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(54) **A METHOD FOR COLLECTING DATA FROM A MOTOR-DRIVEN VEHICLE**

VERFAHREN ZUM SAMMELN VON DATEN VON EINEM MOTOR GETRIEBENEN FAHRZEUG

PROCEDE PERMETTANT DE RECUEILLIR DES DONNEES D'UN VEHICULE A MOTEUR

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Description

TECHNICAL FIELD:

[0001] The present invention relates to a method for collecting data from a motor-driven vehicle, which is provided with a microprocessor with memory for storing a particular quantity of data, the data being provided by a number of sensors connected to the vehicle and its motor and being recorded and compiled into a specific data file upon each recording occasion.

BACKGROUND ART:

[0002] With modern vehicles, faultfinding, for example in the event of a breakdown, can be difficult and time-consuming. At the same time, questions can arise concerning guarantees and whether the vehicle has been used correctly or whether the vehicle has been tampered with in any way by the user. In addition, it can be advantageous to be able to ascertain quickly whether the replacement of a vital component, such as a turbo-compressor, has resulted in the problem being put right.

[0003] These problems occur in particular with heavy vehicles such as lorries for long-distance transportation, which are subject to intensive use. In addition, these vehicles are optimized for being used within power ranges that are relatively close to the maximum power. Very high demands are also made regarding fuel economy for these vehicles.

[0004] GB-A-2043310 discloses an electrical device for storing data related to a journey of a motor vehicle. The device has a first data store and a second data store. The first data store comprises data related to the most resent journey portion which is continuously overwritten by new data. The second data store is used for storing information in case of power failure or in case of an accident. In such cases data is transferred from the first data store to the second data store. The electrical device in GB-A-2043310 may be considered as a analogue to the "black box" flight recorders used in air craft.

[0005] The length of this period of time is determined by the storage capacity of the memory unit. It is economically advantageous if this capacity can be reduced.

DISCLOSURE OF INVENTION:

[0006] An object of the invention is therefore to achieve a method for collecting data from a motor-driven vehicle, which method makes possible a cost-effective and efficient system solution.

[0007] For this object, the method according to the invention as stated in claim 1 is characterized by the steps of ascertaining that predetermined working conditions of the vehicle engine are fulfilled for recording a data file, of recording a data file as a non-erasable reference data file, and, on subsequent occasions when said conditions are fulfilled, of successively recording and storing a number of successively erasable data files within the predetermined quantity of data. As a result of designing the method in this way, the quantity of data contains both non-erasable reference data and erasable logging data, which means that the system solution can be made very cost-effective.

[0008] Advantageous embodiments of the invention are described in the following subsidiary claims.

BRIEF DESCRIPTION OF DRAWINGS:

[0009] The invention will be described in greater detail in the following, with reference to embodiments that are shown in the attached drawings, in which:

Figure 1 is a diagram that shows a torque graph for a motor, and

Figure 2 is a diagram that illustrates a scenario of change in engine speed over time that is a condition for recording.

MODES FOR CARRYING OUT THE INVENTION:

[0010] The method according to the invention is intended to be used for recording status information comprising a number of operational parameters for a driving motor mounted in a vehicle. These operational parameters can vary, for example depending upon the type of motor that the method is used with, the area of use of the motor and depending upon what information is available. Thus, the development of new types of sensor can open up new possibilities regarding information about the status of a motor. In addition, new legislation can result in new operational parameters needing to be added. The following embodiment thus contains only one example of what such status information can constitute.

[0011] The status information recorded on one and the same occasion can, for example, comprise the following

operational parameters: Cooling fan speed, Vehicle speed, Accelerator position, Engine load, Fuel supply pressure, Oil pressure, Turbocharger pressure, Turbo temperature, Ambient air pressure, Coolant temperature, Crankcase pressure, Incoming air temperature, Oil temperature, Fuel load, Engine speed, EGR, Total distance driven and Total running time for the motor.

[0012] This status information can be used to determine the condition of the motor and to study the historical trends during the life of the motor. An electronic diagnostic tool can be used for reading off and processing status information before this is presented to the user.

[0013] In this embodiment, there are four different events that cause a recording of status information to be carried out. After each of these events, a recording is carried out as soon as all the recording conditions are fulfilled. The status information is stored either in a rolling register or in a special memory, depending upon the event that caused the recording to be carried out. The memory structure can be designed in the following way:

Memory for special status recordings	First status recording
	Status recording after a certain period of time
	Component replacement 1
	Component replacement 2
Rolling register for normal status recordings	Number 1
	Number 2
	...
	Number 15

[0014] The first status recording is carried out when the motor is brand new and when all conditions for recording are fulfilled for the first time. This recording is never overwritten.

[0015] The second status recording is carried out after the motor has been running for a particular number of hours, corresponding to the motor's normal running-in period. This recording is never overwritten.

