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(54) **Event data acquisition and transmission system**

Ereignisdatenerfassungs- und Übertragungssystem

Système d'acquisition et de transmission de données événementielles

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## Description

**[0001]** The present invention concerns a data acquisition and transfer system for transferring data via the mobile phone network. It is particularly but not exclusively concerned with the transfer of data from individuals to a central reception point and it is contemplated that the data may take many different forms. However, one important feature with which the present invention is concerned is that the major telecommunications operators and electronic suppliers are at present involved in the complex and difficult process of moving from the second generation of mobile phones to the third generation. As a result of this shift major companies are going to own increasingly under-utilised second generation digital networks and manufacturing capabilities for some time to come. Thus an aspect of the present invention is concerned with providing a range of opportunities which will enable these under-utilised facilities to remain revenue generating in a profitable manner.

**[0002]** One such opportunity lies in the field of drug testing. The process of testing new drugs in order to have them approved by the appropriate regulatory bodies can cost major drug firms up to a million dollars in lost revenue for each extra day needed to get approval.

**[0003]** One of the reasons it takes so long to get drugs approved is the length of time it takes to get sufficient good quality data out of the trials which have to be carried out. Doctors frequently mis-record data, and double-blind trials are expensive and take time to arrange. It is believed that schemes already exist to bypass the problems raised for example by doctors' handwriting and other vagaries in which test data is captured via the web. However errors still occur and the data is often inaccurate.

**[0004]** Thus in accordance with one aspect of the present invention data will be collected directly from the patient and from the receptacle from which the trial drug is dispensed.

**[0005]** It will, however, be appreciated that the basic inventive concept is applicable to a wide range of fields and is not necessarily limited to the concept of drug trials. Thus as will be apparent from the following description the inventive concept is applicable to monitoring the health of individuals who are not undergoing drug trials, locating or monitoring individuals for security purposes and also for carrying out regular checks on operating machinery.

**[0006]** EP 0 784 387 A2 refers to a means of optimising throughput on a communications channel shared by multiple users. The system combines a carrier sense, multiple access (CSMA) mode with a time division multiple access (TDMA) mode to achieve a channel utilisation greater than 90 %. The remote units send a poll request to a base station using the CSMA mode and receive a poll signal from the base station with a poll sequence. The remote units send their data in their assigned time slot.

**[0007]** US 5 905 247 A refers to a parking fee system

including a parking fee register in which information is maintained on one or more vehicles known to the system for which payment is made for parking, a vehicle-specific identification device from which a vehicle code of a vehicle is machine readable, and a control device for automatically reading the vehicle code from the vehicle-specific identification device for transmitting a control request message containing the vehicle code to the parking fee register, and for receiving a control information message reporting on the payment or non-payment of the parking fee and for notifying a user of the device of the information included in the control information message.

**[0008]** US 4 685 149 A refers to a meteor burst communication system including at least two spaced apart master stations, in association with a plurality of groups of remote stations spaced at locations remote from the master stations, with each group being associated with one of the master stations. Each of the master stations includes a radio transmitter for transmitting probing digital radio signals having address portions which are directed from the master station for reflection from meteor trails to the remote stations associated with the master station. Each of the remote stations includes a radio receiver for receiving the reflected probing digital radio signals from the master stations. Each of the remote stations also includes at least one sensor of physical characteristics such as snow depth or rain fall. The remote stations each include a transmitter for transmitting digital data representative of the output of the associated sensor to the master station via reflection from a meteor vapour trail, if the received address portion compares with the stored digital address sequence in accordance with predetermined criteria.

**[0009]** A data receiver station and a system according to the invention are disclosed in claims 1 and 6, respectively. In order that the present invention may be more readily understood, the embodiments thereof will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of the overall system architecture;

Figure 2 is a diagram showing elements of the present invention in conjunction with the public services telephone network;

Figure 3 is a block diagram of a sensor/transmitter;

Figure 4 is a plan view of a pill receptacle which can be used in the system shown in Figures 1 and 2;

Figure 5 is a block diagram of the active components of Figure 4;

Figures 6 and 7 are flow charts showing modes of operation of the device of Figure 5;

Figure 8 shows another form of pill receptacle;

Figure 9 shows a sensor bracelet; and

Figure 10 is a block diagram of data reception and polling terminal incorporating the present invention.

**[0010]** Referring now to the drawings, Figure 1 represents in a generic fashion a family of monitoring and transmitting devices which will be described in greater detail hereinafter. Block 1 represents a generic sensor device for obtaining data and for transmitting the acquired data. Block 2 represents the data telecommunications networks (and their operating companies) over which the data is transmitted to the device 1 so as to trigger a response to data which is transmitted from the device 1 either in response to a change in the circumstances of the device, to a signal initiated by an internal clock or in response to a request received to and from a processing centre shown at 3. Block 4 represents a user of the system for which the data, perhaps after analysis in block 3, is eventually returned. The directions of transmission of the data are shown by the headed arrows.

**[0011]** Turning now to Figure 2 of the accompanying drawings, this shows a conventional representation of the public services telephone network at 5. Connected to the PSTN 5 are a number of blocks 1a...1n each corresponding to block 1 of Figure 1. As will be appreciated these devices need not be identical and may in fact have a number of different functions. It is for this reason that some of the devices are connected to the PSTN 5 by double headed arrows indicating that they are capable of both receiving and transmitting data to the centre 3 whilst other devices only have a single headed arrow indicating that they are only capable of sending data to the centre 3. As there are several different types of device 1, there may also be several different organisations each interested in acquiring data so that Figure 2 shows three such organisations 4a...4c.

**[0012]** Turning now to Figure 3 of the accompanying drawings, this is a block diagram of circuitry which can be employed in the devices 1a...1n. Thus the block diagram comprises a sensor 6 shown in the figure as having two data inputs, data 1 and data 2 and adapted to send data corresponding to the two inputs to a second generation transmit/receive circuit 7. The circuit 7 operates under the control of a microprocessor CPU unit 8 which also controls a clock 9. The clock reduces power consumption of the sensor by only switching the sensor on in response to appropriate commands from the CPU 8. Thus in several of its potential functions the device has a power saving sleep mode. Thus the sensor can sense data 1 and data 2 either simultaneously or at staggered intervals which need not be the same. Because of the possibility that the sensors may be required to operate over extended periods of time the question of power usage is of considerable importance and this feature will be described in greater detail hereinafter in conjunction

with Figure 10 of the accompanying drawings. The transmit/receive circuit 7, the CPU 8, and the clock 9 may all be formed as a microcircuit on a single chip. The circuit can include an optional memory 10 and also includes a power source 11 which can be any suitable small battery such as the lithium batteries used to power calculators and digital watches. It is of course entirely possible for the power source to include photocells so that electrical energy can be generated by ambient light.

**[0013]** It will be appreciated that the nature of the sensor has not been specified and it is of course possible for the sensor to have only a single data input or a plurality of data inputs greater than two in number in accordance with the functions of the sensor within the overall system.

