory is selected from the group consisting of an audio tape, a magneto-optical mini-disk, a magnetic disk and an optical disk.

9. The device of Claim 1, wherein the received data is audio data that has been converted from analog form to digital form.

10. The device of Claim 9, wherein the digitized audio data has been compressed.

11. The device of Claim 9, wherein the digitized audio data is encrypted.

12. The device of Claim 1, wherein the extracted data is alphanumeric data.

13. The device of claim 12, wherein the speech-producing sub-system includes a speech synthesizer for converting the alphanumeric data to the analog signal.

14. The device of Claim 1, wherein the extracted data is digitized, encrypted and compressed, and further comprising a decryptor for providing conditional access to and decrypting the extracted data.

15. The device of Claim 14, wherein the decryptor includes a decompression algorithm to decompress the extracted data.

16. The device of Claim 14, wherein the decryptor is enabled by a key received by the tuner.

17. The device of Claim 14, wherein the decryptor is enabled by a key device operatively connected to the decryptor.

18. The device of Claim 1, wherein the user interface is voice activated.

19. The device of Claim 1, wherein the user interface includes:

a manual input device mountable on an automobile steering wheel; and

a link from the manual input device to the controller.

20. The device of Claim 1, wherein the user interface includes a control for determining a speed at which the speech producing subsystem outputs the analog signal.

21. The device of Claim 1, wherein the tuner includes means for channel skip tuning.

22. The device of Claim 1, the speech producing subsystem comprising:

an amplifier for amplifying the analog signal; and

means for converting the amplified signal to sound.

23. The device of Claim 1, further comprising means for connecting the receiving system to at least an antenna of an automobile radio set.

24. The device of Claim 6, the received data comprising means for designating a hierarchy for the database.

25. The device of claim 1, wherein the controller comprising means for storing the extracted data received in a RAM portion of the memory up to the capacity of the RAM before transferring the digital data to a storage portion of the memory, wherein the storage portion is selected from the group consisting of disk medium and tape medium.

26. The device of Claim 25, wherein the tape medium is a digital audio tape.

27. The device of Claim 25, wherein the disk medium is a magnetic disk.

28. The device of Claim 25, wherein the disk medium is a magnetic-optical disk.

29. The device of Claim 25, wherein the disk medium is an optical disk.

30. The device of Claim 1, wherein a speed of transmission of the data is varied thereby to efficiently use available bandwidth of the broadcast signal.

31. A method for transmission of audio data comprising the steps of:

converting the audio data to digitized data;

forming a data base of the digitized data;

forming menus for selection of particular segments of the data base;

compressing the digitized data;

encrypting the compressed data and;

transmitting the encrypted and compressed data;

extracting the data from the transmitted signal;

providing a memory;

storing the extracted data in the memory;

providing a set of menus for accessing the data;

selecting items from the set of menus;

providing portions of the stored data in response to the selection of items;

decrypting the portions of the stored data;

converting the decrypted portions to an analog signal.

32. The method of Claim 31, further comprising the steps of:

providing digitized alphanumeric data;

encrypting the digitized alphanumeric data;

transmitting the encrypted alphanumeric data; and

selecting the compressed data or the encrypted alphanumeric data.

33. A system for broadcast transmission of audio data comprising:

a converter for converting audio information to digital data;

a compressor for compressing the audio data;

an encryptor for encrypting the digital data;

means for inserting the compressed encrypted digital data into a broadcast transmission signal;

a tuner for extracting the digital data from the transmission signal;

a memory for storing the extracted data;

a user interface for providing a set of menus to a user describing the stored data;

a controller for selecting data from the memory in response to selections from the menus;

a decryptor for decrypting the selected data;

a decompressor for decompressing the selected data; and

a converter for converting the digital data to analog audio data.

