

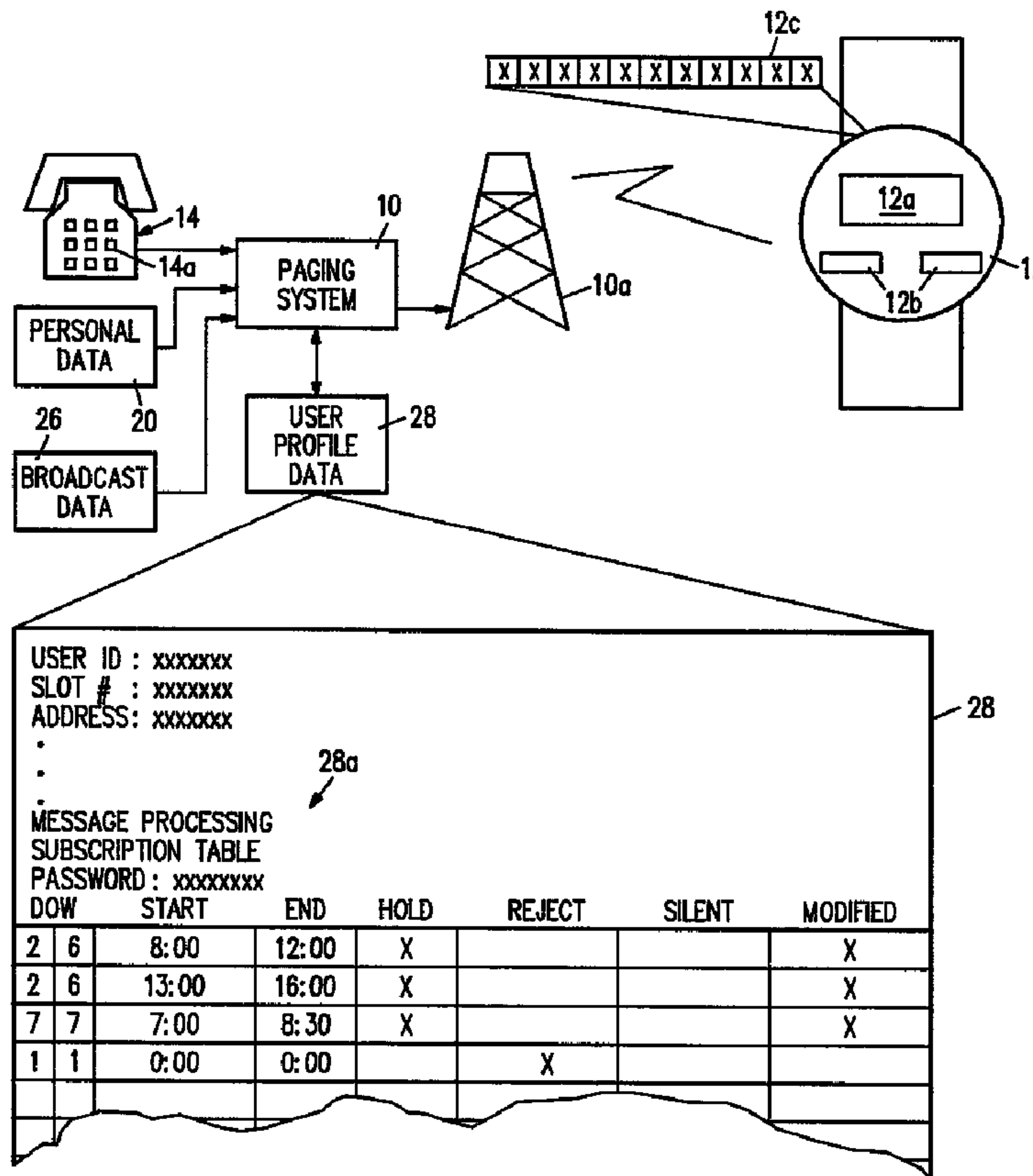


(86) Date de dépôt PCT/PCT Filing Date: 1994/06/08
 (87) Date publication PCT/PCT Publication Date: 1994/12/22
 (45) Date de délivrance/Issue Date: 2007/08/07
 (85) Entrée phase nationale/National Entry: 1995/11/16
 (86) N° demande PCT/PCT Application No.: US 1994/006505
 (87) N° publication PCT/PCT Publication No.: 1994/030021
 (30) Priorité/Priority: 1993/06/10 (US08/075,074)

(51) Cl.Int./Int.Cl. *H04Q 7/08* (2006.01),
H04Q 7/10 (2006.01)
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(54) Titre : TRAITEMENT DES MESSAGES ET CONTROLE DES ALARMES AMELIORES POUR DISPOSITIF DE RADIOMESSAGERIE

(54) Title: ENHANCED MESSAGE PROCESSING AND ALARM CONTROL FOR A PAGING DEVICE



(57) Abrégé/Abstract:

A paging system (10) offering an improved message processing and alarm control function is shown and illustrated wherein the message acceptance and alarm control is performed conditionally as a function of time of day and day of week. Conditional

(57) **Abrégé(suite)/Abstract(continued):**

message processing may include accepting or declining presentation of a message based on a time reference. Alarm control may be provided according to user alarm definition to personalize alarm presentation unique to the user. This allows the user to more appropriately control message processing and alarm presentation according to personal criteria.

1 ENHANCED MESSAGE PROCESSING AND ALARM CONTROL FOR A
2 PAGING DEVICE

3 BACKGROUND OF THE INVENTION

4 The present invention relates generally to communication
5 systems, and particularly to paging systems having an
6 alarm feature activated in coordination with information
7 presentation.

8 Paging devices typically are small radio signal receiving
9 and paging information storing devices including an alarm
10 feature activated upon receipt of paging information.

11 The most common form of alarm feature is an audible
12 alarm, and vibrating alarms are available on many
13 devices. The user hears or feels the alarm and knows
14 when paging information, e.g., a telephone number, has
15 just arrived by radio signal broadcast. Typically,
16 paging information arrives as a telephone number to be
17 called in response to the page. The person originating
18 the page dials a telephone number associated with a given
19 paging device and, in response to voice prompts, enters a
20 sequence of digits to be delivered to and presented on a
21 display of the pager.

22 Paging devices have evolved, however, beyond simply
23 delivering a telephone number to be called. Paging
24 devices often serve as personal information terminals

1 receiving a variety of information in addition to
2 telephone numbers. As personal information terminals,
3 paging devices carry a variety of information services,
4 e.g., weather reports, stock reports, sports scores, and
5 personal financial information. Furthermore, paging
6 devices are now being used across a broader spectrum of
7 users. Paging devices are now being used for personal
8 information exchange, e.g., between parents and children,
9 and between persons engaged in business and non-business
10 related communication.

11 Thus, paging devices are being used by more and more
12 people for more and more purposes. As a result, message
13 traffic on paging systems is increasing and the paging
14 messages and information delivered to individual paging
15 devices can be both numerous and frequent. With such
16 increase, it is ever more important that paging devices
17 be appropriately integrated into everyday use and not
18 interfere with non-paging related user activities, yet
19 still serve effectively as a personal information
20 terminal available throughout the day for receipt of a
21 variety of information packages.