[0016] Use of the two remaining memory entries within the memory for special status recordings can be instigated via an electronic diagnostic tool in the event of a replacement of a vital component in the motor, for example in the event of a replacement of the turbo unit. These instigated recordings can be overwritten on a rolling basis. Instigated status recordings are carried out as soon as all the conditions for recording are fulfilled.

[0017] The normal register for status recording contains in this embodiment 15 memory entries, which are overwritten on a rolling basis with a suitable minimum interval of time. Time-activated status recording or fault-finding recording with a diagnostic tool is carried out as soon as all the conditions for recording are fulfilled.

[0018] In order that the different operational parameters in a status recording can contain relevant and repeatable data, a plurality of preconditions needs to be fulfilled before instigated or time-activated status recording can be carried out. For example, the sensors that are included in the recording conditions must be working properly. In addition, it is a condition that the motor is not in so-called motor protection mode.

[0019] Assuming that these preconditions are fulfilled and that the status recording is either instigated or time-activated, further conditions for the status recording need to be fulfilled. For example, the motor's coolant temperature must be within a particular range, the engine load must be high (close to maximum torque) or have a high torque requirement, the air pressure must be normal, motor protection mode must not be activated and the engine speed must be decreasing within a specific engine speed range.

[0020] The condition concerning the engine load means that the engine load must have been high for a particular period of time, for example for a few seconds. If the motor is not "healthy", it is possible that a system for reducing emissions will limit the torque when the torque requirement is high.

[0021] The condition concerning decreasing engine speed is only tested if the other conditions are fulfilled and occurs when the engine speed decreases within an engine speed range. If the engine speed increases within the range, the conditions will immediately become invalid, see Figure 2.

[0022] Figure 1 is a diagram that shows the engine speed on the X-axis and the torque on the Y-axis, and shows a conventional torque graph 10 for a combustion engine. Figure 2 illustrates the relationship of change in engine speed over time which is a condition for recording when the engine speed decreases by a particular number of rpm C within an engine speed range A-B. This is in order to ensure that the engine is running at full load and in this way to obtain conformity in the collection of data. D shows the fulfilling of the condition over time.

[0023] An electronic diagnostic tool that can be connected to the vehicle's data system can be used to instigate a recording of a data file when the conditions are fulfilled. This is used in particular when fault-finding on the vehicle.

[0024] The invention is not to be regarded as being limited to the embodiments described above, a number of further developments and modifications being possible within the framework of the following patent claims.

Claims

1. Method for collecting data from a motor-driven vehicle, which is provided with a microprocessor () with memory for storing a particular quantity of data, the data being provided by a number of sensors connected to the vehicle and its motor and being recorded and compiled into a specific data file upon each recording occasion, **characterized by** the steps
of ascertaining that predetermined working conditions of the vehicle engine are fulfilled for recording a data file,
of recording a data file as a non-erasable reference data file, and
on subsequent occasions when said conditions are fulfilled, of successively recording and storing a number of successively erasable data files within said memory.

2. Method according to Claim 1, **characterized by** the step of recording the reference data file when the vehicle is newly manufactured.

3. Method according to Claim 1 or 2, **characterized by** the step
of recording an additional non-erasable reference data file during running in or when the vehicle has just completed its running-in period.

4. Method according to any one of Claims 1 to 3, **characterized by** the step
of recording a reference data file when the vehicle undergoes a replacement of a vital motor component.

5. Method according to Claim 4, **characterized by** the step of recording an erasable reference data file when the vehicle undergoes a later replacement of a motor component.

6. Method according to Claim 4 or 5, **characterized by** the step of successively recording and storing an additional successively erasable reference data file in the event of subsequent replacements of a vital motor component.

7. Method according to any one of Claims 1 to 6, **characterized by** the step
of also recording calculated and estimated data in the data file, in addition to such data as is generated by sensors.

8. Method according to any one of claims 1 to 7, **characterized by** the step,
when said conditions are fulfilled, of instigating a recording of a data file via a diagnostic tool for use when fault-finding on the vehicle.

Patentansprüche

1. Verfahren zum Sammeln von Daten von einem motorbetriebenen Fahrzeug, das mit einem Mikroprozessor mit einem Speicher zum Speichern einer bestimmten Menge von Daten versehen ist, wobei die Daten durch eine Anzahl von Sensoren bereitgestellt werden, die mit dem Fahrzeug und seinem Motor verbunden sind, und nach jedem Aufzeichnungsereignis in eine spezifische Datendatei aufgezeichnet und kompiliert werden, **gekennzeichnet durch** die Schritte
der Ermittlung, dass vorherbestimmte Arbeitsbedingungen des Fahrzeugmotors für eine Aufzeichnung einer Datendatei erfüllt sind,
des Aufzeichnens einer Datendatei als nicht löschbare Referenzdatendatei, und bei darauffolgenden Ereignissen, wenn die Bedingungen erfüllt sind, des aufeinanderfolgenden Aufzeichnens und Speicherns einer Anzahl von aufeinanderfolgend löschbaren Datendateien in dem Speicher.

