



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.03.2011 Bulletin 2011/13

(51) Int Cl.:
G07C 5/08 (2006.01) B60R 16/023 (2006.01)

(21) Application number: **09170535.0**

(22) Date of filing: **17.09.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

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(54) **System, vehicle, method and computer program product**

(57) System for monitoring the amount of power being drawn from an electric power source (12) by onboard peripheral equipment (14) of a vehicle (10). The system comprises at least one sensor means arranged to determine the amount of power being drawn from an electric power source (12) by at least one piece of onboard peripheral equipment (14) of a vehicle (10), and an indicator

(18) arranged to provide a user of the vehicle (10) with information concerning the amount of power being drawn from said electric power source (12) by said at least one piece of onboard peripheral equipment (14) when the vehicle (10) is in use, whereby the indicator (18) is arranged to show the inverse of the amount of power being drawn from said electric power source (12).

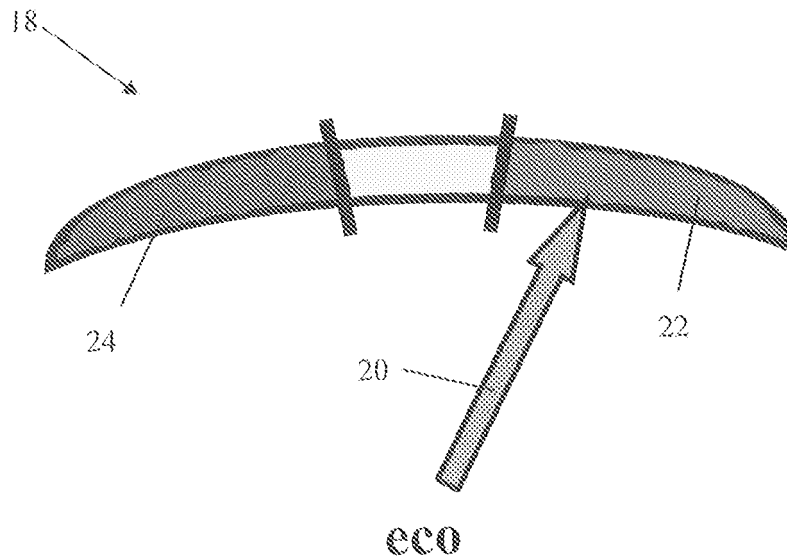


Fig. 2

Description

TECHNICAL FIELD

[0001] The present invention concerns a system for monitoring the amount of power being drawn from an electric power source by onboard peripheral equipment of a vehicle, a vehicle comprising such a system and a method of saving energy in a vehicle and a computer program product.

BACKGROUND OF THE INVENTION

[0002] Electric vehicles and hybrid electric vehicles can receive their power from a number of sources, including fossil fuels, nuclear power, and renewable sources, such as tidal power, solar power and wind power. Energy may be transmitted to the vehicle through use of overhead lines, wireless energy transfer or a direct connection through an electrical cable. The electricity may then be stored onboard the vehicle in an electric power source such as a battery, flywheel, supercapacitor or fuel cell. Power is drawn from the electric power source when the vehicle is being driven.

[0003] Many vehicles now contain an ecometer. An ecometer is a fuel consumption gauge that helps drivers visually monitor how their driving style impacts their vehicles' fuel consumption allowing them to save fuel and money and to reduce the vehicle's carbon monoxide emissions.

[0004] Conventional ecometers display fuel consumption (in miles per gallon or kilometers per litre or some other distance per volume measure) on an easy to read display, such as a colour coded eco-graph, which may help to train a driver to drive in a more efficient and environmentally friendly manner and consequently improve the fuel economy of his/her vehicle and improve the environment.

[0005] As drivers are becoming increasingly environmentally aware, new ways of saving energy when using a vehicle are being sought.

SUMMARY OF THE INVENTION

[0006] An object of the invention is to provide a system that helps a user of a vehicle to save energy when he/she is using the vehicle.