22 Paging devices are personal devices because they are
23 carried close at hand by the user throughout the workday.
24 The paging device is a routine, personal daily accessory
25 carried around the wrist such as in a wristwatch pager,
26 in a handbag such as in a woman's compact-form pager, or

1 in more traditional fashion attached to a belt. Paging
2 devices are personal devices as distinguished from more
3 sophisticated, or larger, information terminals such as
4 portable computer based systems used as part of a
5 dedicated information delivery mechanism, e.g., portable
6 computers or terminals with modems and not a personal
7 accessory. The paging device is a small personal
8 adornment carried throughout the workday and must fit
9 well into all aspects of the user's daily routine. In
10 particular, the paging device alarm can activate at any
11 time and should be least intrusive as possible to the
12 user and to others while still alerting the user to
13 incoming messages.

14 As paging devices become more commonly used as personal
15 information terminals, the user is faced with a dilemma
16 regarding the alarm feature associated with information
17 delivery. Paging devices have a simple bi-state alarm
18 enable/disable feature where the alarm is either active
19 or inactive. When the alarm is disabled, no audible beep
20 occurs. When enabled, an audible beep occurs for every
21 paging message received. Users traditionally want to
22 disable the alarm under certain conditions. For example,
23 the alarm feature is disabled at a meeting where the user
24 does not wish to be disturbed or to disturb others.
25 After the meeting, the user checks the paging device for
26 messages received and then enables the alarm feature.
27 This satisfies the user's desire to avoid disturbing

1 others because the pager can always be made silent by use
2 of the alarm enable/disable feature.

3 Because a conventional alarm feature control is bi-state,
4 i.e., either enabled for all messages or disabled for all
5 messages, it has proven inadequate, especially for use
6 with a paging device serving as a personal information
7 terminal. Users must select between the two available
8 alarm modes, neither of which satisfies their needs. If
9 the alarm is disabled because information service alarms
10 are annoying, the user is not immediately aware of those
11 paging messages the user considers important enough to
12 require prompt attention, just for the convenience of not
13 hearing the alarm for every information service message
14 received. If the alarm is enabled, the paging device
15 user hears the alarm for each and every message received,
16 including numerous alarms relating to information service
17 messages the user may consider non-critical. Because the
18 primary use of the paging device is to be made
19 immediately aware of important information, many users
20 leave the alarm feature enabled and endure the frequent
21 and annoying, both to the user and to others, alarms.

22 The user of a paging device is not the only one
23 interested in control over use of paging devices and
24 inappropriate activation of the paging device alarm. For
25 example, many students, e.g., high school students and
26 younger, now use paging devices to stay in touch with

1 peers and parents. The schools, however, do not
2 appreciate the use of such paging devices, and in some
3 cases have sought restricted use. The primary complaint
4 by the school is annoying paging device alarms disrupting
5 classroom activities. Furthermore, just the potential
6 for receiving incoming information may pose a nuisance to
7 students attention. A student may spend time monitoring
8 the paging device to see whether messages have arrived,
9 whether the alarm feature is enabled or not. While it
10 would be desirable to resolve such classroom annoyances
11 to the satisfaction of school administrators, students
12 should enjoy the benefits of powerful personal
13 information terminals. Unfortunately, there appears to
14 be no simple solution to this problem. It is not fair to
15 confiscate or ban paging devices. While the students
16 could disable their alarm feature during classroom
17 activities, the students could nevertheless be distracted
18 by the potential for incoming messages and might spend
19 valuable classroom time monitoring the paging device even
20 while in its disabled alarm mode.

21 It would be desirable, therefore, to provide enhancement
22 in message processing and alarm feature control for
23 paging devices, especially when used as personal
24 information terminals with relatively high message
25 traffic. Users of such personal information terminals
26 should be immediately aware of certain information, and
27 need not be immediately concerned with other information.

1 Users of such devices further want to have appropriate
2 control over the alarm mode, i.e., appropriate to what
3 they personally consider requires an alarm. A
4 conventional bi-state alarm feature control, however,
5 fails to satisfy the personal needs of the paging device
6 user employing the paging device as a personal
7 information terminal.

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SUMMARY OF THE INVENTION

A paging device acting as a personal information terminal includes conditional enhanced message processing and user defined alarm features responsive generally to
5 designated time periods. Under the present invention, time of day can, according to individual user preference, provide a basis for message screening, delayed message broadcast or modified alarm control.

According to one aspect the invention provides in
10 a paging system comprising paging devices receiving messages and producing an audible alarm upon receipt of paging messages, a paging device comprising: an information storage device storing a user defined alarm presentation designating a particular tone presentation, a current time of day
15 indication, and a desired alarm time; a user interface providing access to said information storage allowing the user to define and store a representation of said user defined alarm presentation; and an alarm device responsive to receipt of a paging message for referencing said
20 information storage to present an audible alarm corresponding to said user defined alarm presentation if said current time of day indication corresponds to said desired alarm time.

The subject matter of the present invention is
25 particularly pointed out and distinctly claimed in the concluding portion of this specification. However, both the organization and method of operation of the invention, together with further advantages and objects thereof, may best be understood by reference to the following description
30 taken with the accompanying drawings wherein like reference characters refer to like elements.

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BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying
5 drawings in which:

FIG. 1 illustrates schematically a paging system according to the present invention employing enhanced message processing and alarm presentation as a function

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1 of a time reference.

2 FIG. 2 illustrates a message transmission protocol,
3 including use of alarm control data delivered to paging
4 devices of the paging system of FIG. 1.

5 FIG. 3 illustrates processing within the paging system of
6 FIG. 1 relative to enhanced message processing functions
7 and alarm presentation.

8 FIG. 4 illustrates processing within a paging device of
9 the system of FIG. 1 including paging device
10 implementation of enhanced message processing and alarm
11 presentation.

12 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

13 The present invention will be illustrated in the context
14 of a time-division multiplexed paging system employing
15 personal paging devices, e.g., wristwatch paging devices,
16 serving as personal information terminals. FIG. 1
17 illustrates schematically a paging system including
18 paging devices, only one being illustrated, used as
19 personal information terminals. FIG. 2 illustrates a
20 broadcast protocol and time-division multiplexing used by
21 the paging system of FIG. 1 in transmission of message
22 packets according to a first embodiment of the present
23 invention. It will be understood, however, that the
24 present invention may be practiced in a variety of

1 communication systems where personal information
2 terminals are used.

3 In FIG. 1, paging system 10 receives information from a
4 variety of sources for broadcast to paging devices 12,
5 one such paging device 12 being shown in FIG. 1. Each
6 paging device 12 includes a display panel 12a for
7 presentation of paging information, and control buttons
8 12b. Control buttons 12b are used for a variety of
9 functions, including manipulation by the user to place
10 device 12 in an alarm enable mode or in an alarm disable
11 mode. A high volume and variety of message types may be
12 delivered to the paging devices 12 throughout the day.
13 In this aspect of paging system 10, the paging devices 12
14 are considered personal information terminals.

15 Traditional paging messages originate from a telephone 14
16 including a keypad 14a. Telephone 14 is used to contact
17 paging system 10 and, by appropriate manipulation of
18 keypad 14a, designate one of paging devices 12 by unique
19 user identification and further designate a multiple
20 digit numeric message to be delivered to and displayed
21 upon paging device 12. A second type of message
22 originating from telephone 14 and appearing on display
23 12a of paging device 12 is a single digit numeric code.
24 For example, 10 such numeric codes, i.e., "code 0"
25 through "code 9" may be presented on display 12a. Other
26 message types originating from telephone 14 are

1 predetermined, frequently used literal messages such as
2 "call home" or "call office." Thus, telephones, e.g.,
3 the telephone 14, are available as information sources
4 originating a variety of paging messages to be delivered
5 to personal information terminals, e.g., the device 12,
6 of paging system 10.