34. A receiver for receiving a broadcast signal including compressed data, comprising:

a tuner connected to receive the broadcast signal at an input terminal thereof and having an output terminal;

a decryptor having an input connected to the output terminal of the tuner, and having an output terminal;

a user interface operatively connected to the decryptor;

a memory having an input port connected to the output terminal of the decryptor, and having an output port;

a decompression circuit having an input terminal connected to the output port of the memory and having an output terminal; and

a converter having an input terminal connected to the output terminal of the decompression circuit, and having an output terminal for providing an analog signal.

35. The receiver of Claim 34, further comprising:

a voice synthesizer circuit having an input terminal connected to the output port of the memory and having an output terminal;

a switch having two input terminals connected respectively to the output terminals of the voice synthesizer and of the converter, the switch having an output

terminal for providing an analog signal, and further having a control terminal operatively connected to the decryptor.

36. The receiver of Claim 35, wherein the decryptor includes:

access circuitry connected between the output terminal of the tuner and the input port of the memory, and having a control terminal; and

a microcontroller operatively connected between the control terminal of the access circuitry and the user interface.

37. A method for broadcast of audio data, comprising the steps of:

converting the audio data to digitized data;

compressing the digitized data;

encrypting the digitized data; and

broadcasting the compressed and encrypted digitized data.

38. A method for receipt of broadcast digital compressed data, comprising the steps of:

tuning to a broadcast signal including the digitized data;

extracting the digital data from the broadcast signal;

decrypting the extracted digital data;

storing the decrypted data;

accessing portions of the stored data in response to user commands;

decompressing the accessed portions of the data; and

converting the decompressed data to an analog signal.

39. A system for providing compressed digital audio data to a broadcast transmitter, comprising:

an analog to digital converter having an input terminal connected to receive an audio signal and having an output terminal;

data compression and encryption circuitry having an input terminal connected to the output terminal of the converter, and having an output terminal adapted for operative connection to the broadcasting transmitter.

