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(54) **Digital tachograph and method therefor**

(57) The present invention relates to a digital tachograph (1) comprising a driver identifier means (4, 5), a processing means and a user interface (2), wherein the processing means is configured to acquire travel data

from a vehicle the digital tachograph is installed into and to acquire driver data from the driver identifier means. The processing means is further configured to display an accumulated driving time for the driver through the user interface.

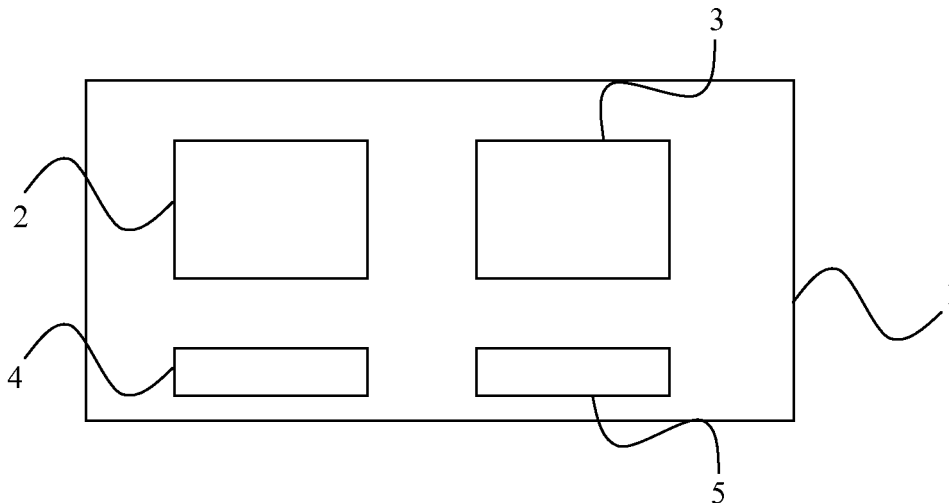


FIG. 1

Description

FIELD OF INVENTION

[0001] The present invention relates generally to digital tachographs, and particularly to a user interface for a digital tachograph.

BACKGROUND

[0002] A digital tachograph is a recording and control device for road transport. The digital tachograph is generally composed of a Vehicle Unit (VU) containing a printer, two slots for smart cards and a display. The VU is connected to a gearbox of a vehicle it is installed in via a secure detecting means.

[0003] The VU is arranged to continuously record and store data about activities and violations of a driver of the vehicle in a VU memory and on the driver's personal smart card. Examples of data stored are driver activities, durations, speeding, warnings of suspected tampering and other technical data. The driver's current activity is recorded each minute, and the activity of driving is automatically recorded. When the vehicle is stationary, it is possible for the driver to select among the non-driving activities of work, available and rest.

[0004] Drivers are prompted, at smart card insertion into the VU, to do manual inputs of activities that happened between last smart card withdrawal and current insertion, with start and end time for each activity and daily working period. If no manual input of activities is entered this period is registered as unknown.

[0005] A digital tachograph greatly facilitates for a driver to register active usage of a vehicle, but rest time or other non-driving time is still cumbersome to register for a driver.

[0006] There further exists a rather complex law requirement within Europe regarding the relationship between driving period and rest period for a driver. This has e.g. resulted in that there exists a law requirement for that a warning should be issued from the VU to the driver when no uninterrupted rest period of 45 minutes is registered during 4.5 hours of a driving period.

SUMMARY OF THE INVENTION

[0007] A problem with a warning according to the current law requirement is that it only serves as guidance for the driver. The driver could thus unintentionally violate a driving/rest period requirement due to the complex nature thereof.

[0008] An object of the present invention is to facilitate for the driver not to violate driving/rest period requirements.

[0009] This object, among others, is according to the present invention attained by a digital tachograph and a method, respectively, as defined by the appended claims.

