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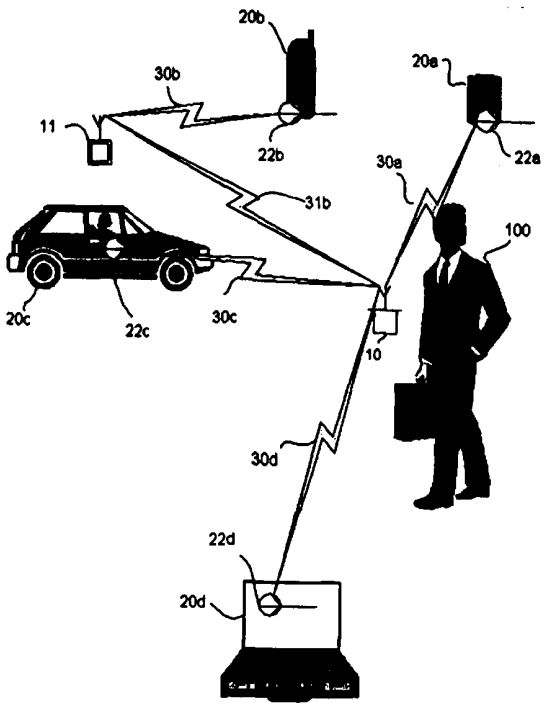

(57) Abstract: A system for simplifying the life of a person comprises a base station carried by the user (person) and one or more "mobile units" communicating with the base station. The base station can detect the presence and/or the absence of the respective mobile unit within a surveyed area. In some applications, a "mobile unit" can detect the presence or absence of a base station within a "surveyed area" to, for example, enable or disable an object associated with the mobile unit.

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SYSTEM AND METHOD FOR SIMPLIFYING THE LIFE OF A PERSON

FIELD OF THE INVENTION

The present invention relates generally to a system for simplifying the life of a person, including means for detecting the proximity of objects and controlling their use, and for adding security, flexibility and access to information.

BACKGROUND

Detectors have been in use that detect the proximity of a metallic part. These detectors for proximity generally operate according to the principle of a modification of a magnetic field or a modification of the resonance frequency of a resonance circuit. These detectors for proximity allow the location of an object or a person if this object and this person carries a metallic part. However, the detection could only be made within a limited distance. It is also known to detect the presence of a person by means of a detector sensitive to infrared radiation.

Other types of detector systems have been disclosed. For example, European patent application EP-A-0840265 discloses a synchronous receiving / transmitting departure alarm. The system comprises a base station and one or several mobile units. The mobile units transmit at intervals of a fixed time. The communication between the base station and the mobile units only takes place in the direction from the mobile unit to the base station and the signal from the mobile unit synchronizes the base station.

As another example, German patent application DE-A-3529127 discloses a

method for data transmission in an alarm system comprising a base station and one or more alarm units. The communication takes place in both directions between the base station and the alarm units. In a communication cycle, the base station sends out a synch pulse that is received by all alarm units at the same time. Each alarm unit responds to the received synch pulse with a specific time delay.

SUMMARY OF THE INVENTION

The invention proposes a system for simplifying the life of a person which comprises a base station carried by the user (person) and one or more "mobile units" communicating with the base station. All the embodiments and examples have in common that the base station can detect the presence and/or the absence of the respective mobile unit within a surveyed area, or in some applications that a "mobile unit" can detect the presence or absence of a base station within a "surveyed area".

In one embodiment, persons and "passive" objects (objects not exchanging any information with the associated mobile unit) could be surveyed by a user carrying the base station. Examples of passive objects are physical belongings like a wallet, an umbrella etc.. The objects could, however, also be "active" in the sense that they exchange information with the associated mobile unit. Examples of active objects are different kinds of electronic apparatuses or sensors for physical parameters as temperature, weight, position etc., connected to and in communication with the mobile unit. In this case the base station could obviously survey not only the location of an object (inside or outside the surveyed area) but also one or several physical parameters related to the associated object or, e.g., the status of some electronic equipment connected to the mobile unit.

In a case where a "mobile unit," connected to and in communication with some electronic equipment, detects the presence or absence of a base station within a "surveyed area," the equipment could be enabled by the physical presence of an operator carrying a base station. In such a case, the base station would send out a pre-defined signal to the "mobile unit" identifying the user/operator. Thus, correctly entered PIN-codes, passwords, etc., would not suffice to operate the equipment. If the operator is not additionally identified as a registered user by the signal sent out from the base station he is carrying to the mobile unit, no transaction will take place.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of the preferred embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings an embodiment that is presently preferred, it being understood, however, that the invention is not limited to the specific methods and instrumentalities disclosed. In the drawings:

Figure 1 is a block diagram of an embodiment of a base station and a mobile unit in accordance with the present invention;

Figure 2 is a circuit diagram showing an example of a base station for use in a system with one way communication;

Figure 3 is a circuit diagram showing an example of a mobile unit for use in a system with one way communication;

Figure 4 is a flow chart showing an example of the operation of a system with

two-way communication between the mobile units and the base station;

Figure 5 is a flow chart showing an example of the operation of a system having special arrangements for saving energy;

Figure 6 is a illustration of the use of the base station with multiple objects provided with mobile units;

Figure 7 is a flow chart showing an example of the procedure for starting up the system;

Figure 8 is a flow chart showing an example of the procedure for linking one or several mobile units to the base station;

Figure 9 is a flow chart showing an example of the operation of a system having a special mute mode in a secure area;

Figure 10 is a flow chart showing an example of the operation of a system including a special high power mobile unit for the mute mode in a secure area; and

Figure 11 is a flow chart showing an example of the operation of a system supervising the absence of one or several mobile units and at the same time the presence of one or several mobile units.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The invention is directed generally to a system for detecting the proximity of objects, controlling their use, adding security, flexibility and access to

information. To that end, the system employs a wireless connection between a base station and one or more mobile objects.

An essential part of the invention resides in a system and method for detecting the proximity of an object or a person to a base station. Figure 1 provides an overview of the operation of this part of the invention. The system comprises a base station 10, which could be fixed or mobile and at least one mobile unit 20 that is related to the object or person whose proximity is being detected. The base station 10 could further comprise a computer-readable storage memory 16 that stores a program for carrying out the method of the present invention. The storage could include read-only memory (ROM) or random access memory (RAM) 25 and may further include a hard disk drive, a removable magnetic disk drive, an optical disk drive, a memory stick, etc. The computer-readable storage medium provide non-volatile storage of computer readable instructions, data structures, program modules and other data for the processor 14 in embodiments including such a processor.

As described more fully below, in accordance with a first type of embodiment of the system, base station 10 may be equipped with a receiver but without a transmitter and the mobile unit(s) 20 equipped with a transmitter but without a receiver. In a second type of embodiment, base station 10 may be additionally provided with a transmitter and mobile units 20 may be additionally provided with a receiver.

Thus, according to the first type of embodiment, the system for detection comprises a radio-frequency transmitter 22 that is formed as part of the mobile unit 20 that is arranged to be fixed on the object or the person or to be integrated in said object the proximity of which should be detected. The transmitter 22 transmits, e.g., intermittently, a signal 30 with a fixed or varying frequency (e.g., a frequency compatible with BLUETOOTH). The base station 10 is then capable

of receiving the signal 30 by way of a receiver. When the system is set up with more than one mobile unit the mobile units are typically transmitting different identification signals and the base station should be able to distinguish the signals from the different mobile units. Therefore the base station may additionally comprise a detector capable of detecting these different identification signals. Additionally the base station may comprise a mechanism that adjusts the reception sensitivity; a mechanism for detection of reception; a mechanism for detection of absence of reception; and a mechanism for commutation for activating either the mechanism for the detection of presence of reception or the mechanism for detection of absence of reception.

The base station 10 then detects the reception or absence of reception. Having detected the presence or absence of a reception from a mobile unit 20, base station 10 communicates this information to the user by emitting an output signal 17 activating e.g. mechanism for acoustical output 19, mechanism for optical output 21 or mechanism for tactile output 23.

The system allows the detection of the presence of mobile unit 20 in an area around base station 10 the extension of which area could be adjusted. Typically, a physical person carries base station 10 but it could also be fixed in space. Mobile unit(s) 20 are usually related to objects or physical persons to be surveyed. The base station could activate an alarm depending on the detected presence or non-presence of the mobile unit(s) in the surveyed area.

The identification of the different mobile units could be made in different ways, e.g. by means of time sharing, frequency sharing or code division multiple access (CDMA).

Figure 2 is a circuit diagram showing an example of a base station for use in a system with one way communication between one mobile unit and the base

station. As can be seen the design makes use of a number of standard integrated circuits manufactured by MOTOROLA. The heart of the design is a microprocessor MC13135. The embodiment comprises three switches arranged on the base station possible to operate by the user. SW1 is a switch for power ON/OFF. SW2 is a switch by means of which the mode, detection of presence/detection of absence, can be set. Finally, the switch SW3 has the form of a push button by means of which the detection mode momentarily could be set to presence. This push button is used when the user tries to locate the mobile unit. If the mobile unit is inside the surveyed area when the push button is pressed the base station will give alarm.

Figure 3 is a circuit diagram showing an example of a mobile unit for use in a system with one way communication. It is a straight forward design of a transmitter which transmits a pulse train in the 27MHz band.

