PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G07C 5/08 — A1

(11) International Publication Number: **WO 96/31846**

(43) International Publication Date: 10 October 1996 (10.10.96)

(21) International Application Number: PCT/GB96/00825

(22) International Filing Date: 3 April 1996 (03.04.96)

(30) Priority Data:
9507155.1 6 April 1995 (06.04.95) GB

(71) Applicant *(for all designated States except US)*: IMMOBILISER UK LIMITED [GB/GB]; Shenley Hall, Rectory Lane, Shenley, Radlett, Hertfordshire WD7 9AN (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: SHIELD, John, Leslie [GB/GB]; 8 Dadsley Road, Tickhill, Doncaster DN11 9JS (GB). THOMPSON, David, John [GB/GB]; Havera Bank West, Howgill Lane, Sedburgh, Cumbria LA10 5HB (GB).

(74) Agent: KELVIE, George, T.; Urquhart-Dykes & Lord, Northern Assurance Buildings, 3rd floor, The Victoria Suite, Albert Square, Manchester M2 4DN (GB).

(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

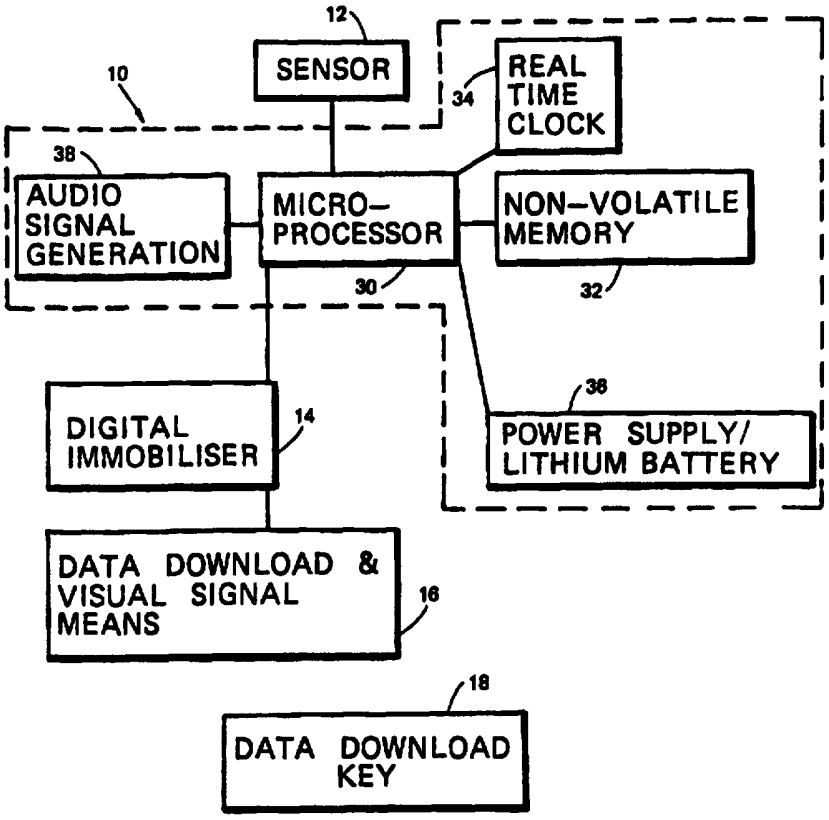
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: JOURNEY RECORDING SYSTEM FOR A VEHICLE

