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(54) **System enabling transfer of mileage and other vehicle data as registered, processed and stored by the system, to telecommunications and data networks outside the vehicle**

(57) System to be used in wheeled vehicles, for registration, processing and storage of data with respect to trips of the vehicle, comprising means for data transfer between the system according to the present invention and suitable electronic devices in said vehicle or in the proximity of said vehicle, characterised by the fact that

the system according to the present invention comprises means to control at least one other electronic device in such manner that through said electronic device, trip data as registered, processed and stored by the system according to the present invention, is transferred to one or more telecommunications and/or datanetworks outside the vehicle.

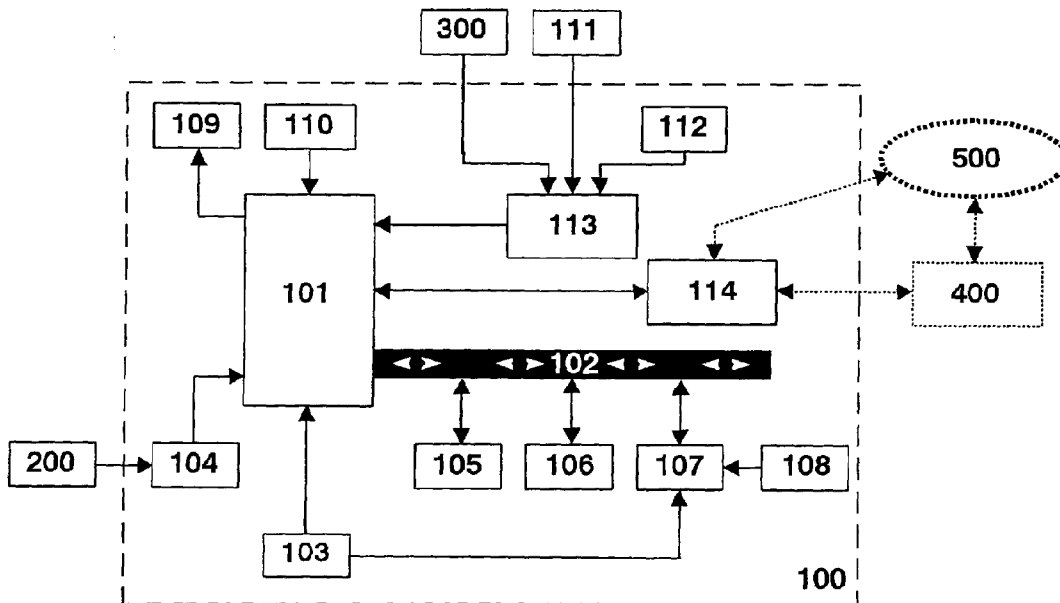


Fig. 1

EP 1 207 499 A2

**Description**

## FIELD OF THE INVENTION

**[0001]** The present invention generally relates to a system to be used in wheeled vehicles, enabling registration, processing and transfer to at least one telecommunications or datanetwork outside the vehicle, of data with respect to a trip of the vehicle, like for instance a trip number, date and time at the start of a trip, date and time at the end of a trip, the odometer reading at the start and at the end of a trip, and an identification of the purpose of the trip, for instance private, business or commuting.

## BACKGROUND OF THE INVENTION

**[0002]** Traditionally in motorcars and other (motor)vehicles there's a device present to register the distance traveled by the vehicle. Even today the principle of many of these "odometers" is based on a mechanical conversion of wheel or axle rotation into a measure of the distance traveled, which measure is displayed through a mechanical or electronic counter in the vehicle's dashboard. In addition to registration of the total distance traveled by the vehicle since it was manufactured, many odometers offer a possibility to register the distance traveled by the vehicle during a specific trip, through the use of a so-called "daycounter", which can be reset to zero prior to every trip. In the above mentioned conversion of wheel or axle rotations into mileage information, the conversion error may be as large as five percent.

