

Description

The present invention relates to a paging receiver used in a radio paging communication system.

A numeric display paging receiver and an alpha-numeric display paging receiver are available as receivers capable of receiving message data from a caller and displaying the message data in conventional radio paging communication systems. A most convenient data input means for transmitting message data to a paging receiver is a key telephone set.

Although the key telephone set is used as an input means for inputting message data to a numeric display paging receiver in a conventional radio paging communication system, the key telephone set is not used as an input device for inputting message data to an alphanumeric display paging receiver due to the following reason. Message data is not input to the alpha-numeric display paging receiver without using an exclusive data input terminal such as a personal computer. The alphanumeric display paging receiver has an advantage in that perfectly free letter information can be received, while the numeric display paging receiver can receive only numeric information as message data. However, the alpha-numeric display paging receiver is not yet popular in spite of the above advantage.

At the time of transmission of message data to the alpha-numeric display paging receiver in the conventional radio paging communication system, even if message contents represent numeric information such as a destination telephone number, the message data is coded as an alpha-numeric code.

US-A-4 382 256 (D1) discloses a prior art paging receiver which demodulates a carrier wave with a paging signal code and a plurality of information key codes. The demodulated information key codes are decoded by the paging receiver when its own paging signal code is detected. The paging receiver contains a plurality of words corresponding to said information key codes. These stored words are read out when they correspond to the decoded information. The read out codes are then displayed.

A disadvantage of the above mentioned receivers is that transmission efficiency of the message data is undesirably degraded.

It is an object of the present invention to provide a radio paging communication system capable of transmitting message data from a normal key telephone set to an alpha-numeric display paging receiver.

It is another object of the present invention to provide a method of effectively transmitting message data consisting of or including numeric information to the alpha-numeric display paging receiver.

It is another object of the present invention to provide an improved alpha-numeric display paging receiver.

It is still another object of the present invention to provide a paging receiver with an improved functionality and convenience of operation, in particular by making it possible to use a wide variety of coded messages.

These objects can be achieved by the features of claim 1.

By providing means for detachably connecting the standard expression memory it is possible to have standard expression memories for different applications. Thus, a user may use standard expression memories for business-use, private-use, etc. Also the paging receivers may be customized for differing professional needs. Paging receivers in hospitals, factories or offices may need different sets of standard expressions. These different needs of the above mentioned working environments may be fulfilled by making standard expression memories detachably connectable to the paging receivers.

Further, by displaying the standard expression designating code when the specific standard expression memory means is not connected to the paging receiver, the paging receiver remains functional even without a standard expression memory connected. In every day life, the detachable standard expression memory may get lost. In that case, the paging receiver would be rendered useless unless, as described above, the standard expression designating code is displayed. The user can then recognize not only whether the standard expression memory is connected or not, but also which standard expression is stored in the standard expression memory, provided the user has written down the standard expression or has memorized the standard expression corresponding to the standard expression designating code.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram showing a system configuration of a base station in a radio paging communication system;

Figs. 2A to 2D are formats of a radio paging signal code;

Fig. 3 is a table showing a JIS (Japanese Industrial Standards) 8-bit code set;

Fig. 4 is a block diagram showing a circuit arrangement of a paging receiver used in the radio paging communication system according to a first embodiment of the present invention;

Fig. 5 shows a data format of data stored in a RAM shown in Fig. 4;

Fig. 6 is a table showing abbreviation Nos. and contents of the corresponding standard expressions;

Fig. 7 is a table showing codes corresponding to the key operations of abbreviation Nos. and characters;

Fig. 8 is a flow chart showing receiving process-

ing;

Fig. 9 is a flow chart showing readout processing;
Fig. 10 is a flow chart showing readout data display processing (Fig. 9) in detail;

Fig. 11 is a view showing examples of transmission of standard expression abbreviation Nos.;

Fig. 12 is a block diagram showing a circuit arrangement of a paging receiver according to a second embodiment of the present invention;

Fig. 13 is a perspective view of the paging receiver and its detachable standard expression memory; and

Fig. 14 is a flow chart showing readout processing of the second embodiment.

Fig. 1 is a block diagram showing a system configuration of a base station in a radio paging communication system. Referring to Fig. 1, reference numeral 1 denotes a key telephone set; and 2, a personal computer having a communication function. The key telephone set 1 and the personal computer 2 are used as input terminals for causing a caller to input a calling number of a paging receiver and a message thereto. The key telephone set 1 and the personal computer 2 are connected to a control center 4 of the base station through public telephone line 3.

The control center 4 includes an I/O circuit 5 connected to the public telephone line 3. The I/O circuit includes a modem and an answering circuit. A calling number input by the caller at the key telephone set 1 or the personal computer 2 is input to a collator 6 through the public telephone line 3 and the I/O circuit 5. The collator 6 collates the input calling number with calling numbers of a plurality of subscriber's receivers which are stored in a subscriber's receiver memory 7. When the input calling number does not coincide with any one of the calling numbers stored in the memory 7, the collator 6 sends a command to the answering circuit in the I/O circuit 5 to cause the answering circuit to send to the caller a message "The designated calling number is not registered at present". However, when the input calling number coincides with one of the calling numbers stored in the memory 7, the collator 6 sends the input calling number which coincides with one of the stored calling numbers to a signal processor 8. At the same time, the collator 6 outputs one of the different commands based on different types of paging receivers in accordance with the destination paging receiver assigned with this calling number. The selected command is output to the I/O circuit 5 and the signal processor 8. When the type of paging receiver assigned with the input calling number coinciding with the stored calling number is a tone-only type having no display device, the collator 6 sends a command to cause the I/O circuit 5 to send a message "Calling is started. Please hang up the phone and wait" to the caller. The collator 6 sends a command to cause the signal processor 8 to send a paging signal. When the type of pager receiver is a