(57) Abstract

Sensor means (12) senses journey data and delivers it to a first microprocessor (30) to which a real time clock (34), a first, non-volatile, digital memory (32) and a power supply (36) are connected. The sensed data is then stored in the first memory (32) along with a record of the effective time and date thereof. The microprocessor (30) is also connected to a data download head (16) bearing electrical contacts. The system also comprises a separate key device (18) incorporating a second microprocessor and a second memory. Data in the first memory (32) can be transferred to the key device (18) by touching said device against the contacts of the head (16), and said data can be further transferred to a remote computer by similarly holding said key device (18) against corresponding electrical contacts provided on the computer or on a secondary head connected thereto. Optionally, the first microprocessor (30) is connected to the data download head (16) by way of an immobiliser device (14) which is connectable to the ignition system of the vehicle and serves to cut the electrical connection thereof whenever the vehicle is left by the owner or authorised driver.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	**GB**	United Kingdom	**MW**	Malawi
AT	Austria	**GE**	Georgia	**MX**	Mexico
AU	Australia	**GN**	Guinea	**NE**	Niger
BB	Barbados	**GR**	Greece	**NL**	Netherlands
BE	Belgium	**HU**	Hungary	**NO**	Norway
BF	Burkina Faso	**IE**	Ireland	**NZ**	New Zealand
BG	Bulgaria	**IT**	Italy	**PL**	Poland
BJ	Benin	**JP**	Japan	**PT**	Portugal
BR	Brazil	**KE**	Kenya	**RO**	Romania
BY	Belarus	**KG**	Kyrgystan	**RU**	Russian Federation
CA	Canada	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CF	Central African Republic			**SE**	Sweden
CG	Congo	**KR**	Republic of Korea	**SG**	Singapore
CH	Switzerland	**KZ**	Kazakhstan	**SI**	Slovenia
CI	Côte d'Ivoire	**LI**	Liechtenstein	**SK**	Slovakia
CM	Cameroon	**LK**	Sri Lanka	**SN**	Senegal
CN	China	**LR**	Liberia	**SZ**	Swaziland
CS	Czechoslovakia	**LT**	Lithuania	**TD**	Chad
CZ	Czech Republic	**LU**	Luxembourg	**TG**	Togo
DE	Germany	**LV**	Latvia	**TJ**	Tajikistan
DK	Denmark	**MC**	Monaco	**TT**	Trinidad and Tobago
EE	Estonia	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**UG**	Uganda
FI	Finland	**ML**	Mali	**US**	United States of America
FR	France	**MN**	Mongolia	**UZ**	Uzbekistan
GA	Gabon	**MR**	Mauritania	**VN**	Viet Nam

JOURNEY RECORDING SYSTEM FOR A VEHICLE

This invention concerns an electronic journey recording system for a vehicle.

Conventional journey recording in heavy goods vehicles is by way of a tachograph, linked to the speedometer and mileometer of the vehicle and providing a permanent record on card or paper of the distances travelled over a fixed period of time.

An object of the present invention is to provide a simple yet reliable journey recording system, suitable for use in any vehicle from small cars, to large commercial vehicles and even earth movers, which makes use of modern electronic means and therefore does not involve the manual insertion and removal of tachograph discs, nor any hard copy storage of data within the vehicle.

The invention provides a vehicle journey recording system comprising sensor means sensing and delivering journey data to a first microprocessor to which a real time clock, a first, non-volatile, digital memory and a power supply are connected, the sensed data then being stored in the first memory along with a record of the effective time and date thereof, the

microprocessor also being connected to a data download head bearing electrical contacts, and the system also comprising a separate key device incorporating a second microprocessor and a second memory whereby the data in the first memory can be transferred to the key device by touching said device against the contacts of the head, and said data can be further transferred to a remote computer by similarly holding said key device against corresponding electrical contacts provided on the computer or on a secondary head connected thereto.

In a particularly advantageous embodiment of the invention the microprocessor is connected to the data download head by way of an immobiliser, which is a device, already commercially available from the applicants, which is connectable to the ignition system of a vehicle and serves to cut the electrical connection thereof whenever the vehicle is left by the owner or authorised driver.

The vehicle is effectively immobilised and cannot be started up and driven off by unauthorised personnel. The immobiliser incorporates a microprocessor and is connected to a contact head which is usually mounted on the vehicle dashboard. The immobiliser is released, that is to say, the cut-out of the electrical circuit is de-activated, when its microprocessor recognises a predetermined unique digital identification code. This code is input to it by a key device incorporating a memory and a microprocessor (similar to the key device which

is part of the journey logging system of the present invention) being touched against the contact head. Thus, whenever the owner or authorised driver enters the vehicle he or she must release the immobiliser by means of the uniquely coded device in the manner just explained, before turning on the ignition. When such an immobiliser is included as an adjunct to the journey recording system, the contact head of the immobiliser functions also as the data download head of the logging system and the key devices of both the immobiliser and the logging system can effectively communicate with the respective microprocessors of the immobiliser and the logging system by way of this head. In the case of the immobiliser the key device inputs its unique identification code, whilst in the case of the logging system the key device firstly inputs its identification code and upon recognition of same by the first microprocessor of the system, it receives the journey data stored in the first memory of the system.