[0007] This object is achieved by a system for monitoring the amount of power being drawn from an electric power source by the onboard peripheral equipment of a vehicle, i.e. all of the electrically-powered equipment of a vehicle that is used for peripheral functions not concerned with driving, such as an air conditioning unit, seat warming devices, a vehicle's multimedia system, a GPS system, a windscreen warming/wiping device, etc. The system comprises at least one sensor means that is arranged to determine the amount of power being drawn from at least one electric power source, such as a battery,

flywheel, supercapacitor or fuel cell, or a plurality or combination thereof, by at least one piece of onboard peripheral equipment of a vehicle.

[0008] The system also comprises an indicator arranged to provide a user of the vehicle with information concerning the amount of power being drawn from the electric power source by the at least one piece of onboard peripheral equipment when the vehicle is in use, i.e. when the vehicle is being driven or just before its engine has been switched on or just after its engine has been switched off, which information is based on the information determined by the at least one sensor means. The indicator is arranged to show the inverse of the amount of power being drawn from the electric power source, i.e. the higher the amount of power being drawn from the electric power source, the lower the reading on the indicator. The reading on the indicator is therefore inversely proportional to the power being drawn from the electric power source and thereby directly proportional to the environmental benefit of operating onboard peripheral equipment at a particular operating status.

[0009] The system will therefore inform a user of a vehicle how the use of at least one piece of onboard peripheral equipment impacts his/her vehicle's fuel consumption and thereby allow the vehicle user to save fuel (i.e. electric power) and money by using the onboard peripheral equipment in his/her vehicle in a more environmentally-friendly manner. A user might namely be encouraged to switch off a piece of onboard peripheral equipment or to change its operating status to a lower fuel consuming level on being provided with information concerning how much fuel is being used to power the onboard peripheral equipment he/she is using.

[0010] The expression "sensor means" as used throughout this document is intended to include means for detecting/measuring/sensing/receiving information concerning or related to the amount of power being drawn from an electric power source, and means for determining/calculating the amount of power being drawn from the electric power source on the basis of said information. A sensor means may for example include hardware and/or software components, such an ammeter and a processor means, such as a vehicle's electronic control unit, ECU.

[0011] The amount of power being drawn from an electric power source may for example be determined by measuring or estimating the amount of current being drawn by the at least one piece of onboard peripheral equipment. An ECU may be arranged to receive readings from the ammeter and determine the power being drawn from the electric power source based on those readings. Alternatively, a sensor means may for example be arranged to detect a particular operating status of a piece of on board equipment (i.e. whether a particular piece of onboard peripheral equipment is switched on or off, or the fuel consuming level at which it is operating), whereby said sensor means is arranged to equate a particular operating status to a particular amount of power being

drawn from the electric power source.

[0012] The indicator may be arranged to display substantially instantaneous and/or average fuel consumption over a predetermined time period. It may be arranged to provide information concerning each piece of onboard peripheral equipment separately, whereupon a user may see the effect of changing the operating status of a particular piece of onboard peripheral equipment to a lower/higher fuel consuming level. Alternatively or additionally, it may be arranged to show the total amount of power being drawn from an electric power source by all of the onboard peripheral equipment, whereby a user may see the effect of changing the operating status of one or more pieces of onboard peripheral equipment on the total amount of power being drawn from the battery.

[0013] Information may be provided to the user substantially constantly, periodically, at a specific point in time, for example whenever the operating status of a piece of onboard peripheral equipment is changed or when the available electric power in the electric power source falls below a certain level, or on request. The information may be provided to a user visually and/or audibly and/or tactily.