[0010] A reason that the driver unintentionally can violate a driving/rest period is that the driver not easily can see how long continuous driving period he has during a present work period. By providing a digital tachograph comprising a driver identifier means, a processing means and a user interface, wherein the processing means is configured to acquire travel data from a vehicle the digital tachograph is installed into and to acquire driver data from the driver identifier means, wherein the processing means is configured to display an accumulated driving time for the driver through the user interface, it is much easier for the driver to not violate required maximum driving times. The driver identifier means preferably comprises a smart card reader.

[0011] The accumulated driving time is preferably calculated since the last fulfilled break, which require at least 45 minutes uninterrupted rest, during 4.5 hours of accumulated driving time.

[0012] A more complex requirement, compared to the fulfilled break, is the requirement for the daily rest, which is based on time periods between these daily rests and not based on the more straight forward calendar day. The accumulated driving time is advantageously calculated as the sum of all driving times for the driver since the last uninterrupted eleven hours of rest. An exception to the requirement of eleven hours of rest is that at most three times per weekly work period, i.e. between any two weekly rest periods, the daily rest requirement is relaxed to nine hours of rest. The accumulated driving time can preferably be set to zero when selected through the user interface, and/or when a smart card of the driver and/or a co-driver is inserted into the digital tachograph.

[0013] Further features and advantages of the present invention will be evident from the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention will become more fully understood from the detailed description of embodiments given below and the accompanying figures, which are given by way of illustration only, and thus, are not limitative of the present invention, wherein:

Fig. 1 schematically illustrates a digital tachograph according to an embodiment of the present invention.

Fig. 2 schematically illustrates a method for decision support for a driver of a digital tachograph according to an embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0015] In the following description, for purpose of explanation and not limitation, specific details are set forth, such as particular techniques and applications in order to provide a thorough understanding of the present invention. However, it will be apparent for a person skilled

in the art that the present invention may be practiced in other embodiments that depart from these specific details. In other instances, detailed description of well-known methods and apparatuses are omitted so as not to obscure the description of the present invention with unnecessary details.

[0016] An embodiment of a digital tachograph according to the present invention will now be described with reference to Figs. 1-2.

[0017] The digital tachograph 1 comprises a driver identifier means 4 and 5, a processing means, a user interface 2 and a printer 3. The driver identifier means is by law required to comprise two smart card readers: a first smart card reader 4 for a current driver and a second smart card reader 5 for a possible secondary driver, a so called co-driver. Without such restrictions the driver could e.g. be identified remotely through a mobile phone, a PDA, RFID, a Bluetooth connection, or similarly. The processing means preferably comprises a secure processing unit for handling e.g. driver identification, including authenticity certificates, and for storing e.g. driving data received from a gear box of a vehicle the digital tachograph is installed into, via a secure detector, and a second processing unit relieving the secure processing unit of non-secure processing, such as user interface communication. The user interface 2 comprises input means for e.g. manual entry of data and a small display for displaying e.g. a warning of possible too little rest for the driver. The user interface 2 is particularly configured to be able to display an accumulated driving time.

[0018] Law requirements e.g. require that a driver takes at least 45 minutes uninterrupted rest for each 4.5 hours of driving. Further, during a 24 hour time period, the driver should take at least 11 hours of uninterrupted rest, with a reduce requirement of nine hours at most three times between any two weekly rest periods.

[0019] The accumulated driving time displayed for the driver is preferably calculated from the last daily rest for the driver, i.e. the last eleven or nine hours of uninterrupted rest. Yet further, the accumulated driving time is preferably also calculated as the sum of all driving times since the last non-relaxed daily rest. The present requirement for a non-relaxed daily rest is uninterrupted eleven hours of rest.

[0020] Driver data, e.g. regarding fulfilled break and daily rest, is preferably acquired from the smart card of the driver, which stores such data for about one month. Alternatively, driver data is acquired from the tachograph, which stores such data for about one year. Use of driver data from the smart card is preferred, since the smart card is connected to the driver, and driver activity data from the tachograph is connected to a specific vehicle and fleet.