The data download head preferably also includes means for giving visual signals. In this respect an audible signal, such as a bleep, and/or a visible signal, such as illumination of an LED or small lamp, may be given when the identification code is recognised upon key contact. The audible signal, if provided for, is generated by separate means connected to the first microprocessor, whilst the LED or lamp is incorporated in the contact head. One or both such signals may also be used to indicate completion of transfer of the journey data

from the first microprocessor to the key device. Another purpose of such signals is to indicate to the vehicle driver whenever the first memory is approaching a state of being completely filled up with journey data, necessitating download of the data via the key device if the earlier data is not to be lost, by being recorded over as logging continues.

The power supply is suitably in the form of a lithium battery, having an effective life of between one and three years.

The sensor means is preferably a magnetic shock sensor which should be mounted to any convenient part of the vehicle chassis. This will sense all vibrations of the vehicle associated with its motion and effectively indicates the period when the vehicle is in motion, which period is then logged in the digital memory by interaction with the clock data.

Alternatively the sensor means may comprise a counter device linked into the connection between the speedometer and mileometer of the vehicle to log the distance covered by the vehicle. Such sensor means may be provided in addition to the aforesaid motion detecting sensor, in which case an additional non-volatile memory store would need to be provided and linked in series with the first non-volatile memory to connect to the first microprocessor.

Another alternative would be for the sensor means to comprise a microwave device mounted at the front of the vehicle to monitor the distance of said vehicle from the rear of any preceding vehicle. Again, this could be provided in addition to the vibration sensor and/or the distance sensor, and would require a separate non-volatile memory linked through the microprocessor to the data download head.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Fig 1 is a block diagram of an exemplary system in accordance with the invention;

Fig 2 is an enlarged perspective view of the data download head of the preferred system;

Fig 3 is an enlarged perspective view of the key device of the preferred system; and

Fig 4 is a circuit diagram of the unit constituting the system of the invention, excepting for the separate key device.

Referring to Figs 1 to 3, the apparatus required for the preferred system of the invention comprises an enclosed unit, indicated at 10 in Fig 1, which may be mounted in any suitable concealed position within a vehicle being fitted with the

system, a magnetic shock sensor 12, which is mounted at any convenient position on the vehicle chassis, an immobiliser unit 14, also mounted at a concealed position in the vehicle, generally behind the dashboard, a data download head 16, which is mounted in the dashboard, and a data download key 18. The head 16 is shown in Fig 2. It includes electrical contacts 24, 26 and a light emitting diode (LED) 28. The key 18 is shown in Fig 3. It consists of a small disc-shaped metal housing 20 mounted on a tapering plastics base 22. The key 18 is a separate component, that is to say it is not connected to the remainder of the system apparatus. The key housing 20 encloses a microprocessor and a memory. Such an item is commercially available, for example from Dallas Inc of Texas, USA.

Within the unit 10, as indicated in Fig 1, there is a microprocessor 30, a 64K non-volatile digital memory 32, a real-time clock 34, a lithium battery 36, and means 38 for audio signal generation. As shown, the components 32 to 38 are all electrically connected to the microprocessor 30. The external shock sensor 12 and the immobiliser unit 14 are also electrically connected to the microprocessor 30. And the data download head 16 is connected to the microprocessor 30 by way of the immobiliser unit 14.

The immobiliser unit 14 is an optional part of the system. It includes a microprocessor and in operation it is connected to

the ignition system of the vehicle with a facility to cut the electrical circuit of the ignition system, or to cut its connection to its power supply (battery) whenever the engine is switched off. The circuit connection or power supply is re-established only by the inputting of a predetermined identification code by means of a key device.

