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(54) **A DEVICE AND A METHOD FOR CALIBRATING A TIME UNIT**

EINRICHTUNG UND VERFAHREN ZUM KALIBRIEREN EINER ZEITEINHEIT

DISPOSITIF ET PROCEDE D'ETALONNAGE D'UNE UNITE DE TEMPS

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Description

FIELD OF THE INVENTION AND PRIOR ART

5 **[0001]** The present invention relates to a device for calibration of a time-giving unit in a vehicle which time-giving unit is arranged to emit a reference time to one or more electronic units, and a method for carrying such calibration.

[0002] Such a time-giving unit, usually a real-time clock, which may possibly display time, and electronic units are normally arranged so that the electronic units will log the times of certain events (e.g. times when faults occur in these units) or operating data of the vehicle.

10 **[0003]** All types of vehicles are covered but, for the purpose of explaining (but in no way thereby limiting the object) the invention, the particular application to motor vehicles which travel on land, in the form of trucks, buses and the like, is hereinafter discussed.

[0004] In such vehicles the electronic units are electronic control units (ECUs) used, for example, for controlling the vehicle's engine, gearbox etc. The time-giving unit in such a vehicle is usually situated in the so-called instrument cluster (ICL) in the form of a real-time clock, in which case it usually emits to the electronic control units not only the reference time, which cannot be altered by the driver, but also a local time which is usually also displayed and can be set by the driver. By means of the reference time, these electronic control units log in a memory the times of various events, e.g. times when faults occur in these units. To enable optimum subsequent evaluation of the information thus stored by the electronic control units, it is of crucial importance that the reference time concerned can constantly be provided reliably and with a correct value for all the control units. At the same time, this needs to be achieved by simple means universally applicable to all types of vehicles with such time-giving units and electronic units without entailing extensive modifications or special designs for different types of vehicles. This is a problem for which no solution has previously been found.

SUMMARY OF THE INVENTION

25 **[0005]** The object of the present invention is to provide a device and a method of the kind defined in the introduction which make it possible to at least substantially solve the problem defined above.

[0006] This object is achieved according to the invention by providing such a device with a means arranged to receive a superordinate reference time from a second time-giving unit of the vehicle and a contrivance arranged to calibrate the first-mentioned first time-giving unit by causing the latter's reference time to correspond to the superordinate reference time received, separately from the first time-giving unit's emission of reference time to said electronic units, and by a method according to the attached independent method claims.

[0007] Updating the reference time in this way until it corresponds to a superordinate reference time which may very exactly correspond to real time makes it possible to ensure that the reference time which the electronic units receive from the first time-giving unit is reliable and correct so that the data which are coordinated with time indications in the electronic units can be used in the best possible manner. The fact that this updating also takes place separately from the first time-giving unit's emission of reference time to the electronic units means that the first time-giving unit's function will be exactly the same, and that the electronic units will experience the first time-giving unit the same way, as if said calibration did not take place. The only difference will be that the reference time which they receive will be more accurately correct. The first time-giving unit thus does not pass on the reference time indication which comes from said means but emits continuously its own reference time, and it will thus emit this reference time independently of whether it receives any information about new superordinate reference time or not.

[0008] According to one embodiment of the invention, the contrivance is arranged to effect the calibration by comparing at predetermined intervals of time the superordinate reference time received and the first time-giving unit's reference time and by (at least when a deviation exceeding a predetermined value occurs) correcting the first time-giving unit's reference time. This is achieved with advantage, according to another embodiment of the invention, by the contrivance comparing once per minute the time indication in seconds according to the superordinate reference time received and the first time-giving unit's reference time in order to correct the latter when a deviation exceeding a predetermined value is determined.

50 **[0009]** Vehicles with tachographs already have such a second time-giving unit with high requirements for giving correct time, and it is particularly advantageous to use this tachograph for providing the superordinate reference time for calibration of the first-mentioned time-giving unit.

[0010] According to one embodiment of the invention, the second time-giving unit is designed to deliver a superordinate reference time with a predetermined maximum slight deviation from a time which is substantially fixed relative to Universal Time. This may for example be achieved by the second time-giving unit's reference time being checked at regular intervals by being compared with Universal Time on the occasion of an inspection and by the requirements for the operation which it is required to perform during that time being made strict. It is of course also possible for the second time-giving unit to be designed to have some kind of communication with a facility which emits information about Universal

Time in order thus to update its superordinate reference time, which will then substantially correspond to Universal Time.

[0011] According to another embodiment of the invention, the device comprises means coordinated with the second time-giving unit and arranged to ensure energy supply to that unit independently of the energy supply to other parts of the device, thereby ensuring that the second time-giving unit can constantly provide a reliably correct superordinate reference time to the first-mentioned time-giving unit.