Battery dimensions and weight, rechargeable or not, are significant design parameters, especially for the mobile units. As such, the design of low power mobile units is of prime interest to reduce power consumption. On one hand, it is usually of interest to make the physical dimensions, especially of the mobile unit(s), as small as possible, which implies small batteries, in order to extend the application possibilities to small objects as e.g. glasses, pens, key-holders etc. On the other hand, it might be advantageous to extend the time between the battery replacements or recharging and to be able to use the system for larger survey areas which will imply larger batteries.

With a system according to the invention, it has been possible to reach dimensions in the order of a few square centimeters for mobile units 20 having a lifetime of the batteries of more than 2000 hours with a lithium battery, e.g. of the type CR2032, for the mobile unit and standard alkaline batteries in the base station. In the future even smaller units will be possible to realize.

In a second type of embodiment of the invention, base station 10 is additionally equipped with a transmitter and each mobile unit 20 with a receiver. According to Figure 1, a processor 14 is coupled to a memory 16 and a combined transmitter and receiver (i.e. transceiver 12) whereby a set of computer-executable instructions carried out on processor 14 carry out at least a portion of the method as described more fully below. Processor 14 controls the operation of transceiver 12 for sending and receiving an electromagnetic signal 30 by way of antenna 13 to and from various ones of the mobile units 20. Such mobile units 20 also include a transmitter and receiver (i.e. transceiver 22) for communicating with base station 10.

Base station 10 could in this embodiment intermittently send out modulated "question signals" or simple synch pulses urging mobile unit or units 20 to respond. The signal could address one specific mobile unit 20 at a time or all mobile units 20 substantially simultaneously. In the first case, base station 10 waits for the response from the addressed mobile unit 20 before the next mobile unit is addressed. In the second case, each mobile unit 20 could be programmed for a specific time delay between in-coming question signals and the response signal. Typically, communications from the base station to the mobile unit utilize amplitude modulated radio signals which are easily demodulated. However, other modulation principles could also be used. Mobile units 20 could respond by electrically switching the antenna from being an absorber of radio frequency radiation to being a reflector of radiation. Signals reflected in this way by an antenna forming part of a mobile unit should, in this description, be considered to be "transmitted" by the mobile unit. Data and software stored in mobile unit 20 could control the switching of the antenna thereby modulating the reflected signal that will be demodulated at the base station. In this way, data could be transferred from mobile unit 20 to base station 10. The data stored in mobile unit 20 could be fixed or varying due to some

parameter. In the simple case data could e.g. be a fixed identification code of mobile unit 20.

A system according to the above description will be more flexible in that the power used by the mobile unit(s) 20 will be very low and to some extent can be controlled from base station 10.

In a further embodiment, the signal sent out from the base station could be used for "waking up" the mobile units from a low power "sleeping" state.

Various communication protocols may be used to carry out the communication 30 between base station 10 and mobile unit 20. For example, a wireless protocol rapidly gaining industry acceptance is the BLUETOOTH standard. Many manufacturers make pre-configured devices to communicate in accordance with the BLUETOOTH standard and therefore will already have integrated in their system a basic BLUETOOTH component. The system of the present invention contemplates using the BLUETOOTH transmitter to provide signal 30.

Transmitter 22 of mobile unit 20 may be powered by a battery, which is coupled to the transmitter 22 of mobile unit 20. The battery may be provided strictly for the use of transmitter 22 or transmitter 22 may draw power from a power source supplying the object to be detected, such as using a cellular telephone battery when the object to be detected is a cellular telephone. Alternatively, transmitter 22 may be powered by base station 10. In such an embodiment, transmitter 22 may be a portion of an RFID tag wherein it powers itself from a radio frequency signal broadcast by base station 10.

The following is an example of a procedure for initializing or linking a new mobile unit 20 to a base station 10 wherein base station 10 and mobile unit 20 are both provided with a transmitter and a receiver.

When new mobile unit 20 is turned on, it sends its full identification code which could be a pulse or pulse train with fixed repetition frequency to base station 10. Base station 10 receives the identification code from mobile unit 20, detects the same and sends a response signal (an "OK") to the new unit. With a certain delay after the reception of the "OK" from the base station the mobile unit 20 again sends its identification code. This time the base station is first checking against time slots occupied by other already registered mobile units and adjusts by adding an appropriate delay before it is sending out its "OK" signal. In this way the new mobile unit will be attributed a non-conflicting time slot for the future communication with the base station.

According to one embodiment, mobile unit 20 could continue to send its full identification signal. Each time base station 10 has received a pair of full identification signals it gives an "OK" and adjusts for drift according to the above, if necessary.

It should be noted that the above procedures are not compatible with certain protocols like e.g. BLUETOOTH.

According to an aspect of the invention, each mobile unit 20 could be arrange to send out a full identification signal, e.g. once every other minute. In the time interval between two full identification signals, the same mobile unit 20 only sends a simple pulse with a certain delay (in a known time slot) indicating to the base station that "I am here". Hence, the sequence will be "Full identification signal", "I am still here", "I am still here", . . . "Full identification signal"...etc. Such a system would decrease the power needs of both base station 10 and mobile unit 20.

According to another aspect of the invention, each mobile unit 20 could be

arranged to send only a short low power signal to base station 10 for a predefined amount of time before a pair of full identification signals are sent again. Each time base station 10 receives the pair of full identification signals, it signals its "OK" and adjusts for drift, as indicated above, if necessary.

Figure 4 is a flow chart showing an example of the operation of a system according to the second embodiment wherein base station 10 and mobile unit 20 each have a transmitter and a receiver. In this embodiment, a procedure has power saving mode for the mobile units and facilities for deactivating any associated equipment.

In accordance with the second embodiment, base station 10 will "learn" through the reception of, say, the first 5 to 10 signals when it has to be in operation in order to receive the signals from the from the different mobile units 20. Base station 10 could be arranged to use this information in order to switch to a low power mode when no signal is expected which will reduce base station 10 power needs.

Figure 5 is a flow chart showing an example of the operation of a system having such a special arrangements for saving energy in the base station of a system according to the first type of embodiments.

Figure 6 illustrates the operation of the system of the invention wherein base station 10 is associated with a physical person 100 and mobile units 20(a-d) represent various objects to be detected. Each object has a transmitter and/or receiver to send and/or receive signals 30(a-d), respectively. Additionally, Figure 2 illustrates the use of relay base station 25 to further detect the presence of mobile units 20. Mobile unit 25 may be used to detect a signal, e.g., 30b that is to weak to be detected by mobile unit 10 and magnify that signal for reception by unit 10.

In embodiments both according to the first and the second type mobile unit(s) 20 may be fixed (either permanently or removably) to the object or the person that is to be surveyed, e.g., by glue, taping, strapping, by the use of VELCRO, etc. Mobile unit(s) 20 as well as base station 10 could also be integrated in an object, as e.g. in a watch, handbag, belt, portable telephone etc.

If the system is set to detection of a non-presence of a mobile unit 20, i.e. there should be an alarm signal when there is no detected incoming intelligible signal from the mobile unit 20. The system could be used for the surveillance of an object related to said mobile unit 20 or, e.g., prevent such an object from being forgotten by a person carrying a base station 10. In this way, a person that is not supposed to leave a room without carrying the surveyed object can be so informed. Depending on the status presence/absence of the means for commutation of the receiver of the base station this unit is sending out a detection signal, e.g. an acoustical signal, signifying either the presence of the object or the person within a predetermined distance from the base station or the non-presence within the same distance. Contrary to the case with known anti-theft alarm apparati, the acoustical signal is not generated by the object to survey but by the receiver of the base station.

In accordance with another aspect of the system, the system can be extended not only to monitor the presence of an object but also to add a security level. When the distance between base station 10 and a selected one of a mobile unit 20 is greater than a set distance, the radio frequency link is disrupted in the direction from mobile unit 20 to base station 10. In other words, the signal from mobile 20 unit is no longer received by base station 10. Then at base station 10 an output signal 17 is activated to indicate the absence of the object.

In the same way in a system in which base station 10 is also transmitting, mobile

unit 20 will "know" that the distance to base station 10 is greater than a set value when mobile unit 20 no longer receives a signal. A security system on mobile unit 20 could then be activated in order to prevent the use of e.g. the equipment associated with mobile unit 20 such as a computer 20a, a portable phone 20b, automobile 20c etc.. The distances for which the link in the direction towards the base station and from the base station are disrupted respectively, do not have to be the same of course.

Alternatively, the device may detect the lack of presence of the base station and automatically go into a non-operating sleep position (e.g., to save energy when detecting the non-presence of an operator). Today many computers have a mode of operation in which, e.g. the display or a hard disk drive are put in sleep position if the keyboard or the mouse is not operated during a certain time. These two modes could of course be combined.

In such an embodiment, base station 10 may intermittently send out modulated "question signals" urging mobile unit(s) 20 to respond. This signal may also be used to identify a person carrying a base station 10 or an additional coded signal can be added for this purpose. In the case of a high security level, the latter one can have a coded signal that will evolve with time, a well defined iterative process or a specific answer (coded signal) requested by the unit in charge of identifying the person carrying the base station 10.