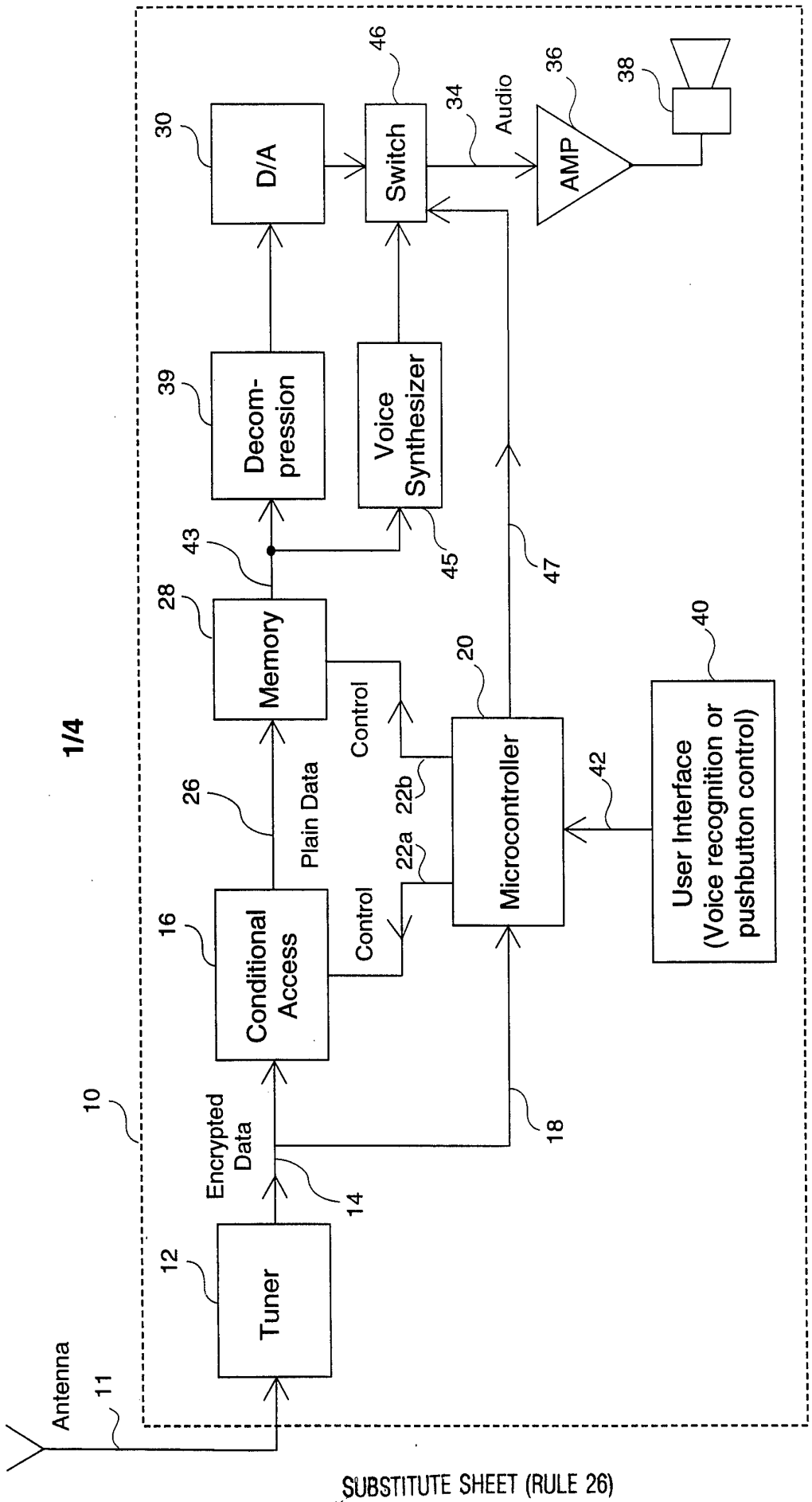

1/4
Antenna
11
10
Tuner
12
Encrypted Data
14
18
Conditional Access
16
Plain Data
26
Memory
28
43
Decom-pression
39
D/A
30
Voice Synthesizer
45
47
Switch
46
34
Audio
AMP
36
38
Microcontroller
20
Control
22b
22a
Control
User Interface (Voice recognition or pushbutton control)
42
40