[0012] Vehicles which travel by land, particularly of the truck or bus type, are in some cases subject to a legal requirement that a tachograph be fitted, whereas this is not necessary for others, e.g. military vehicles, milk tankers and buses which run according to timetables and are therefore not provided with a tachograph. In order to be able to provide the vehicles with the same system for logging the times of events in their electronic control units, such vehicles are therefore provided with a separate first-mentioned time-giving unit, usually a real-time clock arranged in the instrument cluster. If all vehicles had a tachograph, such a real-time clock would not really be necessary and there would be less point in applying the invention to vehicles. However, if possible, it is desirable to avoid two variants for achieving the same purpose, i.e. depending on whether there is or is not a tachograph in the vehicle, and this is achieved by the invention. The fact that the first time unit's reference time is updated quite separately from that time unit's emission of reference time to the electronic control units means that the system whereby the electronic control units are provided with reference time is independent of the particular configuration of the system, i.e. it functions always in the same manner and always receives information from the same source (the first-mentioned time unit) irrespective of whether there is or is not a tachograph in the vehicle. Using the same source for important information irrespective of the configuration of the system facilitates testing, fault tracing etc. It also results in a more robust technical solution.

[0013] It is known from US 5 957 986 to, in a vehicle, cause a master clock in a tachograph to communicate with a time-giving unit in an instrument cluster. However, the device therein described is of quite a different kind from that according to the present invention in that its idea is that when local time is altered by the driver in the time-giving unit the change is logged by the tachograph and a differential time is stored in the tachograph so that it can, upon demand, display local time.

[0014] The document JP06333117 discloses an example of time matching means on-board of a vehicle.

[0015] The invention also relates to an installation and to a vehicle provided with a device according to the invention according to the attached claims. Their functions and advantages are indicated with all desirable clarity by the above discussion of devices according to embodiments of the invention.

[0016] Further advantages and advantageous features of the invention are indicated by the ensuing description and other dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Embodiments of the invention quoted as examples are described below with reference to the attached drawings, in which:

Fig. 1 is a schematic block diagram illustrating the general construction and main principle of operation of a device according to a first embodiment of the invention,

Fig. 2 is a view corresponding to Fig. 1 of a device according to a second embodiment of the invention, and

Fig. 3 is a flowchart schematically illustrating an embodiment of the method according to the invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0018] Fig. 1 illustrates extremely schematically a vehicle 1 for carrying passengers and/or goods by road, such as a bus, a truck or the like. The vehicle comprises electronic control units 2 (ECUs) arranged to control, for example, the vehicle's various engine functions, gearbox, brake system and the like.

[0019] The vehicle also comprises a schematically depicted instrument cluster 3 (ICL) which is arranged visibly for the driver and comprises various instruments for displaying the vehicle's speed, the speed of the vehicle's engine, the cooling water temperature etc. A time-giving unit in the form of a real-time clock 4 is arranged in the instrument cluster 3. The real-time clock 4 is arranged to display current local time to the driver by visual means 5, such as a display, and this local time can be set by the driver by operating a setting means 6.

[0020] The real-time clock 4 is arranged to emit a reference time via a CAN bus 7 (CAN = Controller Area Network) to all the electronic units 2 in the form of seconds, minutes, hour, month, day, year, and possibly also to emit local time in hours and minutes to the electronic control units 2 if local time differs from the reference time. Instead of CAN, emission might also be by means of, for example, FlexRay or TTCAN.

[0021] The reference time emitted by the real-clock 4 can never be altered by the driver. This reference time is used

by the electronic control units 2 for logging the times of events, i.e. coordinating certain events with the times when they occur, e.g. times when faults occur in these units. These data may subsequently be used, e.g. on the occasion of vehicle repairs, for identifying fault causes and consequential faults.

[0022] The vehicle also has a tachograph 8 (TCO) which comprises a clock 9 or some other time-giving unit. The presence of such a tachograph is a legal requirement for certain types of vehicle in most countries. The tachograph is arranged to record inter alia the vehicle's speed at various times by means of the clock 9. The permissible drift of the clock 9 is very small and this clock's time indication is normally checked about every second year at an authorised workshop relative to Universal Time, so-called world time, or UTC (Universal Time Coordinated) and is set to correspond thereto. It would also be possible for the tachograph's clock 9 to be in constant communication via satellite with some remotely situated unit which emits Universal Time or UTC so that it is constantly upgraded to a time corresponding thereto.

[0023] What has been described up to this point applies to the bulk of today's vehicles of said types. We now go on to describe what is characteristic for the invention.

[0024] The tachograph's clock 9 is arranged to emit a superordinate reference time to a receiver 10 in the instrument cluster 3. This superordinate reference time is preferably emitted with standard SAE J1939, an American standard used by the bulk of the truck industry which describes the communication protocol used over CAN. It expresses the reference time in the first six character groups (bytes) in the following sequence:

seconds:	0-59.75 s with 0.25 s resolution
minutes:	0-59 min with 1 min resolution
hours:	0-23 h with 1 h resolution
month:	1-12 months with 1 month resolution (the value 0 here means "nought")
day:	0.25-31.75 days with 0.25 d resolution (the value 0 here means "nought")
year:	year 1985-2235.