[0014] According to an embodiment of the invention the system is arranged to provide a user of the vehicle with the operating status of the at least one piece of onboard peripheral equipment. A vehicle's engine may for example be switched off when a piece of onboard peripheral equipment is switched on and, if the vehicle does not comprise means to automatically switch off that piece of onboard peripheral equipment when the engine is switched off, that piece of onboard peripheral equipment will automatically return to the operating status it had before the vehicle's engine was switched off when the vehicle's engine is switched back on again. Additionally, a passenger leaving a vehicle might leave a seat warming device switched on unnecessarily. The system according to the invention, by providing a user of the vehicle with the operating status of onboard peripheral equipment, might therefore result in an unwanted or unnecessary piece of onboard peripheral equipment being switched off.

[0015] According to another embodiment of the invention the system is arranged to provide a user of the vehicle with the operating status of the at least one piece of onboard peripheral equipment substantially constantly, periodically, at a specific point in time, for example whenever the operating status of a piece of onboard peripheral equipment is changed or when the available electric power in the electric power source falls below a certain level, or on request.

[0016] According to a further embodiment of the invention the system comprises a memory that is arranged to store the information and/or processor means that is arranged to send the information to a user outside of the vehicle. Stored and/or transmitted information may be analysed and thereby provide a user or an interested party with fuel consumption information.

[0017] The present invention also concerns a vehicle comprising a system according to any of the embodiments of the invention. The vehicle may be an electric or hybrid vehicle or any other vehicle comprising at least one electric power source. The present invention is particularly advantageous for a vehicle powered at least in part by an electric power source, such as an electrically powered vehicle, since the vehicle's range, i.e. the maximum distance the vehicle can travel before its electric power source needs to be recharged, will be affected by the amount of power drawn from its electric power source to power the onboard peripheral equipment in the vehicle.

[0018] The present invention further concerns a method of saving energy in a vehicle. The method comprises the steps of determining the amount of power being drawn from an electric power source by at least one piece of onboard peripheral equipment of a vehicle and providing a user of the vehicle with the inverse of this information when the vehicle is in use.

[0019] According to an embodiment of the invention the total amount of power being drawn from an electric power source by all of the onboard peripheral equipment of the vehicle is determined.

[0020] According to another embodiment of the invention the method comprises the step of providing a user of the vehicle with the operating status of the at least one piece of onboard peripheral equipment substantially constantly, periodically, at a specific point in time or on request.

[0021] According to a further embodiment of the invention the method comprises the step of storing and/or sending the information to a user outside of the vehicle.

[0022] The present invention also concerns a computer program product that comprises a computer program containing computer program code means arranged to cause a computer or a processor to execute the steps of a method according to any of the embodiments of the invention, stored on a computer-readable medium or a carrier wave.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The present invention will hereinafter be further explained by means of non-limiting examples with reference to the appended figures where;

Figure 1 shows a vehicle comprising a system according to an embodiment of the invention,

Figure 2 shows an indicator of a system according to an embodiment of the invention,

Figure 3 shows a display means of a system according to an embodiment of the invention, and

Figure 4 is a flow diagram showing the steps of a method according to an embodiment of the invention.

[0024] It should be noted that the drawings have not been drawn to scale and that the dimensions of certain features have been exaggerated for the sake of clarity.

DETAILED DESCRIPTION OF EMBODIMENTS

[0025] Figure 1 shows a vehicle 10 comprising a system according to an embodiment of the invention. The vehicle 10 comprises an electric power source 12, such as one or more batteries and a piece of onboard peripheral equipment 14, such as a seat warming device powered by the electric power source 12. The system for monitoring the amount of power being drawn from the electric power source 12 by the seat warming device 14 comprises a sensor means 16 that arranged to determine the amount of power being drawn from the electric power source 12 by the seat warming device 14 substantially continuously, such as once per second, periodically, at a specific point in time or on request. An indicator 18 arranged to provide a user of the vehicle 10 with information concerning the amount of power being drawn from the electric power source 12 by the seat warming device 14 when the vehicle 10 is in use based on the determinations made by the sensor means 16.

[0026] The indicator 18 is arranged to show the inverse of the amount of power being drawn from said electric power source 12. For example, the indicator 18 may be arranged to show: (100% of the possible consumption in power) minus (the determined consumption in power).