numeric display type having a seven segments type display device, the collator 6 sends a command to the I/O circuit 5 to cause it to send a message "Please input a message." to the caller. In this case, the collator 6 sends a command to the signal processor 8 to cause it to treat the message data input from the caller as a numeric code, i.e., 4-bit coded data. When the type of paging receiver is an alpha-numeric display type having a matrix type display device, the collator 6 sends a command to the I/O circuit 5 to cause it to send a message "Please input a message." to the caller. In this case, the collator 6 sends a command to the signal processor 8 to cause it to treat the message data input from the caller as an alpha-numeric code, e.g., JIS (Japanese Industrial Standards) 8-bit coded data.

The message data from the caller is input to the signal processor 8 and a detector 9 through the I/O circuit 5. The detector 9 detects a shift code which represents that the subsequent data in the message data is numeric code data when the shift code is included in the message data. The shift code can be constructed by device control codes DC1 to DC3 in alpha-numeric codes (e.g., an ISO 7-bit code, an ASCII code which complies with the ISO 7-bit code, a JIS 7-bit code, or a JIS 8-bit code), or nondefined codes in these alphanumeric codes. When the shift code is used as a code which represents that the subsequent numeric data represents a standard abbreviation No., it must be a combination of continuous numeric codes which will not be found in a normal data input, as will be described later. When the detector 9 detects that the shift code is included in the message data from the caller, the detector 9 sends a command to the signal processor 8 to cause it to treat message data subsequently input to the signal processor 8 as the alpha-numerically coded data. The signal processor 8 processes the paging receiver calling number supplied from the collator 6 and the caller's message data input through the public telephone line 3 and the I/O circuit 5 into a paging signal code having a predetermined format.

A radio paging signal code to be used in the paging communication system of this embodiment will be described below.

Figs. 2A to 2D are code formats of the CCIR (Comite Consultatif International des Radio-Communication) radiopaging code No. 1 which is a so-called POCSAG (Post Office Code Standardization Advisory Group) code.

Fig. 2A shows an overall transmission signal format. The format including a 576-bits preamble signal A of "101010 ..." and a plurality of subsequent batch data B, C, The preamble signal causes the paging receiver to recognize that the data will be transmitted. At the same time, the preamble signal establishes bit synchronization.

Fig. 2B shows a batch data format. The batch data format includes a one-word sync code SC at its

beginning. Eight frames CD1 to CD8 each having two codewords follow the sync code SC. Each codeword has 32 bits. The codewords are classified into address and message codewords.

Figs. 2C and 2D show formats of address and message codewords, respectively. Fig. 2C shows the address codeword which includes a message flag at its beginning. An address bits (address code), function bits, BCH parity bits, and an even parity bit follow the message flag.

The message flag indicates whether the codeword is an address or message codeword. If the message flag is set at logic "0", it represents an address codeword. If the message flag is set at logic "1", it represents a message codeword. The address code follows the message flag and consists of bit 2 to bit 19. The address code corresponds to the calling number. Function bits follow the address code. The function bits have two bits and represent, for example, a display form and an alarm form. The function bits represent four functions by "00", "01", "10", and "11". The function information can be input by the caller at the key telephone set upon a paging contract between a subscriber and a paging service company. Therefore, the function information can be used to identify the caller. The BCH parity bits are used to correct an error in the address code and have bit 22 to bit 31. The even parity bit follows the BCH parity bits. The even parity bit represents an odd or even number of "1"s from the beginning to the end of the address codeword.

Twenty message bits follow a message flag of the message codeword shown in Fig. 2D. The message bits represent message data from a caller. If 4-bit coded numeric data are used, the message data represent five characters. However, if the 8-bit coded alpha-numeric data are used, the message data represent 2.5 characters. The data bits are arranged such that the least significant bit (LSB) is output first every character. That is, if the first character is a character of the numeric data, the LSB of the character is located at bit 2 of the message codeword, and the most significant bit (MSB) thereof is located at bit 5. The LSB of an alpha-numeric data character is located at bit 2 of the message codeword, and the MSB is located at bit 9. BCH parity bits and an even parity bit are added to the message bits in the same manner as in the address codeword.

The signal processor 8 shown in Fig. 1 generates an address codeword corresponding to the calling number from the collator 6 and a message codeword corresponding to the caller's message data on the basis of the commands from the collator 6 and the detector 9, and sends them as a paging signal code having a predetermined format to a transmitter 10. In this case, the address codeword is inserted in any one of the frames of the batch format (Fig. 2B) on the basis of the calling number. The message codeword is transmitted next to the address codeword. If the mes-

sage data from the caller cannot be assigned to one message codeword, a plurality of message codewords are generated and are continuously transmitted next to the address codeword. The transmitter 10 transmits the paging signal code from the signal processor 8 as a radio signal from an antenna 11.

In this embodiment, the normal data code of the message data for the alpha-numeric display paging receiver may be a JIS 8-bit code (Fig. 3). A code "FF" (hexadecimal notation) which is not defined in the JIS 8-bit code table is used as a shift code. Therefore, when message data including the shift code "FF" is input as the message data from the caller to the alpha-numeric display paging receiver, the base station outputs the data up to the shift code "FF" as the 8-bit code data and the subsequent code as the 4-bit code data. The alpha-numeric display paging receiver which receives this data processes the reception data as the 8-bit code data if it does not detect the shift code "FF" in the received message data. Otherwise, the alpha-numeric display paging receiver processes the subsequent data as 4-bit code data.