The immobiliser key device is not shown, but it is identical in its external appearance to the key device of the journey logging system, which is shown in Fig 3.. An authorised driver who possesses the necessary key device carrying the unique immobiliser code inputs said code to the unit 14 simply by touching the housing (as 20) of the key device to the electrical contacts 24, 26 of the data download head 16.

Turning now to the journey recording system itself, the unit 10 records when the vehicle is in authentic use, ie when it is in motion. The clock 34 is used by the microprocessor 30, in conjunction with the information from the magnetic shock sensor 12, to record in the memory 32 the date and time of each start and stop of the vehicle. In this respect, the sensor 12 detects vibration and transmits an electrical impulse to the microprocessor 30 whenever a vibration occurs. Whenever the vehicle is travelling all minor irregularities in the road surface give rise to pulses, and, on average, about 20 pulses will occur within a distance of 10m or so. The microprocessor 30 counts the pulses. A "start" is recorded in

the memory 32 only when an excess of 25 pulses has been counted. This ensures that only a genuine start up of the vehicle is recorded. A "stop" is recorded in the memory 32 only when there have been no pulses for a period of over 3 minutes, the time of the "stop" event then being back dated to 3 minutes before either by the microprocessor 30 or in the ultimate software, depending on the set up of the system. This ensures that short idle spells, for example while the vehicle stands in a traffic jam, are not recorded as "stops". In this respect, virtually any motion of the vehicle will give rise to sensor pulses and it is extremely unlikely, even in a severe jam, that no motion at all will occur in a 3 minute period. In this way, the recording of spurious stops and starts is reduced to a minimum.

The digital memory 32 is capable of storing up to 4,000 events, an event, as mentioned, being a start or stop, as well as a change of date. Assuming about ten journeys per day, this allows for over 200 days of storage. At the time when only a further 50 events can be recorded, whenever the vehicle ignition is switched on the microprocessor 30 will cause generation of an audible series of tones by the audio means 38. These will continue until the ignition is switched off. Obviously, the tone is intended to indicate to the driver that the memory 32 is almost full and that it is time to download the journey data stored therein. If this is not done, when the memory 32 is completely full new data starts to be

recorded over the oldest, so the oldest data is lost in the "wrap-around" process.

Downloading of data is accomplished very simply by the driver touching the disc 20 of the key 18 to the contacts 24, 26 of the download head 16, so as to complete the circuit, for only a few seconds. The vehicle ignition must be switched on to enable downloading to take place. Firstly, a unique identification code is transferred from the key 18 to the logging unit 10. Once this is recognised by the microprocessor 30, an audio visual signal is given (by means 38 and 28) and copying of data from the memory 32 to the memory in the housing 20 takes place. Upon completion of the transfer, ie the copying operation, a further audio visual signal is given.

Once the data has been downloaded to the key 18, the pulse counter in the microprocessor 30 is automatically re-set to zero and the audio tone indicative of a nearly-full memory (if it was being emitted) is cancelled. Data recording can then continue and go on over the previously recorded data, which has been downloaded.

The key 18 can be used over and over again, and, of course, the unit 10, along with the sensor 12 and download head 16 will function indefinitely, provided the battery 36 is replaced or recharged, as necessary. The use of a 180 mAH

lithium cell, which gives a life of 3 years, is recommended, but alternatives are, of course, possible. A battery having a life of at least 12 months, is, however, preferred.

Although the data in the memory 32 can be copied to more than one key 18, only keys which carry the relevant unique identification code will be able to extract the data, so the system is secure.

After the data has been copied onto the key 18, the information should be further copied (down loaded) to a personal computer (pc) provided with software in the form of the necessary data retrieval package. This data transfer will be accomplished in the same way simply by holding the key disc 20 against contacts on a data head of the pc.

Fig 4, as mentioned, is a circuit diagram of the system which operates as described above, but without the inclusion of the immobiliser unit, and the key 18 is not shown, being, as it is, a separate item.

Variations in the system are possible, particularly in the form of sensor and the type of information logged, as mentioned in the introduction hereto.