[0027] It should be noted that a single sensor means 18 may be used to determine the amount of power being drawn from the electric power source 12 by a just one, a plurality, or all of the pieces of onboard peripheral equipment 14, optionally depending on which pieces of onboard peripheral equipment 14 a vehicle user chooses to monitor.

[0028] Figure 2 shows an indicator 18 according to an embodiment of the invention. In the illustrated embodiment the indicator 18 is in the form of a gauge incorporated into the dashboard of the vehicle 10 which shows the total amount of power being drawn by all of the onboard equipment 14 of a vehicle. The indicator 18 may comprise a colour coded ecograph display to provide easily understandable visual feedback to a user of a vehicle 10. When the indicator's arrow 20 is pointing to the right hand side 22 of the display the driver is using the vehicle's onboard peripheral equipment 14 in an environmentally-friendly manner since a relatively small amount of power is being drawn from the vehicle's electric power source 12. When the indicator's arrow 20 is pointing to the left hand side 24 of the display the driver is drawing a relatively large amount of power from the electric power source 12 in order to power the onboard peripheral equipment 14 and therefore not driving in an environmentally friendly manner.

[0029] Such an indicator 18 may be incorporated into a vehicle's speedometer or tachometer display. Alternatively, such an indicator 18 may be provided above the

control panel of a piece of onboard peripheral equipment 14. The indicator 18 may comprise a digital display representing/showing the amount of power being drawn from the electric power source. The indicator 18 may also be arranged to provide a visual, audible or tactily detectable alarm signal, for example if the power available from the electric power source 12 falls below a certain level and a user of a vehicle is drawing a relatively large amount of power from the electric power source 12 in order to power the vehicle's onboard peripheral equipment 14.

[0030] Figure 3 shows an indicator 18 comprising a display means 18 such as an LCD display screen. The LCD display screen may be arranged to provide a user the operational status of onboard peripheral equipment 12 when the user presses a status button 26 for example. In the illustrated embodiment a user is provided with information that his/her vehicle's stereo, air conditioning unit and seat warmer device are switched on and that his/her GPS system is switched off. Words such as low, medium or high, numerical or colour indicators may be used to provide the driver with information concerning the amount of power that is being drawn from the electric power source 12 when operating a piece of onboard peripheral equipment 12 at the level at which its operating. The user may then choose to change the operating status of one or more pieces of onboard peripheral equipment 14, optionally in response to a prompt from the system, for example by pressing a reset button 28.

[0031] A vehicle user using a system according to the present invention could therefore quickly learn how to achieve improved fuel economy, or mileage, by using his onboard peripheral equipment in an environmentally friendly manner.

[0032] According to an embodiment of the invention the system may comprise a memory 30 that is arranged to store the information and/or processor means 32 that is arranged to send information concerning the amount of power drawn from the electric power source 12 of a vehicle in order to power the vehicle's onboard peripheral equipment to a user outside of the vehicle 10. The memory 30 and processor means 32 may for example be located in the vehicle's electrical control unit (ECU).

[0033] Figure 4 shows the steps of a method for saving energy in a vehicle according to an embodiment of the invention. The method comprises the steps of determining the amount of power being drawn from an electric power source by at least one piece of onboard peripheral equipment of a vehicle and providing a user of the vehicle with the inverse of this information when the vehicle is in use. Optionally, this information may also be stored for subsequent analysis or transmitted to a remote user for example. The method also comprises the step of providing a user of the vehicle with the operating status of the at least one piece of onboard peripheral equipment and/or asking a user whether he/she would like to change the operating status of any of the vehicle's onboard peripheral equipment.

[0034] Further modifications of the invention within the scope of the claims would be apparent to a skilled person. There are for example many ways in which information concerning the amount of power being drawn from at least one electric power source may be determined and subsequently provided in inverse to a user.