Therefore the signal sent out by the base station carried by a person can be used to transfer a simple or sophisticated message to any elements that are provided with an integrated communication system. The following list gives a few examples of the contemplated applications of the present invention when the base station is provided with a transmitter. The signal sent out from the base station could be used:

To poll system information when passing a specific location.

1. To poll system information collected in a central unit (not shown) when the person carrying the base station is passing a specific location. For example, when the person is leaving home and power is not disconnected from home appliances, door(s) are not closed, etc, base unit 10 will be informed and enabled to output an alarms signal to the user.

To send authorizing signal.

2. To send a signal in order to give right to the person carrying the base station to operate any types of system, an element, a tool or a distribution unit. For example, the system could give the authorization to a person to print out a stored fax from a fax machine, to start and operate a computer etc.

To locate and monitor a person.

3. To locate the person carrying the base station inside a building, to control when he is entering or leaving a location, a building, simplifying the control process.

To send orders to mobile or fixed units.

4. To send orders to mobile or fixed units in order to communicate between them and with the base station, to enter or start a process, to report a status. The identification of a driver of a vehicle could for instance automatically manage the debiting of motorway fees, parking fees etc.

Figure 7 is a flow chart showing an example of the procedure for starting up the system. It is assumed that one or several mobile units 20 have already been

linked to a base station 10. Base station 10 has "registered" the respective mobile units 20, i.e. identification codes and repetition frequency have been memorized for each mobile unit 20. The flow chart in Figure 7 illustrates a procedure for checking the battery status at the start up of the system.

Figure 8 is a flow chart showing an example of the procedure for linking one or several mobile units to the base station. The numbered boxes correspond to the following actions and steps in the exemplified procedure.

1. Switch "off" all M.U.
2. Switch "off" the B.S.
3. Switch "on" the B.S. - the B.S. starts to "listen"
4. Physically put a M.U. on top of or close to the B.S.
5. Switch "on" this M.U. The M.U. starts to send out its identification signal (e.g. emission a few ms and in the frequency 27 MHz, or any other free transmission band). This identification signal is sent with a repetition frequency of about 1 Hz. The B.S. receives this signal from the M.U.
6. After a few seconds, the user manipulates a special switch or button on the B.S. in order to give order to the B.S. to memorize the received coded identification signal and the repetition frequency
7. Has the B.S. already memorized this identification signal and the repetition frequency and confirmed it by a beep?
   No, then go back to "2" - B.S. instructs by special signal
   Yes, then go to "8" - B.S. registers the link to the M.U. (cf. 10 below)
8. Has the M.U. already been registered ?
   Yes, then go to "9"
   No, then go to "10"
9. The B.S. knows that this M.U. has e.g. to be treated with a top priority level, The B.S. will confirm it by a special signal. Go to "11"
10. B.S. is confirming the good reception and memorization of the coded signal

and repetition frequency by emitting a signal. This means that the B.S. has now identified a new M.U. to supervise. The B.S. reports by sending out a specific alarm signal, e.g. acoustical, informing the user of the system that this specific alarm signal is linked to this M.U. As an alternative the user can register e.g. a word or a short phrase in the B.S. which will be used as alarm signal.

11. Switch "off" the M.U. " thus breaking the link between this M.U. and the B.S., the B.S. is giving an alarm signal.

12. Do you want to introduce a new M.U.

Yes, then go to "2"

No, then go to "13"

13. The system is set up, switch to operational mode by using a special key or button.

14. End of process

Preferably, the user interface for the system is as simple and cost effective as possible. Hence, much of the feedback to the user can be through the use of simple tones and/or light (LED) signals. However, the invention contemplates the use of text based indicators such as small LCD screens or the like. Even simple acoustical output could be used.

The receiver of base station 10 could advantageously be equipped with a mechanism for adjusting the sensitivity of the reception of the signals from the transmitters in order to be able to change the distance for the detection of mobile unit(s) 20. This distance could e.g. be set by means of simple switches to a short distance (e.g. 0.5 to 2 meters) or to a longer distance (e.g. 2 to 10 meters) by modifying the detection threshold or attenuation of the RF signal.

According to one embodiment of the invention, the receiver of base station 10 is equipped with a mechanism to raise the sensitivity of the reception during a certain time, e.g. from 1 two 5 minutes, in order to allow the person carrying the

base station to temporarily move outside the area of detection without causing an alarm.

Base station 10 could also be equipped with a mechanism for interruption of the reception during a certain time, e.g. 1 to 5 minutes with automatic reset. The interruption time could also be introduced in the receiver by means of pulses on a pushbutton or similar whereby every pulse e.g. could corresponds to 1 minute of interruption.

In order to make the system more convenient to use in certain situations, it can be arranged as follows. Certain places or areas could be defined as "secure" in the sense that the probability of a user losing control over mobile units 20 is very low in those places or areas or the consequences of losing control are insignificant. Such places could, for instance, be the user's own office or home. An alarm every time a user was more than, say, 2 meters from a mobile unit could be disturbing. A special "mute" switch could be arranged on base station 10 to allow the user to deal with such a situation. Accordingly, if this switch is operated the base station 10 will still control mobile unit 20 but for a specific time (e.g., 5 minutes) will not emit an alarm signal when the signal of one or more units is not received. Base station 10 will wait at least these defined 5 minutes before acting. If within this period of time, a signal is again received from mobile unit 20, the 5 minute window will be reset for another 5 minutes and so on up to the end of the mute time of, for example, 1 hour. By switching "off" and "on " the Mute button, the system may be reset for an additional 1 hour mute time.

Figure 9 is a flow chart showing an example of the operation of a system having a special mute mode in a secure area. As described above.

Figure 10 is a flow chart showing an example of the operation of a system including a special, high-power mobile unit for the mute mode in a secure area.

This high power mobile unit which could be connected to an AC power outlet is used for automatically switching on and off the mute mode when the user provided with base station 10 moves in and out of a secure area. This mobile unit 20 could also be registered by base station 10 as a normal mobile unit.

Base station 10 could further be equipped with a mechanism, e.g. in the form of a push-button, connected in parallel to the commutation mechanism for presence/absence making it possible to easily verify the presence of an object when base station 10 is set to detect absence of mobile units 20. This push-button could also be used when searching for an object within the surveyed area. If the system is also detecting the intensity of the received signal base station 10 could also indicate the direction and distance to the mobile unit.

In a system according to the invention, measures could be taken to avoid false alarms. Assume, e.g., that a system is operating with a base station 10 surveying a number of mobile units 20. If base station 10 is not receiving an identification signal from a specific mobile unit 20, it can be configured not to send out an alarm signal immediately but wait for one or several additional consecutive missing signals before an alarm signal is given to the user indicating the loss of the transmission link.

In a further embodiment e.g. the intensity of a number of consecutive incoming identification signals from each mobile unit 20 could be stored in e.g. a first-in-first-out register. Based on the signal history memorized in this way an algorithm stored in the base station could sort out the false alarms. You could e.g. expect that the intensity would decrease successively when a mobile unit is moving out of the surveyed area. Therefore a sudden loss of the signal could be considered as suspect and the alarm could be filtered out until the status has been confirmed according to some condition (e.g., time period). If on the other hand, mobile unit 20 is not receiving an expected "OK" signal from base station 10,

mobile unit 20 can be arranged to continue to send out its identification signal for a preset period of time, e.g. 1 to 5 minutes in order to be prepared for a reestablishment of the link. If the OK signal is still not received at the end of this preset period of time, mobile unit 20 could be arranged to switch to a low power "sleeping" mode.

In an application with an associated electronic equipment connected to the mobile unit a security system could be activated to act on said equipment, e.g., in order to disable the same.

Figure 11 is a flow chart showing an example of the operation of a system supervising the absence of one or several mobile units and at the same time the presence of one or several mobile units.

Assume that there are a certain number of mobile units 20 already supervised by a base station 10 for the mode absence, i.e. base station 10 should give an alarm to the user when the distance to one of these mobile units 20 is too great. Users may desire to have one of mobile units 20 supervised for presence. In that case, the distance between mobile unit 20 to be supervised for presence and the base station is intentionally increased. Base station 10 will give an alarm in response to the increase in distance. By way of a switch arranged on the base station 10, the user switches to the mode "presence". Base station, having the information about which mobile unit 20 caused the alarm, will now be able to change the survey mode for that mobile unit 20. All the other mobile units 20 will continue to be surveyed for absence.

Instead of using the information memorized in base station 10 about which mobile unit 20 caused the alarm, base station 10 could be arranged to continue to survey all mobile units 20 that are still sending recognizable signals to base station 10 in the absence mode. All other mobile units 20 registered in the base

station 10 will be surveyed in the presence mode.

For example, consider the instance wherein a user is going to a restaurant carrying an umbrella associated with a mobile unit 20, which is normally surveyed in the absence mode. The user may leave the umbrella at the entrance but wish, of course, not to forget the umbrella when leaving the restaurant. When the user moves away from the umbrella, base station 10 will emit an alarm signal. When the switch on base station 10 setting the mode is operated according to the above, mobile unit 20 associated with the umbrella and all other registered mobile units at the moment not sending recognizable signals to base station 10 will be switched to survey in presence mode. All the other mobile units the user has on him or with him will continue to be surveyed in the absence mode. This means that when the user again comes close to the umbrella at the entrance when leaving the restaurant the base station will emit an alarm signal reminding the user to pick up the umbrella.