Thus the count begins at year 1985, which is given the value "0" when sent over CAN

[0025] For a digital tachograph, UTC is used as reference time, whereas for a paper tachograph the reference time is either local time of the country where the vehicle is registered or UTC. The device for calibrating the real-time clock 4 further comprises a contrivance 11 arranged for communicating with the receiver 10 and the real-time clock 4 and comparing said superordinate reference time with the real-time clock's reference time. As regards the time indication in seconds, this comparison is preferably done once per minute, and if a deviation exceeding a predetermined value is detected, e.g. at least 0.25 s, a signal is then sent to the real-time clock to alter its reference time to match with the superordinate reference time.

[0026] This updating of the reference time of the real-time clock 4 takes place quite separately from the real-time clock's emission of reference time to the electronic control units 2, and this emission is always of the reference time currently stored in the real-time clock, independently of the results of said comparison. Thus the real-time clock 4 is not concerned with whether it receives any message about a new reference time from the contrivance 11 or not, but pays attention constantly to the reference time which it has and emits.

[0027] The contrivance 11 is preferably arranged so that after interruption of the device's operation at start-up of the device, e.g. when the vehicle's ignition key is turned after the vehicle has been switched off, it also compares the minute indications of the superordinate reference time received and of the real-time clock's reference time in order to effect correction of the latter in the event of deviation between these minute indications.

[0028] The tachograph 8 is provided in a conventional manner with backup means 12, e.g. one or more batteries, arranged to ensure energy supply to the tachograph and hence to the latter's clock 9 independently of the energy supply to other parts of the device, so that the tachograph's clock constantly maintains a substantially correct superordinate reference time.

[0029] The instrument cluster 3 emits the time from its real-time clock 4 together with an offset of two bytes which shows the difference between the reference time and the local time which may be set via the setting means 6. For display of time on the display 5, the reference time plus the offset is used for showing local time, and the reference time is used for time stamping of, for example, fault codes in the electronic control units 2.

[0030] Fig. 2 illustrates a device according to a third embodiment of the invention which represents a further variant of the delivery of the superordinate reference time to the receiver means 10. The vehicle concerned has no tachograph but a separate second time-giving unit 14 arranged to deliver the superordinate reference time to the receiver means 10. This second time-giving unit might be a real-time clock with a small permissible drift and with battery backup, but it is also possible for it to receive its time from a remotely situated location 15 via, for example, a satellite 13.

[0031] Fig. 3 illustrates schematically an embodiment of the method according to the invention in the form of a flowchart. A superordinate reference time is produced at 16 and sent for comparison at 17 with a reference time emitted in parallel at 18 from a first time-giving unit. If the reference time and the time emitted at 18 match, the method stops at 19. If the comparison shows a difference between the times, an alteration to the time emitted at 18 takes place at 20. Entirely separately from the alteration to the time-giving unit's reference time at 20, this time-giving unit's reference time is emitted continuously to electronic units at 21.

[0032] The invention is of course in no way limited to the embodiments described above, since a multiplicity of possibilities for modifications thereof are likely to be obvious to a specialist in the field, without having thereby to deviate from the basic concept of the invention as defined in the attached claims.

[0033] For example, the invention might be applied to other types of installations than those in a vehicle and, for example, the concept of the invention might be used, if so desired, for keeping two parts of a production line or two production lines absolutely synchronised with one another.

[0034] Said receiver means and contrivance need not be physical elements, as these functions might be integrated in the time-giving unit which emits reference time to the electronic units. The two functions might also be combined in a separate physical element. Nor in the case of vehicles need they be arranged in the instrument cluster, nor need the last-mentioned time-giving unit either.

[0035] The comparisons between superordinate reference time and reference time might take place at intervals other than as stated above, e.g. every second minute, every tenth minute or every half minute.