Returning now to device 1a of Figure 2

**[0014]** It will be appreciated that the device shown in Figure 3 is essentially a generic one and that certain of the devices shown in Figure 2 have only a one-way communication path with the PSTN 5 so that they cannot be interrogated by the centre 3. In these devices the send/receive circuit 7 need of course only have a send capability so that it can be simplified. Naturally if efficiencies of scale are present it may be simpler to have a send/receive capability in every device with the receive facility only being enabled in the appropriate circumstances.

**[0015]** One embodiment of a device such as 1a will now be described with regard to Figures 4 and 5 of the accompanying drawings. Thus device 1a is concerned with monitoring a drug testing program in which the patient has to take a regular dosage of the drug under test and in which a drug company is interested in the patient's response to this dosage. In this embodiment it is accordingly necessary for the drug company to know both when a pill is taken and the response by the patient to the taking of the drug. In its simplest form the device 1a will merely indicate that the patient has opened the pill receptacle. On the opening of the receptacle, the sensor is intended to give an instruction to the transmit circuit to send a short text message to the processing centre 3 where the fact that the receptacle has been opened, and the timing of its opening, is logged for future analysis and transmission to the initial user, namely the drug company, for whom the data is intended.

**[0016]** Figure 4 of the drawings shows a typical receptacle for pills in the form of a laminated strip 20 having an electro conductive metal foil surface provided with recesses 21 each holding a single pill. The sensor and its associated circuitry and power supply are located at 22. When the patient breaks the laminated foil to remove a pill, this is detected by the sensor which causes the send circuit 7, shown in Figure 5, to send the appropriate message. In Figure 5 the laminated foil is again shown at 20 and provides a conductive path between the power source 11 and the sensor 6 which path is changed each time the laminate is broken to enable the patient to remove a pill. Accordingly the sensor 6 can operate by de-

tecting changes in the resistance or capacitance of the conductive foil. The foil and the various items of circuitry are mounted on a backing strip 22 of suitable material such as thick paper or cardboard which is relatively tougher than that of the foil so that a user will preferentially break the laminate to activate the sensor. Given that the device employs a microprocessor and associated memory it is possible to pre-program the device with a schedule so that if the schedule is not followed an alert message is transmitted to the centre 3.

**[0017]** In applications where the intervals between pills being taken are not critical to the safety of the patient, a more sophisticated embodiment of the present invention may be used. In one such embodiment, data will be transmitted to the centre 3 on the transmission of a polling request from the centre 3. In such a case the breaking of the foil might not cause the immediate transmission of a signal to the centre 3 but will merely cause the fact that the foil has been broken to be stored in memory. Accordingly, when a request is received the stored data will then be sent as before. In another variant information about the timing of each pill's removal can be stored in memory contained within the foil pack, and all such stored data may be transmitted in a single communications session, so that the battery power requirements of the foil pack, and thus its size and weight, are reduced.

**[0018]** There will now be described a more sophisticated variant of the device just described with reference to Figures 4 and 5. As already mentioned it may well be that the drug company instigating the tests will require further information in addition to the fact that a patient has been taking his/her pills at the appropriate times and logging the times at which the pills were taken. Thus it is entirely possible for the drug company to wish to be able to monitor changes in the patient's condition when undergoing the drug regime. In such a situation it may be necessary for the patient to be provided with two sensing and transmitting devices. One device could be similar to the device just described with regard to Figures 4 and 5 whilst the other device could be a more sophisticated variant of this device which is attached to the patient and which monitors factors relevant to the patient's state of health. Such factors could be blood pressure, temperature, heart rate, skin pH and perspiration rate etc. and will of course depend on the nature of the drug being tested. Accordingly in this variant of the present invention the sensor 6 will accept a number of different inputs so that the required information can eventually be transmitted to the main centre 3. Additionally in order to conserve power the sensor may only be activated in response to a request received at the circuit 7 for stored information to be sent as text messages back to the centre 3. One way of ensuring that the data is relevant would be to time the polling request appropriately in response to data already transmitted with regard to the timing of the patient's taking of the drug. In this scenario it is assumed that there is no direct linkage between the sensor monitoring the patient's condition and the sensor monitoring the taking

of the drugs. However, in another variant one or other of the devices could send its stored data to be appended to the data stored in the other device so that on interrogation from the centre 3 all the appropriate data is transmitted at the same time.

**[0019]** The device associated directly with the patient could be in the form of a bracelet worn by the patient or in the form of a patch such as one or more electrodes attached directly to the patient's skin by suitable adhesives or taping and worn under the patient's clothing.

**[0020]** The flow diagrams of Figures 6 and 7 show alternative ways in which the generated data can be accessed by the centre 3. In these flow diagrams 6a represents the sensor 6 shown in Figures 4 and 5 and 6b represents a similar sensor but monitoring health characteristics of the patient involved. It will be appreciated that both of these sensors are similar to the one described with reference to Figure 3.

**[0021]** In the flow diagram of Figure 6 it is assumed that the sensor 6a operates in its normal manner and when a pill is taken transmits this fact at step S1 to the centre 3 where it is received at step S2. At step S3 a computer (not shown) at centre generates a log indicating that a particular patient has taken a particular pill at a particular time. In step S4 the centre 3 sends a request to interrogate the sensor 6b and to request the latter to transmit in step S5 the data that it has acquired back to the centre 3 so that this data can be added to the log generated at step S3. Naturally the data accessed in the transmit request step S4 can also include previous data which has been stored by the sensor 6b at appropriate intervals after the last time it was polled by the centre 3.

**[0022]** In the flow diagram of Figure 7 an alternative scenario is shown in which the output of sensor 6a in response to the removal of a pill is stored in memory at step S8 together with data from sensor 6b for subsequent transmission. In step S8 the centre 3 generates a poll signal to interrogate the stored data.

**[0023]** In response to this interrogation step a step S9 makes the decision as to whether or not one or more pills have been taken since the last poll of the device. This information would of course be of importance to the company making the drug trial. Whether or not a pill has been taken data concerning the patients condition is transmitted in step S10 and the fact that a pill has been taken is flagged in step S11. If a pill has not been taken this information is also supplied to step S12 where a log of the available data is generated for subsequent use.

**[0024]** It will be appreciated that the embodiment of Figure 7 could be changed in a relatively simple manner by keeping the data separate in two streams in which each memory 10 of each sensor device is interrogated by the centre 1 with each sensor device sending its relevant data independently of the other to generate the final log at the centre 1.

**[0025]** It will be appreciated that in the system just described the quality of data gathered is likely to be much more accurate than similar data gathered by a doctor or

even from a patients own records and it would also be gathered much faster. The advantage for this for the drug company carrying out the tests is clear in that there will be reduced time delay before a successful drug can be marketed. Additionally for the telecommunication network operator the advantage is higher utilisation of their network, but with limited life span contract thus for a drug testing program each sensor might be required to be able to operate over a matter of a few weeks or months. For the electronic suppliers there will be the corresponding advantage of the opportunity to get more utilisation out of their 2g second generation cellular telephone chip set production capabilities. However, it must be appreciated that exactly the same concept may be applied when inevitable progress means a move from third generation chip sets to fourth generation chip sets and so on.