7 Further message types delivered to paging device 12 are
8 provided as part of information service subscriptions.
9 Paging system 10 receives information from a personal
10 data information source 20. Personal data information
11 source 20 can provide a variety of types of information
12 resulting in a variety of message types, each message
13 being relevant to individual users of paging devices 12.
14 For example, personal data source 20 might be a banking
15 institution delivering to paging system 10 an account
16 balance for persons using paging device 12. Under such
17 arrangement, certain users of paging devices 12 would
18 subscribe to an information service relating to delivery
19 of bank account balance information on a scheduled basis,
20 e.g., at a given time each day. Such bank account
21 information could be coded in the format of a telephone
22 number and appear on display 12a of paging device 12
23 with, for example, a special area code or digit format
24 indicating by prearrangement that the numeric message
25 represents a bank account balance. Other types of
26 personal data provided by personal data source 20 could
27 be from a variety of sources, but are directed by way of

1 system 10 to an individual user of system 10 according to
2 a particular information service subscription.

3 Information of general interest, i.e., as distinguished
4 from personal information relative only to an individual
5 subscriber of system 10, is taken by system 10 from
6 broadcast data source 26. Broadcast data source 26
7 receives information from a variety of sources, but feeds
8 such general interest information to paging system 10 for
9 relay to groups of subscribing users of system 10. For
10 example, broadcast data source 26 provides local weather,
11 local sports, and stock information to paging system 10.
12 In turn, paging system 10 delivers such information to
13 corresponding user groups subscribing to these
14 information services. For example, a person using paging
15 device 12 might obtain on a scheduled basis the current
16 temperature or daily Dow-Jones industrial average. Such
17 information could be coded by prearrangement in the
18 format of a multiple digit numeric paging message, i.e.,
19 appear in form as a telephone number or particular digit
20 pattern, but indicate message type.

21 Thus, paging system 10 offers to its customers a variety
22 of services beyond conventional paging message delivery.
23 Each customer can subscribe to certain information
24 services in addition to conventional paging services.
25 Customers might subscribe to a personal data information
26 service, e.g., bank account balance information, or to a

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1 broadcast data information service, such as local sports
2 scores or local weather conditions. In such use, paging
3 device 12 becomes a personal information terminal. The
4 device is carried on the person throughout the day and
5 remains close at hand. All paging messages delivered to
6 paging device 12 are displayed on display 12a upon
7 receipt. Also, device 12 includes a memory for storing
8 received messages and allowing the user to cycle through,
9 for example, the most recently received messages. In
10 this manner, all messages received are available for
11 later reference.

12 In accordance with the present invention, message
13 processing is conducted with reference to a user
14 designated time period, e.g., time of day. In this
15 manner, users can customize message processing by paging
16 system 10 and paging device 12 according to a personal
17 time schedule. For example, if the user is a student
18 then selected message processing and alarm features can
19 be conducted with reference to a school classroom
20 schedule. Similarly, persons having regular work hours
21 in an office, and preferring to be contacted directly by
22 way of an office telephone, could modify message
23 processing and alarm features as a function of regular
24 office hours. Message processing could include a variety
25 of modifications relative to traditional paging message
26 delivery directly to a paging device. For example, the
27 paging system 10 could simply reject all attempts to

1 deliver messages during certain times with a voice
2 message to the caller indicating times of unavailability
3 and availability. Alternatively, such messages could be
4 accepted, but not delivered to the paging device until a
5 later time, e.g., following a user designated hold
6 period. Students benefit because messages can be
7 accepted by system 10 during classroom hours, but not
8 delivered to the paging device until after classroom
9 hours. Also, if a user is regularly out of range
10 relative to the paging system 10, such user might desire
11 to hold transmission of all paging messages during a time
12 when the user is out of range. When the user later
13 returns to within range of paging system 10, such held
14 messages could be then broadcast according to user
15 designated scheduling for appropriate delivery to the
16 associated paging device 12. For example, a person might
17 regularly have office hours in a different geographic
18 area during certain days of the week. For such days of
19 the week, paging system 10 could simply collect paging
20 messages for broadcast during a time when the user has
21 returned to the reception area of paging system 10.
22 Thus, enhanced message processing can be relative to time
23 of day, or relative to days of the week.

24 FIG. 2 illustrates a time-division multiplexed broadcast
25 protocol 30 employed by the paging system 10 in
26 delivering messages to paging devices 12. Protocol 30
27 defines a repeating time frame 32 divided into a given

1 number of time slots 34. Each paging device 12 is
2 associated with at least one time slot 34. Paging
3 devices 12 activate periodically in coordination with
4 time frame 32. More particularly, each paging device 12
5 activates its radio receiving circuitry and captures an
6 information packet 38 transmitted by antenna 10a of
7 system 10 during the associated time slot 34. In this
8 manner, paging system 10 delivers information packets 38
9 to particular paging devices 12 in time-division
10 multiplexed fashion.

11 Paging system 10 maintains a collection of user profile
12 data 28 in management of its customer accounts. For each
13 user of paging system 10 a user profile 28 is maintained.
14 Each profile 28 includes certain information relevant to
15 transmission of information packets 38, as described more
16 fully hereafter, and other information relevant to an
17 enhanced message processing subscription associated with
18 that user. As may be appreciated, each profile 28
19 includes other information relevant to the user, but not
20 relevant to description of the present invention and not
21 illustrated in FIG. 1.

22 The user profile data 28 detailed in FIG. 1 includes
23 fields for a user ID, slot number, and address used in
24 the transmission of information to the paging device 12
25 for that user. In accordance with the present invention,
26 each user profile 28 also includes a message processing

1 subscription table 28a setting forth time periods in
2 association with message processing functions. As
3 illustrated in FIG. 1, each profile 28 includes a table
4 of information wherein each row corresponds to a time
5 period and associated message processing functions. The
6 first two columns each indicate a day of week where, for
7 example, a value 0 indicates day of week is irrelevant
8 for the associated message processing function and where
9 values 1-7 correspond to each day of the week. Thus, the
10 first two columns can designate a time period expressed
11 in days of the week. The third and fourth columns of
12 each row designate time of day values indicating a start
13 and an end time for a time period. As may be
14 appreciated, the values stored in the first four columns
15 of the message processing subscription table 28a allows
16 designation of selected time periods which may be with
17 reference to particular days of the week and further to
18 particular times of day.

19 The remaining columns in each row indicate message
20 processing functions to be executed during the time
21 period indicated by the first four columns. In the
22 illustrated example, each designated time period can be
23 associated with a hold function where the message is
24 accepted by the paging system 10 but not transmitted to
25 the paging device 12 until after the designated period; a
26 reject function where the paging system 10 declines a
27 proposed message but accepts voice mail as a substitute;

1 a silent function where the message is accepted by the
2 paging system 10 and transmitted to the paging device 12
3 but the alarm feature of the paging device 12 is disabled
4 regardless of its local setting by the user of paging
5 device 12; and a modified alarm function when a user
6 selected alarm is used to distinguish among paging device
7 12 alarms.

