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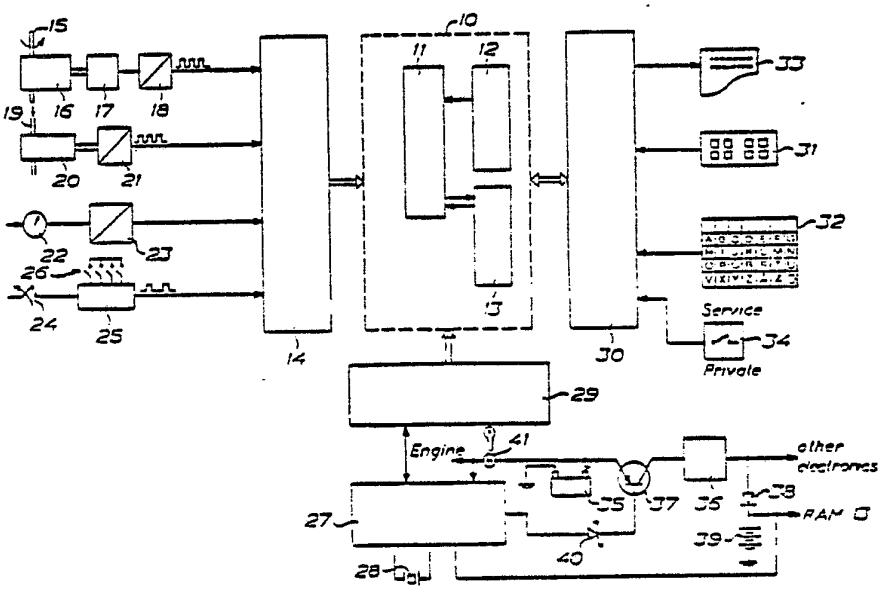

(57) Abstract

A computer system for vehicles for calculating and indicating various operating values. Connected to a central processing unit (11) are pick-offs (16, 20, 22, 24) for sensing operating quantities, and a clock circuit (27) for giving the time. Further connected to the central processing unit are on the one hand a permanent read only memory (12) for the calculating functions of the central processing unit, and on the other hand a random access memory (13) and an alphanumeric printer (33). An alphanumeric keyboard (32) is connected to the central processing unit to program the random access memory and for manually controlled typing on the printer.

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COMPUTOR SYSTEM FOR VEHICLES

The invention relates to a computor system for vehicles comprising a programmed central unit, pick-offs for sensing operating quantities and supplying signals to the central processing unit, a clock circuit connected to the central processing unit, means for supplying control signals to the central processing unit and means for presentation of the functional values calculated in the central processing unit.

With such a computor system in the vehicle, the driver of the vehicle can continuously obtain information on such functional values as average speed, petrol consumption at a certain moment, the amount of fuel in the tank, the distance covered, the remaining distance to a certain destination, arrival time at the destination, etc. With this computor system, it is also possible to obtain information about how far it is to a certain turning, notification of when it is time for maintenance to the vehicle, information about position and much more which may be of interest to the driver or the owner of the vehicle.

In known embodiments of a computor system for vehicles, the function of interest is selected by means of a key set and the result is read off in a display which comprises a screen with light-emitting diodes. The computor systems are adapted to meet the need of the driver or owner of the vehicle for information, instructions being given to the computor system by selecting from the key set one or the other of a number of fixed instruction lists (programs), depending on which functional value it is desired to have information about. In order to be able to keep a diary of how the vehicle is used, with the aid of a computor system for vehicles of known construction, which is desirable if not to say necessary where official cars are concerned, which must be regarded as mobile work

places, the flow of information from the known computor systems accordingly must be supplemented by manual routines, such as noting down the functional values shown on the display and information related thereto which is not obtained from the computor systems. These manual routines which may thus be required in order that the information document may be complete, are elaborate and tiresome.

There is therefore a need to be able to obtain from the computor system documented information which can be accepted by companies and/or authorities in connection with accounting and providing information of different kinds, for example for invoicing, to give proof of the distance travelled in connection with taxation, or to indicate the distance paid for where it is a question of taxis and contract cars, and to be able to combine this information with outside documented information, for example information about various destinations and different types of run.