**[0003]** Presently registration of the distance traveled by a vehicle is predominantly achieved through the use of electro-mechanical sensors, with the aim to facilitate processing of the resulting data in electronic form by the measurement and control electronics that take an increasingly important position in modern road vehicles. The wheel or axle rotations are in this case represented by electrical pulses, where the number of pulses in a specific period of time is related to the distance traveled by the vehicle during that period of time. In this respect it is to be noted that the relation between the number of pulses per period and the distance traveled by the vehicle during that same period is dependent on vehicle parameters like the wheel diameter.

**[0004]** An accurate registration of the distance traveled by a vehicle is important in many respects. Some of the more traditional situations where this registration plays a role include for instance determining the market value of a vehicle that is to be purchased or sold, determining when vehicle maintenance is required, determining the rent when one has rented a vehicle, calculating the height of the allowance to be paid by an employer to an employee when the latter uses his/her private vehicle for business purposes, calculating the fare for a taxi trip, or registering the fuel consumption of a vehicle per unit distance.

**[0005]** Nowadays the economic importance of (car) mobility is very high. In addition to this many corporate motor pools consist completely of leased vehicles, leading to a situation in which leasing companies are the legal owners of the vehicles and are in most cases also responsible for vehicle maintenance. However, current information with respect to the leased vehicles is not continuously at the disposal of said leasing companies, like for instance the odometer reading, that may be important to determine for instance whether maintenance is required, or to determine whether the lease contract should be revised because the distance traveled with a specific vehicle significantly exceeds the contract provisions. Cars in the higher priced segments are in some cases equipped with extensive sensor and control systems, for instance offering the possibility to send a telecommunications message to the maintenance service with respect to (potential) defects in the vehicle's technical systems. Such equipment is however quite expensive, what makes application economically infeasible for average corporate motor pools. In addition to this comes the fact that such equipment is in most cases specifically tailored to a particular brand or even a particular type of car. This makes flexible application of said equipment in vehicles of different brand and/or type virtually impossible.

**[0006]** The patent document US 5 673 018 describes a relatively simple passive transponder device that is to be affixed to a vehicle wheel. By means of a sensor the wheel rotations are registered and converted into a measure of the distance traveled by the vehicle. This mileage data is stored in an electronic memory in the device. When the transponder comes into the range of the electro-magnetic field of a special transmitter/receiver which is located for instance at the entrance of a garage or a fuel station, the transponder emits a signal, for instance consisting of an electronic representation of said mileage data, which is then received by said receiver. The main disadvantage of this device is the fact that the mileage data can only be transferred to systems outside the vehicle at specific locations. In addition to this, the affixing of electronics to moving parts of the vehicle's exterior, in this case a wheel, considerably increases the risk of damage to the device which may result in defects.

**[0007]** Furthermore, devices are known in the art, that enable the transfer of vehicle data by means of infrared light to receivers outside the vehicle. Also in this case, data can only be transferred at specific locations, and there is a need for a clear line of sight between the transmitter inside the vehicle and the receiver outside.

**[0008]** Registration of the distance traveled with a vehicle furthermore plays an important role when a distinction has to be made between distance travelled for private purposes and distance travelled for business purposes. For most companies with a motor pool that mainly consists of leased vehicles this will be the case. In some countries people who drive a "company car" that

is leased by their employer will be subjected to the payment of extra income taxes when the distance travelled with the company car for private purposes exceeds a specific threshold value. To avoid extra taxation the registered user of the leased vehicle is required to keep a consistent and accurate mileage record. It is also required that there exists an unambiguous relationship between mileage registered as being for business purposes and a specific business activity. To be able to prove such relationship an accurate activity record has to be kept. Manually keeping such mileage and activity records, for instance by reading the vehicle's odometer at the start and end of every trip, calculating the distance travelled during said trip and writing it down together with the corresponding business activity, may easily lead to errors, omissions and unnecessary costs.

