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[Continued on next page]

(54) Title: POWER SUPPLY FOR A DATA CENTER

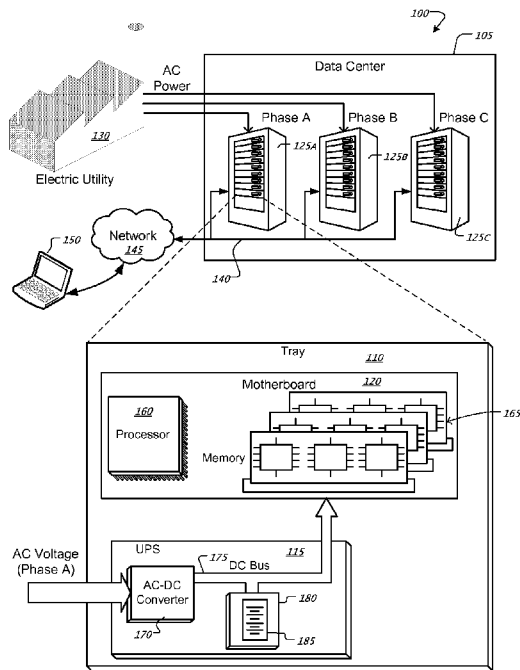


FIG. 1B

(57) Abstract: Apparatus and associated method and computer program products involve a highly efficient uninterruptible power distribution architecture to support modular processing units. As an illustrative example, a modular processing unit includes an integrated uninterruptible power system in which a PFC-boost AC-to-DC conversion occurs between the utility AC grid and the processing circuit (e.g., microprocessor) loads. In an illustrative data center facility, a power distribution architecture includes a modular array of rack-mountable processing units, each of which has processing circuitry to handle network-related processing tasks. Associated with each modular processing unit is an integrated uninterruptible power supply (UPS) to supply operating power to the network processing circuitry. Each UPS includes a battery selectively connectable across a DC bus, and an AC-to-DC rectifier that converts an AC input voltage to a single output voltage on the DC bus. The regulated DC bus voltage may be close to the battery's fully charged voltage.

WO 2009/012451 A3



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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

**Published:**

— *with international search report (Art. 21(3))*  
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**Declarations under Rule 4.17:**

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

**(88) Date of publication of the international search report:**

13 August 2009

**INTERNATIONAL SEARCH REPORT**

International application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**

INV. H02J9/06 G06F1/26 H02M3/335 H02J1/14  
ADD. H02M1/42

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 G06F H02M

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 practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 1 355 404 A (HITACHI LTD [JP]; HITACHI COMP PERIPHERALS CO [JP]; HITACHI MAXELL [JP] 22 October 2003 (2003-10-22) abstract paragraph [0022] - paragraph [0034]; figures 6-8	1-21, 31-33, 40-44 22-30
X	US 2005/182981 A1 (HAYASHI KATSUNORI [JP]) 18 August 2005 (2005-08-18) abstract; figures 4,8	1,40
X	US 6 157 168 A (MALIK RANDHIR S [US]) 5 December 2000 (2000-12-05) abstract; figure 2A	1,40
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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 document 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)

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\*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.

\*G\* document member of the same patent family

Date of the actual completion of the international search

17 June 2009

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26/06/2009

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## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2008/070475

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 2007/139577 A (EXAFLOP LLC [US]; KRIEGER KEN [US]; BORCHERS ALBERT [US]) 6 December 2007 (2007-12-06) the whole document -----	1, 22-24, 40
Y	US 2006/187600 A1 (BROWN SCOTT R [US] ET AL) 24 August 2006 (2006-08-24) paragraph [0007] - paragraph [0008] paragraph [0023]; claim 13 -----	22-24
A	US 3 757 131 A (KRUTZ R ET AL) 4 September 1973 (1973-09-04) column 4, line 55 - column 5, line 48 -----	22-24
Y	US 4 809 151 A (OTA NAOTO [JP]) 28 February 1989 (1989-02-28) abstract; figure 1 -----	25-30
Y	US 6 225 708 B1 (FURUKAWA NOBORU [JP] ET AL) 1 May 2001 (2001-05-01) abstract; figure 2 -----	25-30
A	US 2005/286191 A1 (VORENKAMP PIETER [US] ET AL) 29 December 2005 (2005-12-29) abstract; figures 1, 2, 5 -----	25-30

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2008/070475

## 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.:  
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:
  
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 allsearchable 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.:  
  
1-33, 40-44
  
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.:

### 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/SA/ 210**

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

1. claims: 1-21,40-44

DC bus voltage setting  
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2. claims: 22-33

restoration of the AC mains supply  
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3. claims: 34,37-39,45,48-52

PFC control of AC/DC converter  
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4. claims: 35-36,46-47

DC supply impedance matching  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/070475

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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