The object of the invention is to simplify the administrative routines for recording the use of the vehicle by providing a computor system for vehicles of the kind referred to above, which automatically and in a certain co-operation with the driver permits recording of important data regarding the use of the car on the basis not only of information from the computor system but also information which is introduced from the outside by the driver, as a result of which the computor system acquires the character of what could be called an "auto-journal" and constitutes an aid to administration of the driving.

For this purpose, the computor system according to the invention has obtained the characteristics appearing from claim 1.

To elucidate the invention, one embodiment thereof

will be described in detail below with reference to the accompanying drawings in which

FIG. 1 is a perspective view of the driver's seat in a vehicle with the computor system according to the invention mounted therein,

FIG. 2 is a block diagram, partially a circuit diagram, of the computor system, and

FIG. 3 is a view of a portion of a tape which is obtained from the computor system.

According to FIG. 1, the computor system comprises a loose control unit A which is connected by means of a cable B to a micro-processor which can be mounted behind the dashboard of the vehicle or at another suitable place therein. The computor system further comprises a unit C which contains a printer and which is likewise coupled to the micro-processor in a manner not shown in detail. On the dashboard there is a holder D on which the unit A can be placed when it is not being used for programming of the computor system.

With reference to FIG. 2, the micro-processor 10 comprises a central processing unit (CPU) 11, a read only memory (ROM) 12 and a random access memory (RAM) 13. A plurality of pick-offs are connected to the computor via interfaces 14. For the supply of signals which represent the actual speed of the vehicle, there is mounted on the conventional speed wire 15, extending from the gearbox to the conventional speedometer of the vehicle, a so-called T-gear 16 which is connected via an adaptation gear 17 to a photo-electric pick-off 18 which, depending on the rotation of the speed wire, delivers a number of pulses per time unit in proportion to the rotational speed of the wire. These pulses are supplied to the computor 10 via the interfaces 14 as input signals which are representative of the speed of the vehicle.

Connected into the pipe between the fuel tank of

the vehicle and the engine of the vehicle - this pipe is indicated at 19 in the drawing - is a flow rate meter 20 which can be of the mechanical type, for example of the type which has screws which are rotated by the liquid (the fuel) flowing through. This flow rate meter drives a photo-electric pick-off 21 which delivers pulses in proportion to the flow rate measured, and these pulses are also delivered via the interfaces 14 to the computor as a signal which is proportional to the fuel flow rate.

The photo-electric pick-offs 18 and 21 may be of the type which comprises a perforated disc which is rotated and periodically lets through light pulses from a light source to a light-sensitive element in which the light pulse is converted into an electric pulse.

A third pick-off comprises a level indicator 22 in the fuel tank. This pick-off can be of the same type as is used to control the fuel gauge on the dashboard of the vehicle, that is a pick-off which delivers a voltage in proportion to how high the fuel level is in the tank. The voltage is supplied to a converter 23 which converts the voltage signal into a frequency signal which is supplied to the computor 10 via the interfaces 14.

Finally, in the drawing, there is shown a pick-off 24 which is assumed to be dependent on the engine speed. This pick-off may, for example, be adapted to deliver a pulse each time an ignition spark is produced in a cylinder in the engine and it can thus be driven directly or indirectly by the breaker of the ignition system. The pulses from the pick-off 24 are supplied to a counter 25 which delivers a pulse each time ignition has occurred in all cylinders of the engine, that is one pulse after four input pulses, if the engine is a four-cylinder engine, and one pulse after six input pulses if the engine is a six-cylinder engine, and so on. The output pulses are supplied to the computor 10 via the interfaces 14. In the

drawing, it is indicated diagrammatically, by means of a number of switches 26, that the counter 25 may be adjustable for adaptation to engines with different numbers of cylinders.

The said pick-offs are adapted to supply the quantities which depend on the operation of the car, but the values which one is interested in obtaining in the majority of cases are related to time in one way or another. Therefore, the computor system also comprises a clock circuit 27 which can be of the same type as is used in TV sets with indication of time. The clock circuit is of the 24-hour type without a calender and is controlled by a quartz crystal 28. For reasons which will be explained further on, it should also be of the type which has a switch function, meaning that the clock circuit can switch on and off an electrical circuit and has its own memory which can be programmed with regard to the moments of time for switching on and off. The clock circuit is connected to the computor 10 via an interface 29.