A paging receiver which is employed in the radio paging communication system according to a first embodiment will be described with reference to Figs. 4 to 11. In this embodiment, the paging receiver includes a standard expression memory.

Referring to Fig. 4, reference numeral 21 denotes an antenna for receiving the radio signal transmitted from the base station antenna 11 shown in Fig. 1. The radio signal received by the antenna 21 is demodulated into a digital signal by a receiver 22. The digital signal is supplied to a decoder 23. The decoder 23 compares the input calling number (address code) with its own calling number stored in an ID-ROM 24 to determine whether the input calling number coincides with its own calling number. If a noncoincidence is detected, the reception operation of the receiver 22 is stopped. However, if a coincidence is detected, the message data to be received is supplied to a CPU 25.

The CPU 25 sequentially stores the reception data from the decoder 23 in a RAM 26 and causes a loudspeaker 28 to generate an alarm sound through a driver 27. When message data stored in the RAM 26 is to be displayed, the CPU 25 determines whether the shift code "FF" for converting a reading unit from eight bits to four bits is present in the data. If no shift code "FF" is detected, the CPU 25 determines that the data is character data of the normal 8-bit code, and pattern data corresponding to the character data are read out from a character generator 29. The read-out pattern data are transferred to a display buffer 30. The received message is then displayed on a display 31 such as an LCD (Liquid Crystal Display).

When the shift code "FF" is present in the readout data, the CPU 25 determines that the data is 4-bit code data. The two hexadecimal numbers (i.e., two four-bit data) following the shift code "FF" are proc-

essed as a standard expression abbreviation numbers. That is, a standard expression character code corresponding to the two four-bit data (i.e., two hexadecimal numbers) is read out from a standard expression memory 32. The pattern data corresponding to this character code is transferred to the display buffer 30, and the standard expression message is displayed on the display 31.

Reference numeral 33 denotes a key input unit which includes a readout switch (not shown) for reading out a received message stored in the RAM 26 and a reset switch for stopping an alarm sound and a display. Key input signals from the key input unit 33 are output to the CPU 25.

Fig. 5 shows a data format of the RAM 26. As shown in Fig. 5, the RAM 26 includes 30 message registers $D_1, D_2, \dots, D_{30}$ and can store a maximum of 30 messages. All pieces of call information are respectively stored in registers $CA_1, CA_2, \dots, CA_{30}$.

The call information is the function information as previously mentioned. When a plurality of calling numbers are assigned to a single receiver, information representing a correspondence between calling and a specific one of the calling number can be also included in the call information. At the time of calling, different alarm sound, e.g., different melodies are generated based on different pieces of call information, and they are stored in the registers CA_1 to CA_{30} .

These pieces of call information are simultaneously displayed during the display of the received message (to be described later). Even after the alarm sound is stopped, the callee can confirm who is calling, i.e., he knows a correspondence between calling and a specific one of the calling numbers, and the content of the function information by monitoring the call information. An 8-sec timer counter T_1 is a timer for counting an alarm time of the alarm sound. A 30-sec timer counter T_2 is a timer for counting a 30-sec display period. A display mode flag F_1 is a flag for determining whether the message data is being displayed. During the display, the flag F_1 is set at logic "1". An alarming flag F_2 determines whether the alarm sound is being produced. During generation of the alarm sound, the alarming flag F_2 is set at logic "1". The RAM 26 also includes a display pointer P which represents an address of message register storing the message data to be displayed, and a memory counter MC for storing the number of messages stored in the message registers D_1 to D_{30} .

Fig. 6 is a table showing the standard expression abbreviation Nos. and the contents of the standard expressions corresponding to the abbreviation Nos. When an abbreviation No., i.e., two hexadecimal digits, for example, "01" or "02", is sent to the base station, the abbreviation No. is transmitted from the base station to the receiver. The corresponding standard expression as shown in Fig. 6 is displayed on the receiver.

Fig. 7 shows hexadecimal numbers and characters which correspond to key input operations when the numeric keys "0" to "9", a key "#", and a key "*" of the key telephone set are combined to represent the hexadecimal numbers "0" to "F". As described above, when the nondefined code "FF" (hexadecimal notation) in the JIS 8-bit code table is defined as the shift code for shifting the reading unit from the JIS 8-bit code to a 4-bit code, the keys "*" and "4" are sequentially depressed, and the combination of the keys and "4" is used twice, thereby inputting the shift code "FF". A desired standard expression abbreviation number is then input. A code "EE" is also not defined in the JIS 8-bit code table. In addition, since a character "J" corresponding to the 4-bit code "E" is not successively input in a normal state, the code "EE" may be used as a shift code.

An operation of the receiver having the above arrangement will be described with reference to flow charts in Figs. 8 to 10.

Fig. 8 is the flow chart showing receiving processing when calling is made. When the receiver receives a radio signal from the base station and detects its own calling number, message data received next to the calling number is stored in the first register D_1 of the message registers of the RAM 26 in step S1. In this case, prior to storage of the received data in the register D_1 , the previous message data stored in the RAM 26 are sequentially shifted to the subsequent registers. Therefore, the currently received message data is stored in the first register D_1 , and the second newest message data is stored in the second register D_2 . In this manner, the messages data are stored in the registers in accordance with the reception time order. In step S2, the count value of memory counter MC is incremented by "1". When the message data are stored in all the registers D_1 to D_{30} , this increment processing is not performed. The alarming flag F_2 is set to start generation of an alarm sound (step S3). At the same time, the timer counter T_1 for counting the 8-sec alarm time is cleared and then started (step S4).

