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Belmore Road, Randwick, NSW 2031 (AU). **JANKOV, Vladimir** [AU/AU]; 14/166 Belmore Road, Randwick, NSW 2031 (AU).

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(74) Agent: **YOUNG, Philip, Claude**; Wilson & Young, P.O. Box 553, Alexandria, NSW 1435 (AU).

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(71) Applicant (for all designated States except US): **SHELL, Allan, Michael** [AU/AU]; 14/166 Belmore Road, Randwick, NSW 2031 (AU).

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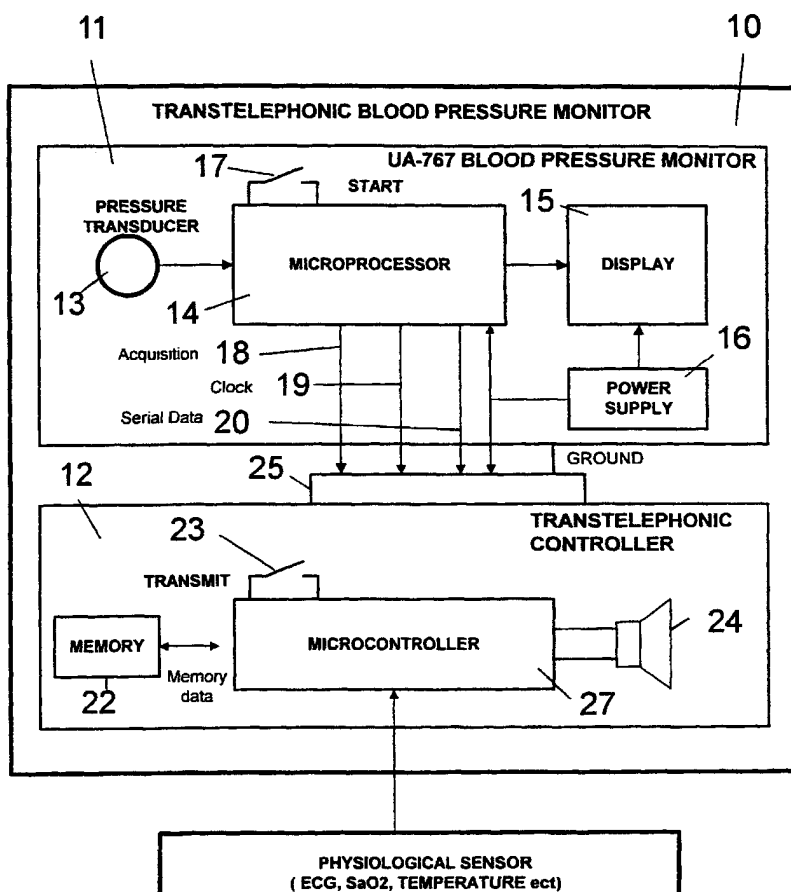
(71) Applicants and

(72) Inventors: **PLATT, Harry, Louis** [AU/AU]; 14/166

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(54) Title: TRANSTELEPHONIC BLOOD PRESSURE MONITOR



(57) Abstract: A transtelephonic blood pressure monitoring apparatus (10) having a blood pressure monitor (11) and a blood pressure sensor. The apparatus (10) includes a blood pressure acquisition and memory (22), a controller (27), a transducer and output (24), wherein the blood pressure acquisition and memory (22) receives blood pressure data from the sensor and either sends the blood pressure data in real time to the controller (12) which converts data into transmission signals to the output or stores the blood pressure data in the memory (22) for delayed transmission to the transmission device, the controller controlling the operation of the apparatus (10).



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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TRANSTELEPHONIC BLOOD PRESSURE MONITOR

The present invention relates to physiological monitoring of patients and, in particular, to physiological signal acquisition apparatus which provides real time and/or recorded data transmission over a telephone network to a remote location
5 where it is decoded and analysed.

BACKGROUND TO THE INVENTION

The management of hypertension, ie high blood pressure, continues to be one of the most important issues facing physicians. This is due to the widespread prevalence of the disorder, as there are an estimated sixty million persons in the
10 United States alone, and partly because of the consequences of uncontrolled, poorly treated hypertension which can lead to the occurrences of strokes, heart attacks and heart failures.

Self monitoring of blood pressure by patients at their own homes, offices and the like offers the potential for improved and cost effective management of
15 hypertension. Home monitoring of blood pressure offers the availability of more frequent measurement readings that can give a precise estimate of blood pressure trends over long periods of time.