**[0026]** It must be appreciated that the receptacle for pills disclosed in Figures 4 and 5 can take other forms. Thus Figure 8 shows the receptacle in the form of a standard pill bottle 30. In such a case the sensor 6 will merely record for transmission the removal of the led of the bottle.

**[0027]** Figure 9 shows a bracelet 40 which can be worn by a user, in order to detect variations in the user's bodily functions.

**[0028]** As already mentioned the basic sensor configuration shown in Figure 3 has the potential to carry out a wide range of functions. Thus the device shown at 1b in Figure 2 could be utilised to detect the possibility of impending heart attacks in a patient. In this case, the sensor 6 has appropriate sensors and embedded software that detect heart beat patterns that are known to be precursors of a heart attack. When these are detected by the CPU the transmit section will be enabled to send an appropriate message to the centre 3 so that emergency services could be alerted. It is of course possible also to alert the wearer with the risk that the shock might advance the heart attack.

**[0029]** In an exactly equivalent manner the sensor just described could be associated with machinery rather than with individual humans so as to detect actual or imminent failure and alert owners or maintenance companies. The sensors can also provide useful data to manufacturers about the conditions under which a product fails.

**[0030]** Sensor 1c in Figure 2 is shown as having a GPS capability and in this variant of the invention the sensor 6 is a motion location sensor and the send/receive circuit 7 can be simplified so that it is a single-use message sender. Such a device can be attached to valuable items so that if they are moved the police will be alerted. Combining this feature with the GPS capability the device will also be able to tell the police where the article is.

**[0031]** As is apparent from the foregoing description one of the advantages of the centre 3 is that it can operate on behalf of a number of clients and that it will also generate a substantial amount of secondary data.

**[0032]** In all of the variants described above the ques-

tion of maintaining a sufficient power supply for the sensors and their associated send/receive circuits is of considerable importance. In order to conserve power each sensor may have a sleep mode in which there is minimal power consumption in such a case the sensor might only respond to a polling signal from the centre 3 and be quiescent until the polling signal has been received.

**[0033]** Turning now to Figure 10 of the accompanying drawings this shows in greater detail a data reception and polling terminal 40 corresponding to the centre 3 shown in Figure 2.

**[0034]** Figure 10 again shows the PSTN network at 5 and sensor devices 1a...1n. As before some of these devices have only a transmit capability and others have a receive/transmit capability.

**[0035]** In the centre of polling terminal 40 blocks 41a, 41b and 41c represent receive terminals for receiving data signals from devices similar to send only device 1a or for both sending data to and receiving data from sensor devices such as device 1n. Thus terminal 41a represents a receive-only terminal, whilst terminals 41b and 41c are transmit/receive terminals. Each terminal is capable of at least receiving data from a large number of sensor devices, and some terminals can also transmit to a large number of sensor devices. Associated with each terminal is an electronic processor. Terminal 41a is shown connected to a processor 42 whilst terminals 41b, 41c are shown connected to a data processing system 44. Processor 42 on receipt of data from a sensor device is programmed to recognise the source of the data and to log the data, including time of receipt, in an appropriate storage area 43.

**[0036]** Data processing system 44 is also capable of generating outgoing data such as polling calls and is also programmed to store in appropriate files details of all outgoing and incoming data as required by a user of the system. As already discussed power conservation is an important factor in the operation of the various sensors. Thus it will be seen that polling terminal 40 also includes a system clock which can be of any suitable type. Each processor can have its own clock or, as shown a single clock can be used. Data processing system 44 also includes a storage area 46 storing Sensor Timing Data, namely the time at which each sensor which is to be polled in synchronism with that sensor's clock switching the sensor on and in addition, if there are passive sensors, the times at which data is expected to be received from the sensors. The data processing system 44 also includes a stored set of batch routines indicated at 47 in order to control the polling of target sensors at appropriate times as set by the STD file 46. The batching routine can also flag if a non-polled sensor has been quiescent for too long a period in response to data stored on the same file area. Provided that each sensor clock 9 is in nominal synchronism with the system clock or its associated clock then the combination of the synchronised clocks, the STD file and the Batch routine will ensure that each device to be polled can remain in a very lower pow-

er. Mode with only its clock operational and its memory contents refreshed except when data is required. Naturally the polling times will vary with polling intervals for security sensors being shorter than those, for example, drug testing.

## Claims

1. A data receiver station (40), comprising:

a first transmitter (41 b, 41 c) configured to transmit a first polling signal at a first time and a second polling signal at a second polling time, wherein the first transmitter (41 b, 41 c) is configured to transmit the first polling signal over a data telecommunications network (5) to a data acquisition and transfer device (1, 1 c, 1 n) requesting a first data associated with a change detected by a first sensor (1 a, 1 b, 1 d, 6a), and wherein the first transmitter (41 b, 41 c) is configured to transmit the second polling signal to the data acquisition and transfer device (1, 1c, 1 n) requesting a second data associated with a change detected by a second sensor; a first receiver (41b, 41c) configured to receive the first and second data sent in response to and after the first polling signal, wherein the first receiver (41b, 41c) is configured to receive the first and second data over the data telecommunications network (5); and a controller (44) coupled to the first transmitter (41b, 41c) and the first receiver (41b, 41c) and configured to determine the second polling time depending upon a content of the first data including an indication of when the first sensor (1a, 1b, 1d, 6a) detected the change received by the first receiver (41b, 41c) and to control the first transmitter (41b, 41c) to send the second polling signal at the second time, wherein the controller (44) is configured to determine the time for sending the second polling signal depending upon when the first sensor (1a, 1b, 1d, 6a) detected the change.

2. The data receiver station of claim 1, wherein the content of the data includes an indication of when a sensor detected a change in a physical characteristic.

3. The data receiver station of and one of claims 1 to 2, further including a memory, wherein the controller is further configured to determine a time of receipt of the data and to store both the content of the data and the time of receipt of the data in the memory.

4. The data receiver station of any one of claims 1 to 3, the data acquisition and transfer device having first and second sensors each responsive to a

change of a predetermined nature and a transmitter for transmitting over a mobile phone network data concerning an occurrence of each change to the data receiver station, wherein the data receiver station comprises:

the controller is configured to determine a time for sending the second polling signal depending upon a content of the first data and to control the transmitter to send the second polling signal at the determined time.

5. The data receiver station of claim 4, wherein the content of the first data includes an indication of when the first sensor detected the change, and wherein the controller is configured to determine the time for sending the second polling signal depending upon when the first sensor detected the change.

6. A data acquisition system, comprising:

the data receiver station (3, 40) of any one of claims 1 to 4, and:

a data acquisition device (1, 1 c, 1n), comprising:

a second receiver (7) configured to receive over the data telecommunications network (2, 5) the first and second polling signals,

a first sensor (6a) configured to sense a first physical characteristic, a second sensor (6b) configured to sense a second physical characteristic, and

a second transmitter (7) configured to transmit the first and second data, wherein the data acquisition device (1, 1 c, 1n) is configured to generate the first data based on the first physical characteristic as sensed by the first sensor (6a) and to generate the second data based on the second physical characteristic as sensed by the second sensor (6b),

wherein the content of the first data includes an indication of when the first sensor detected the first physical characteristic, and

wherein the data acquisition device (1, 1c, 1n) is further configured to transmit by the second transmitter (7) the first data in response to the second receiver (7) receiving the first polling signal and the second data in response to the second receiver (7) receiving the second polling signal.