[0021] The accumulated driving time can preferably be reset to zero by the driver, e.g. through the user interface 2, preferably through a setting menu. An advantage with this reset is that driver can select when to reset, but it could be cumbersome for the driver to reset. The accu-

mulated driving time can alternatively be reset to zero each time the driver's smart card is inserted into the digital Tachograph. The smart card reset is a little blunt, which e.g. could provide a faulty calculation if the driver e.g. removes the smart card from the tachograph during a food break. The smart card reset is preferably improved by prompting the driver to reset the accumulated driving time, allowing the driver to continue calculation of the accumulated driving time after e.g. a food break.

[0022] The digital tachograph will typically work the following way. A driver of a vehicle the digital tachograph is installed into inserts his smart card into the driver identifier means, i.e. the first smart card reader 4. The processing means acquires driver data, i.e. identifies the driver, through his smart card and a PIN, preferably using both the secure processing unit and the second processing unit.

[0023] A driver is required to input data regarding activities performed since the last time his smart card was inserted into this or another digital tachograph.

[0024] The insertion of the smart card into the digital tachograph could in one configuration reset the accumulated driving time to zero.

[0025] The digital tachograph acquires travel data from the vehicle through the secure detector.

[0026] The processing means calculates an accumulated driving time for the driver and displays the accumulated driving time for the driver through the user interface. In this way the driver receives a decision support for avoiding violating driving/rest requirements.

[0027] Preferably, the processing means is configured to provide a decision support for a first accumulated driving time, since last daily rest, and a second accumulated driving time, since last fulfilled break. Advantageously, the processing means is configured to display only one of the first and second accumulated driving times, preferably the one having the shortest period of time until its law requirement is violated. With a larger display both the first as well as the second accumulated driving time could be displayed simultaneously, and the one of the first and second accumulated driving time nearest violating a required non-driving period of time is preferably marked.

[0028] For further decision support, when every data (full driver activity data as well as law requirements in each relevant country) necessary for calculating the remaining driving time until violation of a required non-driving time is accessible, the remaining driving time is displayed for the driver as a supplementary decision support. Even though remaining driving time until violation of a required non-driving time is of use for the driver, the accumulated driving time provides a better complete picture for the driver of which requirement he is close to violate as well as how long rest/non-driving activity is needed.

[0029] It will be obvious that the present invention may be varied in a plurality of ways. Such variations are not to be regarded as departure from the scope of the present

invention as defined by the appended claims. All such variations as would be obvious for a person skilled in the art are intended to be included within the scope of the present invention as defined by the appended claims.

Claims

1. A digital tachograph (1) comprising a driver identifier means (4, 5), a processing means and a user interface (2), wherein said processing means is configured to acquire travel data from a vehicle the digital tachograph is installed into and to acquire driver data from said driver identifier means, **characterized in that** said processing means further is configured to display an accumulated driving time for said driver through said user interface. 10
2. The digital tachograph according to claim 1, wherein said driver identifier means comprises a smart card reader. 20
3. The digital tachograph according to claim 1 or 2, wherein said accumulated driving time is calculated since the last daily rest. 25
4. The digital tachograph according to any of claims 1-3, wherein said accumulated driving time is the sum of all driving times for said driver since the last non-relaxed daily rest. 30
5. The digital tachograph according to any of claims 1-4, wherein said accumulated driving time is set to zero when selected through said user interface. 35
6. The digital tachograph according to any of claims 1-5, wherein said accumulated driving time is set to zero when a smart card of the driver is inserted into the digital tachograph. 40
7. The digital tachograph according to any of claims 1-6, wherein said accumulated driving time is set to zero when a smart card of a co-driver is inserted into the digital tachograph. 45
8. The digital tachograph according to any of claims 1-7, wherein a first accumulated driving time is calculated since the last daily rest and a second accumulated driving time is calculated since last fulfilled break. 50
9. The digital tachograph according claim 8, wherein said processing means is configured to display only one of said first accumulated driving time and second accumulated driving time. 55
10. The digital tachograph according claim 9, wherein said processing means is configured to display said

first accumulated driving time or said second accumulated driving time in dependence of shortest time to violating a law requirement.