One aspect of blood pressure self monitoring and management that causes concerns is a so called "reporting bias". It is believed that a means of reducing
20 reporting bias error is to provide the patient with blood pressure monitoring means that can record the blood pressure in memory and then transfer the recorded data to the physician.

There are known automatic digital blood pressure monitors such as the UA-767 Automatic Digital Blood Pressure Monitor from A&D Company Limited. This
25 monitor is an oscillometric blood pressure measurement device for hospitals and private use. This device measures and displays blood pressure and heart rate in automatic mode calibrating itself, inflating and deflating the cuff and then automatically turning off itself. Only the one last measurement can be displayed because the monitor does not have data memory. Upon completion of each

measurement, the UA-767 transmits 5 bytes of measure values to a built in serial interface on its main printed circuit board.

It would be advantageous to provide a blood pressure monitoring apparatus which provides real time or delayed transmission of recorded blood pressure data to a remote monitoring location, such that it can be collated and analysed and reported to a physician, by providing a memory for multiple storage and to provide the device with a data uploading function so that date and time of each recording can be transmitted to a remote monitoring station.

Hitherto, it has not been possible to provide blood pressure data to remote monitoring locations as the sampling of the data and displaying of the data does not lend itself to being converted into the appropriate signals to be transmitted by transtelephonic means. There has not been a desire or need in the past to display the data acquired through blood pressure monitoring in a similar method as other physiological data.

15 OBJECT OF THE INVENTION

It is an object of the present invention to provide a blood pressure monitoring apparatus which substantially overcomes or ameliorates the above mentioned disadvantages. At the very least, the object of the invention is to provide an alternative to known blood pressure monitoring and display apparatus.

20 DISCLOSURE OF THE INVENTION

According to one aspect of the present invention there is disclosed a transtelephonic blood pressure monitoring apparatus having a blood pressure monitor and a blood pressure sensor means, said monitor including a blood pressure acquisition and memory means, a control means, a transducer means and output means, wherein said blood pressure acquisition and memory means receives blood pressure data from said sensor means and either sends said blood pressure data in real time to said transducer means which converts data into transmission signals to said output means or stores said blood pressure data in

said memory means for delayed transmission to said transmission means, said control means controlling the operation of said apparatus.

Preferably the apparatus also includes a display means display means for displaying either in real time or from the memory means the blood pressure data
5 which is acquired.

Preferably the transducer means converts the data into signals which are sent to a speaker output as audio signals which are preferably transmitted over a telephone network to a remote receiving station which decodes and analyses the received audio signals.

10 In other preferred forms of the invention, the apparatus also comprises other physiological sensors such as ECG, SAO2, temperature, etc and corresponding signal acquisition and amplifying means.

In such forms, the apparatus uses the control means, transducer means and output means to transmit the corresponding data to a remote location via the
15 telephone network.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be now be described with reference to the accompanying drawings in which:

Fig. 1 is a schematic block diagram of the apparatus of the present invention.

20

BEST MODE OF CARRYING OUT THE INVENTION

A blood pressure monitoring apparatus 10 is illustrated in the drawing. The apparatus 10 includes a blood pressure monitor 11 which has a blood pressure sensor cuff (not illustrated) connected thereto and a transtelephonic controller 12. The monitor 11 uses the auto-inflate cuff to record blood pressure from the upper

arm, wrist or finger of the patient, where the data is received by a blood pressure transducer 13 contained within the monitor 11.

The pressure transducer 13 is connected to a microprocessor 14 which receives signals from the transducer 13, analyzes the received data and displays measured blood pressure on a display 15. A power supply 16 supplies power to the microprocessor 14 and the display 15.

The blood pressure monitor 11 is activated by a pushbutton 17 "START". The monitor 11 calibrates itself and starts measurement routines. A signal 18 which is acquired is pulled high at this stage and held high by the microprocessor 14 until measurement is complete. After completion of the measurement, the monitor 11 displays the results on the display 15 and outputs measured values via a serial interface comprised of two signals; signal 19 being a serial clock output and signal 20 being a serial data output. Protocol of the transmission is compatible with well known Serial Peripheral Interface (SPI).

Transtelephonic functionality is implemented by the transtelephonic controller 12 which is made up of a microcontroller 21, serial memory 22, pushbutton 23 and speaker 24. The transtelephonic controller 12 is connected to the monitor 11 by a connector 25.