7. The data acquisition system of claim 6, wherein the controller is configured to determine the time for sending the second polling signal depending upon when the first sensor detected the first physical characteristic. 5
8. The data acquisition system of claim 6 or claim 7, wherein the network is a phone network.
9. The data acquisition device of any one of claims 6 to 8, further including a memory, wherein the controller is further configured to determine a time of receipt of the first data and to store both the content of the first data and the time of receipt of the first data in the memory. 10
10. The data acquisition device of any one of claims 6 to 9, wherein the first and second physical characteristics are changes in physical characteristics. 15

### Patentansprüche

1. Datenempfängerstation (40), die umfasst: 20

einen ersten Sender (41 b, 41 c), der konfiguriert ist, um ein erstes Abfragesignal zu einer ersten Zeit und ein zweites Abfragesignal zu einer zweiten Abfragezeit zu senden, wobei der erste Sender (41b, 41c) konfiguriert ist, um das erste Abfragesignal über ein Datentelekommunikationsnetz (5) an eine Datenerfassungs- oder Übertragungsvorrichtung (1, 1c, 1n) zu senden, die erste Daten anfordert, die zu einer Änderung gehören, die von einem ersten Sensor (1a, 1 b, 1 d, 6a) erfasst wird, und wobei der erste Sender (41 b, 41 c) konfiguriert ist, um das zweite Abfragesignal an die Datenerfassungs- und Übertragungsvorrichtung (1, 1 c, 1n) zu übertragen, welche zweite Daten anfordert, die zu einer Änderung gehören, die von einem zweiten Sensor erfasst wird, einen ersten Empfänger (41 b, 41 c), der konfiguriert ist, um die ersten und zweiten Daten zum empfangen, die ansprechend auf und nach dem ersten Abfragesignal gesendet werden, wobei der erste Empfänger (41 b, 41c) konfiguriert ist, um die ersten und zweiten Daten über das Datentelekommunikationsnetz (5) zu empfangen; und 25

eine Steuerung (44), die mit dem ersten Sender (41b, 41c) und dem ersten Empfänger (41b, 41c) gekoppelt ist und konfiguriert ist, um die zweite Abfragezeit abhängig von einem Inhalt der ersten Daten einschließlich einer Anzeige, wann der erste Sensor (1a, 1b, 1d, 6a), die von dem ersten Empfänger (41b, 41c) empfangene Änderung erfasst hat, zu bestimmen, und um 30

den ersten Sender (41b, 41c) zu steuern, um das zweite Abfragesignal zu der zweiten Zeit zu senden, wobei die Steuerung (44) konfiguriert ist, um die Zeit zum Senden des zweiten Abfragesignals abhängig davon, wann der erste Sensor (1a, 1b, 1d, 6a) die Änderung erfasst hat, zu bestimmen. 35

2. Datenempfängerstation nach Anspruch 1, wobei der Inhalt der Daten eine Anzeige umfasst, wann ein Sensor eine Änderung in einer physikalischen Charakteristik erfasst hat. 40

3. Datenempfängerstation nach einem der Ansprüche 1 bis 2, die ferner einen Speicher umfasst, wobei die Steuerung ferner konfiguriert ist, um eine Empfangszeit der Daten zu bestimmen und sowohl den Inhalt der Daten als auch die Empfangszeit der Daten in dem Speicher zu speichern. 45

4. Datenempfängerstation nach einem der Ansprüche 1 bis 3, wobei die Datenerfassungs- und Übertragungsvorrichtung erste und zweite Sensoren, die jeweils auf eine Änderung einer vorgegebenen Art ansprechen, und einen Sender zum Senden von Daten, welche ein Auftreten jeder Änderung betreffen, über ein Mobiltelefonnetz an die Empfängerstation hat, wobei die Datenempfängerstation aufweist: 50

dass die Steuerung konfiguriert ist, um eine Zeit zum Senden des zweiten Abfragesignals abhängig von einem Inhalt der ersten Daten zu bestimmen und den Sender zu steuern, um das zweite Abfragesignal zu der vorgegebenen Zeit zu senden. 55

5. Datenempfängerstation nach Anspruch 4, wobei der Inhalt der ersten Daten eine Anzeige umfasst, wann der erste Sensor die Änderung erfasst hat, und wobei die Steuerung konfiguriert ist, um die Zeit zum Senden des zweiten Abfragesignals abhängig davon, wann der erste Sensor die Änderung erfasst hat, zu bestimmen. 60

6. Datenerfassungssystem, das umfasst: 65

die Datenempfängerstation (3, 40) nach einem der Ansprüche 1 bis 4, und:

eine Datenerfassungsvorrichtung (1, 1 c, 1n), die umfasst:

einen zweiten Empfänger (7), der konfiguriert ist, um die ersten und zweiten Abfragesignale über das Datentelekommunikationsnetz (2, 5) zu empfangen, einen ersten Sensor (6a), der konfigu-

riert ist, um eine erste physikalische Charakteristik abzutasten, einen zweiten Sensor (6b), der konfiguriert ist, um eine zweite physikalische Charakteristik abzutasten, und einen zweiten Sender (7), der konfiguriert ist, um die ersten und zweiten Daten zu übertragen,

wobei die Datenerfassungsvorrichtung (1, 1 c, 1n) konfiguriert ist, um die ersten Daten basierend auf der ersten physikalischen Charakteristik, wie von dem ersten Sensor (6a) abgetastet, zu erzeugen, und die zweiten Daten basierend auf der zweiten physikalischen Charakteristik, wie von dem zweiten Sensor (6b) abgetastet, zu erzeugen,

wobei der Inhalt der ersten Daten eine Anzeige umfasst, wann der erste Sensor die erste physikalische Charakteristik erfasst hat, und wobei die Datenerfassungsvorrichtung (1, 1 c, 1 n) ferner konfiguriert ist, um von dem zweiten Sender (7) die ersten Daten ansprechend darauf, dass der zweite Empfänger (7) das erste Abfragesignal empfängt, und die zweiten Daten ansprechend darauf, dass der zweite Empfänger (7) das zweite Abfragesignal empfängt, zu übertragen.

7. Datenerfassungssystem nach Anspruch 6, wobei die Steuerung konfiguriert ist, um die Zeit zum Senden des zweiten Abfragesignals abhängig davon, wann der erste Sensor die erste physikalische Charakteristik erfasst hat, zu bestimmen.
8. Datenerfassungssystem nach Anspruch 6 oder Anspruch 7, wobei das Netz ein Telefonnetz ist.
9. Datenerfassungsvorrichtung nach einem der Ansprüche 6 bis 8, die ferner einen Speicher umfasst, wobei die Steuerung ferner konfiguriert ist, um eine Empfangszeit der ersten Daten zu bestimmen und sowohl den Inhalt der ersten Daten als auch die Empfangszeit der ersten Daten in dem Speicher zu speichern.
10. Datenerfassungsvorrichtung nach einem der Ansprüche 6 bis 9, wobei die ersten und zweiten physikalischen Charakteristiken Änderungen in physikalischen Charakteristiken sind.