8 Also held in each table 28a is a password field allowing
9 a person proposing transmission of a message to a paging
10 device 12 to override any message processing
11 subscriptions indicated in the profile 28. For example,
12 such a password could be used by a parent wishing to
13 deliver a message to a child's paging device 12 and
14 dictate whether the paging device 12 activates its alarm
15 feature regardless of any message processing
16 subscriptions indicated by profile 28 and regardless of
17 any current user setting of the alarm enable/disable mode
18 at the paging device 12.

19 Referring now to FIGS. 1 and 2, system 10 references the
20 user profile 28 to associate a given user ID unique to
21 each user and paging device 12 with an associated slot 34
22 and address. Several paging devices 12 can be associated
23 with each time slot 34, and the address value is used by
24 paging devices 12 sharing one time slot 34 to distinguish
25 among their respective information packets 38. Thus,
26 each information packet 38 includes an address field 38a

1 and a data or message field 38b. When a paging device 12
2 activates and captures an information packet 38, it first
3 examines the address field 38a to determine whether the
4 packet is intended for that paging device 12. If the
5 address field 38a matches, information from the message
6 field 38b is then used to display a message on display
7 12a. The message is then stored in the memory of device
8 12 for later reference.

9 Also illustrated in FIG. 2, each information packet 38
10 includes alarm control data 38c. Alarm control data 38c
11 allows an alarm override function relative to the local,
12 i.e., user established by operation of buttons 12b, alarm
13 enable/disable mode for a paging device 12. Alarm
14 control data 38c indicates whether alarm override is to
15 be applied and what alarm mode is to be asserted when
16 receiving and displaying the associated message field
17 38b. In this manner, paging system 10 can invoke a given
18 alarm mode remotely. In particular, paging system 10 can
19 cause silent delivery of a message or can cause audible
20 alarm delivery of a message regardless of the current
21 setting of the alarm enable/disable mode for the paging
22 device 12. Furthermore, alarm control data 38c may
23 indicate use of a modified audible alarm according to a
24 user designated sound pattern. The alarm control data
25 38c is, therefore, a multiple-bit field presented
26 according to a predetermined content and format by paging
27 system 10 and interpreted by each paging device 12 to

1 invoke the appropriate alarm control in connection with
2 the associated information packet 38.

3 FIG. 3 illustrates paging system 10 processing relative
4 to the collection of messages to be transmitted to paging
5 devices 12, and according to particular message
6 processing subscriptions established relative to
7 particular paging devices 12. In FIG. 3, system 10
8 collects a message in block 40 from a caller or an
9 information service source. Messages may come from a
10 variety of sources such as telephone 14, personal data 20
11 or broadcast data 26. Also in block 40, system 10
12 receives, or may generate in the case of information
13 collected from broadcast data source 26, a user ID number
14 to indicate the destination for the associated message.
15 In block 42, the user ID value provides access one of the
16 user profiles 28 to determine whether or not an enhanced
17 message processing subscription applies to the message.
18 Thus, in block 44 system 10 reads the subscription table
19 28a and collects all time periods indicated therein. If
20 system 10 identifies one or more message processing
21 subscriptions in user profile 28, i.e., the current day
22 of week and time of day falls in range relative to one or
23 more time periods indicated in the message processing
24 subscription table 28a, then processing branches to block
25 50 where system 10 identifies the associated message
26 function.

1 In decision block 52, processing branches to block 54 if
2 the associated message processing function is a hold
3 function. In block 54, system 10 accepts the message,
4 provides to the caller a voice message indicating the
5 message will not be delivered immediately and provides a
6 time of day when the message will be delivered, i.e.,
7 indicates the end of the user designated hold period.
8 Finally, system 10 queues the message for transmission at
9 the day and time indicated in the message processing
10 subscription table, i.e., holds transmission until the
11 end of the hold period. If the indicated message
12 processing subscription is a reject function, then
13 processing branches from decision block 56 to block 58
14 where system 10 informs the caller that the message will
15 not be accepted and will not be delivered, but that voice
16 mail will be accepted as a substitute. Thus, block 58
17 concludes with system 10 accepting a voice mail message
18 for the indicated paging device 12 user. Finally, in
19 block 58 system 10 queues for later transmission a "voice
20 mail pending" message for delivery as a coded message,
21 e.g., queue a "voice mail" message to be broadcast to the
22 user following the indicated reject period.

23 If the indicated message processing function is a silent
24 function, then processing branches from decision block 60
25 to block 62 where system 10 accepts the message, sets the
26 alarm control data 38c to cause no alarm, and transmits
27 the message immediately according to normal processing.

1 If the indicated message processing function is a
2 modified alarm function, then processing branches from
3 decision block 64 to block 66 where system 10 accepts the
4 message, sets the alarm control data 38c to cause a user
5 defined modified alarm, and transmits the message
6 according to normal processing. As will be explained
7 more fully hereafter, a modified alarm may be employed by
8 the user during certain times of the day, or could be
9 established for all times of day. For example, when the
10 user is in a meeting a less intrusive alarm may be useful
11 because the user is immediately aware of the incoming
12 message, but does not disturb others with the less
13 intrusive alarm. As may be appreciated, a relatively
14 brief alarm could be heard well enough without disturbing
15 others. Also, a modified alarm is useful when the user
16 is close to other users of similar paging devices. In
17 such situation, and especially when the group of users
18 each have high message traffic, it is desirable to have a
19 unique alarm presentation to distinguish among alarms.
20 Thus, the user can designate certain time periods during
21 which a modified alarm will be used.

22 If in decision block 46 the current time of day does not
23 fall within any of the indicated message processing
24 subscription time periods, then processing branches from
25 decision block 46 to decision block 70 where system 10
26 determines whether or not a password override function is
27 indicated. For example, the caller is presented with

1 voice prompts including an ability to indicate password
2 override message processing. If system 10 determines in
3 block 70 that no password override function is indicated
4 by the caller, then processing branches from block 70 to
5 block 72 where the message is transmitted according to
6 normal processing, i.e., as soon as possible and without
7 reference in alarm control data 38c to any modified
8 message processing subscription. Typically, this would
9 be transmission to the indicated paging device 12 in the
10 next available time frame 30.

11 If, however, system 10 determines in block 70 that a
12 password override function is indicated by the caller,
13 then processing branches to block 74 where the caller is
14 prompted for a password and the password is compared to
15 the password indicated in the associated user profile 28.
16 As may be appreciated, such processing might include
17 opportunity for the caller to re-enter the password as a
18 part of a user interface feature. If the password is
19 verified, then system 10 accepts the message, gets alarm
20 override information from the caller, sets the alarm
21 control data 38c to indicate alarm override according to
22 caller designation, i.e., cause or not cause an audible
23 alarm, and transmits the message. Thus, a caller
24 submitting a message for delivery to a paging device 12
25 with the password and authority to override an active
26 enhanced message processing subscription also has the
27 authority to dictate which type of alarm will occur upon

1 receipt of the message, i.e., whether there will be a
2 normal alarm, no alarm, or a modified alarm presented
3 according to user definition.

4 FIG. 4 illustrates processing at the paging device 12
5 relative to message processing subscriptions. In FIG. 4,
6 paging device 12 activates its radio receiving circuitry
7 and captures a message packet 38 in the appropriate time
8 slot 34 in the processing block 80. In block 81, paging
9 device 12 compares the received address field 38a to its
10 own address field. If no match occurs, then the message
11 was not intended for that paging device 12 and processing
12 branches from block 81 to unrelated programming (not
13 shown). If, however, the address field 38a in the
14 received information packet 38 matches the paging device
15 12 address then processing branches to decision block 82
16 where paging device 12 interrogates the alarm control
17 data 38c.