When alarming is started, the CPU 25 determines whether the display mode flag F_1 is set, i.e., the message data is being displayed (step S5). If the display flag F_1 is set at logic "0", the flow advances to step S6 to display a message "Page is made." In step S7, the CPU 25 determines whether 8 seconds have elapsed. If NO in step S7, the flow advances to step S8 to determine whether the reset switch is turned on. If NO in step S8, the flow returns to step S7. The operations in steps S7 and S8 are repeated to produce the alarm sound for 8 seconds.

However, if YES in step S8, i.e., the CPU 25 determines that the reset switch is operated, or if YES in step S7, i.e., the CPU 25 determines that 8 seconds have elapsed, the flow advances to step S9 to stop the display. In addition, the alarm sound is stopped,

and the alarming flag F_2 is reset (step S10). The operation of the timer counter T_1 is also stopped (step S11).

When the CPU 25 determines in step S5 that the display mode flag F_1 is set at logic "1", i.e., the user is called while the message data stored in the RAM is displayed, the flow advances to step S12. The display pointer P which represents a memory address of the displayed message is incremented by one.

The display pointer P is incremented due to the following reason. The currently received data is stored in the first message register D_1 upon reception the incoming call, and the previous data is shifted by one address. At the same time, the message No. (address) stored in the display buffer is incremented by one, so that the message No. is updated to a new No. (step S13). Thereafter, the CPU 25 determines whether eight seconds have elapsed in the same manner as in step S7 (step S14) and whether the reset switch is turned on in the same manner as in step S8 (step S15). The flow then advances to steps S10 and S11 to stop alarming and the timer counter T_1 .

In step S6, the message "page" is displayed. Instead of this, the message indicated by the received message data may be displayed. In this case, the processing in step S6 is same as the read out data processing described in later with reference to Fig. 10.

When a data readout switch is depressed instead of calling, readout processing shown in Fig. 9 is executed. In readout processing, the CPU 25 determines in step S21 whether the display mode flag F_1 is set at logic "1", i.e., the message data is displayed. If the display mode flag F_1 is reset at logic "0", the switching operation is the first readout operation, and the flag F_1 is set at logic "1" (step S22). The display pointer P is set at logic "1" (step S23). data processing in step S24 is executed.

When the display mode flag F_1 set at logic "1" in step S21, this state is obtained upon depression of the readout switch again during data readout. In this case, the flow advances to step S25, and the display pointer P is incremented by "1", thus updating the pointer. The CPU 25 determines in step S26 whether the value of the display pointer P is larger than the count value of the memory counter MC, i.e., the number of stored messages. If NO in step S26, i.e., if $P \leq MC$, the readout data processing in step S24 is executed. However, if YES in step S26, i.e., if $P > MC$, the flow advances to step S23. In step S23, the display pointer P is set at 1, and the address of the pointer returns to the beginning.

The contents of the readout data processing in step S24 will be described in detail with reference to the flow chart in Fig. 10.

In step a1 of Fig. 10, the call information of the message register designated by the display pointer P is read out, and the display pattern data corresponding to these codes together with the message No. are

read out from the character generator 29 and stored in the display buffer 30. The message data is read as alphanumeric code data in units of eight bits (step a2). The 8-bit data is determined to be the shift code "FF" representing shifting of the reading unit from eight bits to four bits (step a3). If the 8-bit data is determined to be the shift code "FF", the subsequent analysis or reading unit is shifted into 4 bits (step a4). The two hexadecimal digits following the shift code "FF" are recognized as an abbreviation No. of the standard expression message, and the character code corresponding to the abbreviation No. is read out from the standard expression memory 33. The character pattern data corresponding to the character code are read out from the character generator 29 and are transferred to the display buffer 30 (step a5). The data following the abbreviation No. are read in units of four bits (i.e., each hexadecimal digit) (step a6). The CPU 25 then determines in step a7 whether the message is ended. If NO in step a7, the flow advances to step a8 to determine whether two four-bit code data "F" successively appear. If YES in step a8, the flow returns to step a5, and the two hexadecimal digits are processed as a standard expression abbreviation number.

If NO in step a8, i.e., if two code data "F" are not successively detected, the pattern data corresponding to 4-bit code data analyzed first are read out from the character generator 29 in step a9. The readout pattern data are transferred to the display buffer 30, and the flow returns to step a6. When the end of message is determined in step a7, the pattern data corresponding to the immediately preceding analyzed 4-bit code data is read out from the character generator 29 and transferred to the display buffer 30. Thereafter, the processing is ended.

However, if the shift code "FF" is not determined in step a3, the flow advances to step a10 to determine whether the message is ended. If NO in step a10, the flow advances to step a11, and the data are analyzed as 8-bit codes. The pattern data corresponding to these codes are read out from the character generator 29 and transferred to the display buffer 30. Thereafter, the flow returns to step a2.

Fig. 11 shows key operations, a transmission code transmitted from the base station and display contents when standard expression abbreviation number are input as 4-bit code data from the key telephone set.