Connected to the computor 10 via interfaces 30 is a display 31 which may comprise liquid crystals or light-emitting diodes or may consist of a fluorescent display and is disposed in the control unit A. Also connected to the computor system via this interface, however, is an alphanumeric keyboard 32 on the control unit as well as an alphanumeric printer 33, for example of the type which has a mosaic printing head for printing the various symbols, which is disposed in the unit C. In addition, in the present case, a change-over switch 34 is shown which is connected to the computor 10 via the interfaces 29 for switching over between "Service" and "Private". The operation of this change-over switch, to the extent that it is not clear already from the term, will be described in more detail below.

The whole system described must, of course, be

supplied with electrical power and this power supply must be effected from the battery of the vehicle. Since the computor system requires high power and would involve a heavy loading of the battery of the vehicle if it were constantly connected when the vehicle is standing still with the engine switched off (no charge), the power supply is arranged in a manner specific to the invention.

The battery of the vehicle, which is shown at 35, is usually a 12 V battery but the computor system on the other hand operates at a considerably lower voltage, usually 5 V. Therefore, a voltage transducer 36 is connected to the battery to reduce the battery voltage to 5 V, and this transducer is connected to the car battery via a transistor 37. From the transducer 36, all the electronics of the computor system are supplied directly except the random access memory 13 and the clock circuit 27 to which the power supply is provided from the car battery 35 and the transducer 36 not directly but via a rectifier 38 which connects the transducer to a rechargeable battery 39, for example a rechargeable closed battery of the NiCd type. The reason why the random access memory and the clock circuit are not supplied directly from the car battery is the following.

As mentioned above, the computor system as a whole requires high power and it would involve too great a load on the car battery if this system as a whole were constantly connected to the battery, that is both when the vehicle is in service and when it is standing still. On the other hand, it is not necessary for the computor system to be kept activated when the vehicle is standing still, except with regard to the clock circuit 27 and the random access memory 13, since the clock circuit cannot be allowed to stop, and since an interruption in the activation of the random access memory would mean that the information stored in the store would be erased.

The base of the transistor 36 is connected, via a zener diode 40, to a transistor in the clock circuit 27 and this transistor is controlled on the one hand by the clock circuit and on the other hand by the ignition lock 41 of the vehicle, which is operated by means of the usual ignition key to start the engine of the vehicle and is also connected to the clock circuit. When the ignition is switched off, the transistor in the clock circuit is non-conducting and then the transistor 37 is also non-conducting, which means that the transducer 36 receives no current from the battery 35 of the vehicle.

The transistor in the clock circuit will be conducting by the ignition being switched on, and then the transistor 37 also will be conducting as a result of which the computor system as a whole receives current from the battery 35 or the generator connected to the battery. This means that the electronics which are connected directly to the transducer 36 receive no power when the ignition is switched off, but the clock circuit 27 and the random access memory 13 on the other hand continue to be energized from the battery 39 charged by the engine when running. Thus, the clock circuit 27 continues to be kept operative when the ignition is switched off, and the information which is stored in the random access memory 13 will still be retained in the memory.

It is obvious, however, that the time during which the vehicle stands unused, that is to say the time during which the ignition lock is switched off, cannot be foreseen; it may vary from a few hours to several days. The rechargeable battery 39 naturally does not have such a large capacity that it can supply the clock circuit and the random access memory for any length of time without charging, and in order to ensure that this battery is charged regularly, the clock circuit is programmed to switch on the computor as a whole periodically, indepen-

dently of the ignition lock, by the transistor 37 being made conducting five minutes before the end of the 24th hour of every day. Then, the computor system is switched on for a certain time, for example five minutes, and during this time, the battery 39 is charged. This periodic energizing of the computor system is also used, however, for writing a new date into the random access memory 13, considering that the clock circuit has no calender. This is brought about as a result of the fact that the random access memory in dependence on a signal from the clock circuit, indicating the change-over from 23.59 to 00.00, writes the new date into the memory. In this manner, not only is continuity brought about in the operation of the clock circuit and the random access memory but also successive following up of the time despite the fact that the capacity of the clock circuit as such is limited to the 24-hour period.