- 5 11. A method for display of data in a digital tachograph, **characterized by** the steps of:

- identifying a driver by means of a driver identifier means;
- acquiring travel data from a vehicle the digital tachograph is installed into;
- acquiring driver data from said driver identifier means;
- calculating an accumulated driving time for said driver; and
- displaying the calculated accumulated driving time.

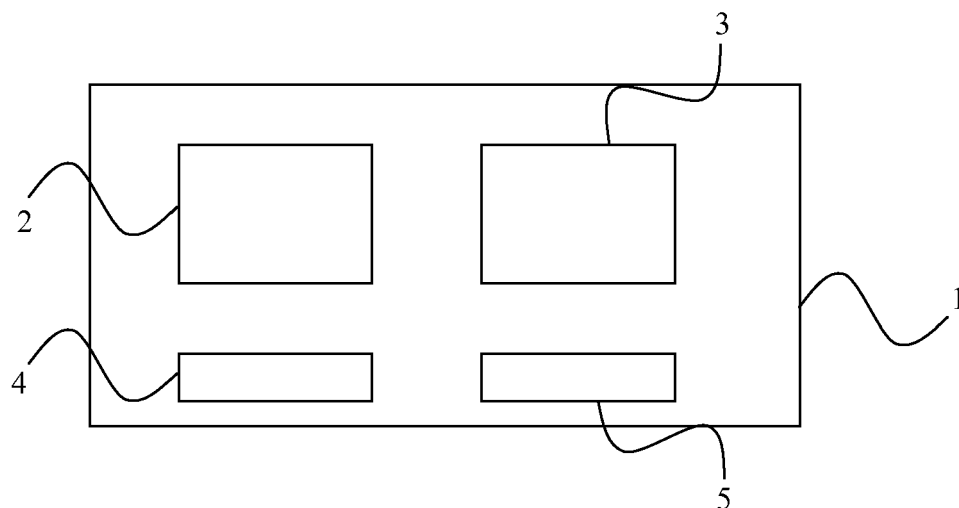


FIG. 1

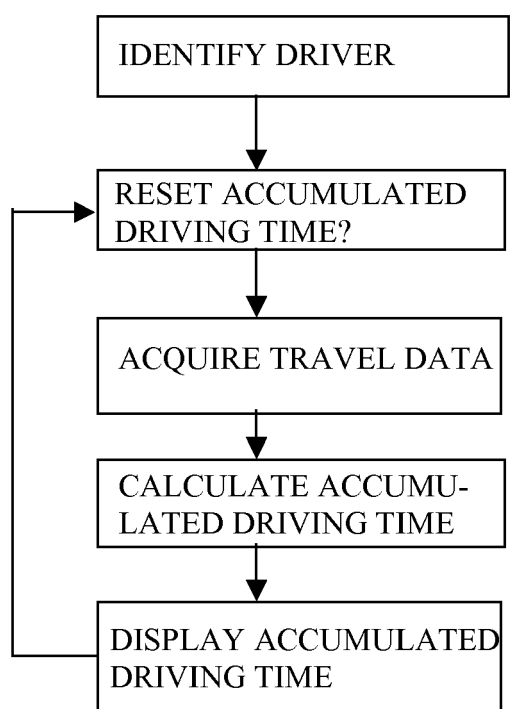


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 4677

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 February 2009	Examiner Königer, Axel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	WO 2007/031460 A (SIEMENS AG [DE]; BLANK JOACHIM [DE]; GESSNER ROLAND [DE]; HELBIG PATRI) 22 March 2007 (2007-03-22) * abstract * * page 1, line 21 - page 2, line 6 * * page 3, line 1 - line 28 * * page 5, line 10 - line 21 * * page 6, line 1 - page 8, line 16 * * figure 1 * -----	1-11	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 February 2009	Examiner Königer, Axel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82