18 If alarm control data 38c indicates an alarm override
19 function, then processing branches to decision block 84
20 where the paging device 12 further interrogates the alarm
21 control data 38c. In decision block 84, if a normal
22 alarm condition is asserted by data 38c, processing
23 branches to block 88 where the normal paging device 12
24 alarm is activated. Following activation of the normal
25 alarm in block 88, processing branches to block 90 where
26 the message is displayed and stored according to normal

1 procedures. If, however, a normal alarm is not indicated
2 in decision block 84, then paging device 12 determines in
3 decision block 92 whether a modified alarm is to be
4 presented.

5 If a modified alarm is to be presented, then processing
6 branches to block 94 where a user defined modified alarm
7 is presented and processing branches to block 90. If a
8 modified alarm is not indicated in block 92, then
9 processing branches to decision block 96 where paging
10 device 12 determines whether or not a silent alarm
11 feature is indicated.

12 If a silent alarm is indicated by alarm control data 38c,
13 then processing branches directly to block 90.

14 Otherwise, processing branches out of block 96 to other
15 programming (not shown) such as that employed for
16 additional message processing enhancements a function of
17 the alarm control data 38c. More particularly, it is
18 contemplated that a variety of enhanced message
19 processing features may be employed under the present
20 invention, and such features could be identified
21 generally in the switch structure indicated in FIG. 4
22 following branching from decision block 96.

23 Returning to decision block 82, if the alarm control data
24 38c indicates no override function, then processing
25 branches to decision block 98 where paging device 12

1 interrogates its local alarm enable mode, i.e., user
2 established alarm mode. If the alarm is enabled, then
3 processing branches to block 88 where the normal alarm is
4 activated. If the local alarm is disabled, then
5 processing branches from block 98 directly to block 90
6 where the message is displayed and stored without an
7 associated alarm. As may be appreciated, the user could
8 be given local control over all alarm modes, i.e.,
9 operation of buttons 12d to select among three possible
10 alarm modes. In particular, the user could set its local
11 alarm mode to be either disabled, enabled for normal
12 alarm, or enabled for the modified alarm. Under such
13 modification to the illustrated embodiment, the decision
14 block 98 would include determination as to which of these
15 three possible modes were indicated by the local alarm
16 mode setting in operation of buttons 12b.

17 As discussed above, the present invention contemplates
18 use of a modified alarm according to user designation.
19 For example, the user can designate the alarm
20 presentation according to data ultimately stored in a
21 memory register 12c (FIG. 1) paging device 12. For
22 example, a user designated alarm presentation definition
23 could consist of a sequence of 10 tone digits stored in
24 register 12c with each tone digit defining the tone
25 presentation during a given time segment of the alarm.
26 Thus, a value 0 for a given tone digit indicates silence,
27 and values 1-9 indicate progressively higher tone

1 presentations. For a one second alarm, the duration of
2 each tone segment or silence period could be 100
3 milliseconds. Also, an additional digit stored in
4 register 12c indicates a number of repetitions for the
5 tone pattern indicated by the 10 tone digit sequence. In
6 this manner, the user has control over a tone sequence
7 presentation including control over the overall alarm
8 period as well as tone pattern and tone cadence. Thus,
9 the user could designate a unique sequence of tone digits
10 and number of sequence repetitions to establish a unique
11 alarm presentation.

12 The alarm definition, i.e., the 10 tone digit sequence
13 and repetition digit, could be entered into paging system
14 10 via a telephone 14 by use of keypad 14a. Thus, the
15 user would engage system 10 by telephone and, following
16 appropriate password protection, indicate the 10 digit
17 sequence and repetition digit to be employed in
18 presentation of a modified alarm. The modified alarm
19 definition is delivered to the designated paging device
20 12 by a special information packet 38. Upon receiving
21 such a special information packet 38, the paging device
22 12 would accept the digit sequence as a modified alarm
23 definition and store that information in the dedicated
24 memory register 12c. Thus, any time a modified alarm
25 presentation is indicated, paging device 12 references
26 register 12c and executes each tone presentation
27 indicated by each digit of the sequence and repeats the

1 sequence as indicated by the repeat digit. As may be
2 appreciated, the overall alarm could be made relatively
3 less intrusive by providing one or only several short
4 bursts of appropriate tone value during the one second
5 alarm period. While only one modified alarm definition
6 is shown herein, it may be appreciated how several such
7 modified alarms could be incorporated into the present
8 invention whereby the user could designate certain time
9 periods for use with one modified alarm, e.g., a
10 relatively non-intrusive alarm for regular or
11 predetermined meeting times, and designate a relatively
12 intrusive but unique alarm for use during times when the
13 user is within audible range of other paging devices. In
14 this manner, the user customizes alarm presentation
15 according to a personal time schedule for more
16 appropriate delivery and processing of messages according
17 to user preference.

18 Thus, enhanced message processing and alarm presentation
19 have been shown and illustrated. In accordance with the
20 present invention, a user of a paging device can
21 designate time periods during which modified message
22 processing and alarm presentation are to be employed. In
23 this manner, the user customizes message processing and
24 alarm presentation according to personal preference. The
25 present invention resolves many problems associated with
26 use of paging devices as personal information terminals,
27 including annoyance both to the user and persons

1 surrounding the user. For example, in the illustrated
2 message processing subscription table 28a of FIG. 1, the
3 user has designated in the first two rows of table 28a
4 time periods corresponding to school classroom hours for
5 the days Monday through Friday from 8:00 A.M. to 12:00
6 Noon and from 1:00 P.M. to 4:00 P.M. Under the
7 particular subscription illustrated, the user has
8 designated for these classroom times a hold function with
9 modified alarm presentation for messages held during the
10 user designated time periods. Thus, the user might
11 receive held messages from the time period between 12:00
12 Noon and 1:00 P.M. with a modified alarm presentation for
13 those held messages when delivered to the paging device
14 12. Also, the user might receive held messages following
15 4:00 P.M. with a modified alarm presentation for such
16 held messages. Also illustrated in the table 28a of FIG.
17 1, the user has designated a time period for Saturday
18 morning from 7:00 A.M. to 8:30 A.M. with hold and
19 modified alarm functions indicated. The user might have
20 a regularly scheduled Saturday morning activity for this
21 time period during which the user either does not wish to
22 be disturbed, or does not have in possession the paging
23 device 12 and would not benefit by an alarm presentation
24 during that period. Finally, the illustrated table 28a
25 also indicates in the fourth row a time period defined as
26 each Sunday of the week. During this time period, the
27 user has designated reject function for all messages
28 submitted to paging system 10. Thus, the user may wish

1 to avoid any activity with respect to paging device 12 on
2 this particular day of the week.

3 As may be appreciated, the present invention provides
4 great versatility in user designation of time periods and
5 associated message processing and alarm presentation
6 functions. It is contemplated that the user would be
7 able to interact with paging system 10 to modify the
8 table 28a at any time. Thus, the user could temporarily
9 establish time periods according to certain upcoming
10 scheduled events, or could leave certain times period in
11 place indefinitely according to regularly scheduled
12 events.