Claims

1. System for monitoring the amount of power being drawn from an electric power source (12) by onboard peripheral equipment (14) of a vehicle (10), **characterized in that** it comprises at least one sensor means (16) arranged to determine the amount of power being drawn from said electric power source (12) by at least one piece of onboard peripheral equipment (14) of a vehicle (10), and an indicator (18) arranged to provide a user of the vehicle (10) with information concerning the amount of power being drawn from said electric power source (12) by said at least one piece of onboard peripheral equipment (14) when the vehicle (10) is in use, whereby the indicator (18) is arranged to show the inverse of the amount of power being drawn from said electric power source (12). 5
2. System according to claim 1, **characterized in that** said indicator (18) is arranged to provide a user of the vehicle (10) with information concerning the total amount of power being drawn from an electric power source (12) by all of said onboard peripheral equipment (14). 10
3. System according to claim 1 or 2, **characterized in that** it is arranged to provide a user of the vehicle (10) with the operating status of said at least one piece of onboard peripheral equipment (14). 15
4. System according to claim 3, **characterized in that** it is arranged to provide a user of the vehicle (10) with said operating status substantially constantly, periodically, at a specific point in time, for example whenever the operating status of a piece of onboard peripheral equipment (14) is changed or when the available electric power in the electric power source (12) falls below a certain level, or on request. 20
5. System according to any of the preceding claims, **characterized in that** it comprises a memory (30) that is arranged to store said information and/or processor means (32) that is arranged to send said information to a user outside of the vehicle (10). 25
6. Vehicle (10) comprising a system according to any of claims 1-5. 30
7. Vehicle (10) according to claim 6, **characterized in that** it is a vehicle powered at least in part by an electric power source. 35
8. Method of saving energy in a vehicle (10), **characterized in that** it comprises the steps of determining the amount of power being drawn from an electric power source (12) by at least one piece of onboard peripheral equipment (14) of a vehicle (10) and providing a user of the vehicle (10) with the inverse of this information when the vehicle (10) is in use. 40
9. Method according to claim 8, **characterized in that** the total amount of power being drawn from an electric power source (12) by all of said onboard peripheral equipment (14) of the vehicle (10) is determined. 45
10. Method according to claim 8 or 9, **characterized in that** it comprises the step of providing a user of the vehicle (10) with the operating status of said at least one piece of onboard peripheral equipment (14). 50
11. Method according to any of claims 8-10, **characterized in that** it comprises the step of storing and/or sending said information to a user outside of the vehicle (10). 55
12. Computer program product, **characterized in that** it comprises a computer program containing computer program code means arranged to cause a computer or a processor to execute the steps of a method according to any of claims 8-11, stored on a computer-readable medium or a carrier wave.