## Revendications

1. Station de réception de données (40), comprenant :  
un premier émetteur (41 b, 41 c) configuré pour transmettre un premier signal d'invitation à

émettre à un premier moment, et un second signal d'invitation à émettre à un second moment d'invitation à émettre,

dans laquelle le premier émetteur (41 b, 41 c) est configuré pour transmettre le premier signal d'invitation à émettre par un réseau de télécommunications de données (5) vers un dispositif d'acquisition et de transfert de données (1, 1c, 1n) demandant une première donnée associée à un changement détecté par un premier capteur (1a, 1b, 1d, 6a), et

dans laquelle le premier émetteur (41 b, 41 c) est configuré pour transmettre le second signal d'invitation à émettre aux dispositifs d'acquisition et de transfert de données (1, 1c, 1n) demandant une seconde donnée associée à un changement détecté par un second capteur; un premier récepteur (41b, 41c) configuré pour recevoir la première et la seconde donnée envoyées en réponse à et après le premier signal d'invitation à émettre,

dans laquelle le premier récepteur (41 b, 41 c) est configuré pour recevoir la première et la seconde donnée par le réseau de télécommunications de données (5) ; et

un contrôleur (44) couplé au premier émetteur (41 b, 41c) et le premier récepteur (41b, 41c) et configuré pour déterminer le second temps d'invitation à émettre en fonction d'un contenu de la première donnée, y compris une indication du moment où le premier capteur (1a, 1b, 1d, 6a) a détecté le changement reçu par le premier récepteur (41b, 41c), et pour commander le premier émetteur (41b, 41 c) pour qu'il envoie le second signal d'invitation à émettre au second moment,

dans laquelle le contrôleur (44) est configuré pour déterminer le moment requis pour envoyer le second signal d'invitation à émettre en fonction du moment où le premier capteur (1a, 1b, 1d, 6a) a détecté le changement.

2. Station de réception de données selon la revendication 1, dans laquelle le contenu des données comprend une indication du moment où un capteur a détecté un changement dans une caractéristique physique.
3. Station de réception de données selon l'une des revendications 1 à 2, qui inclut également une mémoire, dans laquelle le contrôleur est également configuré pour déterminer un temps de réception des données et pour sauvegarder à la fois le contenu des données et l'heure de réception des données dans la mémoire.
4. Station de réception de données selon l'une quelconque des revendications 1 à 3, le dispositif d'ac-

quisition et de transfert de données comportant un premier et un second capteur, chacun réagissant à un changement d'une nature prédéterminée, et un émetteur chargé de transmettre par un réseau téléphonique mobile des données concernant une occurrence de chaque modification apportée à la station de réception de données, dans lequel la station de réception de données comprend :

le contrôleur qui est configuré pour déterminer un moment requis pour émettre le second signal d'invitation à émettre en fonction d'un contenu de la première donnée et pour donner l'ordre à l'émetteur d'envoyer le second signal d'invitation à émettre au moment déterminé.

5. Station de réception de données selon la revendication 4, dans laquelle le contenu de la première donnée comprend une indication du moment où le premier capteur a détecté le changement, et dans laquelle le contrôleur est configuré pour déterminer le moment requis pour émettre le second signal d'invitation à émettre en fonction du moment où le premier capteur a détecté le changement.

6. Système d'acquisition de données, comprenant :

la station de réception de données (3, 40) selon l'une quelconque des revendications 1 à 4, et :

un dispositif d'acquisition de données (1, 1c, 1n), comprenant :

un second récepteur (7) configuré pour recevoir par le réseau de télécommunications de données (2, 5) le premier et le second signaux d'invitation à émettre,

un premier capteur (6a) configuré pour détecter une première caractéristique physique,

un second capteur (6b) configuré pour détecter une seconde caractéristique physique, et

un second émetteur (7) configuré pour transmettre la première et la seconde données, dans lequel le dispositif d'acquisition de données (1, 1c, 1n) est configuré pour générer la première donnée sur la base de la première caractéristique physique telle que détectée par le premier capteur (6a) et pour générer la seconde donnée sur la base de la seconde caractéristique physique telle que détectée par le second capteur (6b),

dans lequel le contenu de la première donnée comprend une indication du moment où le premier capteur a détecté la première caractéristique physique, et

dans lequel le dispositif d'acquisition de don-

nées (1, 1c, 1n) est configuré par ailleurs pour transmettre par le second émetteur (7) la première donnée en réponse au second récepteur (7) recevant le premier signal d'invitation à émettre et la seconde donnée en réponse au second récepteur (7) recevant le second signal d'invitation à émettre.

7. Système d'acquisition de données selon la revendication 6, dans lequel le contrôleur est configuré pour déterminer le moment requis pour émettre le second signal d'invitation à émettre en fonction du moment où le premier capteur a détecté la première caractéristique physique.

8. Système d'acquisition de données selon la revendication 6 ou la revendication 7, dans lequel le réseau est un réseau téléphonique.

9. Dispositif d'acquisition de données selon l'une quelconque des revendications 6 à 8, comprenant par ailleurs une mémoire, dans lequel le contrôleur est configuré par ailleurs pour déterminer un moment de réception de la première donnée et pour sauvegarder à la fois le contenu de la première donnée et le moment de réception de la première donnée dans la mémoire.

10. Dispositif d'acquisition de données selon l'une quelconque des revendications 6 à 9, dans lequel la première et la seconde caractéristiques physiques sont des changements affectant les caractéristiques physiques.