Claims

1. A device for calibration of a time-giving unit (4) in the form of a real-time clock in a vehicle arranged to emit a reference time to one or more electronic units (2) of the vehicle in order to enable them to log in a memory the times of events, e.g. faults or operating data, by means of said reference time, **characterised in that** it comprises a means (10) designed to receive a superordinate reference time from a second time-giving unit (9, 14) of the vehicle, and a contrivance (11) arranged to calibrate the first-mentioned first time-giving unit (4) by causing the latter's reference time to match with the superordinate reference time received, separately from the first time-giving unit's emission of reference time to said electronic units.
2. A device according to claim 1, **characterised in that** said contrivance (11) is arranged to effect the calibration by comparing at predetermined intervals of time the superordinate reference time received and the reference time of the first time-giving unit (4) and, at least when a deviation exceeding a predetermined value occurs, to correct the first time-giving unit's reference time.
3. A device according to claim 2, **characterised in that** said contrivance (11) is arranged to compare once per minute the time indication in seconds of the superordinate reference time received and the reference time of the first time-giving unit (4) in order to correct the latter if deviation exceeding a predetermined value is determined.
4. A device according to claim 3, **characterised in that** said contrivance (11) is arranged so that after interruption of the device's operation at start-up of the device it also compares the minute indications of the superordinate reference time received and of the reference time of the first time-giving unit (4) in order to effect correction of the latter in the event of deviation between these minute indications.
5. A device according to any one of the foregoing claims, **characterised in that** the second time-giving unit (9, 14) is designed to deliver a superordinate reference time with a predetermined maximum slight deviation from a time which is substantially fixed relative to Universal Time.
6. A device according to claim 5, **characterised in that** the second time-giving unit (9, 14) is designed to deliver a superordinate reference time corresponding substantially to Universal Time.
7. A device according to any one of the foregoing claims, **characterised in that** it comprises means (12) coordinated with the second time-giving unit (9, 14) and arranged to ensure energy supply to that unit independently of the energy supply to other parts of the device.
8. A device according to any one of the foregoing claims, **characterised in that** said means (10) is designed to receive a superordinate reference time for a first time-giving unit (4) which is arranged to send a reference time to electronic control units (2) of the vehicle.

9. A device according to any one of the foregoing claims, **characterised in that** the first time-giving unit (4) is arranged in the vehicle's instrument cluster (3).
10. A device according to any one of the foregoing claims, **characterised in that** it is designed to be arranged in a vehicle (1) with a tachograph (8) and that the tachograph's clock (9) constitutes said second time-giving unit.
11. A device according to claim 10, **characterised in that** the clock (9) of the tachograph (8) is arranged to emit the superordinate reference time to the first time-giving unit (4) in accordance with standard SAE J1939.
12. A device according to any one of the foregoing claims, **characterised in that** it is designed for calibration of a first time-giving unit (4) which is arranged to emit both a reference time and a local time to said electronic units (2).
13. A device according to claim 12, **characterised in that** it is designed for calibration of a first time-giving unit (4) connected to means (5) arranged to display said local time and to means (6) arranged to enable manual setting of that local time.
14. An installation comprising one or more electronic units (2) and a time-giving unit (4) which is arranged to emit a reference time to the latter, **characterised in that** it also comprises a device for calibration of the time-giving unit according to any one of claims 1-13.
15. A vehicle comprising a device according to any one of claims 1-13.
16. A method for calibration of a time-giving unit (4) in the form of a real-time clock in a vehicle arranged to emit a reference time to one or more electronic units (2) of the vehicle in order to enable these latter to log in a memory the times of events, e.g. faults or operating data, by means of said reference time, **characterised in that** a superordinate reference time is produced via a second time-giving unit (9, 14) arranged in the vehicle, that the superordinate reference time is compared with the first-mentioned first time-giving unit's reference time and in the event of difference between them the first time-giving unit's reference time is altered to match with the superordinate reference time, and that this comparison of reference times and alteration of the first time-giving unit's reference time take place separately from the first time-giving unit's emission of reference time to said electronic units.
17. A method according to claim 16, **characterised in that** said comparison and any alteration take place at predetermined intervals of time.
18. A method according to claim 17, **characterised in that** said comparison and any alteration of the reference time of the first time-giving unit (4) are effected once per minute by comparison of the time indication in seconds of the superordinate reference time and that of the first time-giving unit's reference time, and that the latter reference time is altered if a deviation exceeding a predetermined value is determined.
19. A method according to any one of claims 16-18, **characterised in that** the superordinate reference time is provided by a second time-giving unit in the form of a clock (9) of a tachograph (8) of the vehicle.

Patentansprüche

1. Vorrichtung zur Kalibrierung einer zeitgebenden Einheit (4) in Form einer Echtzeituhr in einem Fahrzeug, die dazu eingerichtet ist, an eine oder mehrere elektronische Einheiten (2) des Fahrzeugs eine Referenzzeit auszugeben, um diese in die Lage zu versetzen, die Zeiten von Ereignissen, z.B. Fehlern oder Betriebsdaten, mit Hilfe der Referenzzeit in einem Speicher zu erfassen,
dadurch gekennzeichnet, dass sie ein Hilfsmittel (10) umfasst, das dazu ausgebildet ist, eine übergeordnete Referenzzeit von einer zweiten zeitgebenden Einheit (9, 14) des Fahrzeugs zu empfangen, und eine Apparatur (11), die dazu eingerichtet ist, die zuerst genannte erste zeitgebende Einheit (4) gesondert von der Ausgabe der Referenzzeit der ersten zeitgebenden Einheit an die elektronischen Einheiten zu kalibrieren, indem sie bewirkt, dass die Referenzzeit der letzteren der empfangenen übergeordneten Referenzzeit angeglichen ist.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Apparatur (11) dazu eingerichtet ist, die Kalibrierung durch Vergleichen der empfangenen übergeordneten Referenzzeit mit der Referenzzeit der ersten zeitgebenden Einheit (4) in vorgegebenen Zeitintervallen zu bewirken, und zumindest dann, wenn eine einen vorgegebenen

Wert übersteigende Abweichung auftritt, die Referenzzeit der ersten zeitgebenden Einheit zu korrigieren.