When the vehicle is in operation, the calculation of the several functional quantities is effected in the central processing unit 11 in co-operation with the memory 12 which contains an instruction list (program) for the several functions which are required taking into consideration the particular vehicle in which the computor system is mounted. The calculation of the desired functional values is effected in dependence on the signals supplied by the pick-offs 16, 20, 22, and 24, the clock circuit 27 and the random access memory 13.

The memory 13 preferably is constructed as an easily exchanged module so that the program can be altered by changing this module without altering other elements in the computor system. The functional values which the computor is programmed for, can be selected to be indicated in the display by pressing down an appropriate key or appropriate keys on the keyboard 32 which should be of the type wherein there can be shifted between two

different states, meaning that each key corresponds to a certain symbol or relates to a certain predetermined function in the computor.

The functional quantities in question can be indicated continuously by the display and in addition, at a moment which can be determined by the read only memory 12 or by an instruction which is supplied manually from the keyboard 32, the value is typed on a tape 42 in the printer 33. On this tape, the functional values given by the computor can be combined with a text which is introduced on the keyboard and written out on the tape via the computor. Thus, for example, a certain addressee may be written on the tape by means of the keyboard and then functional values such as driving distance, cost, time and date can be recorded thereon from the computor system.

FIG. 3 shows an example of how the tape obtained may appear. It can be completed with various particulars about the purpose of the drive undertaken, which are introduced from the keyboard as illustrated at 44 and 45 in FIG. 3.

In other words there is the possibility of obtaining on the tape a continuous recording of important information regarding the drivings which are made with the vehicle. It is possible to store frequent addresses in the random access memory 13 so that the typing thereof is controlled by the computor, the desired address being selected by introducing a certain code on the keyboard. These functions lie within the scope of generally known computor techniques. What is important is that the administration of the computor system can be effected from the keyboard and that the recording on the tape in the printer comprises on the one hand information which is obtained by calculation in the computor, and on the other hand information which is introduced on the keyboard.

Thus, with the computor system according to the invention a simple but reliably verified account of the use of the vehicle is obtained, and this account can then be used as a basis for invoicing salary payment, car remuneration, tax accounting, etc.

Since the recording on the tape may originate from the keyboard as well as the pick-offs, it is important to make a mark on the tape to show which recording comes from the one or the other of these functional units. This can easily be brought about as a result of the fact that each line which is recorded in the printer as a result of signals from the pick-offs, including the clock circuit, is preceded by a predetermined symbol 43 which is included in the read only memory 12 and may be of any appearance if the recording is effected by means of a mosaic printing head or the like. Thus, the symbol does not need to be present in a printing unit but can be selected as desired for each unit by preprogramming of the memory 12. If the typing is effected from the keyboard, however, this symbol is lacking as at 44 and 45.

The purpose of the change-over switch 34 Service/Private, which is shown in the computor system described is to distinguish between driving which is done in service and that which is done privately. With the change-over switch in the position Private, no recording takes place by means of the printer since in itself it is of no interest what drivings are made privately, but on the other hand the distances covered during private driving are stored in the memory 13. When the change-over switch is in the position Service on the other hand, the printer is switched on and before each run the addressee to which the driving is to take place may be written on the tape manually from the keyboard. In the same manner as with private driving, the distance travelled is stored in the random access memory 13 but after the end of the driving

the distance travelled is recorded on the tape by means of the printer as a result of a control signal from the read only memory 12.

The tape obtained from the printer 33 is an excellent basis for paying out car remuneration to someone who is using his own car in service and for supplying information to the tax authorities if it is a question of a service car which is also used privately.

The computor system can easily be adapted to different requirements for recording the information which is of interest in the individual case and which is to form the basis for routines of different kinds. This is effected by inserting a memory module 12 with the instruction list required by the desired information.