2. Verfahren nach Anspruch 1, **gekennzeichnet durch** den Schritt des Aufzeichnens der Referenzdatendatei, wenn das Fahrzeug neu hergestellt ist.

3. Verfahren nach Anspruch 1 oder 2, **gekennzeichnet durch** den Schritt,
des Aufzeichnens einer zusätzlichen, nicht löschbaren Referenzdatendatei während des Einfahrens oder wenn das Fahrzeug seine Einfahrperiode gerade abgeschlossen hat.

4. Verfahren nach einem der Ansprüche 1 bis 3, **gekennzeichnet durch** den Schritt des Aufzeichnens einer Referenzdatendatei, wenn bei dem Fahrzeug ein Austausch einer wesentlichen Motorkomponente durchgeführt wird.

5. Verfahren nach Anspruch 4, **gekennzeichnet durch** den Schritt des Aufzeichnens einer löschbaren Referenzdatendatei, wenn bei dem Fahrzeug ein späterer Austausch einer Motorkomponente durchgeführt wird.

6. Verfahren nach Anspruch 4 oder 5, **gekennzeichnet durch** den Schritt des aufeinanderfolgenden Aufzeichnens und Speicherns einer zusätzlichen aufeinanderfolgend löschbaren Referenzdatendatei im Falle nachfolgender Austausche einer wesentlichen Motorkomponente.

7. Verfahren nach einem der Ansprüche 1 bis 6, **gekennzeichnet durch** den Schritt, dass auch berechnete und geschätzte Daten in der Datendatei aufgezeichnet werden, zusätzlich zu solchen Daten, die **durch** die Sensoren erzeugt werden.

8. Verfahren nach einem der Ansprüche 1 bis 7, **gekennzeichnet durch** den Schritt, dass, wenn die Bedingungen erfüllt sind, eine Aufzeichnung einer Datendatei über ein Diagnostikwerkzeug veranlasst wird, das verwendet wird, wenn eine Fehlersuche an dem Fahrzeug durchgeführt wird.

Revendications

1. Procédé pour recueillir des données à partir d'un véhicule entraîné par moteur, qui est muni d'un microprocesseur ayant une mémoire pour mémoriser une quantité particulière de données, les données étant fournies par plusieurs capteurs reliés au véhicule et à son moteur et étant enregistrées et compilées dans un fichier de données spécifiques lors de chaque occasion d'enregistrement, **caractérisé par** les étapes consistant à s'assurer que des conditions actives prédéterminées du moteur de véhicule sont remplies pour enregistrer un fichier de données,
enregistrer un fichier de données sous la forme d'un fichier de données de référence non effaçable, et
lors d'occasions ultérieures lorsque lesdites conditions sont remplies, enregistrer et mémoriser successivement plusieurs fichiers de données successivement effaçables dans ladite mémoire.

2. Procédé selon la revendication 1, **caractérisé par** l'étape consistant à enregistrer le fichier de données de référence lorsque le véhicule est nouvellement fabriqué.

3. Procédé selon la revendication 1 ou 2, **caractérisé par** l'étape consistant à enregistrer un fichier de données de référence non effaçable supplémentaire pendant un rodage ou lorsque le véhicule a juste terminé sa période de rodage.

4. Procédé selon l'une quelconque des revendications 1 à 3, **caractérisé par** l'étape consistant à enregistrer un fichier de données de référence lorsque le véhicule subit le remplacement d'un composant vital du moteur.

5. Procédé selon la revendication 4, **caractérisé par** l'étape consistant à enregistrer un fichier de données de référence effaçable lorsque le véhicule subit un remplacement ultérieur d'un composant de moteur.

6. Procédé selon la revendication 4 ou 5, **caractérisé par** l'étape consistant à successivement enregistrer et mémoriser un fichier de données de référence effaçable successivement complémentaire dans le cas de remplacements ultérieurs d'un composant vital de moteur.

7. Procédé selon l'une quelconque des revendications 1 à 6, **caractérisé par** l'étape consistant à aussi enregistrer des données calculées et estimées dans le fichier de données, en plus des données produites par des capteurs.

8. Procédé selon l'une quelconque des revendications 1 à 7, **caractérisé par** l'étape, lorsque lesdites conditions sont remplies, consistant à susciter un enregistrement d'un fichier de données via un outil de diagnostic destiné à être utilisé lors de la découverte d'un défaut sur le véhicule.