13 It will be appreciated that the present invention is not
14 restricted to the particular embodiment that has been
15 described and illustrated, and that variations may be
16 made therein without departing from the scope of the
17 invention as found in the appended claims and the
18 equivalence thereto.

19 Modification can include interpretation of overlapping
20 time periods and compatibility of message processing
21 functions indicated thereby. For example, the user may
22 designate one time period indicating a modified alarm
23 function which overlaps a second time period associated
24 with, for example, a hold function. In this situation,
25 the system would hold the message, transmit the message

1 at the end of the hold period, and include in the
2 transmitted message a modified alarm control code in the
3 field 38c. Thus, some of the alarm functions may be
4 compatible and allow overlapping time periods. Indeed,
5 the user could establish the modified alarm for all time
6 periods by entering a non-restrictive time period, i.e.,
7 for all days and all times of day, in the table 28a and
8 marking the modified column in association therewith. In
9 this manner, the modified alarm would be invoked all
10 cases except where a password override function dictated
11 another alarm.

12 Other alarm features, however, may not be compatible such
13 as, for example, the hold function and the reject
14 function. Thus, while the present invention has been
15 shown as selection of specific message processing
16 functions, it should be appreciated that multiple ones of
17 the message processing functions could be indicated for a
18 single time period, or could be indicated as a result of
19 overlapping time periods. The system 10 and paging
20 devices 12 would employ an appropriate set of rules for
21 interpreting such conditions and, to the extent possible,
22 satisfy the multiple message processing functions
23 indicated. Such rules would further provide some
24 priority mechanism for resolving any conflict between
25 mutually exclusive message processing functions indicated
26 by overlapping time periods. Also, while the
27 determination of message processing functions and alarm

1 presentation have been shown as being executed in the
2 paging system 10, it may be appreciated how many of these
3 functions could be implemented in the paging device 12
4 because the paging device 12 includes a time of day and
5 week reference. Determination of message processing
6 functions and alarm presentation in the paging system 10,
7 however, provide expanded capability, e.g., such as an
8 ability to provide feedback to a caller regarding active
9 message processing functions.

74932-11

CLAIMS:

1. In a paging system comprising paging devices receiving messages and producing an audible alarm upon receipt of paging messages, a paging device comprising:

5 an information storage device storing a user defined alarm presentation designating a particular tone presentation, a current time of day indication, and a desired alarm time;

a user interface providing access to said
10 information storage allowing the user to define and store a representation of said user defined alarm presentation; and

an alarm device responsive to receipt of a paging message for referencing said information storage to present an audible alarm corresponding to said user defined alarm
15 presentation if said current time of day indication corresponds to said desired alarm time.

2. A device according to claim 1 wherein said user defined alarm presentation delivers said alarm according to a user defined tone sequence pattern.

20 3. A device according to claim 2 wherein said user defined tone pattern is established by said user placing in said information storage a sequence of digits each representing a tone and said user defined alarm presentation comprises a sequence of tone presentations corresponding to
25 tones associated with said sequence of digits.

4. A device according to claim 3 wherein said digit sequence further includes digits representing a silent alarm and said user defined alarm presentation includes intervals of silence.

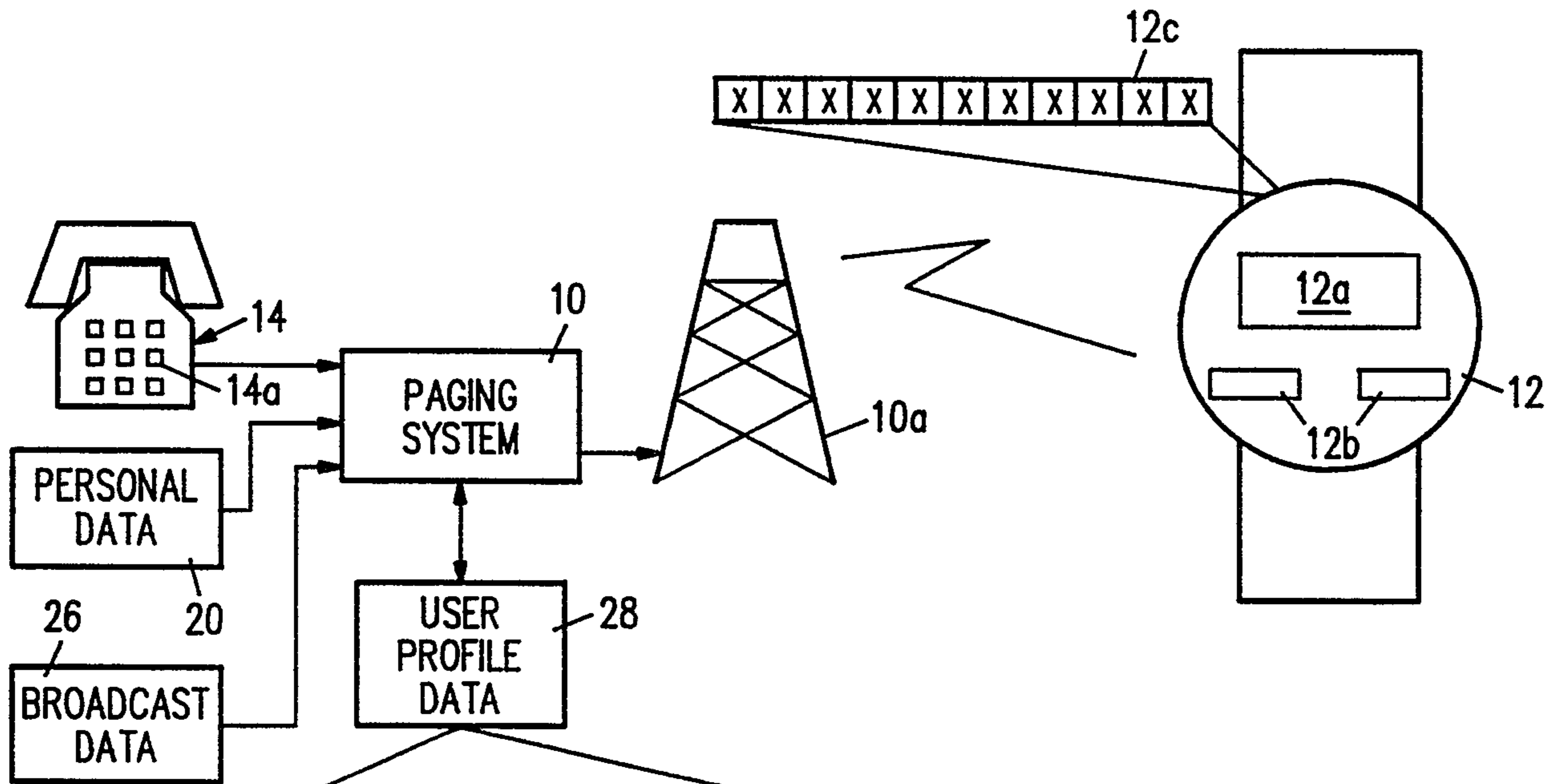
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5. A device according to claim 3 wherein said digit sequence includes a repeat digit representing a repeat function whereby a tone pattern corresponding to the remaining digits in the sequence is repeated a number of 5 times corresponding to the value of said repeat digit.