FIGURE 1

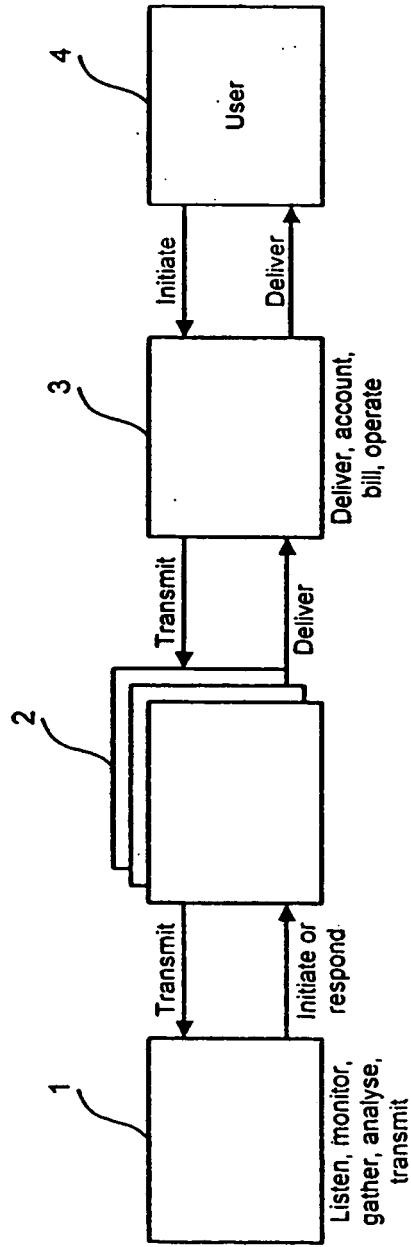


FIGURE 2

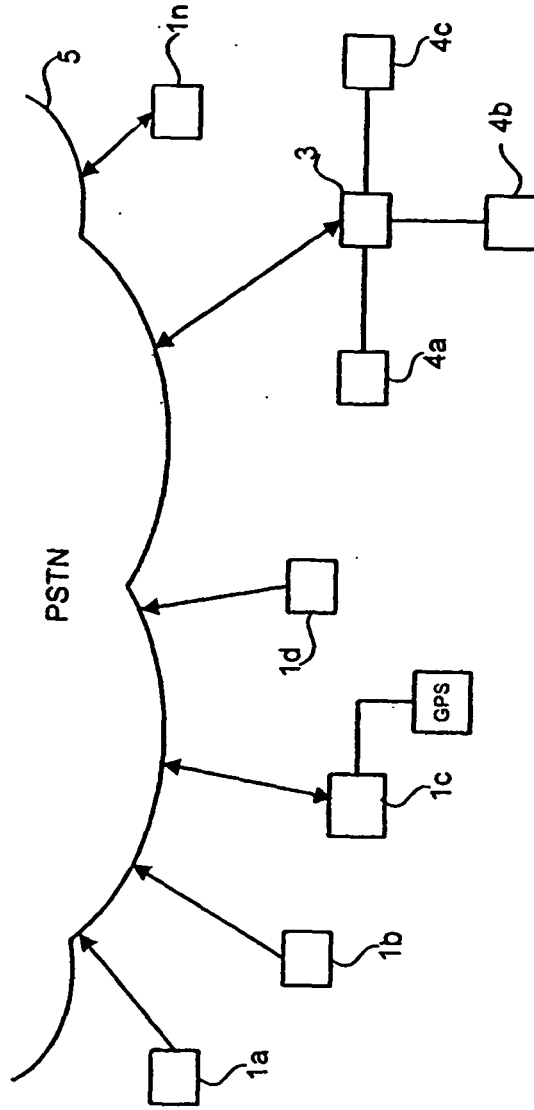
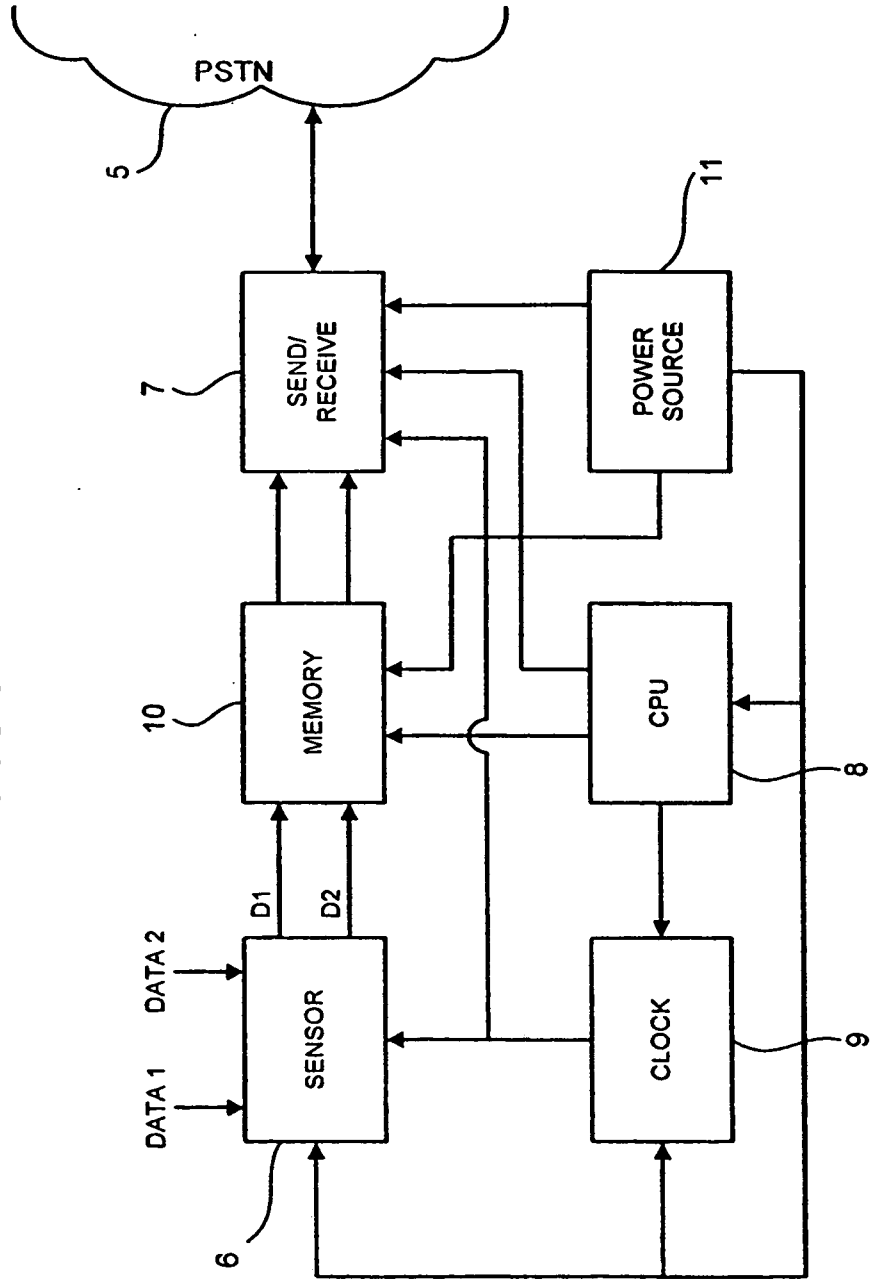