Claims

1. A vehicle journey recording system comprising sensor means sensing and delivering journey data to a first microprocessor to which a real time clock, a first, non-volatile, digital memory and a power supply are connected, the sensed data then being stored in the first memory along with a record of the effective time and date thereof, the microprocessor also being connected to a data download head bearing electrical contacts, and the system also comprising a separate key device incorporating a second microprocessor and a second memory whereby the data in the first memory can be transferred to the key device by touching said device against the contacts of the head, and said data can be further transferred to a remote computer by similarly holding said key device against corresponding electrical contacts provided on the computer or on a secondary head connected thereto.

2. A system as claimed in claim 1 wherein the first microprocessor is connected to the data download head by way of an immobiliser device which is connectable to the ignition system of the vehicle and serves to cut the electrical connection thereof whenever the vehicle is left by the owner or authorised driver.

3. A system as claimed in claim 1 or 2 wherein the key device firstly inputs its identification code and upon recognition of same by the first microprocessor of the system, it receives the journey data stored in the first memory of the system.

4. A system as claimed in any preceding claim wherein the data download head also includes means for giving a visual signal.

5. A system as claimed in any preceding claim further including means for generating an audible signal.

6. A system as claimed in claim 4 or 5 wherein an audible and/or visual signal is given wherever the first memory is approaching a state of being completely filled up with journey data.

7. A system as claimed in any preceding claim wherein the power supply is in the form of a lithium battery.

8. A system as claimed in any preceding claim wherein the sensor means comprises a magnetic shock sensor which, in use, is mounted to the vehicle chassis to sense vibrations of the vehicle associated with its motion.

9. A system as claimed in any preceding claim which the sensor means comprises a counter device linked into the connection between the speedometer and mileometer of the vehicle to log the distance covered by the vehicle.

10. A system as claimed in any preceding claim wherein the sensor means comprises a microwave device mounted at the front of the vehicle to monitor the distance of said vehicle from the rear of any preceding vehicle.

11. A vehicle journey recording system substantially as hereinbefore described with reference to the accompanying drawings.