- 5 3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Apparatur (11) dazu eingerichtet ist, einmal pro Minute die Zeitangabe in Sekunden der empfangenen übergeordneten Referenzzeit mit der Referenzzeit der ersten zeitgebenden Einheit (4) zu vergleichen, um die letztere zu korrigieren, falls eine einen vorgegebenen Wert übersteigende Abweichung festgestellt wird.
- 10 4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Apparatur (11) dazu eingerichtet ist, auch nach einer Unterbrechung des Betriebs der Vorrichtung während der Inbetriebsetzung der Vorrichtung die Minutenangaben der empfangenen übergeordneten Referenzzeit und der Referenzzeit der ersten zeitgebenden Einheit (4) zu vergleichen, um eine Korrektur der letzteren für den Fall einer Abweichung zwischen diesen Minutenangaben zu bewirken.
- 15 5. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** die zweite zeitgebende Einheit (9, 14) dazu ausgelegt ist eine übergeordnete Referenzzeit mit einer vorgegebenen geringfügigen Maximalabweichung von einer Zeit abzugeben, die im Wesentlichen bezüglich der Weltzeit festgesetzt ist.
- 20 6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die zweite zeitgebende Einheit (9, 14) dazu ausgebildet ist, eine übergeordnete Referenzzeit abzugeben, die im Wesentlichen der Weltzeit entspricht.
- 25 7. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** sie ein Mittel (12) umfasst, welches der zweiten zeitgebenden Einheit (9, 14) zugeordnet ist und dazu eingerichtet ist für eine Energieversorgung der Einheit unabhängig von der Energieversorgung anderer Bauteile der Vorrichtung zu sorgen.
- 30 8. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** das Mittel (10) dazu ausgebildet ist eine übergeordnete Referenzzeit für eine erste zeitgebende Einheit (4) zu empfangen, die dazu eingerichtet ist, eine Referenzzeit an elektronische Steuereinheiten (2) des Fahrzeugs zu senden.
- 35 9. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** die erste zeitgebende Einheit (4) in dem Instrumententräger (3) des Fahrzeugs angeordnet ist.
10. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** sie dazu ausgebildet ist, in einem Fahrzeug (1) mit einem Fahrtenschreiber (8) angeordnet zu sein, wobei die Uhr (9) des Fahrtenschreibers die zweite zeitgebende Einheit bildet.
- 40 11. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** die Uhr (9) des Fahrtenschreibers (8) dazu eingerichtet ist, die übergeordnete Referenzzeit in Übereinstimmung mit dem Standard SAE J1939 an die erste zeitgebende Einheit (4) auszugeben.
- 45 12. Vorrichtung nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** sie zur Kalibrierung einer ersten zeitgebenden Einheit (4), ausgebildet ist, die dazu eingerichtet ist, sowohl eine Referenzzeit als auch eine Ortszeit an die elektronischen Einheiten (2) auszugeben.
13. Vorrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** sie zur Kalibrierung einer ersten zeitgebenden Einheit (4) ausgebildet ist, die mit einem Mittel (5), das dazu eingerichtet ist die Ortszeit anzuzeigen, und einem Mittel (6) in Verbindung steht, das dazu eingerichtet ist ein manuelles Einstellen der Ortszeit zu ermöglichen.
- 50 14. Einrichtung mit einer oder mehreren elektronischen Einheiten (2) und einer zeitgebenden Einheit (4), die dazu eingerichtet ist, an die letzteren eine Referenzzeit auszugeben, **dadurch gekennzeichnet, dass** sie zudem eine Vorrichtung zur Kalibrierung der zeitgebenden Einheit nach einem der Ansprüche 1 bis 13 umfasst.
- 55 15. Fahrzeug umfassend eine Vorrichtung nach einem der Ansprüche 1 bis 13.
16. Verfahren zur Kalibrierung einer zeitgebenden Einheit (4) in Form einer Echtzeituhr in einem Fahrzeug, die dazu eingerichtet ist, eine Referenzzeit an eine oder mehrere elektronische Einheiten (2) des Fahrzeugs auszugeben, um diese letzteren in die Lage zu versetzen, die Zeiten von Ereignissen, z.B. Fehlern oder Betriebsdaten, mit Hilfe der Referenzzeit in einem Speicher zu erfassen, **dadurch gekennzeichnet, dass** eine übergeordnete Referenzzeit von einer zweiten in dem Fahrzeug angeordneten zeitgebenden Einheit (9, 14) erzeugt wird, dass die übergeordnete