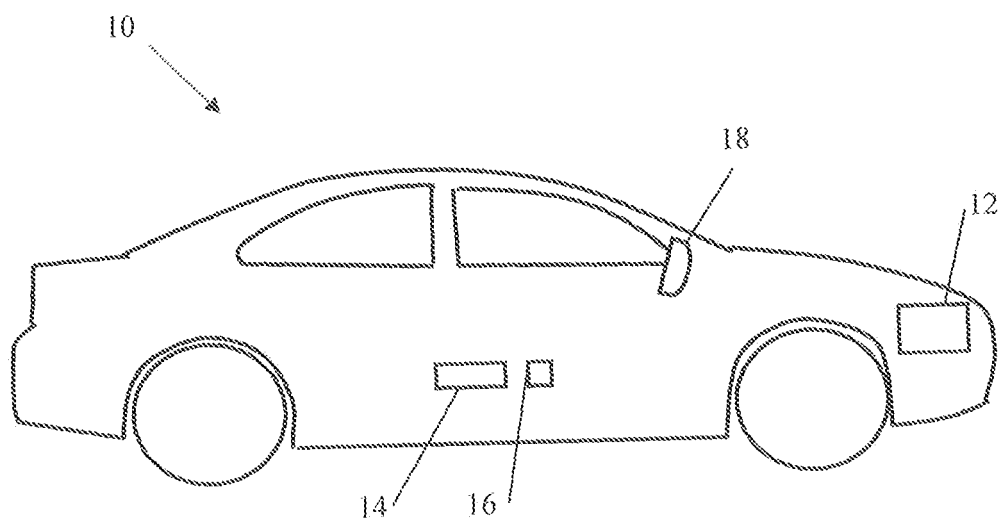


Fig. 1

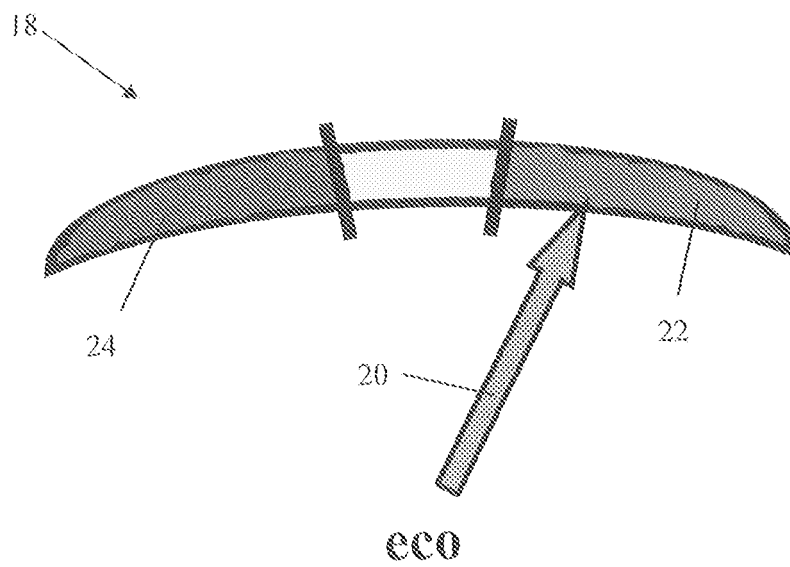
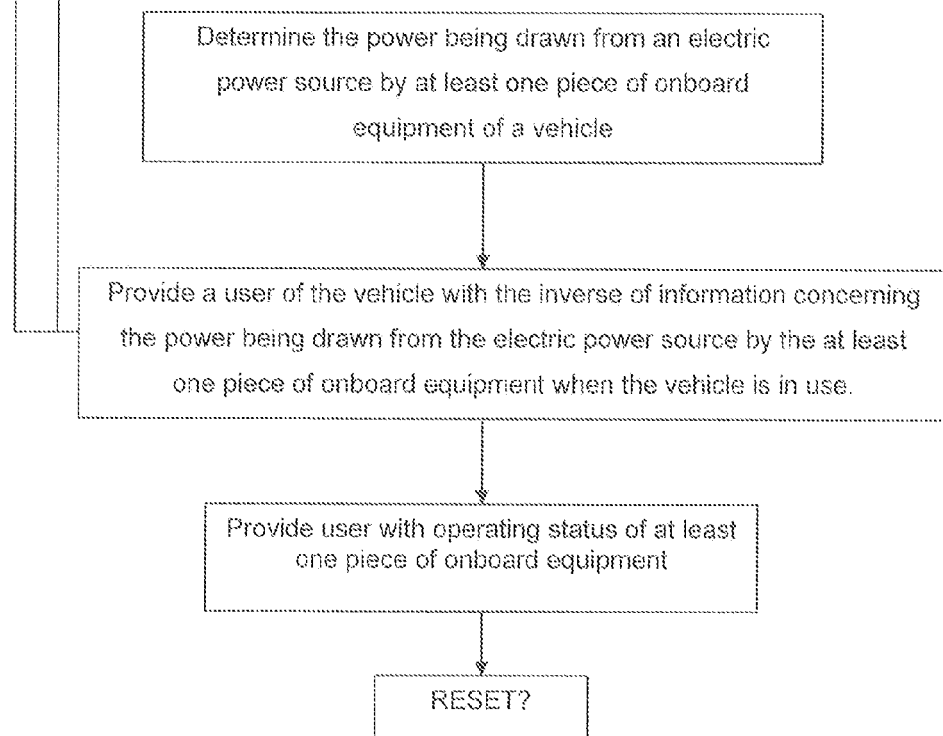
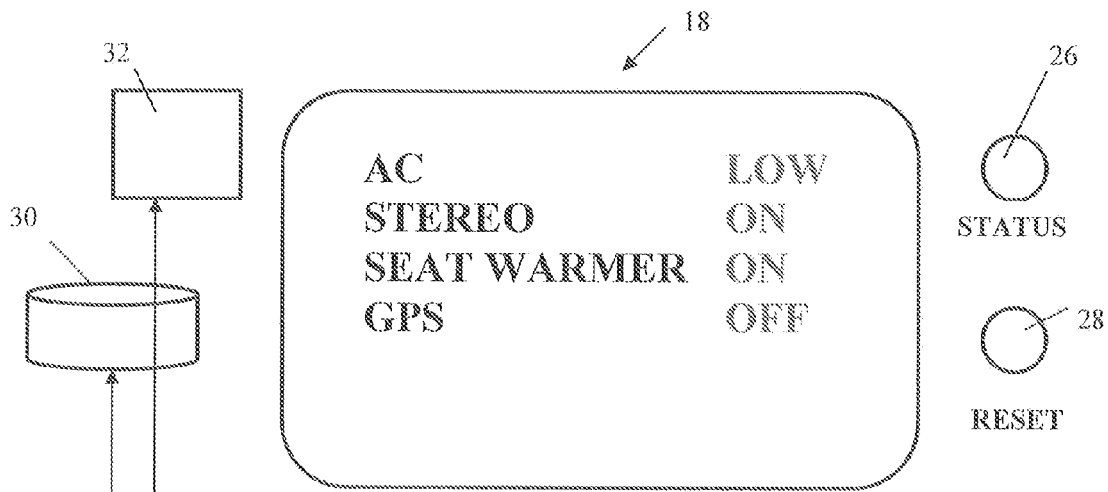