SMART & BIGGAR

OTTAWA, CANADA

PATENT AGENTS



USER ID : xxxxxxxx
 SLOT # : xxxxxxxx
 ADDRESS: xxxxxxxx
 .
 .
 .
 MESSAGE PROCESSING
 SUBSCRIPTION TABLE
 PASSWORD : xxxxxxxx

28a

DOW	START	END	HOLD	REJECT	SILENT	MODIFIED
2 6	8:00	12:00	X			X
2 6	13:00	16:00	X			X
7 7	7:00	8:30	X			X
1 1	0:00	0:00		X		

28

FIG. 1

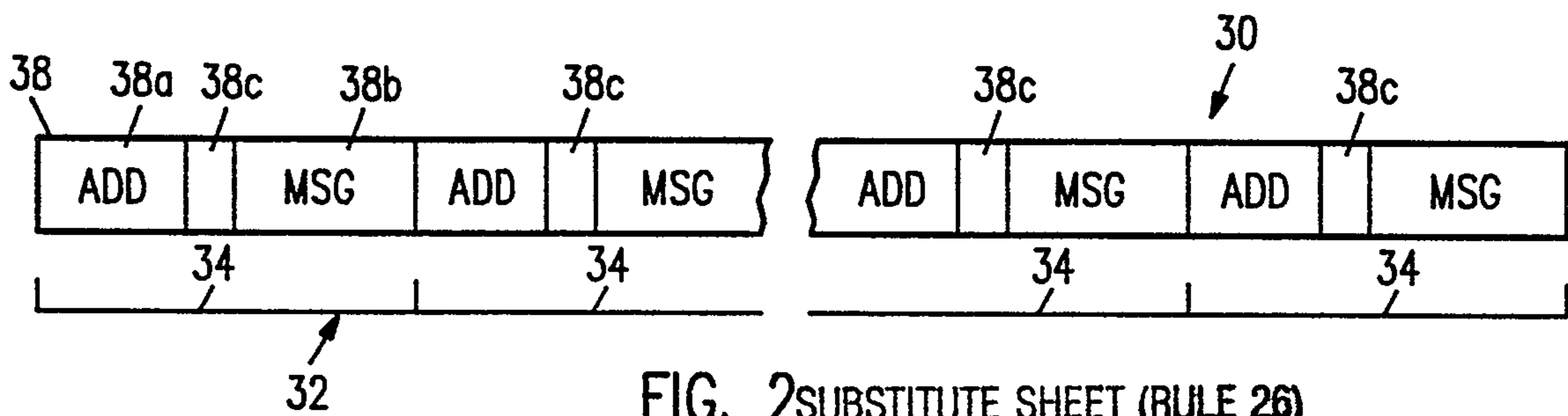


FIG. 2 SUBSTITUTE SHEET (RULE 26)

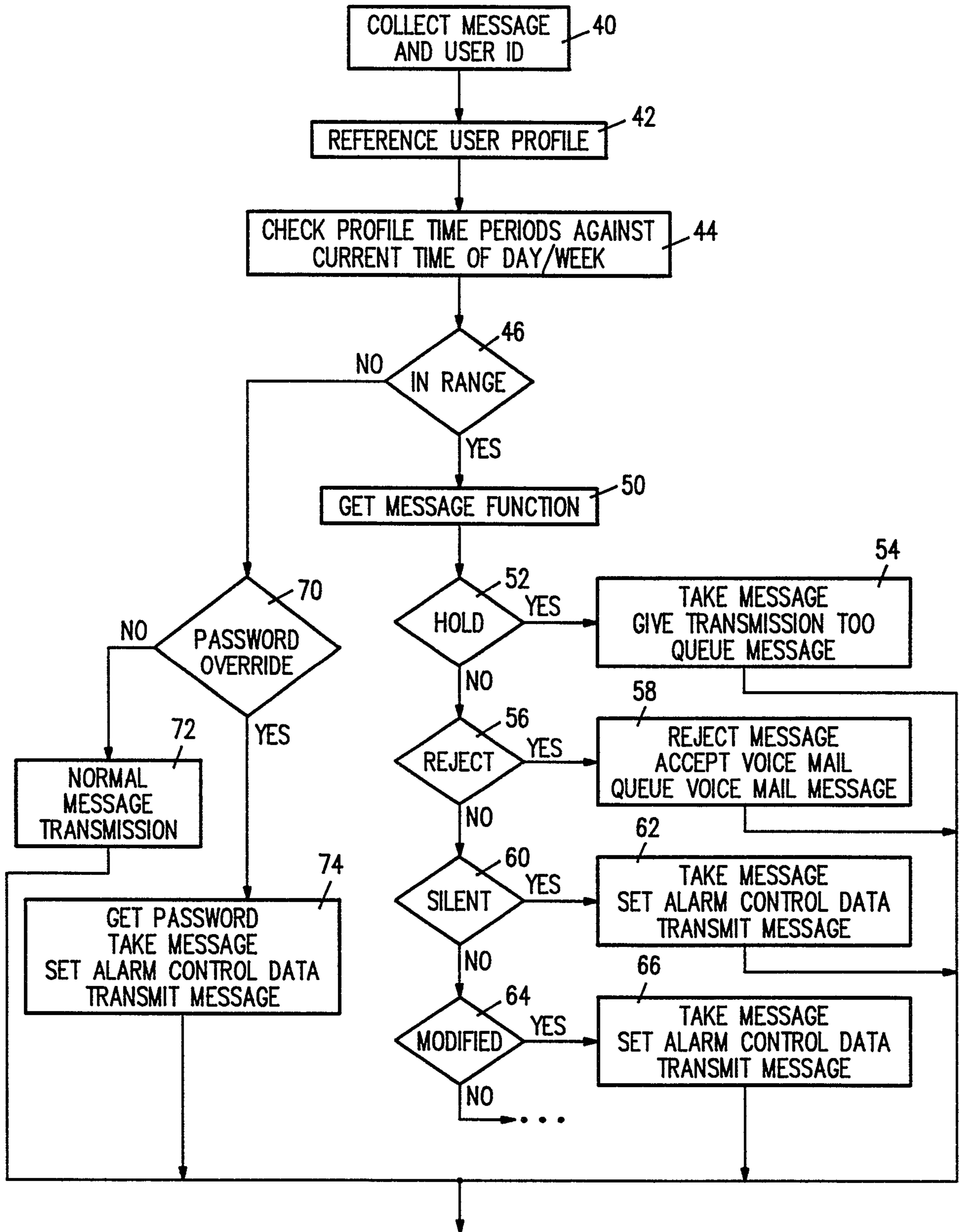


FIG. 3 SUBSTITUTE SHEET (RULE 26)