The transtelephonic controller 12 is activated either by the acquired signal 18 from the monitor 11 for a new data recording or by the pushbutton 23 for data transmission, ie uploading. When the transtelephonic controller 12 is activated by the signal 18, it waits for serial clock signal 19 and serial data output signal 20. Five bytes are transmitted by the microprocessor 14 to the transtelephonic controller 12 via SPI signals 19 and 20 and recorded into memory 22. When the transtelephonic controller 12 is activated by the pushbutton 23, the transtelephonic controller 12 reads the recorded data from memory 23, converts the recorded data into corresponding audio tones and outputs frequency modulated data via the speaker 24 for acoustically coupled transmission of recording via a telephone network to a remote receiving station (not illustrated).

The remote receiving station preferably automatically decodes and analyses the frequency modulated audio signals and creates a report to a physician as required.

Technique of encoding and decoding of analogue and digital data can be implemented in different forms such as frequency or phase modulation, dual tone
5 multi-frequency etc.

The apparatus 10 also includes as preferable features, other physiological sensors 17 such as ECG, SAO2, temperature, etc, whereby the corresponding acquired signals are amplified and conditioned and supplied to the transtelephonic controller 12 for transmission to the remote receiving station.

- 10 The foregoing describes only one embodiment of the present invention, and modifications obvious to those skilled in the art can be made thereto without departing from the scope of the present invention.

CLAIMS

1. A transtelephonic blood pressure monitoring apparatus having a blood pressure monitor and a blood pressure sensor means, said monitor including a blood pressure acquisition and memory means, a control means, a transducer means
5 and output means, wherein said blood pressure acquisition and memory means receives blood pressure data from said sensor means and either sends said blood pressure data in real time to said transducer means which converts data into transmission signals to said output means or stores said blood pressure data in said memory means for delayed transmission to said transmission means, said
10 control means controlling the operation of said apparatus.
2. The transtelephonic blood pressure monitoring apparatus according to claim 1 wherein the apparatus also includes a display means display means for displaying either in real time or from the memory means the blood pressure data which is acquired.
- 15 3. The transtelephonic blood pressure monitoring apparatus according to claim 1 wherein means converts the data into signals which are sent to a speaker output as audio signals which are transmitted over a telephone network to a remote receiving station which decodes and analyses the received audio signals.
4. The transtelephonic blood pressure monitoring apparatus according to claim 1
20 wherein the apparatus also comprises other physiological sensors such as ECG, SAO2, temperature, etc and corresponding signal acquisition and amplifying means.
5. The transtelephonic blood pressure monitoring apparatus according to claim 1 wherein the apparatus uses the control means, transducer means and output
25 means to transmit the corresponding data to a remote location via the telephone network.

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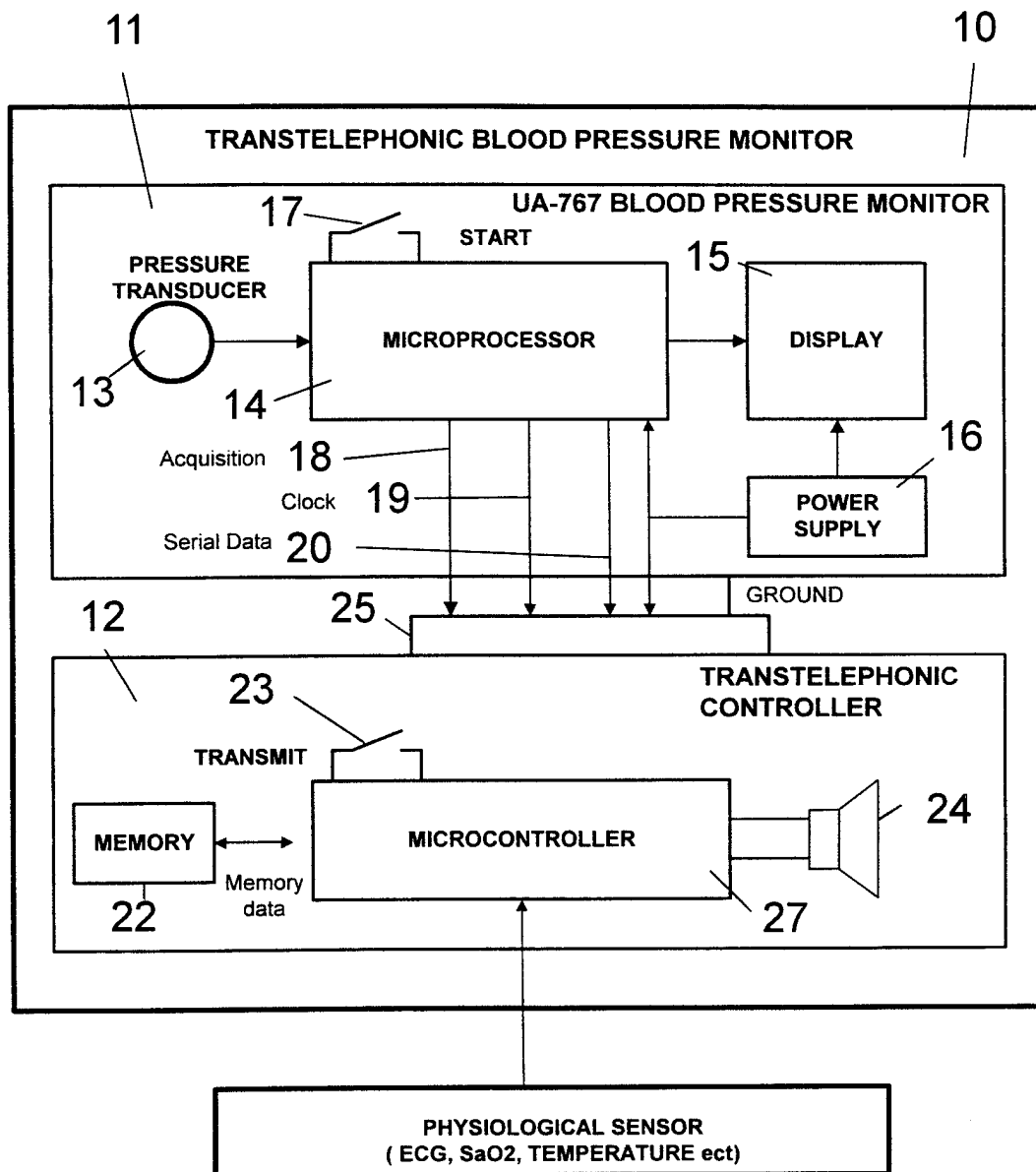