Referenzzeit mit der Referenzzeit der zuerst genannten ersten zeitgebenden Einheit verglichen wird und die Referenzzeit der ersten zeitgebenden Einheit für den Fall einer Abweichung zwischen ihnen in Angleichung an die übergeordnete Referenzzeit geändert wird, und dass dieser Vergleich der Referenzzeiten und die Änderung der Referenzzeit der ersten zeitgebenden Einheit gesondert von der Ausgabe der Referenzzeit der ersten zeitgebenden Einheit an die elektronischen Einheiten stattfinden.

17. Verfahren nach Anspruch 16, **dadurch gekennzeichnet, dass** der Vergleich und jegliche Änderung zu vorgegebenen Zeitintervallen stattfinden.

18. Verfahren nach Anspruch 17, **dadurch gekennzeichnet, dass** der Vergleich und jegliche Änderung der Referenzzeit der ersten zeitgebenden Einheit (4) einmal pro Minute durch Vergleich der Zeitangabe in Sekunden der übergeordneten Referenzzeit mit der der Referenzzeit der ersten zeitgebenden Einheit erfolgen, und dass die letztere Referenzzeit geändert wird, falls eine einen vorgegebenen Wert übersteigende Abweichung festgestellt wird.

19. Verfahren nach einem der Ansprüche 16 bis 18, **dadurch gekennzeichnet, dass** die übergeordnete Referenzzeit von einer zweiten zeitgebenden Einheit in Form einer Uhr (9) eines Fahrtschreibers (8) des Fahrzeugs zur Verfügung gestellt wird.

Revendications

1. Dispositif d'étalonnage d'une unité indiquant l'heure (4) se présentant sous la forme d'une horloge en temps réel installée dans un véhicule et agencée de manière à émettre un temps de référence vers un ou plusieurs dispositifs électroniques (2) du véhicule afin de leur permettre d'enregistrer dans une mémoire l'horaire de certains événements, par ex. des pannes ou des données opérationnelles, à l'aide dudit temps de référence, **caractérisé en ce qu'il** comprend un moyen (10) conçu pour recevoir un temps de référence surordonné provenant d'une seconde unité indiquant l'heure (9, 14) du véhicule, et un système (11) agencé pour étalonner la susmentionnée première unité indiquant l'heure (4) en faisant correspondre le temps de référence de la première unité indiquant l'heure au temps de référence surordonné reçu, séparément de l'émission par la première unité indiquant l'heure d'un temps de référence vers lesdits dispositifs électroniques.

2. Dispositif selon la revendication 1, **caractérisé en ce que** le système (11) est agencé de manière à procéder à l'étalonnage en comparant à des intervalles de temps prédéterminés le temps de référence surordonné reçu et le temps de référence de la première unité indiquant l'heure (4) et, au moins lorsqu'une déviation supérieure à une valeur prédéterminée se produit, à corriger le temps de référence de la première unité indiquant l'heure.

3. Dispositif selon la revendication 2, **caractérisé en ce que** le système (11) est agencé pour comparer une fois par minute l'indication en secondes du temps de référence surordonné reçu et le temps de référence de la première unité indiquant l'heure (4) afin de corriger cette dernière s'il est déterminé qu'il existe une déviation supérieure à une valeur prédéterminée.

4. Dispositif selon la revendication 3, **caractérisé en ce que** le système (11) est agencé de manière à ce que, après l'interruption du fonctionnement du dispositif au moment de l'allumage du dispositif, il compare également les indications en minutes du temps de référence surordonné et du temps de référence de la première unité indiquant le temps (4) afin de procéder à la correction de cette dernière en cas de déviation entre ces indications en minutes.

5. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la seconde unité indiquant l'heure (9, 14) est conçue pour livrer un temps de référence surordonné présentant une légère déviation maximale prédéterminée par rapport à un temps qui est sensiblement fixe par rapport au temps universel.

6. Dispositif selon la revendication 5, **caractérisé en ce que** la seconde unité indiquant l'heure (9, 14) est conçue pour livrer un temps de référence surordonné correspondant sensiblement au temps universel.

7. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend un moyen (12) coordonné avec la seconde unité indiquant l'heure (9, 14) et destiné à assurer l'alimentation en énergie de cette unité indépendamment de l'approvisionnement en énergie des autres parties du dispositif.

8. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit moyen (10) est

conçu pour recevoir un temps de référence surordonné pour une première unité indiquant l'heure (4) qui est agencée de manière à envoyer un temps de référence à des dispositifs électroniques de commande (2) installés dans le véhicule.