**[0009]** In the past, numerous systems have been developed to remedy the problems mentioned above by automating said mileage registration as well as said activity registration. In the patent document US 5 541 858 a device is disclosed consisting of a portable unit comprising at least a micro-processor, RAM-memory, a display and a keyboard, that can be placed in a docking-station in the vehicle. The device makes use of the electronic odometer signal that is standard available in most recent model road vehicles. In addition to this, the device offers the possibility to a user to register activities by assigning a numerical code to each of the activities. The record of an activity, for instance a visit to a specific client, may then be logically connected to a vehicle trip record by entering the corresponding numerical code, after which the data is stored in the portable unit. On the portable unit there's an electrical connector present, through which the registered data can be transferred at a later stage to for instance a personal computer for further processing.

**[0010]** The patent document US 6 064 929 discloses a device wherein the above mentioned portable unit is a portable personal computer (notebook computer, laptop computer), equipped with software for keeping an extensive activity record. The odometer signal that is available in the vehicle is lead to the computer by means of a cable and is combined in said computer with a time and activity record.

**[0011]** A significant drawback of the latter two devices known in the art, is that said portable unit as well as said personal computer are in fact assigned to a specific user and not to a specific vehicle. It is the personal responsibility of this user to transport the device from the vehicle to, for instance, an office location where the stored information can be read out of the device and entered into, for instance, the company's accounting system. The electronic odometer signal however, is dependent on vehicle specific parameters like for instance the wheel diameter. Consequently, when the above mentioned systems are used in another vehicle than the vehicle used for the previous registration, the distance measurement needs to be calibrated before the first trip

in this new vehicle. In most cases such calibration requires reading the odometer and entering the resulting data into the device at least twice, which may lead to errors and omissions. Another drawback of the registration of odometer readings with the help of a portable personal unit, like a portable computer, is the fact that if a vehicle is used by a second person between two trips of a first person, and this second person does not use the same portable unit, the mileage record will not be consistent anymore. The most recent odometer reading stored in the portable unit of the first person will in this case differ from the current odometer reading in the vehicle. Preceding a next registration with said first portable computer, a user will then have to enter again the current odometer reading into the device, with the aforementioned drawbacks as a potential consequence.

**[0012]** The system according to the present invention means to remedy the drawbacks of devices known in the art in this field. To this effect a system for use in wheeled vehicles will be proposed, enabling registration, processing and storing data with respect to trips of said vehicle. The system comprises means for the transfer of data between said system and suitable other electronic devices in the vehicle and/or in the proximity of the vehicle. Said other electronic devices may include for instance mobile cellular telephones en portable computers (like laptop computers, notebook computers, palmtop computers, personal digital assistants) which can nowadays be regarded as more or less belonging to the standard equipment of professional users of wheeled vehicles, and will, as such, be present in said vehicles at least during normal business hours.

**[0013]** The system according to the present invention is characterised by the fact that it comprises means to control said electronic devices in the vehicle or in the proximity of the vehicle in such a fashion that through said electronic devices, data with respect to trips of said vehicle, as registered, processed and stored by the system according to the present invention, can be transferred to at least one telecommunications and/or datanetwork outside the vehicle.

**[0014]** In this way a user has a high degree of freedom in selecting a telecommunications and/or datanetwork through which the data transfer will take place, for instance a GSM (Global System for Mobile communication)-network, satellite networks, networks similar to the Dutch Traxys-network or the future UMTS (Universal Mobile Telecommunications System)-network, as well as a high degree of freedom in selecting a format according to which the communication will take place, for instance in the form of S.M.S. (Short Message Service)-messages, email-messages or facsimile-messages. A significant advantage of the use of such networks is the fact that a vehicle does not have to be at a specific location to be able to transfer the trip data stored in the system according to the invention. Electronic devices like mobile cellular telephones and portable computers are commonly available and relatively low-priced. For

said transfer of data between the system according to the present invention and said electronic devices in or in the proximity of the vehicle, the system according to the present invention may employ a range of communications standards like IrDA (Infrared Data Association) for communication by way of infrared light and Bluetooth for short-distance radio communications. These communications standards are widely supported by manufacturers of, for instance, mobile cellular telephones and portable computers.