While the invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments have been shown in the drawings and accompanying detailed description. It should be understood, however, that there is no intention to limit the invention to the specific constructions disclosed herein. As such, the invention is intended to cover all modifications, alternative constructions, and equivalents falling within the scope and spirit of the invention.

CLAIMS

1. A system for the detection of proximity of an object, comprising: at least one mobile unit comprising a transmitter, said mobile unit being associated with an object; said transmitter transmitting a signal indicative of the presence of said object; and, a base station comprising a receiver and an output signal generator, said base station receiver generating an output signal when during an absence of reception on the receiver of the transmitted signal from the transmitter of the at least one mobile unit.

2. The system according to claim 1, wherein said base station further comprises a transmitter for transmitting a signal urging the at least one mobile unit to respond, said at least one mobile unit further comprising a receiver for receiving the signal transmitted by the base station and transmitting a signal to said base station in response to receiving said signal from said base station.

3. The system according to claim 1 wherein the base station receiver further comprising a mechanism for adjusting the sensitivity of the reception.

4. The system according to claim 1 wherein the base station receiver further comprises a switch for temporarily interrupting the reception.

6. The system according to claims 1 wherein the base station receiver further comprises means for identification and display of the different mobile units.

7. The system according to claim 2 wherein the base station signal urging the at least one mobile unit to respond at the same time and that the mobile units are all responding with a specific delay set for each mobile unit in the system.

8. The system according to claim 1 wherein the base station is associated with a person.

9. The system according to claim 1 wherein the object associated with the mobile unit is inoperable unless it receives a signal from the base station.

10. The system according to claim 9 wherein the associated object is a car.

11. The system according to claim 11 wherein the associated object is a credit card.

12. A method for detecting the proximity of an object, comprising: providing a base station comprising a receiver; tuning said receiver to a first frequency to detect the presence or absence of a signal; and generating an output signal indicative of an object not being present when no signal is detected at the first frequency.

13. The method as recited in claim 12 comprising: at a mobile unit comprising a transmitter, transmitting a signal at a first frequency to indicate presence of an object.

14. The method as recited in claim 12, wherein said base station further comprises a transmitter, the method further comprising: outputting from the base station signal, a signal at a second frequency to urge a mobile unit to respond with a signal at the first frequency to indicate presence of an object.

15. The method as recited in claim 12 wherein the output signal comprises an audible alarm.

16. The method as recited in claim 12 wherein the output signal comprises a

visible indicator.

17. The method as recited in claim 14 wherein said mobile unit further comprises a receiver, the method further comprising: tuning the mobile unit receiver to the second frequency; enabling the object associated with the mobile unit when said second frequency is detected.

18. The method as recited in claim 17 wherein said object associated with said mobile unit comprises an automobile.

19. The method as recited in claim 17 wherein said object associated with said mobile unit is a computer.

20. The method according to claim 12 wherein said base station is associated with a person.

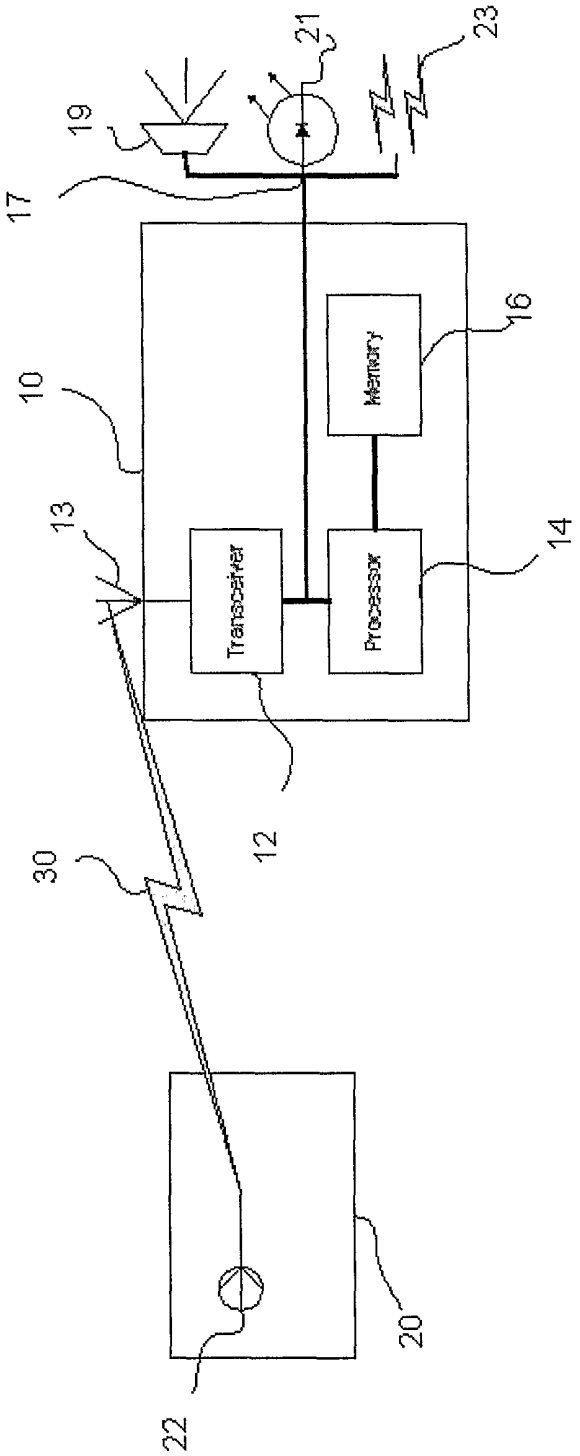
21
23
19
17
16
10
Memory
13
14
Transceiver
Processor
12
30
20
22