- 5 9. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la première unité indiquant l'heure (4) est agencée dans le groupe d'instruments du véhicule (3).
- 10 10. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est conçu pour être agencé dans un véhicule (1) comportant un tachygraphe (8) et **en ce que** l'horloge du tachygraphe (9) constitue ladite seconde unité indiquant l'heure.
- 15 11. Dispositif selon la revendication 10, **caractérisé en ce que** l'horloge (9) du tachygraphe (8) est conçue pour émettre le temps de référence surordonné vers la première unité indiquant l'heure (4) conformément à la norme SAE J1939.
- 20 12. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est conçu pour l'étalonnage d'une première unité indiquant l'heure (4) conçue pour émettre un temps de référence et un temps local vers lesdits dispositifs électroniques (2).
- 25 13. Dispositif selon la revendication 12, **caractérisé en ce qu'il** est conçu pour l'étalonnage d'une première unité indiquant l'heure (4) reliée au moyen (5) conçu pour afficher ledit temps local et au moyen (6) conçu pour permettre de régler manuellement le temps local.
14. Installation comprenant un ou plusieurs dispositifs électroniques (2) et une unité indiquant l'heure (4) conçue pour émettre un temps de référence vers ces derniers, **caractérisée en ce qu'elle** comprend en outre un dispositif d'étalonnage de l'unité indiquant l'heure selon l'une quelconque des revendications 1 à 13.
15. Véhicule comprenant un dispositif selon l'une quelconque des revendications 1 à 13.
- 30 16. Procédé d'étalonnage d'une unité indiquant l'heure (4) se présentant sous la forme d'une horloge en temps réel dans un véhicule, conçue pour émettre un temps de référence vers un ou plusieurs dispositifs électroniques (2) du véhicule afin de permettre à ces derniers d'inscrire dans une mémoire l'heure de certains événements, par ex. des pannes ou des données opérationnelles, à l'aide d'un temps de référence, **caractérisé en ce qu'un** temps de référence surordonné est produit via une seconde unité indiquant l'heure (9, 14) installée dans le véhicule, **en ce que** le temps de référence surordonné est comparé avec le temps de référence de la première unité indiquant l'heure susmentionnée et, en cas de différence entre ceux-ci, le temps de référence de la première unité indiquant l'heure est modifié de manière à le faire correspondre au temps de référence surordonné, et **en ce que** cette comparaison des temps de référence et cette modification du temps de référence de la première unité indiquant l'heure se produit indépendamment de l'émission par la première unité indiquant l'heure du temps de référence auxdits dispositifs électroniques.
- 35 17. Procédé selon la revendication 16, **caractérisé en ce que** ladite comparaison et l'éventuelle modification se produisent à des intervalles de temps prédéterminés.
- 40 18. Procédé selon la revendication 17, **caractérisé en ce que** ladite comparaison et l'éventuelle modification du temps de référence de l'unité indiquant l'heure (4) sont effectuées une fois par minute par comparaison avec l'indication du temps en secondes du temps de référence surordonné et de celle du temps de référence de la première unité indiquant l'heure, et **en ce que** ce dernier temps de référence est modifié s'il est déterminé qu'il existe une déviation supérieure à une valeur prédéterminée.
- 45 19. Procédé selon l'une quelconque des revendications 16 à 18, **caractérisé en ce que** le temps de référence surordonné est fourni par une seconde unité indiquant l'heure se présentant sous la forme d'une horloge (9) d'un tachygraphe (8) du véhicule.