The read only memory 12 can be programmed to effect, in dependence on the calender in the random access memory 13 controlled from the clock circuit, summation and recording of various accumulated values each day, month or year, indicating the date relevant to the value in question, for example for recording driving distance and fuel consumption for each month of the year.

The various building elements in the computor system may consist of commercially available standard units and have therefore not been described in detail with regard to construction thereof. It would lie within the knowledge of the man skilled in the art to select suitable building elements and to connect these as required to build up the computor system according to the invention on the basis of the description given above of the computor system, its operation and purpose.

CLAIMS

1. A computor system for vehicles, comprising a programmed central processing unit (11), pick-offs (16, 20, 22, 24) for sensing operating quantities and supplying signals to the central processing unit, a clock circuit (27) connected to the central processing unit, means (32, 34) for supplying control signals to the central processing unit, and means for presentation of the functional values calculated in the central processing unit, c h a r a c t e r i z e d in that for administering driving with the vehicle, there are connected to the central processing unit (11) on the one hand a permanent read only memory (12) for calculating functions of the central processing unit and on the other hand a random access memory (13) with a calender function controlled by the clock circuit, and that the micro-computor comprising the central processing unit, the read only memory and the random access memory, is connected over buffer circuits (30, 14) an alphanumeric keyboard (32) for supplying any information to the micro-computor and for controlling the operation thereof and an alphanumeric printer (33) for typing both information which has been processed in the micro--computor, and information which is supplied from the keyboard.

2. A computor system as claimed in claim 1, c h a r a c t e r i z e d in that a rechargeable battery which can be periodically connected to the battery (35) of the vehicle, is provided as a current source (39) for the random access memory (13) and the clock circuit (27).

3. A computor system as claimed in claim 1 or 2, c h a r a c t e r i z e d in that the printer (33) is of the type which has a mosaic printing head.