FIG. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01234

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: A61B 5/021

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61B 5/- G08C

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

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

DERWENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/28736 A (NOKIA MOBILE PHONES LTD.) 14 August 1997 Page 4 lines 12 to 22 Page 10 lines 4 to 18	1 to 5
X	US 4608994 A (OZAWA et al.) 2 September 1986 Column 2 lines 53 to 66 Column 7 lines 50 to 53	1 to 5
X	US 5941829 A (SALTZSTEIN et al.) 24 August 1999 Column 5 lines 26 to 53 Column 13 line 64 to column 14 line 2	1 to 5

☒ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search

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Date of mailing of the international search report

13 DEC 2000

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

D. Melhuish
DAVID MELHUIHSH

Telephone No : (02) 6283 2426

INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5007429 A (TREATCH et al.) 16 April 1991 Column 1 line 48 to column 2 line 2	
A	US 5785650 A (AKASAKA et al.) 28 July 1998 Whole document	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01234

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member				
US 4608994					
WO 97/28736	AU 17266/97	EP 959755	FI 960636	US 5772586	
US 5941829	US 5704364				
US 5007429					
US 5785650	EP 761160	JP 9047436			
					END OF ANNEX

专利名称(译)	Transtelephonic血压计		
公开(公告)号	EP1229827A1	公开(公告)日	2002-08-14
申请号	EP2000969096	申请日	2000-10-11
[标]申请(专利权)人(译)	SHELL ALLAN MICHAEL PLATT HARRY LOUIS JANKOV VLADIMIR		
申请(专利权)人(译)	SHELL , ALLAN MICHAEL 普拉特HARRY LOUIS JANKOV , VLADIMIR		
当前申请(专利权)人(译)	SHELL , ALLAN MICHAEL 普拉特HARRY LOUIS JANKOV , VLADIMIR		
[标]发明人	PLATT HARRY LOUIS JANKOV VLADIMIR		
发明人	PLATT, HARRY, LOUIS JANKOV, VLADIMIR		
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优先权	1999PQ3344 1999-10-11 AU		
外部链接	Espacenet		

摘要(译)

一种具有血压监测器 (11) 和血压传感器的经弦电话血压监测装置 (10)。装置 (10) 包括血压采集和存储器 (22)，控制器 (27)，换能器和输出 (24)，其中血压采集和存储器 (22) 从传感器接收血压数据并且发送血压数据实时地传递给控制器 (12)，控制器 (12) 将数据转换成传输信号到输出或将血压数据存储在存储器 (22) 中以延迟传输到传输装置，控制器控制装置的操作 (10)。