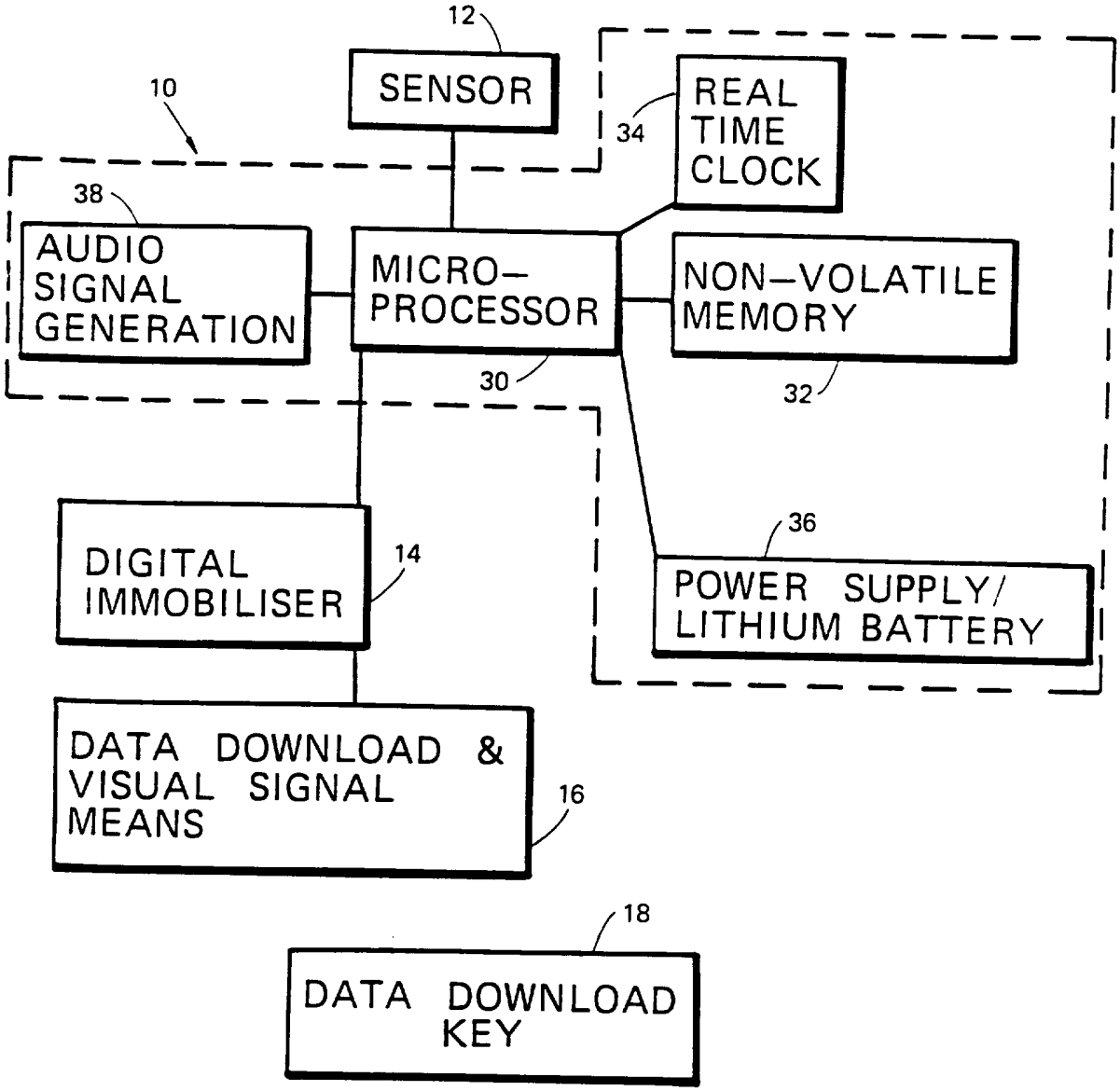

12
SENSOR
10
34
REAL TIME CLOCK
38
AUDIO SIGNAL GENERATION
MICRO–PROCESSOR
NON–VOLATILE MEMORY
30
32
36
DIGITAL IMMOBILISER
14
POWER SUPPLY/ LITHIUM BATTERY
DATA DOWNLOAD & VISUAL SIGNAL MEANS
16
18
DATA DOWNLOAD KEY