As shown in Fig. 11, in order to input the standard expression corresponding to the abbreviation No. "01" at the key telephone set, after a calling number of a receiver is input, the keys "*" and "4" are subsequently depressed, and this combination is depressed twice to input the shift code "FF". Numbers "0" and "1" as the standard expression abbreviation No. "01" are input. Subsequently, the numeral keys "1" and "8", the keys "*" and "2" corresponding to a

hyphen "-" the numeral keys "0" and "0" and the end key "#" are depressed. In the base station, the shift code "FF" as the first input data is detected by the detector 9 in Fig. 1. The base station processes the subsequent input data as the 4-bit codes. The base station sends out the shift code "FF" for shifting the reading unit to four bits from eight bits, the abbreviation number "01", numerals "1" and "8", the hyphen "D" (hexadecimal notation), and numerals "0" and "0".

The receiver stores the transmitted data in the message registers D₁ to D₃₀. When the receiver detects the hexadecimal code "FF" the analysis or reading unit is changed from the 8-bit code to the 4-bit code. Data "01" following the shift code "FF" is decoded as the standard expression abbreviation number, and the subsequent data are decoded as 4-bit codes. In Example 1, the standard expression corresponding to the abbreviation number "01" and data are displayed on the display 30 as "Please return before 18 : 00."

Example 2 shows operations, a transmission code and display contents when the shift code "FF" is transmitted twice to display two different standard expressions. Abbreviated numbers "02" and "03" are sent after the respective shift codes "FF", thereby transmitting two different standard expressions. As a result, a message "We made contact with customer. Total amount is ¥2,000." is displayed on the display 31.

When readout data display processing is completed, the flow advances to step S27 in Fig. 9. The 30-sec timer counter T₂ is started. The CPU 25 determines in step S28 whether 30 seconds have elapsed. If NO in step S28, the CPU 25 determines in step S29 whether the reset switch is operated. When the reset switch is operated or 30 seconds have elapsed, the display is stopped, and the display mode flag F₁ reset to logic "0" (step S30). The timer counter T₂ is stopped (step S31), and the processing is ended.

When an abbreviation number and a numeric code are transmitted from the base station, these data are coded as 4-bit codes, and the 4-bit codes are transmitted together with the shift code, thereby effectively transmitting the data. In the receiver, the shift code is detected, and the transmitted data are processed as 4-bit codes. The received message can be displayed without complicating the circuit arrangement and the processing procedures.

A paging receiver according to another embodiment of the present invention will be described with reference to Figs. 12 to 14. In this embodiment, a standard expression memory is detachable from the paging receiver. The same reference numerals as in the first embodiment denote the same parts in the second embodiment, and a detailed description thereof will be omitted.

Fig. 12 is a block diagram showing a circuit arrangement of the receiver. As is apparent from Fig.

12, the receiver of the second embodiment is substantially the same as that of the first embodiment (Fig. 4) except that a standard expression memory 32 is connected to a CPU 25 through a connector 34.

Fig. 13 is a perspective view of the receiver. A display 31 for displaying a received message stored in a RAM 26, a forward key 41, which corresponds to the data readout switch in the first embodiment, for incrementing a read address of the RAM 26, a reverse key 42 for decrementing the read address, a right key 44 for displaying a message part immediately following the currently displayed message part if the received message is too long to be displayed at once, and a left key 45 for displaying a message part immediately preceding the currently displayed message part of the excessively long message are arranged on the upper surface of the receiver. A standard expression memory pack 46 which incorporates a standard expression memory 32 (to be described later) is detachable at the rear end surface of the receiver. An eject switch 47 is arranged on the right side surface of the receiver. Upon operation of the eject switch 47, the standard expression memory pack 46 can be ejected from the receiver.

When a caller sends a standard abbreviation No. as a message in the radio paging communication system having this paging receiver, a code "00" for representing that the subsequent data is an ID number of a standard expression memory 32 and a 4-bit numeric code for designating the ID number are transmitted as part of the message data in order to specify the abbreviation No. of a given standard expression memory.

An operation of the receiver will be described below. Receiving processing upon reception of an incoming call is the same as that of the receiver of the first embodiment described with reference to Fig. 8. Readout processing upon operation of the forward key 41 is the same as that of the first embodiment described with reference to Fig. 9 except for readout data display processing. Therefore, only the readout data display processing will be described below.

Fig. 14 is a flow chart showing readout data display processing of the second embodiment.

Upon operation of the forward key 41, the same display pointer operations as in steps S21 to S23, S25, and S26 in Fig. 9 are performed, and the readout data display processing is then executed. In step T1, call information of the message register designated by a display pointer P is read out, and display pattern data corresponding to these codes together with the message No. are read out from a character generator 29. The readout data are stored in a display buffer 30. The message data are read out as the alpha-numeric code in units of eight bits (step T2), and it is determined in step T3 whether the 8-bit data is a shift code "FF" which represents shift from the JIS 8-bit code to the 4-bit numeric code. If YES in step T3, the data

analysis or reading unit is shifted to 4 bits in step T4, the subsequent data are read in units of four bits (step T5), and a CPU 25 then determines in step T6 whether the message is ended. If NO in step T6, the flow advances to step T7 to determine whether the readout data is the F (hexadecimal notation) code. If YES in step T7, the flow advances to step T8, and the next 4-bit data is read out to determine in step T9 whether it is an F code. If the data read out for the decision block in step T7 or T9 is not an F code, the readout data represents a symbol or a numeric code. The flow advances to step T10, and the pattern data corresponding to the readout data is read out from the character generator 29. The readout pattern data is transferred to the display buffer 30, and the corresponding symbol or numeric value is displayed on a display 31.