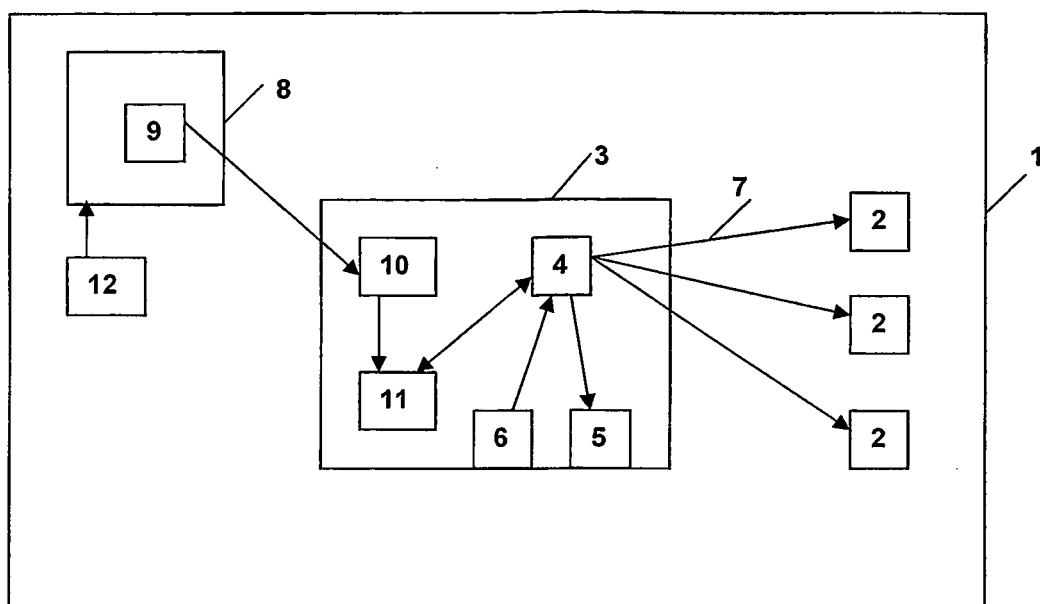


Fig 1

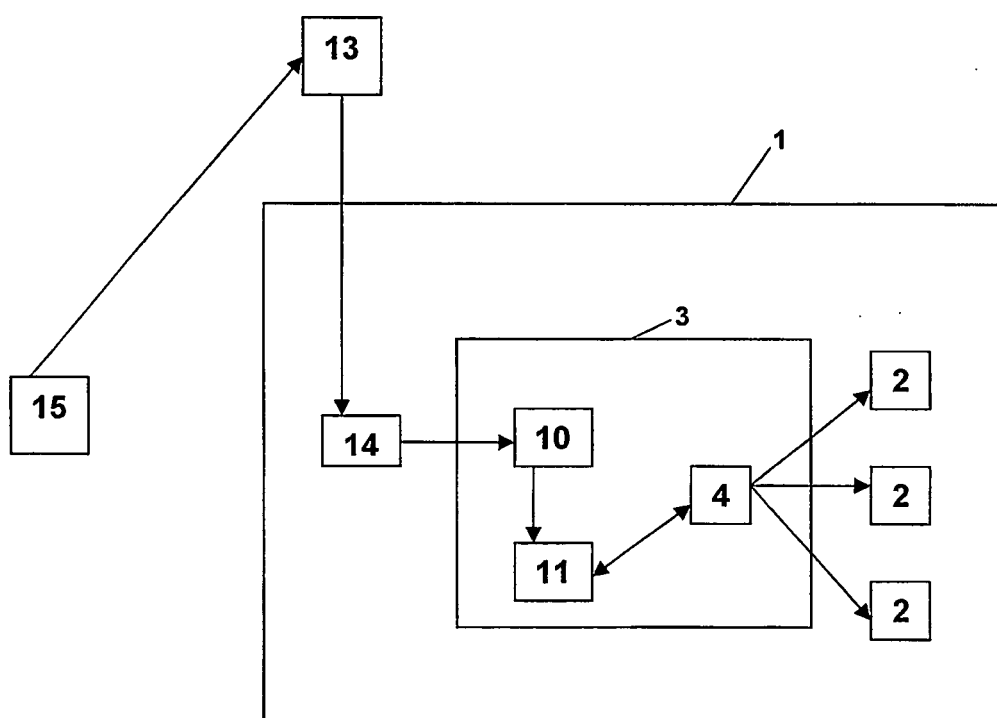


Fig 2

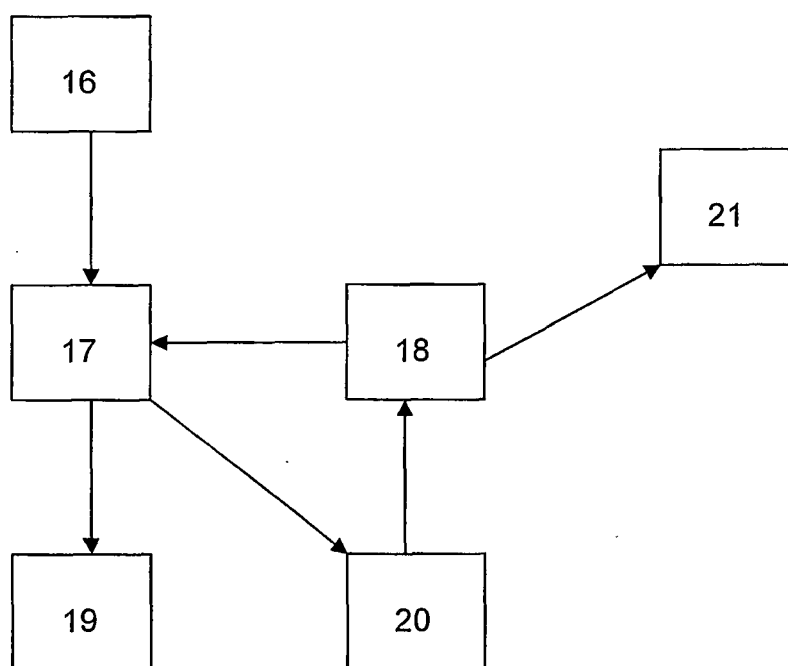


Fig 3

REFERENCES CITED IN THE DESCRIPTION

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