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 09 17 0535

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 101 38 750 A1 (CAA AG [DE]) 27 February 2003 (2003-02-27)	1-4,6, 8-10,12	INV. G07C5/08 B60R16/023
Y	* abstract * * column 1, line 45 - column 2, line 7 * * column 3, line 34 - column 5, line 68 * * figures 1,3 *	5,7,11	
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A	* abstract * * page 2, line 3 - page 5, line 9 * * page 8, line 57 - page 9, line 33 * * figures 1,3 *	1-2,6, 8-9,12	
A	----- US 2003/144779 A1 (OBAYASHI KAZUYOSHI [JP] ET AL) 31 July 2003 (2003-07-31) * page 1, paragraph 1 - paragraph 2 * * page 1, paragraph 7 - paragraph 9 * * page 2, paragraph 18 - paragraph 21 * * page 2, paragraph 36 * * page 3, paragraph 40 - page 4, paragraph 56 * * page 5, paragraph 80 * * page 6, paragraph 88 - paragraph 89 * * page 7, paragraph 116 *	1-4, 6-10,12	TECHNICAL FIELDS SEARCHED (IPC) G07C B60R
A	----- EP 2 028 059 A2 (AUDI NSU AUTO UNION AG [DE]) 25 February 2009 (2009-02-25) * abstract * * column 2, paragraph 5 - column 8, paragraph 24 *	1-4,6, 8-10,12	
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 January 2010	Examiner Van der Haegen, D
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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EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

Application Number
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Place of search The Hague		Date of completion of the search 27 January 2010	Examiner Van der Haegen, D
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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