FIG 1

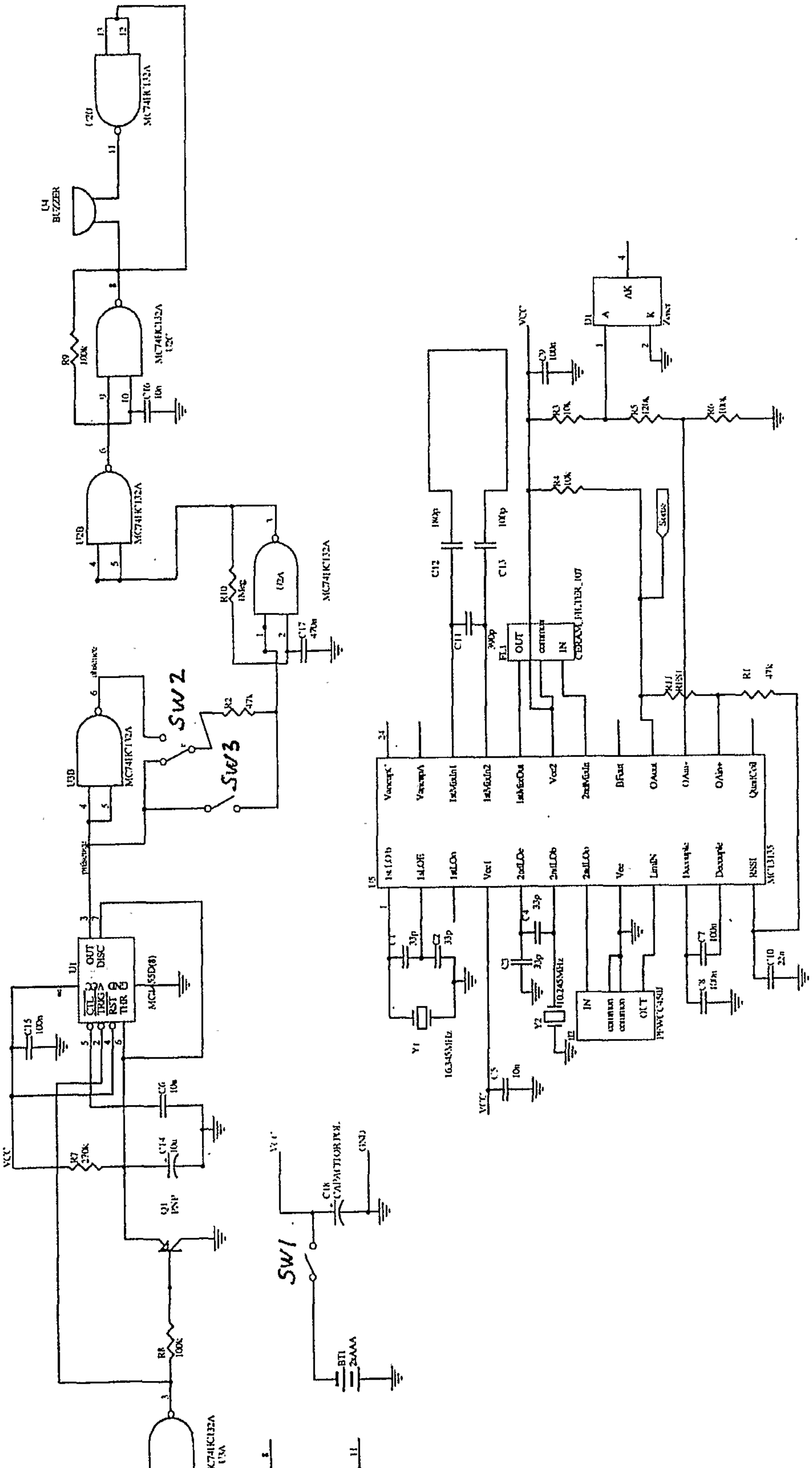

Figure 2

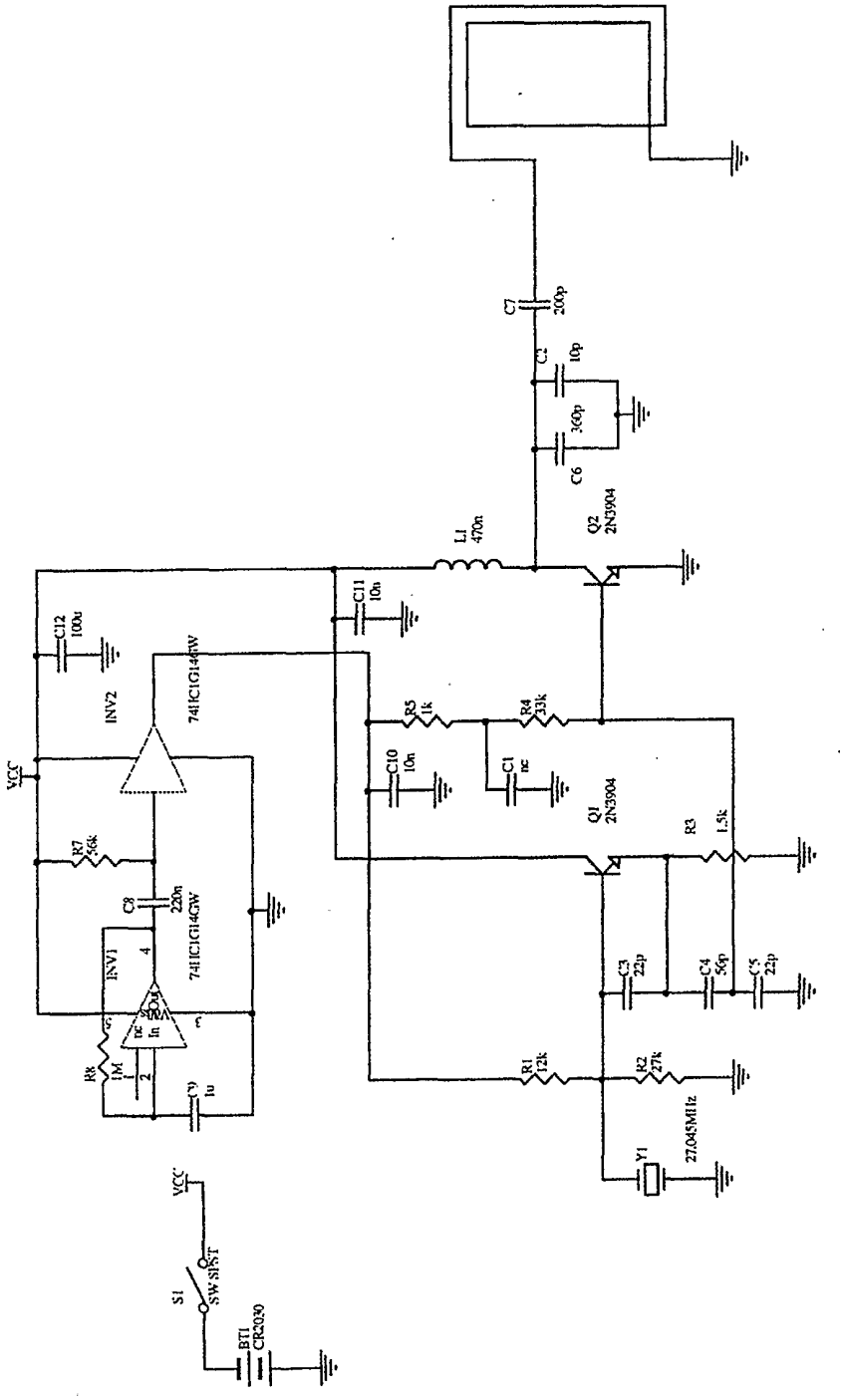
C7 200p
C2 10p
C6 360p
Q2 2N3904
L1 470n
C11 10n
C12 100u
INV2
74HC1G14GW
R5 1k
R4 33k
C10 10n
C1 nc
Q1 2N3904
R3 1.5k
VCC
R7 56k
C8 220n
INV1
74HC1G14GW
C3 22p
C4 56p
C5 22p
Rf 1M
Cf 1u
R1 12k
R2 27k
27.045MHz
Y1
VCC
S1
SW-SPST
BT1
CR2030

Figure 3

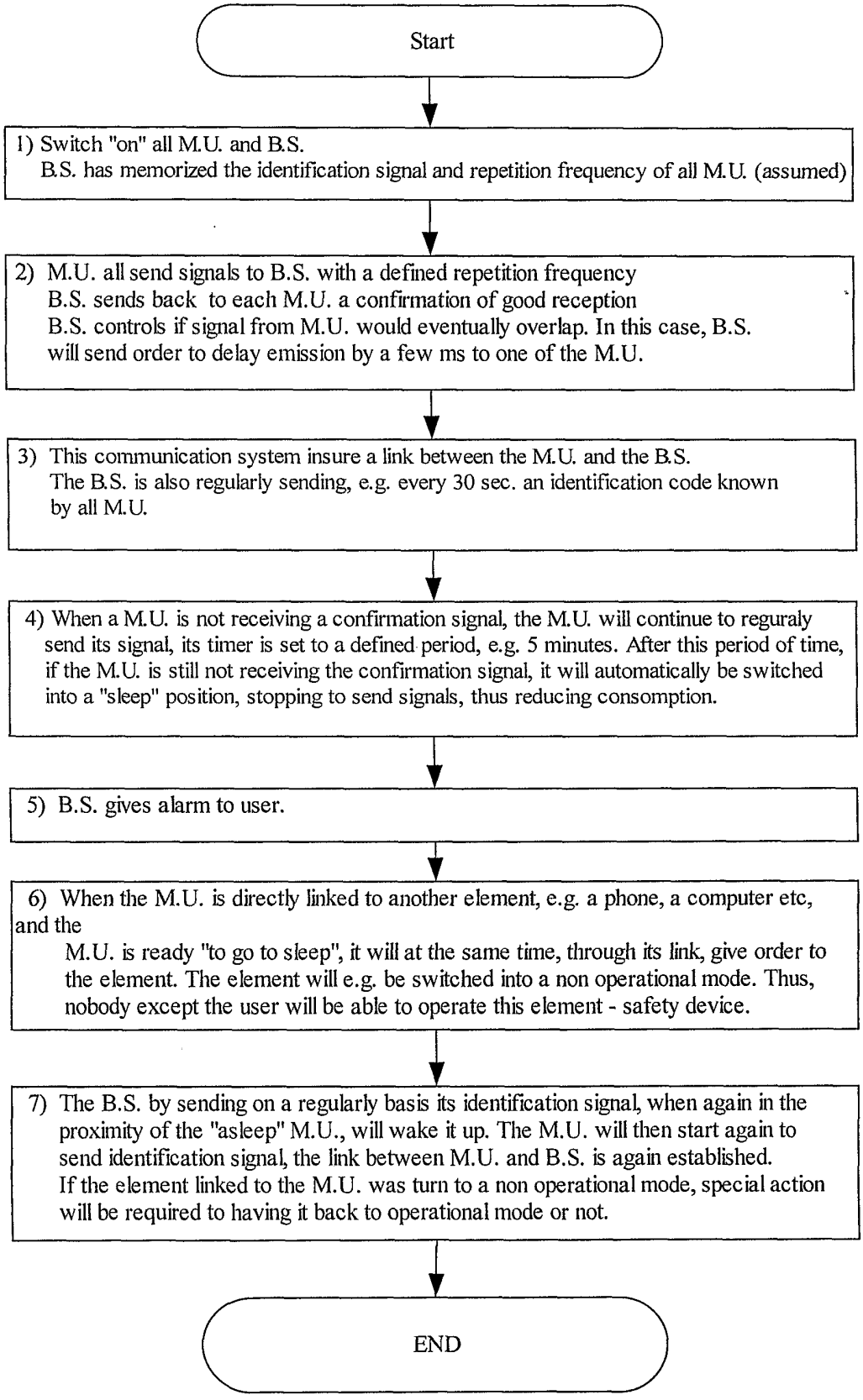
Start
1) Switch "on" all M.U. and B.S.
B.S. has memorized the identification signal and repetition frequency of all M.U. (assumed)
2) M.U. all send signals to B.S. with a defined repetition frequency
B.S. sends back to each M.U. a confirmation of good reception
B.S. controls if signal from M.U. would eventually overlap. In this case, B.S. will send order to delay emission by a few ms to one of the M.U.
3) This communication system insure a link between the M.U. and the B.S.
The B.S. is also regularly sending, e.g. every 30 sec. an identification code known by all M.U.
4) When a M.U. is not receiving a confirmation signal, the M.U. will continue to reguraly send its signal, its timer is set to a defined period, e.g. 5 minutes. After this period of time, if the M.U. is still not receiving the confirmation signal, it will automatically be switched into a "sleep" position, stopping to send signals, thus reducing consomption.
5) B.S. gives alarm to user.
6) When the M.U. is directly linked to another element, e.g. a phone, a computer etc, and the
M.U. is ready "to go to sleep", it will at the same time, through its link, give order to the element. The element will e.g. be switched into a non operational mode. Thus, nobody except the user will be able to operate this element - safety device.
7) The B.S. by sending on a regularly basis its identification signal, when again in the proximity of the "asleep" M.U., will wake it up. The M.U. will then start again to send identification signal, the link between M.U. and B.S. is again established.
If the element linked to the M.U. was turn to a non operational mode, special action will be required to having it back to operational mode or not.
END