If the readout data is detected as an F code in step T9, i.e., two successive F codes are detected, the next data are determined as significant data in the form of two hexadecimal digits. In this case, the flow advances to step T11, and two hexadecimal digits (i.e., 8 bits) are read out. The CPU 25 determines in step T12 whether the readout data is "00". The code "00" represents the subsequent 4-bit data as an ID number of a standard expression memory. The flow then advances to step T13 to read out the next four-bit data. The CPU 25 determines in step T14 whether the 4-bit numeric code, i.e., the ID number of the standard expression memory from the transmitter coincides with that stored in the standard expression memory pack 46 inserted into the receiver. If YES in step T14, a coincidence flag F is set in step T15, and the flow returns to step T5. In step T5, the message data is read out.

If the code having the two hexadecimal digits read out for the decision block in step T12 is not the code "00", the two-digit code represents the standard message abbreviation number sent next to the code "FF", and the flow advances to step T16. The CPU 25 determines in step T16 whether the coincidence flag F is set. If YES in step T16, standard expression readout display processing in step T17 is executed. In this standard expression readout display processing, the standard expression corresponding to the transmitted abbreviation number is read out from the standard expression memory 32. Character pattern data corresponding to the code is read out from the character generator 29 and transferred to the display buffer 30. Therefore, the standard expression is displayed on the display 31.

When the CPU 25 determines in step T16 that the coincidence flag F is not set, this indicates that the standard expression memory 32 designated by the caller is not mounted in the receiver. In this case, the flow advances to step T18. The designated ID number of standard expression memory, a message "STANDARD EXPRESSION", and the standard expression

abbreviation No. are displayed on the display 31.

When the CPU 25 determines in step T3 that the data is not the shift code "FF", the flow advances to step T19 to determine whether the message is ended. If NO in step T19, the flow advances to step T20. The data are analyzed as the 8-bit codes, and the corresponding pattern data are read out from the character generator 29 and transferred to the display buffer 30. The pattern data are then displayed on the display 31. The flow then returns to step T2.

In the second embodiment described above, only the standard expression memory 32 as a ROM is incorporated in the standard expression memory pack 46. However, the standard expression memory 32 may comprise a RAM, and standard expressions formed by a caller may be registered therein.

Alternatively, the standard expression memory may comprise a detachable memory for storing specific standard and a built-in memory (i.e., a memory incorporated in the receiver) for storing general standard expressions. In this case, for example, if a standard expression abbreviation number (number) represents 50 or less, the standard expressions stored in the built-in memory are designated. If the standard expression abbreviation number represents 51 or more, the standard expressions stored in the detachable memory are designated. In this case, a step for determining whether the number represents 51 or more is provided between steps T12 and T16 in the flow chart of Fig. 14. If the number represents 51 or more, the flow advances to step T16. Otherwise, a corresponding standard expression in the built-in memory is read out and displayed.

According to the second embodiment, the standard expression memories for storing standard expressions which satisfy needs of users can be selectively mounted in the receiver, and a message having an arbitrary content can be transmitted depending on the needs of callees.

When a standard expression memory having a number different from the ID number of the standard expression memory designated by the message information transmitted from the transmitter is mounted in the receiver, the ID number of the designated standard expression memory is displayed. Therefore, the callee can easily select a proper standard expression memory.

The receiver need not have a standard expression memory. In this case, the receiver can display only numeral data when a key telephone set is used.

In the above embodiments, the abbreviation numbers are input from a key telephone set. The abbreviation number, however, can be input from, for example, a personal computer.

In the above embodiments, the data input by the key operation is used as the shift code itself. The shift code can be obtained by processing data input by the key operation.



Claims

1. A paging receiver comprising:

receiving means (21, 22, 23) for receiving a coded signal which is transmitted from a transmitter of a base station and includes address data and message data and for demodulating the coded signal;

memory means (26) for storing the message data demodulated by said receiving means;

standard expression memory means (32, 46) for storing predetermined standard expressions;

alpha-numeric display means (30, 31) for displaying message information;

means (25) for reading out message data from said memory means (26) and for detecting a standard expression designating code for designating a standard expression stored in said standard expression memory means (32, 46) in the readout message data to display message information corresponding to the readout message data on said alpha-numeric display means (30, 31); and

display control means (25) for reading out a standard expression designated by said standard expression designating code from said standard expression memory means (32, 46) and for displaying the readout standard expression on said alpha-numeric display means (30, 31); characterized in that

said paging receiver further comprising means (34) for detachably connecting said standard expression memory means (32, 46) to the body of said paging receiver;

said reading/detecting means (25) detects on the basis of said standard expression designating code whether a specific standard expression memory means (32, 46) which stores the designated standard expression is connected to the paging receiver; and

said display control means (25) displays the standard expression designating code on said alpha-numeric display means (30, 31) when it is detected by said reading/detecting means (25) that said specific standard expression memory means (32, 46) is not connected to the paging receiver.

2. A receiver according to claim 1, further including second standard expression memory means, built in said receiver body, for storing another predetermined standard expressions.

3. A receiver according to claim 2, characterized in that said detachable standard expression memory means (32, 46) stores a plurality of specific standard expression message, and said built-in

standard expression memory means stores a plurality of general standard expression message.

4. A receiver according to claim 2 or 3, characterized in that said standard expression designating code includes an abbreviation number, and said display control means (25) selects one between said detachable standard expression memory means (32) and said built-in standard expression memory means depending on the value range of abbreviation number to read out standard expression message.

5. A receiver according to claim 2 or 3, characterized in that said standard expression designating code includes an abbreviation number, and said display control means (25) read out a standard expression message stored in said detachable standard expression memory means (32, 46) when the abbreviation number is predetermined value or more, and read out a standard expression message stored in said built-in standard expression memory means when the abbreviation number is less than said predetermined value.