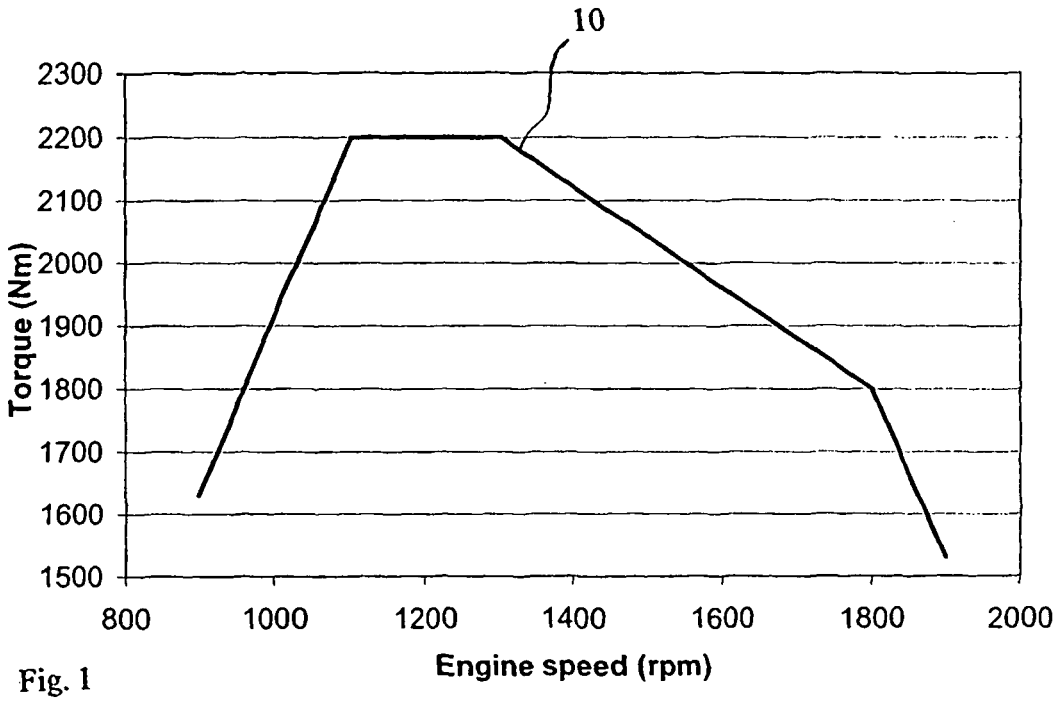

10
2300
2200
2100
2000
1900
1800
1700
1600
1500
Torque (Nm)
800
1000
1200
1400
1600
1800
2000
Engine speed (rpm)

Fig. 1

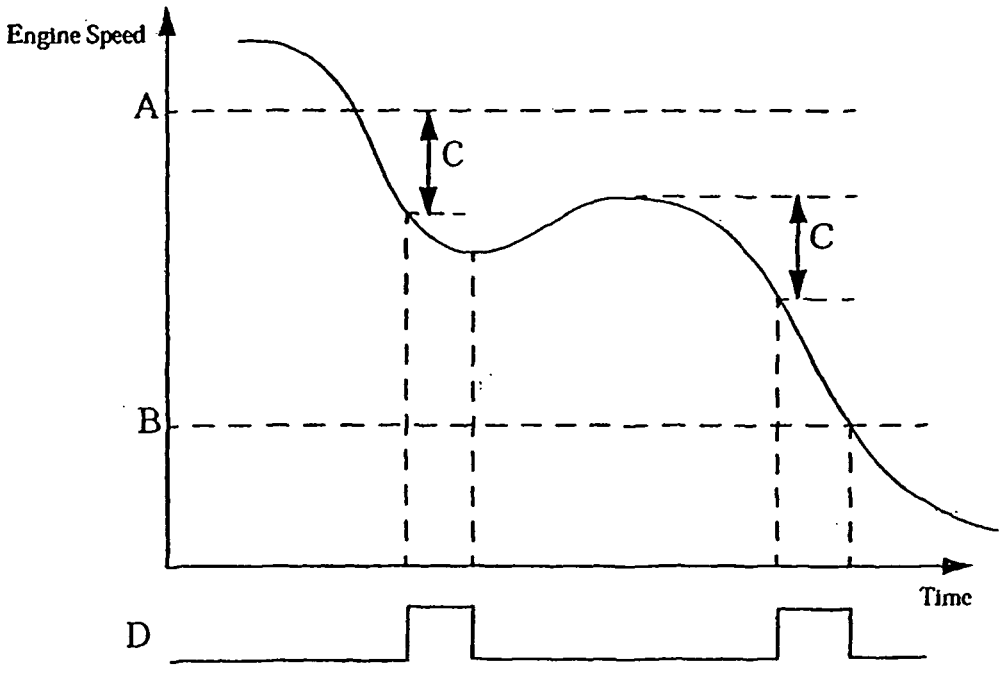

Engine Speed
A
B
C
C
Time
D

Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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