Figure 4

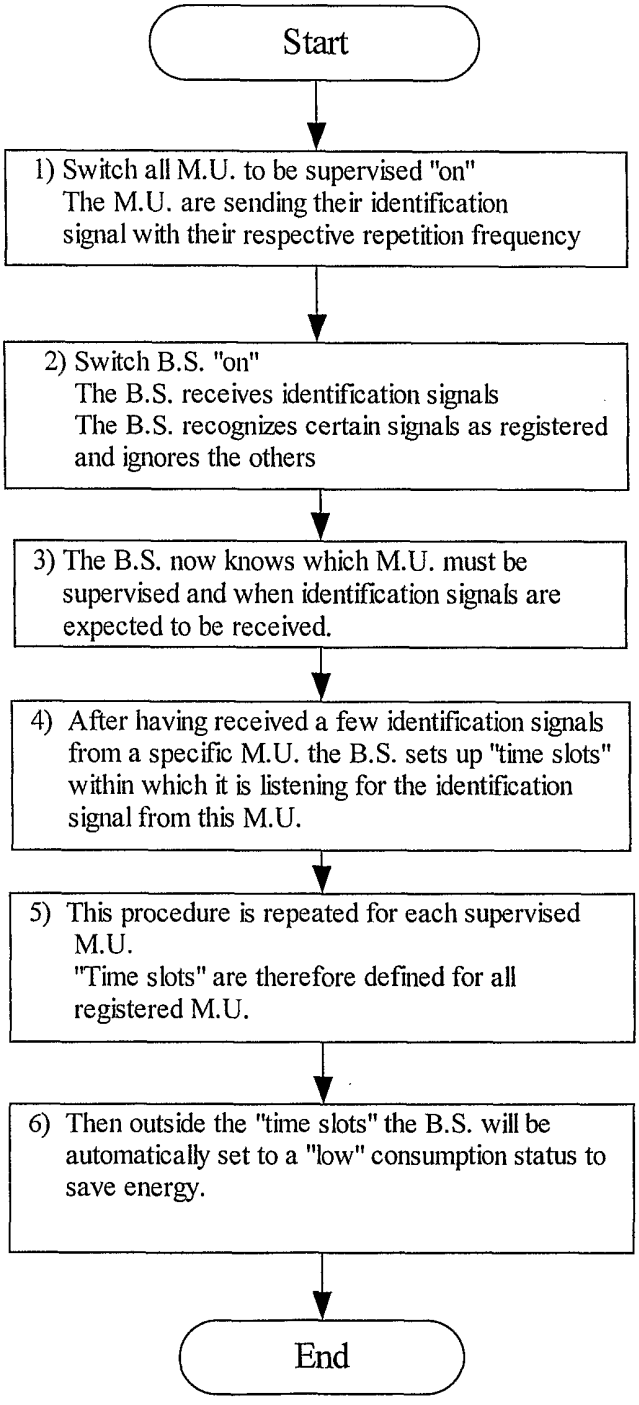
Start
1) Switch all M.U. to be supervised "on"
The M.U. are sending their identification signal with their respective repetition frequency
2) Switch B.S. "on"
The B.S. receives identification signals
The B.S. recognizes certain signals as registered and ignores the others
3) The B.S. now knows which M.U. must be supervised and when identification signals are expected to be received.
4) After having received a few identification signals from a specific M.U. the B.S. sets up "time slots" within which it is listening for the identification signal from this M.U.
5) This procedure is repeated for each supervised M.U.
"Time slots" are therefore defined for all registered M.U.
6) Then outside the "time slots" the B.S. will be automatically set to a "low" consumption status to save energy.
End

FIG 5

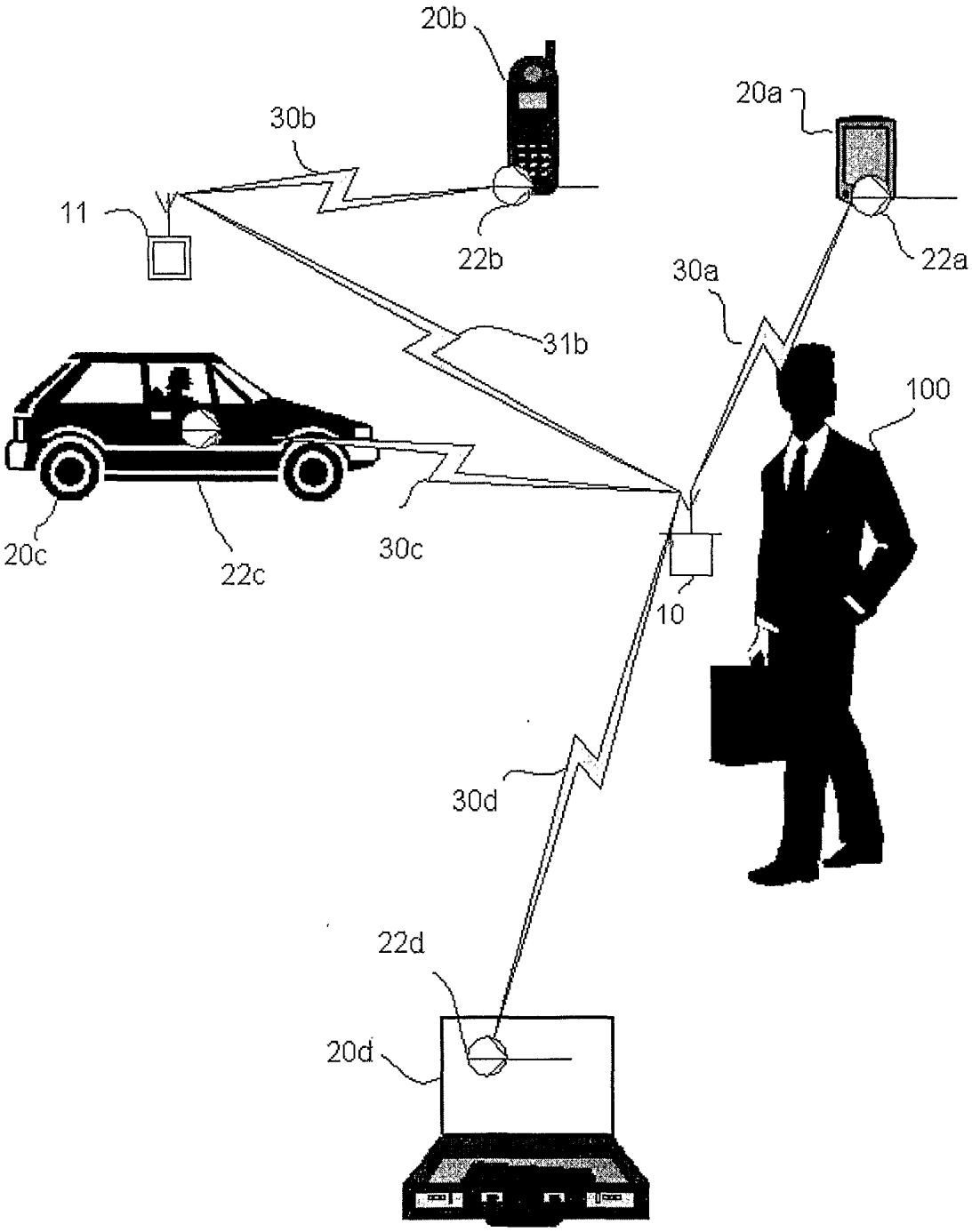

Figure 6

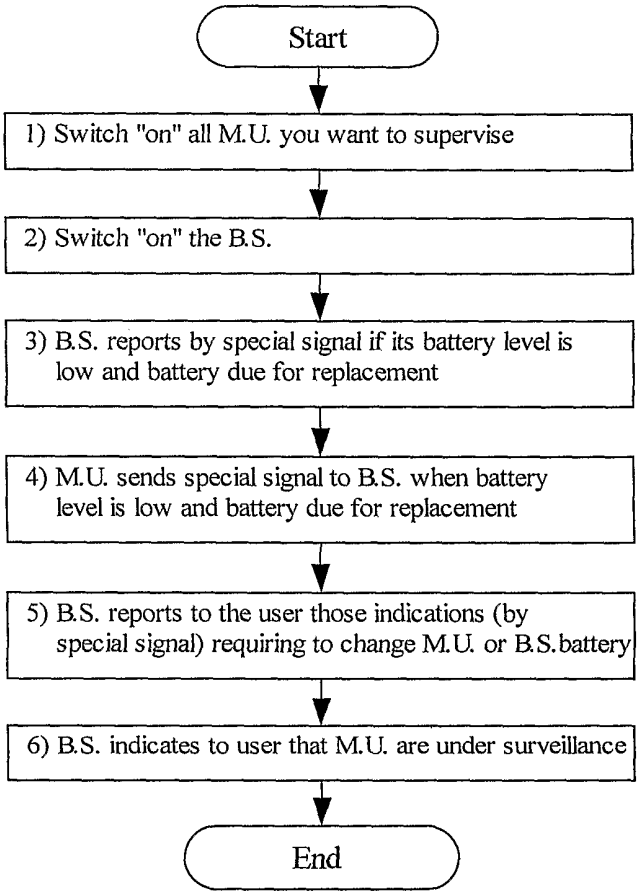
Start
1) Switch "on" all M.U. you want to supervise
2) Switch "on" the B.S.
3) B.S. reports by special signal if its battery level is low and battery due for replacement
4) M.U. sends special signal to B.S. when battery level is low and battery due for replacement
5) B.S. reports to the user those indications (by special signal) requiring to change M.U. or B.S. battery
6) B.S. indicates to user that M.U. are under surveillance
End