6. A receiver according to any one of claims 1-5, characterized in that said detachable standard expression memory means (32, 46) stores an ID number assigned to said detachable standard expression memory means (32, 46), said standard expression designating code includes an ID number and an abbreviation number, said display control means (25) further includes means for discriminating whether an ID number in the readout message data is coincident with the ID number assigned to said detachable standard expression memory means (32, 46), said display control means (25) read out the standard expression message from said detachable standard expression memory means (32, 46) on the basis of an abbreviation number in the readout message data when a coincidence is detected by said discriminating means and for displaying the ID number and the abbreviation number in the message data when a noncoincidence is detected by said discriminating means.

Patentansprüche

1. Ein Funkrufempfänger mit: einer Empfangseinrichtung (21, 22, 23) zum Empfangen eines codierten Signals, das von einem Sender einer Basisstation gesendet wird und das Adreßdaten und Nachrichtendaten enthält, und zum Demodulieren des codierten Signals;



- einer Speichereinrichtung (26) zum Speichern der Nachrichtendaten, die von der Empfangseinrichtung demoduliert werden;
 einer Standardausdruck-Speichereinrichtung (32, 46) zum Speichern vorbestimmter Standardausdrücke;
 einer alphanumerischen Anzeigeeinrichtung (30, 31) zum Anzeigen von Nachrichteninformation;
 einer Einrichtung (25) zum Auslesen von Nachrichtendaten aus der Speichereinrichtung (26) und zum Detektieren eines Standardausdruck-Bestimmungscode zum Bestimmen eines Standardausdrucks, der in der Standardausdruck-Speichereinrichtung (32, 46) gespeichert ist, in den Auslesenachrichtendaten, um auf der alphanumerischen Anzeigeeinrichtung eine Nachrichteninformation anzuzeigen, die den ausgelesenen Nachrichtendaten entspricht; und
 einer Anzeigensteuereinrichtung (25) zum Auslesen eines Standardausdrucks, der durch den Standardausdruck-Bestimmungscode bestimmt worden ist, aus der Standardausdruck-Speichereinrichtung (32, 46) und zum Anzeigen des ausgelesenen Standardausdrucks auf der alphanumerischen Anzeigeeinrichtung (30, 31); **dadurch gekennzeichnet, daß**
 der Funkrufempfänger weiterhin eine Einrichtung (34) umfaßt zum abnehmbaren Verbinden der Standardausdruck-Speichereinrichtung (32, 46) mit dem Hauptteil des Funkrufempfängers, daß die Lese/Detektiereinrichtung (25) auf der Basis des Standardausdruck-Bestimmungscode feststellt, ob eine spezifische Standardausdruck-Speichereinrichtung (32, 46), die den bestimmten Standardausdruck speichert, mit dem Funkrufempfänger verbunden ist; und, daß die Anzeigensteuereinrichtung (25) den Standardausdruck-Bestimmungscode auf der alphanumerischen Anzeigeeinrichtung (30, 31) anzeigt, wenn von der Lese/Detektiereinrichtung (25) festgestellt wird, daß die spezifische Standardausdruck-Speichereinrichtung (32, 46) nicht mit dem Funkrufempfänger verbunden ist.
2. Empfänger gemäß Anspruch 1, wobei weiterhin eine zweite Standardausdruck-Speichereinrichtung vorgesehen ist, die in dem Empfängerhauptteil eingebaut ist, zum Speichern weiterer vorbestimmter Standardausdrücke.
 3. Empfänger gemäß Anspruch 2, **dadurch gekennzeichnet, daß** die lösbare Standardausdruck-Speichereinrichtung (32, 46) eine Vielzahl spezifischer Standardausdrucknachrichten speichert und die eingebaute Standardausdruck-Speichereinrichtung eine Vielzahl allgemeiner Standardausdrucknachrichten speichert.
 4. Empfänger gemäß Anspruch 2 oder 3, **dadurch gekennzeichnet, daß** der Standardausdruck-Bestimmungscode eine Abkürzungsnummer enthält und die Anzeigensteuereinrichtung (25) zwischen der abnehmbaren Standardausdruck-Speichereinrichtung (32) und der eingebauten Standardausdruck-Speichereinrichtung auswählt, abhängig von dem Wertebereich der Abkürzungsnummer, um eine Standardausdrucknachricht auszulesen.
 5. Empfänger gemäß Anspruch 2 oder 3, **dadurch gekennzeichnet, daß** der Standardausdruck-Bestimmungscode eine Abkürzungsnummer enthält und die Anzeigensteuereinrichtung (25) eine Standardausdrucknachricht ausliest, die in der abnehmbaren Standardausdruck-Speichereinrichtung (32, 46) gespeichert ist, wenn die Abkürzungsnummer gleich oder größer einem vorbestimmten Wert ist, und eine Standardausdrucknachricht ausliest, die in der eingebauten Standardausdruck-Speichereinrichtung gespeichert ist, wenn die Abkürzungsnummer kleiner als der vorbestimmte Wert ist.
 6. Empfänger gemäß mindestens einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, daß** die abnehmbare Standardausdruck-Speichereinrichtung (32, 46) eine ID-Nummer speichert, die der abnehmbaren Standardausdruck-Speichereinrichtung (32, 46) zugeordnet ist, wobei der Standardausdruck-Bestimmungscode eine ID-Nummer und eine Abkürzungsnummer enthält, die Anzeigensteuereinrichtung (25) weiterhin eine Einrichtung aufweist zum Unterscheiden, ob eine ID-Nummer in den Auslesenachrichtendaten mit der ID-Nummer übereinstimmt, die der abnehmbaren Standardausdruck-Speichereinrichtung (32, 46) zugeordnet ist, wobei die Anzeigensteuereinrichtung (25) die Standardausdrucknachricht aus der abnehmbaren Standardausdruck-Speichereinrichtung (32, 46) ausliest auf der Grundlage einer Abkürzungsnummer in den Auslesenachrichtendaten, wenn von der Unterscheidungseinrichtung eine Übereinstimmung festgestellt wird und zum Anzeigen der ID-Nummer und der Abkürzungsnummer in den Nachrichtendaten, wenn von der Unterscheidungseinrichtung keine Übereinstimmung festgestellt wird.