FIG. 1

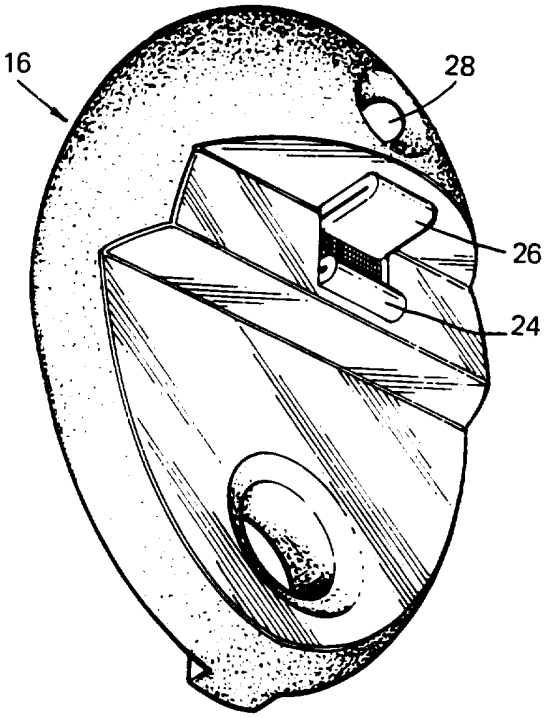


FIG. 2

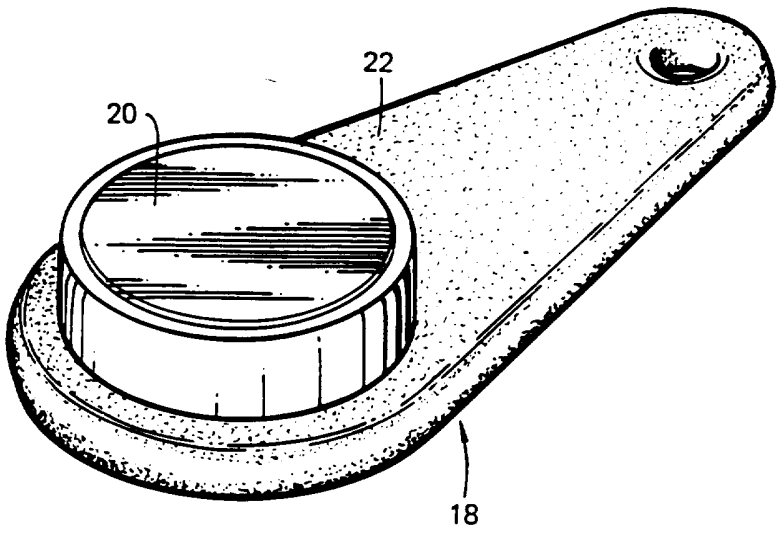


FIG. 3

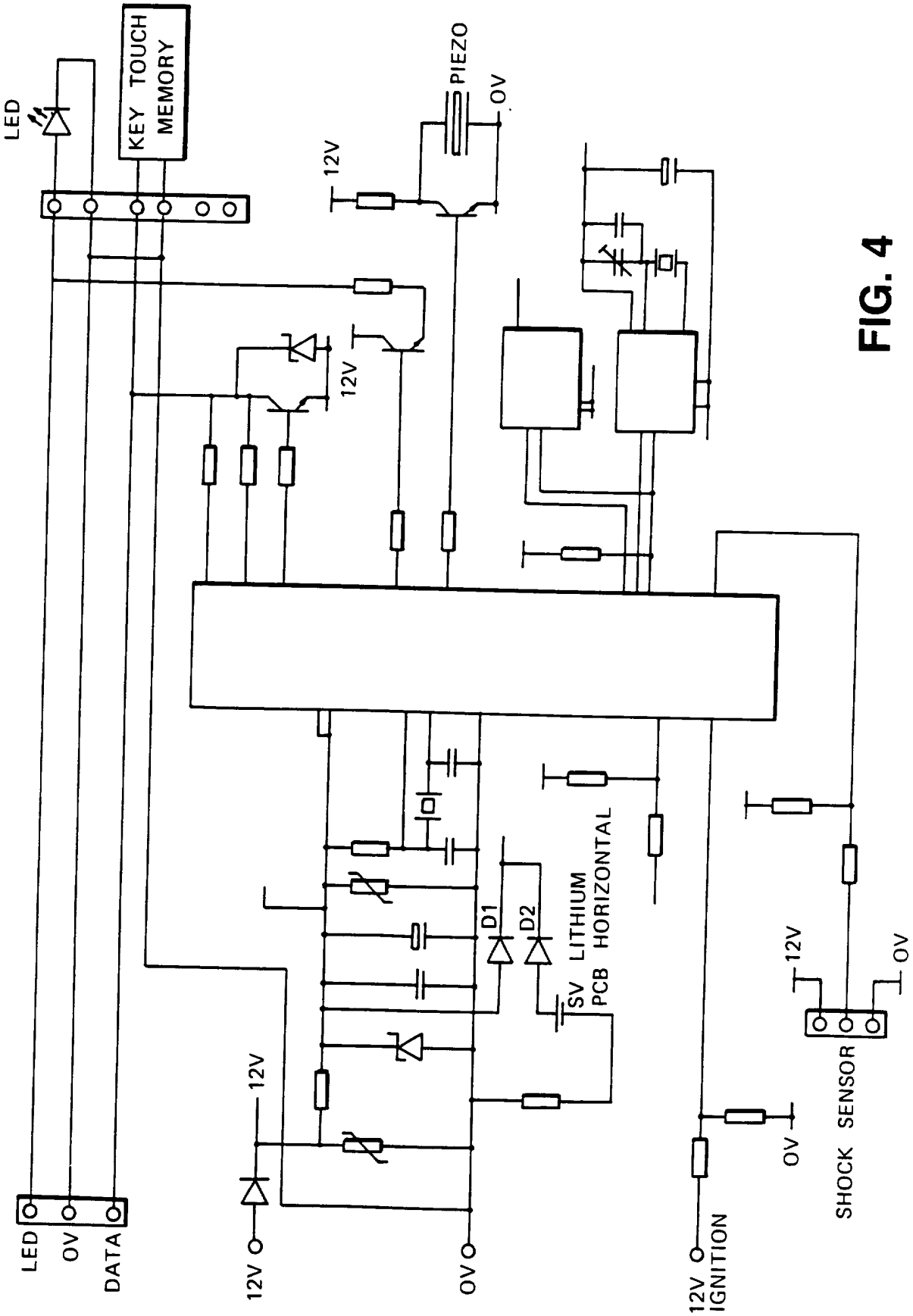

LED
KEY TOUCH MEMORY
PIEZO
0V
12V
12V
D1
D2
5V LITHIUM
PCB HORIZONTAL
12V
0V
SHOCK SENSOR
LED
0V
DATA
12V
0V
12V
IGNITION

FIG. 4

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/GB 96/00825

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G07C5/08

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)
IPC 6 G07C

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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 629 978 (TRANSPORTATION RECORDING SYSTEMS) 21 December 1994 see column 3, line 22 - column 6, line 39; figures ---	1-5,9,11
X	EP,A,0 172 553 (CATERPILLAR MITSUBISHI LTD ;MITSUBISHI HEAVY IND LTD (JP)) 26 February 1986 see page 8, line 20 - page 10, line 21 see page 14, line 23 - page 18, line 23; figures ---	1,9,11
Y	FR,A,2 503 425 (BARBIER JACQUES) 8 October 1982 see page 2, line 1 - page 3, line 1; claims; figures --- -/--	1-6,9,11

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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 document 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

Date of the actual completion of the international search	Date of mailing of the international search report
13 August 1996	27. 08. 96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Meyl, D

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inte· onal Application No
PCT/GB 96/00825