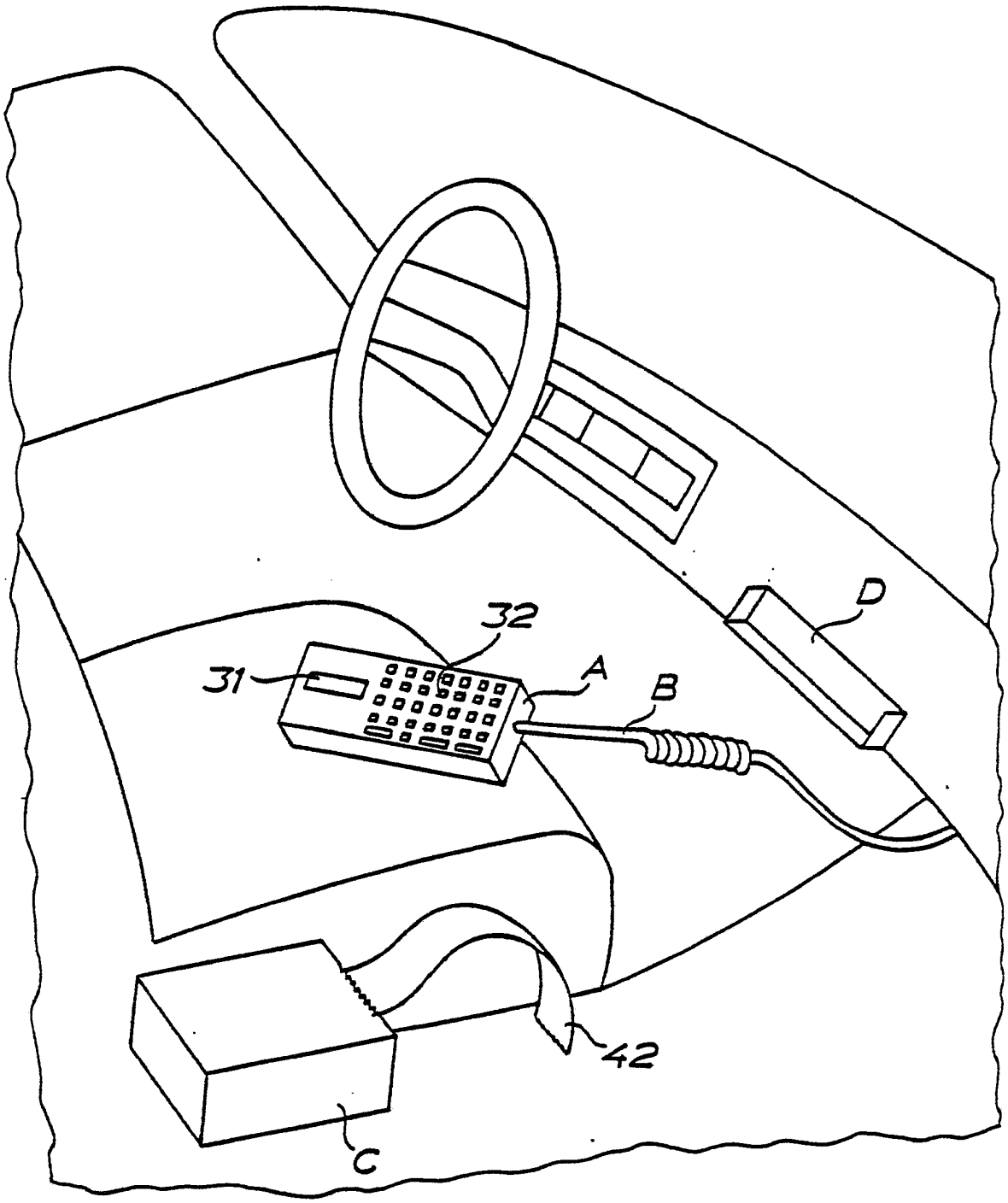

FIG. 1

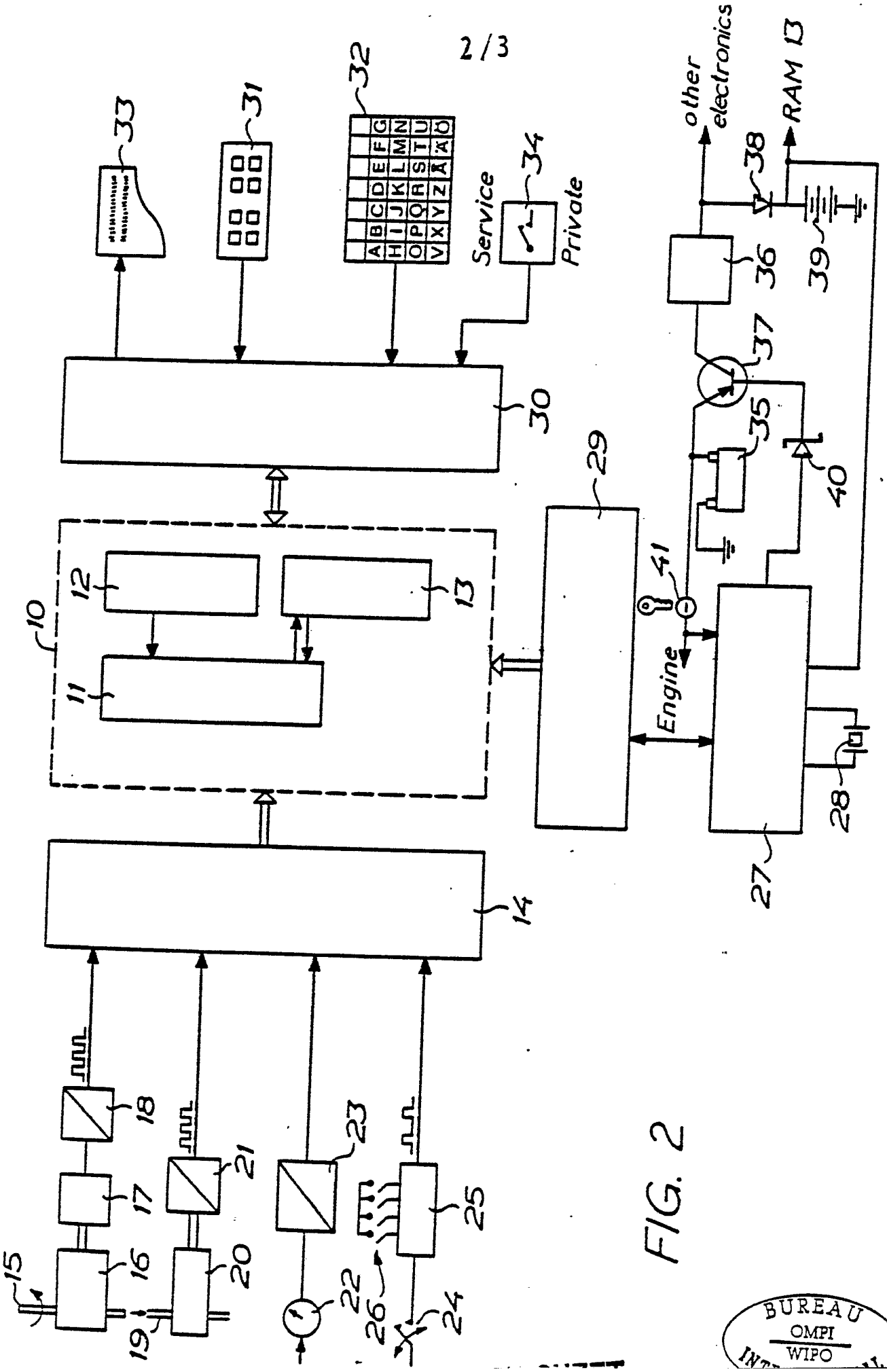

FIG. 2

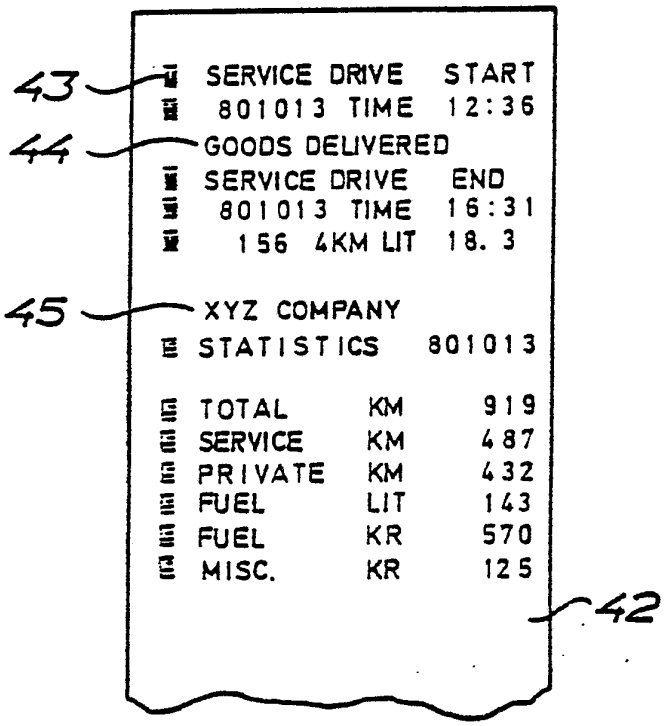

FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE81/00037

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [2]

According to International Patent Classification (IPC) or to both National Classification and IPC [3]

G 06 F 15/20, G 07 C 5/08

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC [3]	G 06 F 15/20, G 07 C 5/08, B 60 R 18/00, 02, 04
US Cl	364:424, 442, 467

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [15] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	Ny Teknik, No7, 1981, issued 12 February 1981, (Stockholm, Sweden) see page 22 "Skrivande bildator" (in Swedish).	1-3
A	DE, A1, 2 243 388 published 1973, March 15, Shell Internationale Research Maatschappii N.V.	
A	US, A, 3 792 445 published 1974, February 12, Bucks et al.	
A	US, A, 4 031 363 published 1977, June 21, Freeman et al.	
A	US, A, 4 050 295 published 1977, September 27, Harvey	
A	US, A, 4 072 850 published 1978, February 7, Mc Glynn	

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"X" document of particular relevance

IV. CERTIFICATION

Date of the Actual Completion of the International Search [1]	Date of Mailing of this International Search Report [2]
1981-09-02	1981 -09- 02
International Searching Authority [1]	Signature of Authorized Officer [20]
Swedish Patent Office	Jan Silfverling