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[Continued on next page]

(54) **Title:** VEHICLE POWER MANAGEMENT APPARATUS AND METHOD

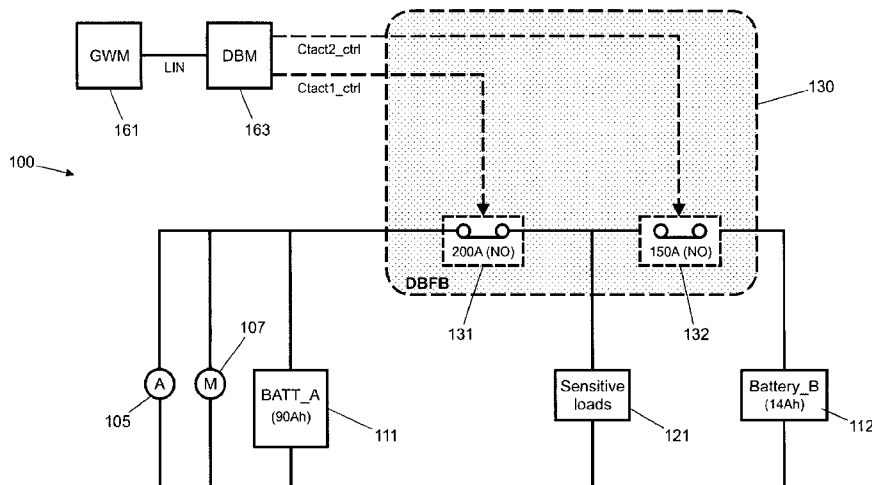


Figure 1 PRIOR ART

(57) **Abstract:** Embodiments of the invention provide electrical power management apparatus for a motor vehicle comprising: a primary power storage device for powering an engine starter device; a vehicle electrical load; a secondary power storage device for powering the vehicle electrical load; and a solid state primary diode portion coupled between the primary power storage device and the vehicle electrical load, the primary diode portion being operable to allow a flow of current in a forward direction therethrough from the primary power storage device to the vehicle electrical load when the starter device is not in use and to prevent a flow of current in a reverse direction therethrough from the secondary power storage device to the engine starter device when the starter is in use.

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- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/051484

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60L11/18 H02J7/14
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
H02J B60L
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/035317 A1 (SIEMENS AG [DE]; BOLZ STEPHAN [DE]; KNORR RAINER [DE]; LUGERT GUENTER) 21 April 2005 (2005-04-21) page 9, line 24 - page 17, line 5 figures 1,2 abstract	1-6,28, 29, 33-35,55
X	EP 0 945 959 A2 (BOSCH GMBH ROBERT [DE]) 29 September 1999 (1999-09-29) column 2, line 34 - column 4, line 36 figure 1 abstract	1,33
X	WO 02/066293 A1 (SIEMENS AG [DE]; BOLZ STEPHAN [DE]; KNORR RAINER [DE]) 29 August 2002 (2002-08-29) page 10, line 13 - page 15, line 18 figure 4 abstract	1,33

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/051484

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: 57, 58
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-6, 28, 29, 33-35, 55

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6, 28, 29, 33-35, 55

A method and an apparatus for a motor vehicle comprising: a primary power storage device for powering an engine starter device; a vehicle electrical load; a secondary power storage device for powering the vehicle electrical load; and a solid state primary diode portion coupled between the primary power storage device and the vehicle electrical load, the primary diode portion being operable to allow a flow of current in a forward direction therethrough from the primary power storage device to the vehicle electrical load when the starter device is not in use and to prevent a flow of current in a reverse direction therethrough from the secondary power storage device to the engine starter device when the starter is in use.
Further features of the first invention relate to details of the primary diode portion.

2. claims: 7-12, 25-27, 36-39, 49-54

A method and an apparatus for a motor vehicle comprising: a primary power storage device for powering an engine starter device; a vehicle electrical load; a secondary power storage device for powering the vehicle electrical load; and a solid state primary diode portion coupled between the primary power storage device and the vehicle electrical load, the primary diode portion being operable to allow a flow of current in a forward direction therethrough from the primary power storage device to the vehicle electrical load when the starter device is not in use and to prevent a flow of current in a reverse direction therethrough from the secondary power storage device to the engine starter device when the starter is in use.
The second invention has as special technical features a primary diode controller for operating the primary diode portion in a standby mode.

3. claims: 13-15, 40-42

A method and an apparatus for a motor vehicle comprising: a primary power storage device for powering an engine starter device; a vehicle electrical load; a secondary power storage device for powering the vehicle electrical load; and a solid state primary diode portion coupled between the primary power storage device and the vehicle electrical load, the primary diode portion being operable to allow a flow of current in a forward direction therethrough from the primary power storage device to the vehicle electrical load when the starter device is not in use and to prevent a flow of current in a reverse direction therethrough from the

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

secondary power storage device to the engine starter device when the starter is in use.

The third invention has as special technical features a battery charging device.

4. claims: 16-24, 30-32, 43-48, 56

A method and an apparatus for a motor vehicle comprising: a primary power storage device for powering an engine starter device; a vehicle electrical load; a secondary power storage device for powering the vehicle electrical load; and a solid state primary diode portion coupled between the primary power storage device and the vehicle electrical load, the primary diode portion being operable to allow a flow of current in a forward direction therethrough from the primary power storage device to the vehicle electrical load when the starter device is not in use and to prevent a flow of current in a reverse direction therethrough from the secondary power storage device to the engine starter device when the starter is in use.

The fourth invention has as special technical features a secondary diode portion being connected between the electrical load and the second power storage device.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 57, 58

Claims 57 and 58 contain a definition of their subject matters reference to the description and drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here. Such claims do not fulfill the requirements of Art. 6 PCT since their subject matter is not defined. Consequently, claims 57 and 58 were not searched.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/051484

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
WO 2005035317	A1	21-04-2005	DE 10346325 A1	04-05-2005
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			WO 02066293 A1	29-08-2002