Figure 1

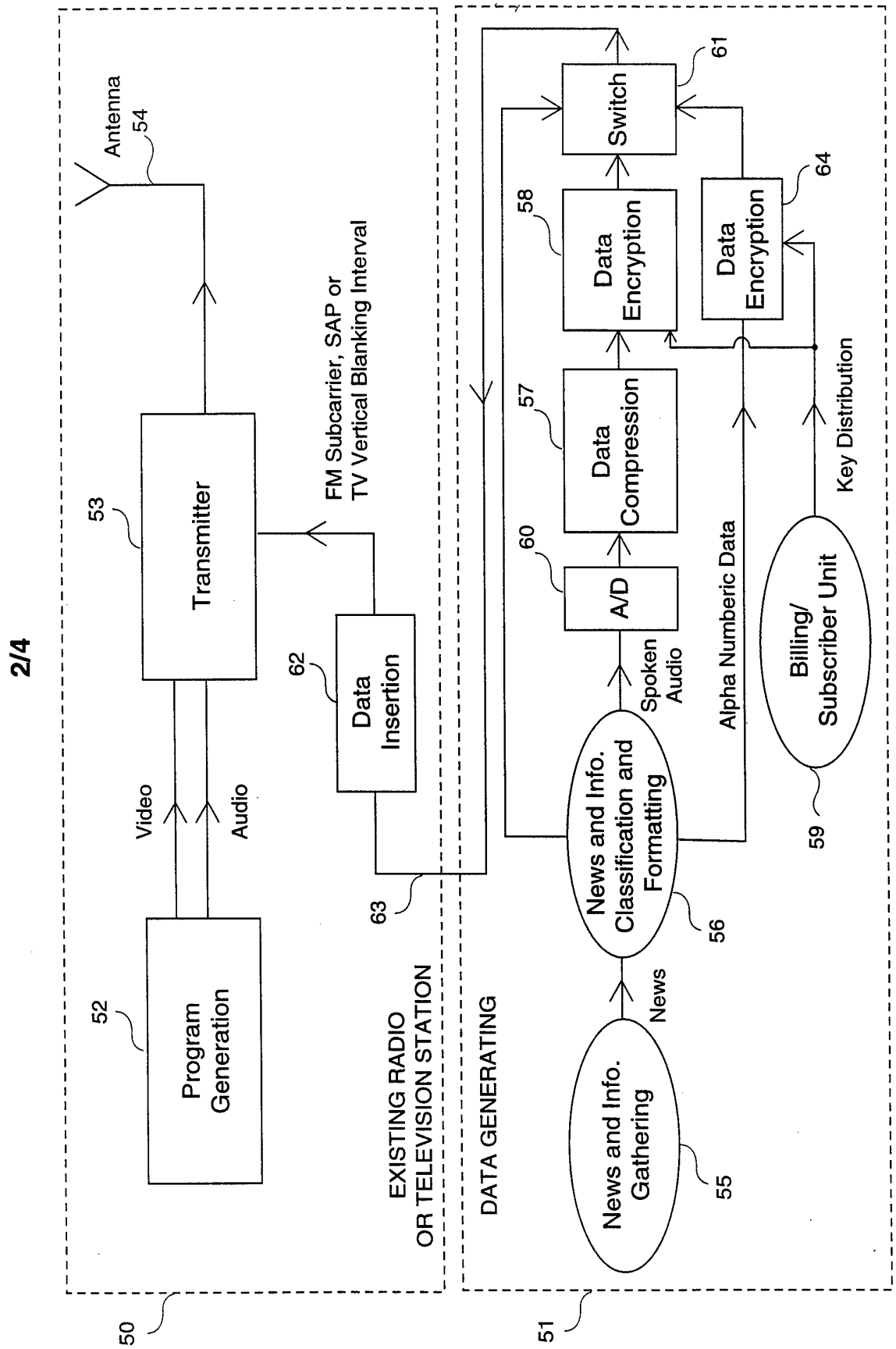

2/4
Antenna
54
Transmitter
53
Video
Audio
Program Generation
52
Data Insertion
62
FM Subcarrier, SAP or TV Vertical Blanking Interval
63
EXISTING RADIO OR TELEVISION STATION
50
DATA GENERATING
51
News and Info. Gathering
55
News
News and Info. Classification and Formatting
56
Spoken Audio
A/D
60
Data Compression
57
Data Encryption
58
Switch
61
Alpha Numberic Data
Data Encryption
64
Billing/ Subscriber Unit
59
Key Distribution