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO,A,94 25936 (LAPREVOTTE JIM ;PARIENTI RAOUL (FR)) 10 November 1994 see page 3, line 11 - page 10, line 26; figures	1-11
Y	FR,A,2 590 027 (TEDOLDI RAPHAEL) 15 May 1987 see page 1, line 23 - page 3, line 34; figure	7
Y	CH,A,679 811 (THOMAS KALLWEIT) 15 April 1992 see column 1, line 61 - column 3, line 20; figure	8
Y	GB,A,1 245 871 (MICRO-ELECTRONICS INTERNATIONAL) 8 September 1971 see page 1, column 1, line 11 - page 2, column 2, line 59; figures	10
A	FR,A,2 612 319 (POLLEN INF) 16 September 1988 see page 2, line 7 - page 8, line 6; figures	1-4,6,9, 11
A	EP,A,0 378 945 (RENAULT) 25 July 1990 see abstract; claims; figures see column 2, line 2 - column 3, line 45	1-3,9,11

2

INTERNATIONAL SEARCH REPORT

nformation on patent family members

Inte onal Application No
PCT/GB 96/00825

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0629978	21-12-94	AU-B-	6961694	20-12-94
		CA-A-	2164301	08-12-94
		WO-A-	9428518	08-12-94
EP-A-0172553	26-02-86	JP-C-	1718463	14-12-92
		JP-B-	3079745	19-12-91
		JP-A-	61075490	17-04-86
		JP-C-	1437417	25-04-88
		JP-A-	61086888	02-05-86
		JP-B-	62045586	28-09-87
		CA-A-	1252208	04-04-89
		US-A-	4757454	12-07-88
		CA-A-	1259702	19-09-89
		EP-A-	0177020	09-04-86
FR-A-2503425	08-10-82	NONE		
WO-A-9425936	10-11-94	FR-A-	2704670	04-11-94
FR-A-2590027	15-05-87	NONE		
CH-A-679811	15-04-92	NONE		
GB-A-1245871	08-09-71	AU-A-	5326169	15-10-70
		DE-A-	1917606	05-11-70
FR-A-2612319	16-09-88	NONE		
EP-A-0378945	25-07-90	FR-A-	2640559	22-06-90