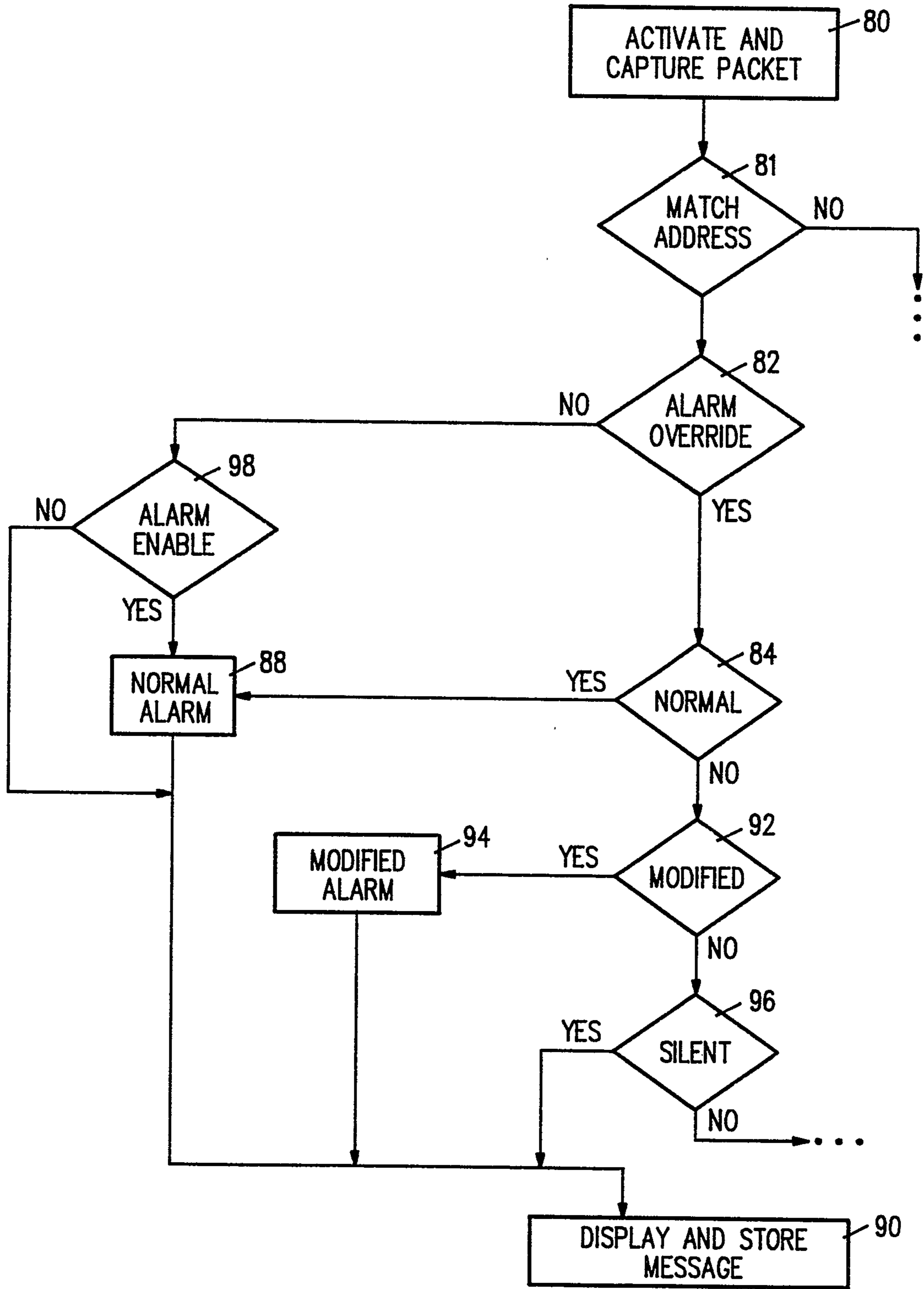
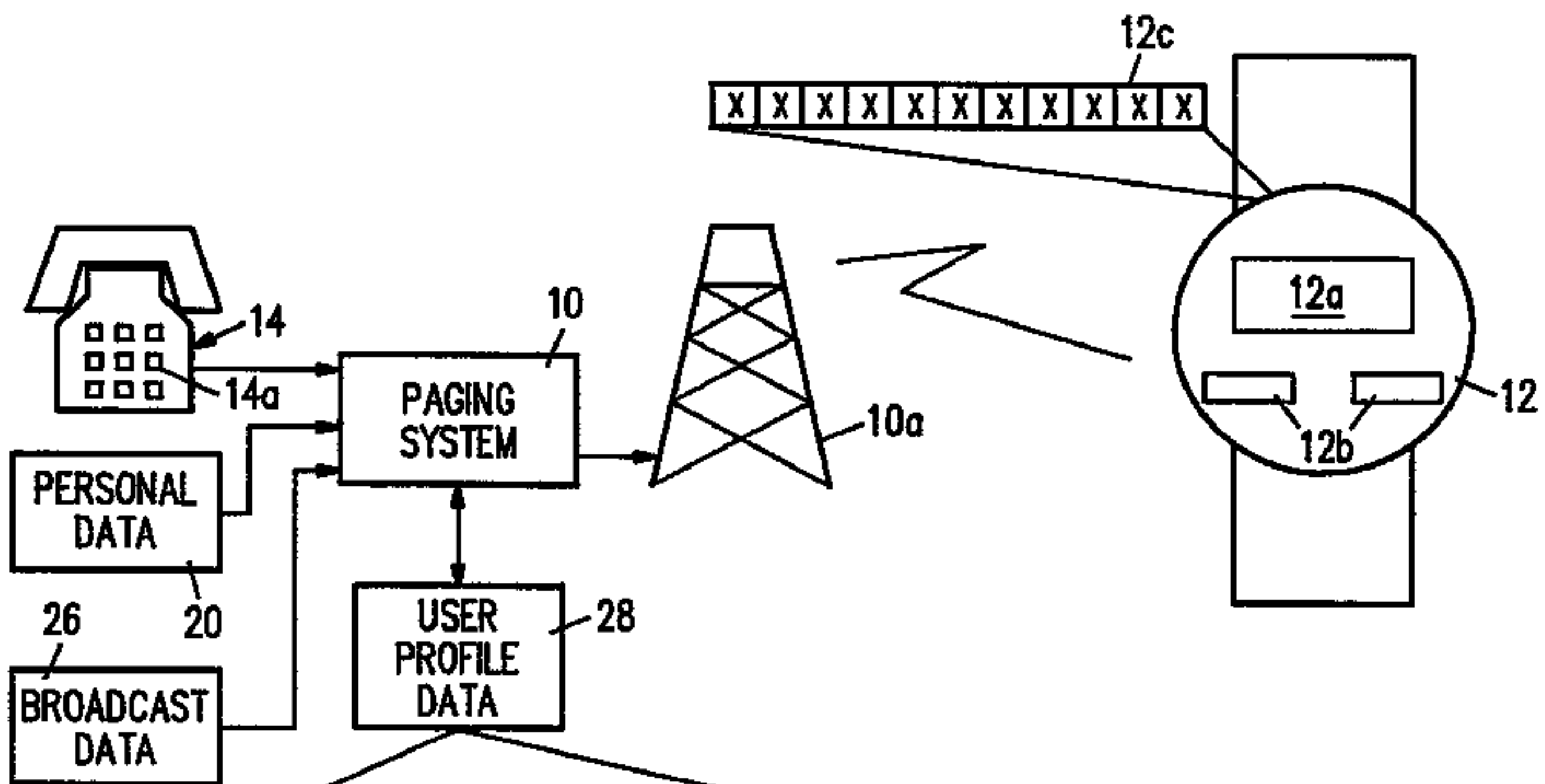


FIG. 4 SUBSTITUTE SHEET (RULE 26)



28

28a

USER ID : xxxxxxxx
 SLOT # : xxxxxxxx
 ADDRESS : xxxxxxxx
 .
 .
 .
 MESSAGE PROCESSING
 SUBSCRIPTION TABLE
 PASSWORD : xxxxxxxx

DOW	START	END	HOLD	REJECT	SILENT	MODIFIED
2 6	8:00	12:00	X			X
2 6	13:00	16:00	X			X
7 7	7:00	8:30	X			X
1 1	0:00	0:00		X		