Revendications

1. Récepteur d'appel de personnes comprenant :
 un moyen récepteur (21, 22, 23) pour recevoir un signal codé qui est émis à partir d'un émetteur d'une station de base et qui comprend



- une donnée d'adresse et une donnée de message et pour démoduler le signal codé ;
 un moyen de mémorisation (26) pour mémoriser la donnée de message démodulée par ledit moyen récepteur ;
 un moyen de mémorisation d'expressions standard (32, 46) pour mémoriser des expressions standard prédéterminées ;
 un moyen d'affichage alphanumérique (30, 31) pour afficher de l'information de message ;
 un moyen de lecture/détection (25) pour lire la donnée de message dans ledit moyen de mémorisation (26) et pour détecter, dans la donnée de message lue, un code de désignation d'expression standard pour désigner une expression standard mémorisée dans ledit moyen de mémorisation d'expressions standard (32, 46), pour afficher, sur ledit moyen d'affichage alphanumérique (30, 31), l'information de message correspondant à la donnée de message lue ; et
 un moyen de commande d'affichage (25) pour lire, dans ledit moyen de mémorisation d'expression standard (32, 46), une expression standard désignée par ledit code de désignation d'expression standard, et pour afficher, sur ledit moyen d'affichage alphanumérique (30, 31), l'expression standard lue ;
 caractérisé en ce que :
 ledit récepteur d'appel de personnes comprend en outre un moyen (34) pour connecter de façon amovible ledit moyen de mémorisation d'expressions standard (32, 46) au corps dudit récepteur d'appel de personnes ;
 ledit moyen de lecture/détection (25) détecte, sur la base dudit code de désignation d'expression standard, si un moyen de mémorisation d'expressions standard (32, 46) spécifique qui mémorise l'expression standard désignée est connecté au récepteur d'appel de personnes ; et
 ledit moyen de commande d'affichage (25) affiche le code de désignation d'expression standard sur ledit moyen d'affichage alphanumérique (30, 31) si ledit moyen de lecture/détection (25) détecte que ledit moyen de mémorisation d'expressions standard (32, 46) n'est pas connecté au récepteur d'appel de personnes.
2. Récepteur selon la revendication 1, comprenant en outre un second moyen de mémorisation d'expressions standard, incorporé dans ledit corps de récepteur, pour mémoriser d'autres expressions standard prédéterminées.
3. Récepteur selon la revendication 2, caractérisé en ce que ledit moyen de mémorisation d'expressions standard amovible (32, 46) mémorise plusieurs messages d'expression standard spécifiques et en ce que ledit moyen de mémorisation d'expressions standard incorporé mémorise plusieurs messages d'expression standard généraux.
4. Récepteur selon la revendication 2 ou 3, caractérisé en ce que ledit code de désignation d'expression standard comprend un numéro d'abréviation, et en ce que ledit moyen de commande d'affichage (25) sélectionne, pour lire le message d'expression standard, l'un dudit moyen de mémorisation d'expressions standard amovible (32) et dudit moyen de mémorisation d'expressions standard incorporé en fonction de la gamme de valeurs du numéro d'abréviation.
5. Récepteur selon la revendication 2 ou 3, caractérisé en ce que ledit code de désignation d'expression standard comprend un numéro d'abréviation, et en ce que ledit moyen de commande d'affichage (25) lit un message d'expression standard mémorisé dans ledit moyen de mémorisation d'expressions standard amovible (32, 46) si le numéro d'abréviation est supérieur ou égal à une valeur prédéterminée et lit un message d'expression standard mémorisé dans ledit moyen de mémorisation d'expressions standard incorporé si le numéro d'abréviation est plus petit que ladite valeur prédéterminée.
6. Récepteur selon l'une quelconque des revendications 1 à 5, caractérisé en ce que ledit moyen de mémorisation d'expressions standard amovible (32, 46) mémorise un numéro d'identification affecté audit moyen de mémorisation d'expressions standard amovible (32, 46) ;
 en ce que ledit code de désignation d'expression standard comprend un numéro d'identification et un numéro d'abréviation ;
 en ce que ledit moyen de commande d'affichage (25) comprend en outre un moyen pour déterminer si un numéro d'identification, dans la donnée de message lue, coïncide avec le numéro d'identification affecté audit moyen de mémorisation d'expressions standard amovible (32, 46) ;
 en ce que ledit moyen de commande d'affichage (25) lit le message d'expression standard à partir dudit moyen de mémorisation d'expressions standard amovible (32, 46) sur la base d'un numéro d'abréviation de la donnée de message lue si ledit moyen de détermination détecte une coïncidence, et affiche le numéro d'identification et le numéro d'abréviation de la donnée de message si ledit moyen de détermination détecte une discordance.