FIGURE 3



*FIGURE 4*

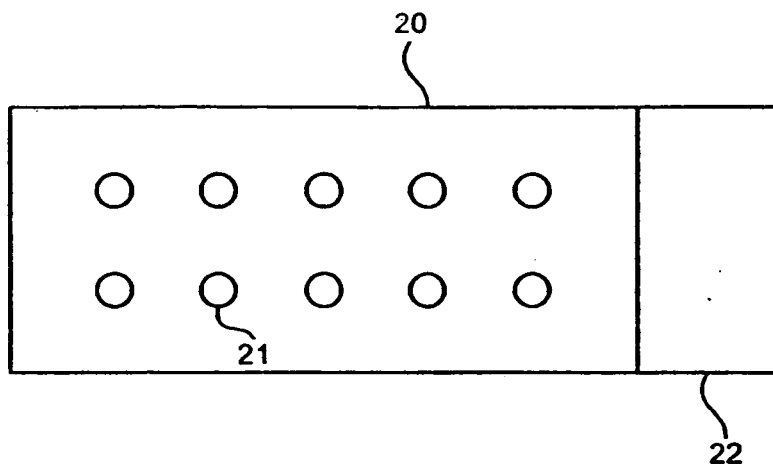


FIGURE 5

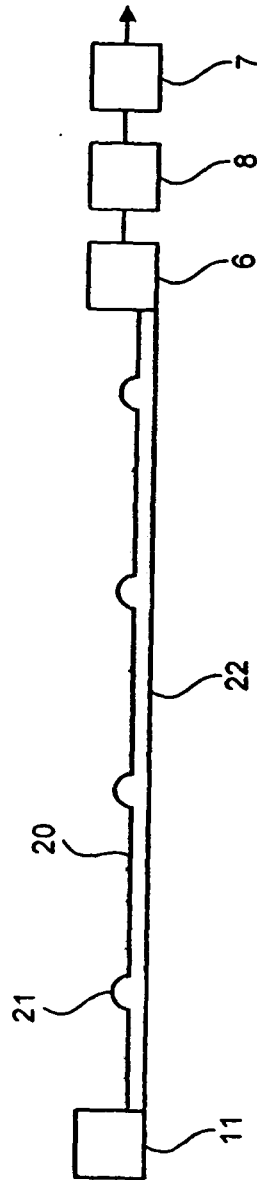


FIGURE 6

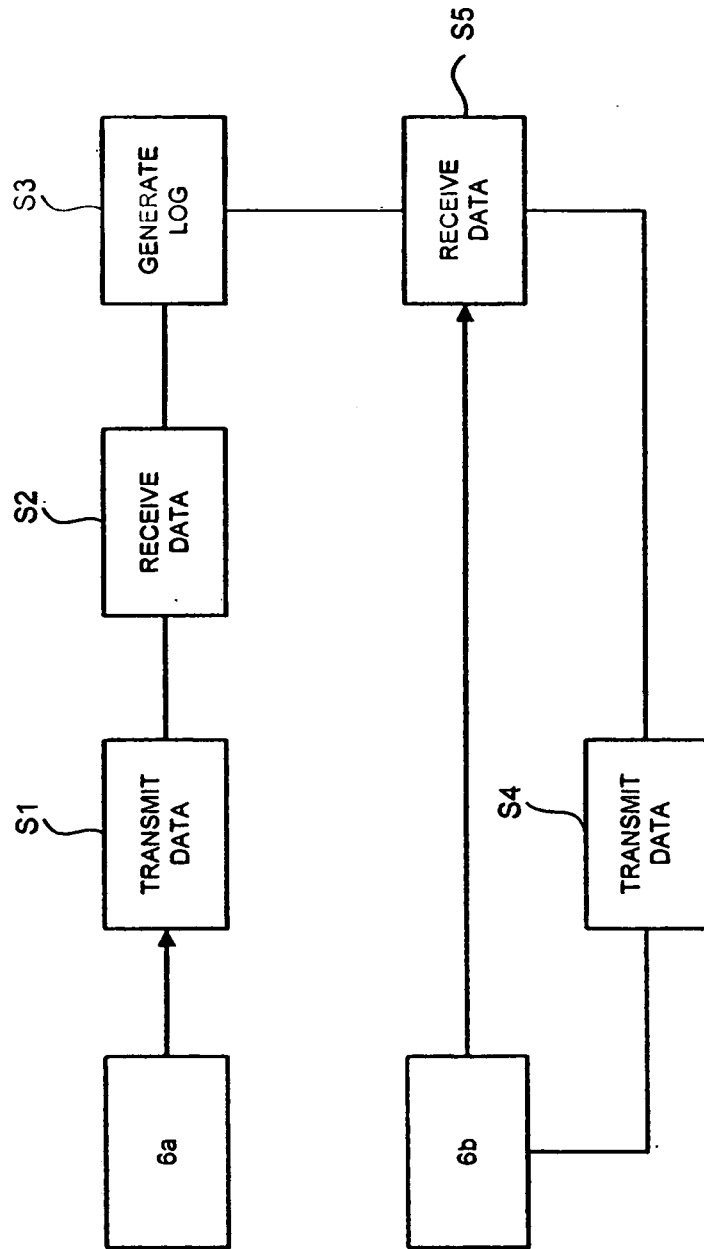
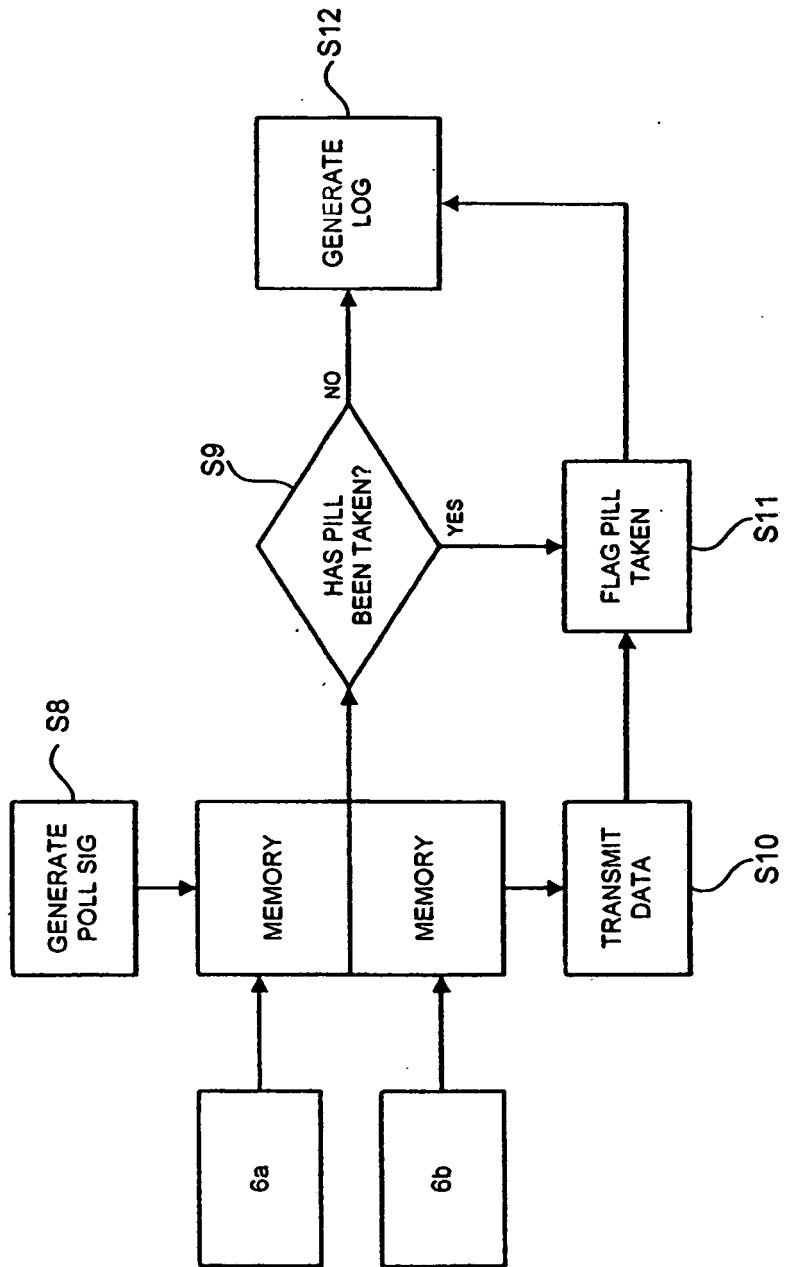
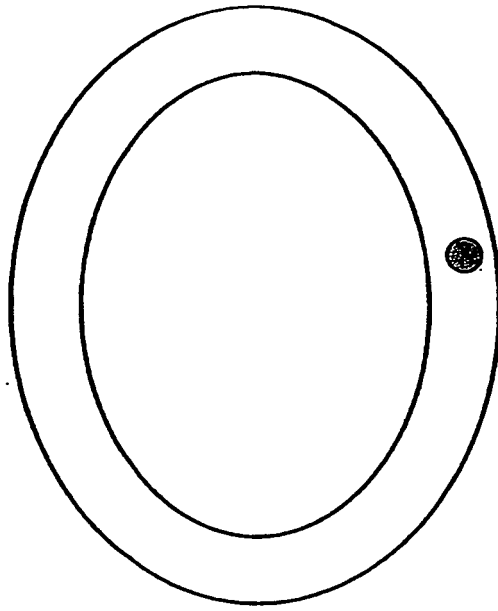
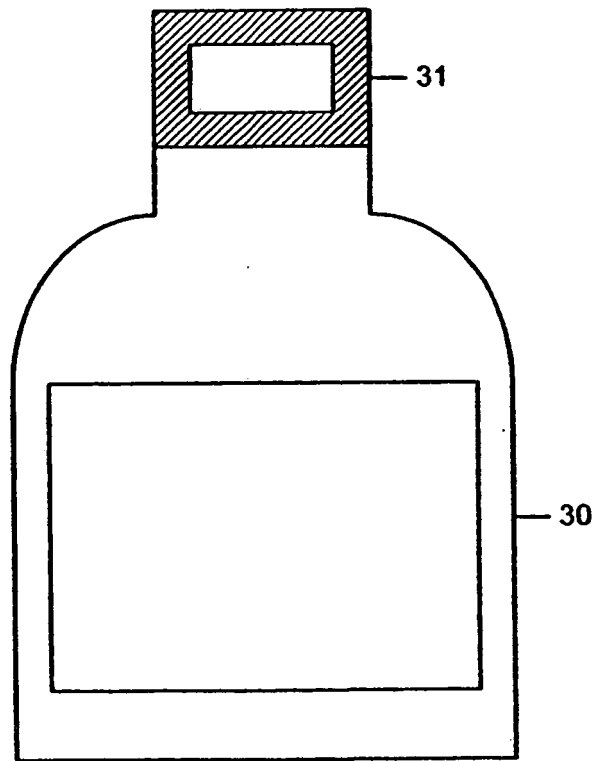