Figure 7

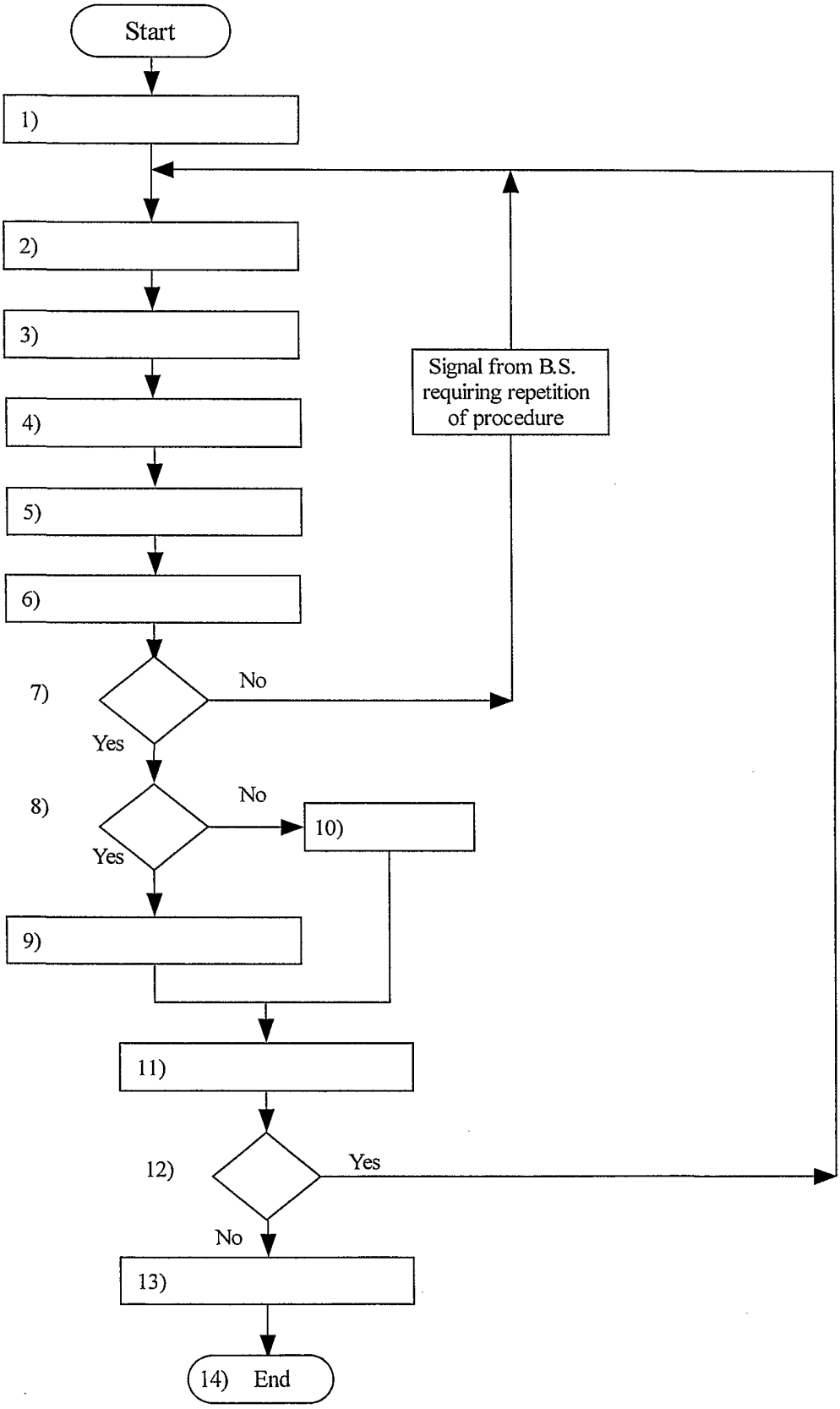
Start
1)
2)
3)
4)
5)
6)
7)
No
Yes
Signal from B.S. requiring repetition of procedure
8)
No
Yes
10)
9)
11)
12)
Yes
No
13)
14) End

Figure 8

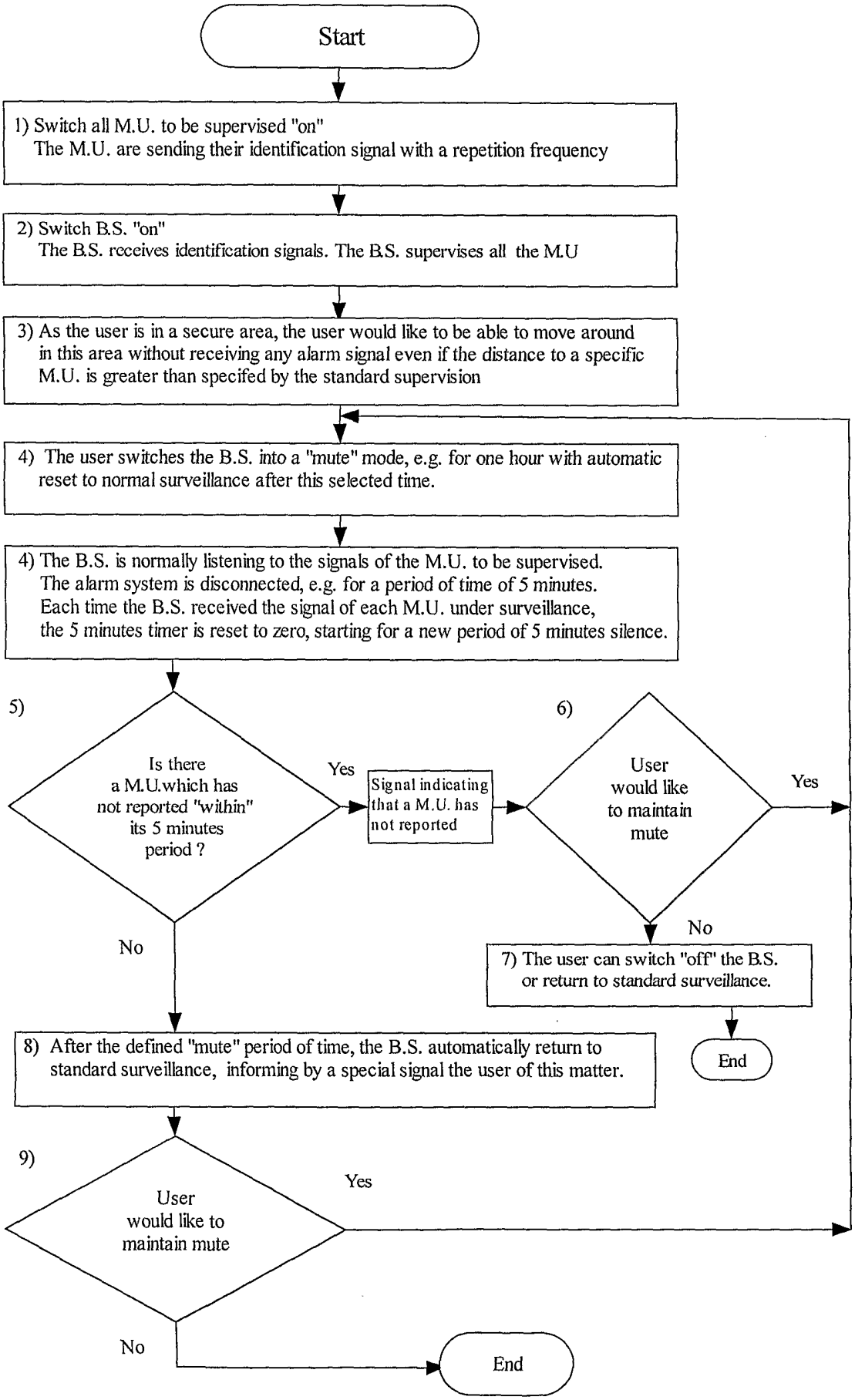
Start
1) Switch all M.U. to be supervised "on"
The M.U. are sending their identification signal with a repetition frequency
2) Switch B.S. "on"
The B.S. receives identification signals. The B.S. supervises all the M.U
3) As the user is in a secure area, the user would like to be able to move around in this area without receiving any alarm signal even if the distance to a specific M.U. is greater than specifed by the standard supervision
4) The user switches the B.S. into a "mute" mode, e.g. for one hour with automatic reset to normal surveillance after this selected time.
4) The B.S. is normally listening to the signals of the M.U. to be supervised.
The alarm system is disconnected, e.g. for a period of time of 5 minutes.
Each time the B.S. received the signal of each M.U. under surveillance,
the 5 minutes timer is reset to zero, starting for a new period of 5 minutes silence.
5)
Is there a M.U.which has not reported "within" its 5 minutes period ?
Yes
Signal indicating that a M.U. has not reported
6)
User would like to maintain mute
Yes
No
7) The user can switch "off" the B.S. or return to standard surveillance.
End
No
8) After the defined "mute" period of time, the B.S. automatically return to standard surveillance, informing by a special signal the user of this matter.
9)
User would like to maintain mute
Yes
No
End