**[0015]** Systems like said portable computers offer flexible possibilities for further on-site processing of trip data, for the addition of extra information and for example for making hard-copies of data by means of a printer in the vehicle itself.

**[0016]** The system according to the present invention may itself comprise means for direct transfer of data as registered, processed and stored by said system according to the present invention to at least one telecommunications and/or datanetwork outside the vehicle. For this purpose the system according to the present invention may for instance comprise built-in transmission/reception means for the GSM-network. This embodiment of the system according to the present invention is particularly advantageous in case only very limited interaction between the system according to the present invention and a user of the vehicle is necessary or required. This may for instance be the case when the functionality of the system according to the present invention is limited to the periodic transfer of trip data to for instance the manager of the corporate motor pool or to a maintenance service. Access to said means for transfer of data between the system according to the present invention and said electronic devices in or in the proximity of the vehicle may then for instance be restricted to an authorised maintenance employee for entering or correction of vehicle specific data in the system according to the present invention. To perform said entering or correction of said vehicle specific data for instance a remote control device using infrared light could be used.

**[0017]** Trip data as registered, processed and stored by the system according to the present invention at least comprise a trip number, date and time at the start of a trip, date and time at the end of a trip, the odometer reading at the start and at the end of a trip, and an identification of the purpose of the trip. The purpose of the trip may be for instance private, business or commuting.

**[0018]** Through an electronic device in the vehicle or in the proximity of the vehicle, which is suitable and comprises means for the transfer of data between the system according to the present invention and said electronic device, extra information may be added. Said extra information may for instance comprise information pertaining to the business activity related to the specific vehicle trip, for instance a visit to a specific client. Such extra information can be added by means of for instance a portable computer (like a laptop computer, notebook computer, palmtop computer, personal digital assistant

etc.). In this way a consistent combination of mileage registration and activity registration can be achieved, which may lead to reduced taxation. Furthermore said extra information may comprise the vehicle location at the start and at the end of the trip, which information could be provided by for instance a G.P.S. (Global Positioning System)-system in the vehicle. Said vehicle location could also be determined by detecting automatically, for instance by means of a mobile cellular telephone, in which cell of a cellular network for mobile communications the vehicle is located and by using the known geographical location of said cell as an approximation for the location of said vehicle. In addition to this extra information could be added in the form of an electronic representation of speech. For this purpose one could make use of a vehicle's built-in microphone/speaker system for a mobile telephone or a microphone/headphone set, which are commonly used nowadays. In this way the system according to the present invention offers flexible and relatively simple usage for a wide range of applications.

**[0019]** To provide for a base functionality, the system according to the present invention comprises at least the following parts:

- a central control and processing unit, for instance a microprocessor, equipped with a suitable software program to provide for the right functionality.
- an electronic memory for storage of vehicle specific data like for instance a vehicle identification code and data necessary for calibration of the vehicle's electronic odometer signal.
- an electronic memory for storage of trip data as registered and processed by the system according to the present invention.
- electronic means to provide the accurate date and time to the system according to the present invention.
- means to detect whether the vehicle's ignition switch is being operated.
- means to register the vehicle's electronic odometer signal.
- means to connect a cable for datacommunication with electronic devices outside the system according to the invention.
- output means, suitable for issuing an optical and/or acoustical warning to a user of the system according to the invention.

**[0020]** All of the abovementioned parts may be realised by means of commonly available and relatively low-priced components.

**[0021]** Said electronic odometer signal may be easily obtained from a standardised connector which is present in most recent model road vehicles to connect for instance a car radio. By using said electronic odometer signal instead of signals provided by complex electronic control and processing systems that may be

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