FIGURE 7



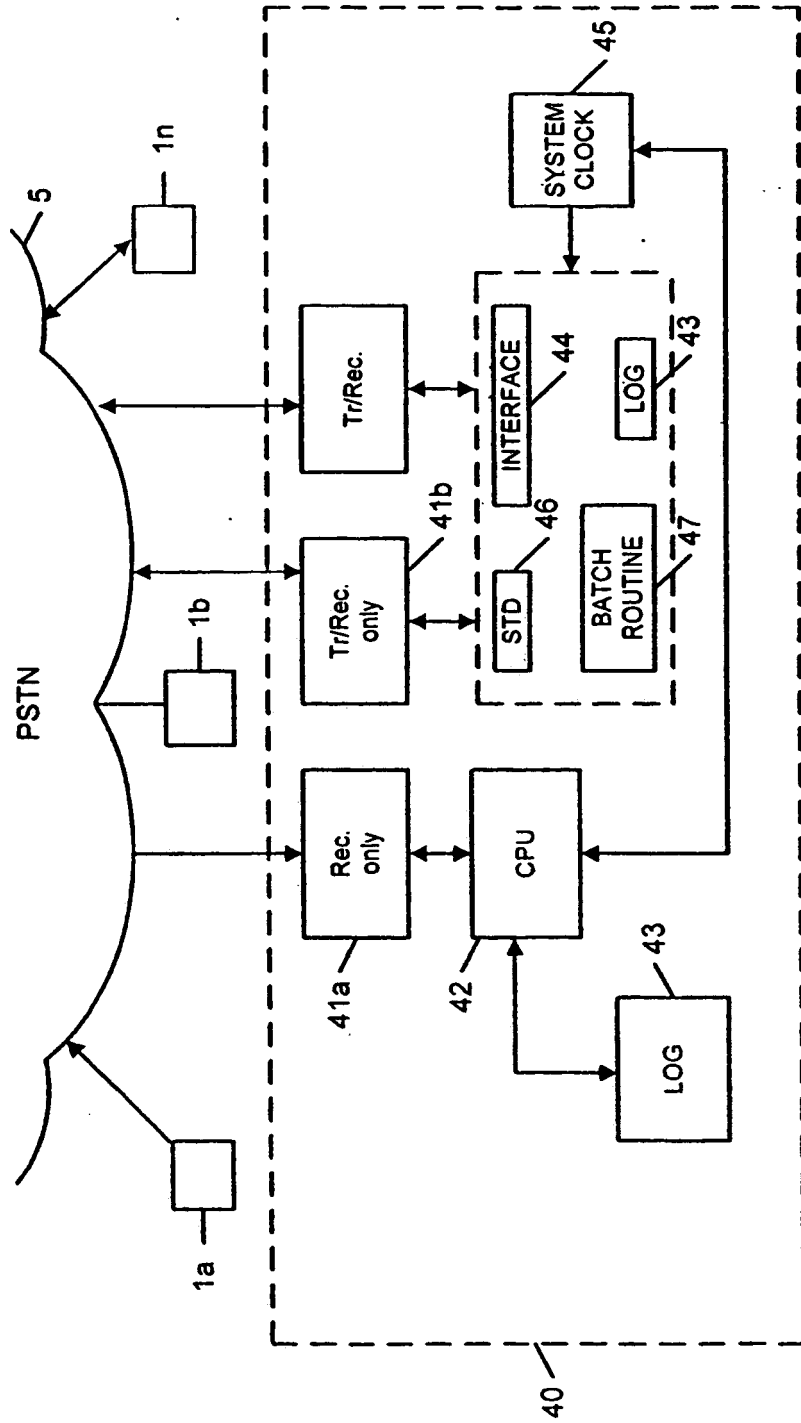


*FIG. 8*



*FIG. 9*

FIGURE 10



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 0784387 A2 [0006]
- US 5905247 A [0007]
- US 4685149 A [0008]

专利名称(译)	事件数据采集和传输系统		
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[标]申请(专利权)人(译)	埃森哲全球服务有限公司, A瑞士CORPORATION		
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外部链接	<a href="#">Espacenet</a>		

摘要(译)

本发明涉及一种数据采集和传输设备，包括响应于预定性质的改变的传感器，以及用于通过移动电话网络将关于这种改变的发生的数据发送到接收站的发射机。这些装置可用于在进行药物试验时监测患者的依从性，并且可以形成系统的一部分，该系统轮询装置的变化并记录所有传输。

FIGURE 1