Figure 9

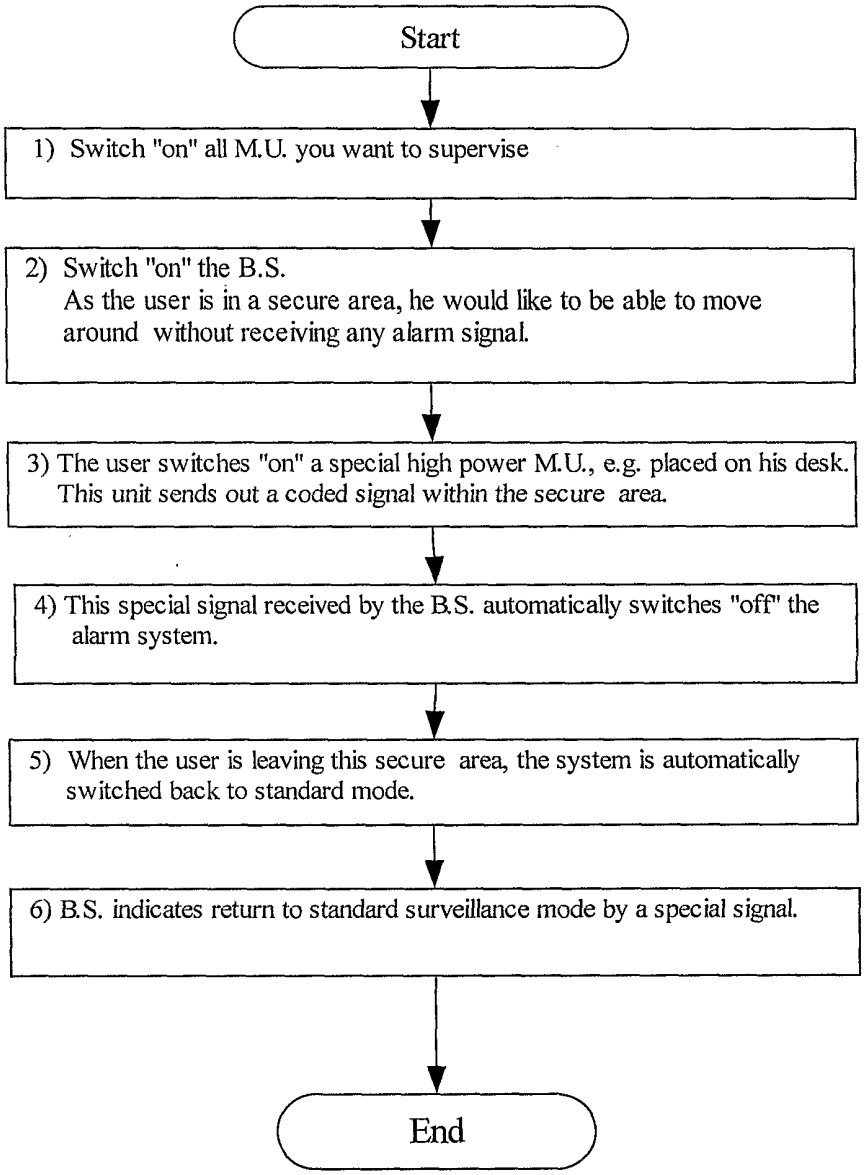
Start
1) Switch "on" all M.U. you want to supervise
2) Switch "on" the B.S.
As the user is in a secure area, he would like to be able to move around without receiving any alarm signal.
3) The user switches "on" a special high power M.U., e.g. placed on his desk. This unit sends out a coded signal within the secure area.
4) This special signal received by the B.S. automatically switches "off" the alarm system.
5) When the user is leaving this secure area, the system is automatically switched back to standard mode.
6) B.S. indicates return to standard surveillance mode by a special signal.
End

Figure 10

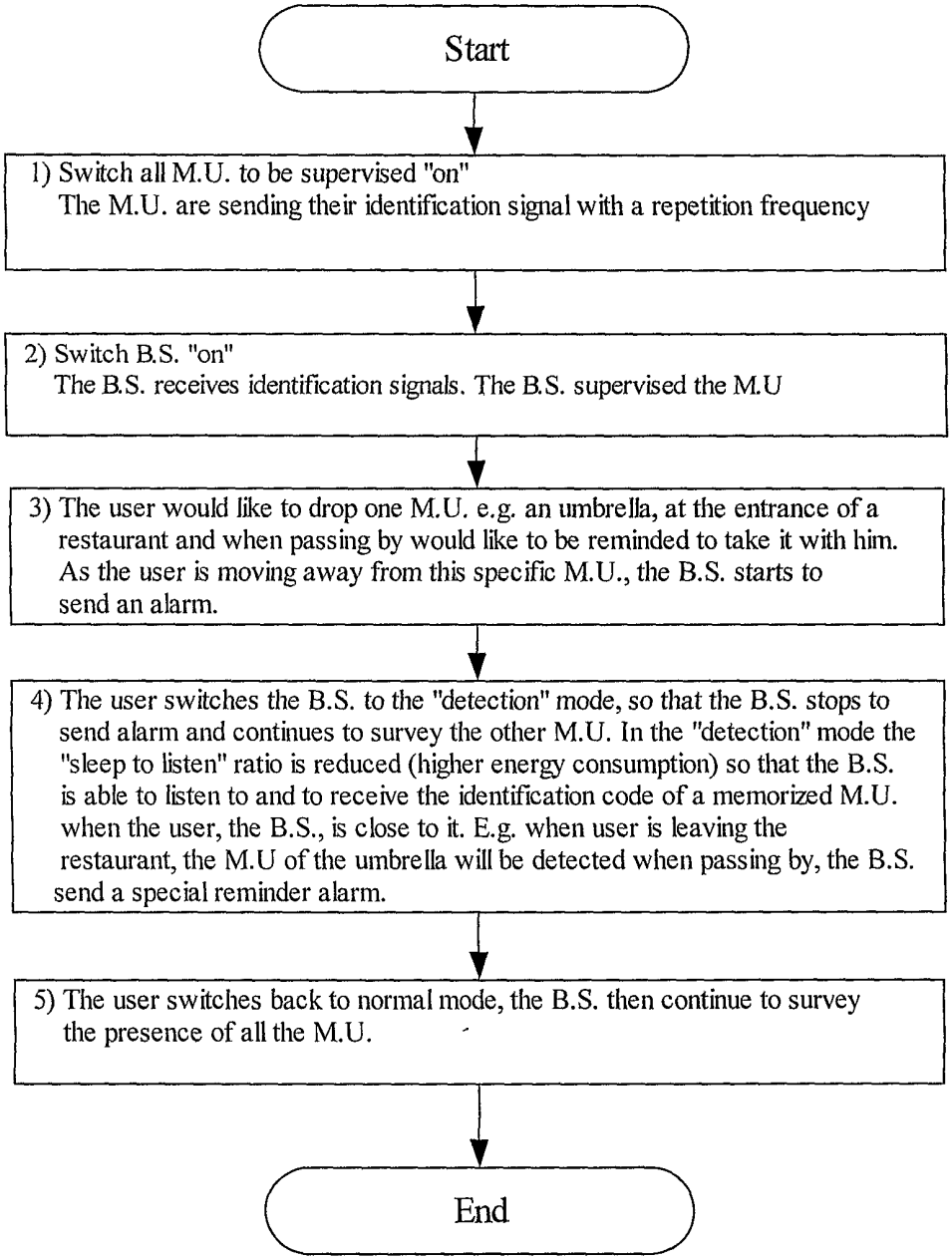
Start
1) Switch all M.U. to be supervised "on"
The M.U. are sending their identification signal with a repetition frequency
2) Switch B.S. "on"
The B.S. receives identification signals. The B.S. supervised the M.U
3) The user would like to drop one M.U. e.g. an umbrella, at the entrance of a restaurant and when passing by would like to be reminded to take it with him. As the user is moving away from this specific M.U., the B.S. starts to send an alarm.
4) The user switches the B.S. to the "detection" mode, so that the B.S. stops to send alarm and continues to survey the other M.U. In the "detection" mode the "sleep to listen" ratio is reduced (higher energy consumption) so that the B.S. is able to listen to and to receive the identification code of a memorized M.U. when the user, the B.S., is close to it. E.g. when user is leaving the restaurant, the M.U of the umbrella will be detected when passing by, the B.S. send a special reminder alarm.
5) The user switches back to normal mode, the B.S. then continue to survey the presence of all the M.U.
End

Figure 11