Figure 2

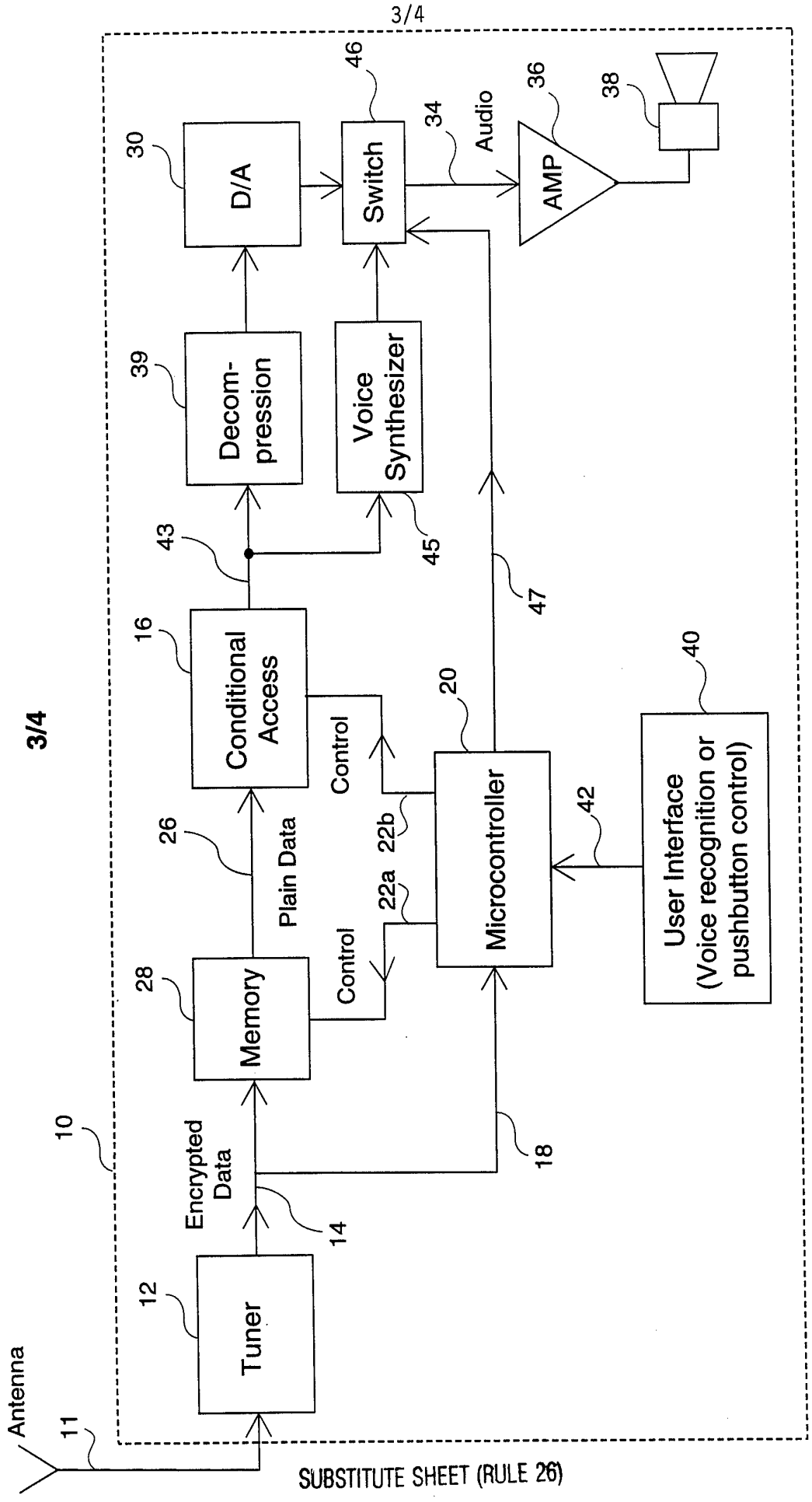

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Figure 3

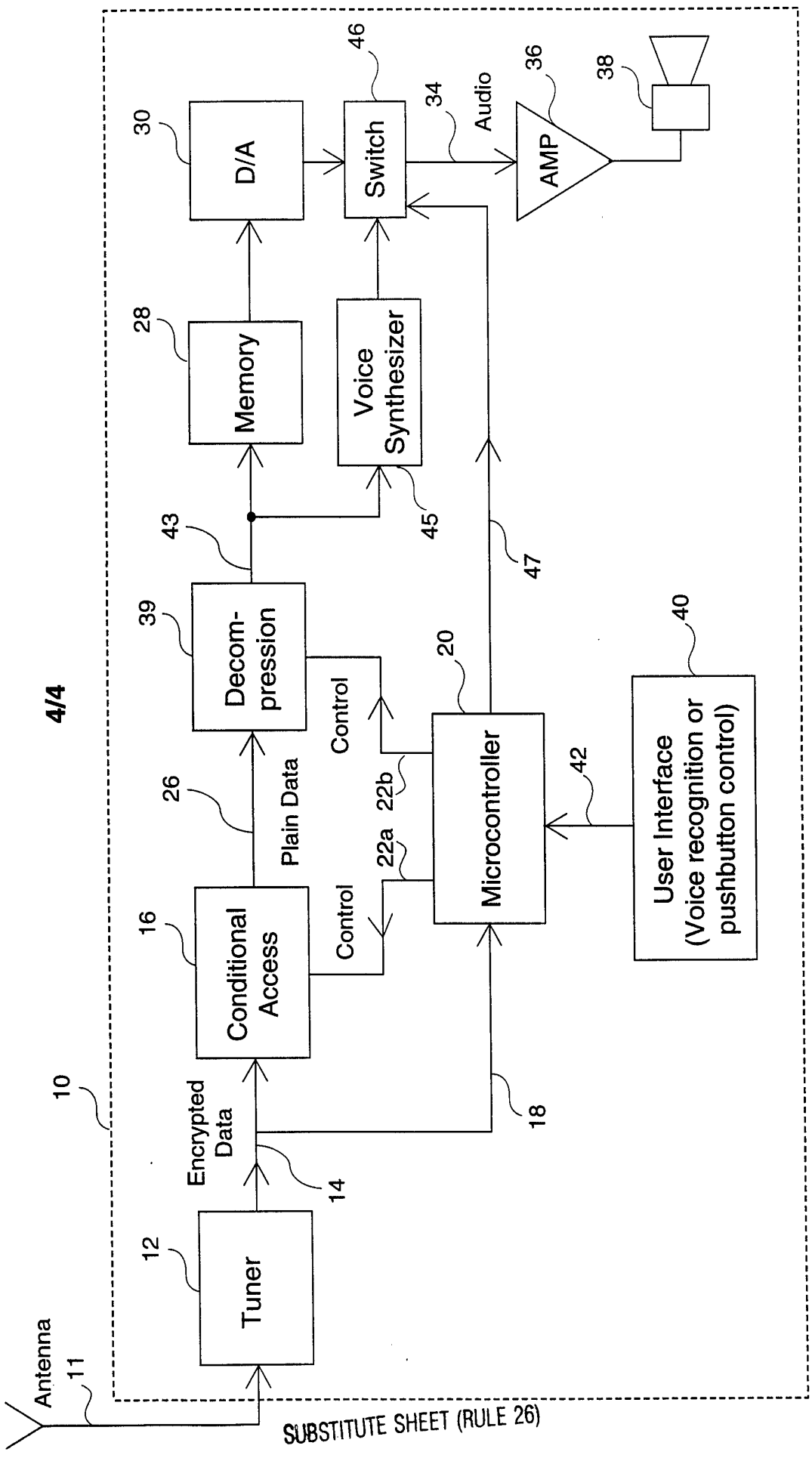

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Audio
AMP
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Figure 4

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 95/00578

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04H1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,5 206 641 (GRANT ET AL.) 27 April 1993 see column 1, line 1 - column 3, line 8; claims 1-5,7-10; figure 2	1
X	FR,A,2 651 352 (URBA 2000) 1 March 1991 see page 1, line 1 - page 4, line 28; figure 1	1
A	US,A,4 682 368 (TAKAHASHI) 21 July 1987 see column 1, line 1 - line 56; claims 1,3; figures 2,3	31,33, 34,37-39
A	WO,A,87 04309 (MOTOROLA INC.) 16 July 1987 see page 1, line 1 - page 4, line 9; claims 1,3,11; figure 1	31,33, 34,37-39

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search
30 May 1995

Date of mailing of the international search report
19.06.95

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 95/00578

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