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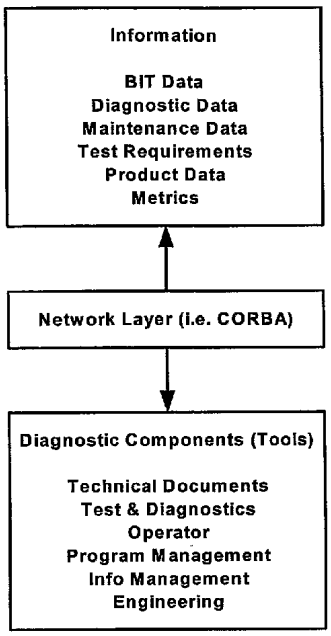
Published:
— *with international search report*

[Continued on next page]

(54) Title: INTELLIGENT INTEGRATED DIAGNOSTICS

Figure 1



(57) Abstract: A diagnostics system comprising a topological map of a target system that has nodes (38, 40, 42, 44, 46, 48) that correspond to components (29, 30, 32, 34, 36) of the target system 5 and links that correspond to connections between the components. Associated with the topological map, is a knowledge store (50) that has a structure that reflects or corresponds to, that of the topological map. Included in this store (50) is a plurality of sections or libraries each of which is provided for storing design specific data associated with one of the nodes (38, 40, 42, 44, 46, 48) of the topological map. Data received from one or 10 more sensors on the target system is included in the topological map, and used together with the design specific infonnation in the knowledge store to diagnose faults.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G05B23/02

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)
IPC 7 G05B

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5 528 752 A (T.KISE ET AL) 18 June 1996 (1996-06-18) column 3, line 57 - column 5, line 59	1-3,6-9, 14-20 4,5, 10-13
Y	US 2003/167111 A1 (KIPERSZTOK OSCAR ET AL) 4 September 2003 (2003-09-04) paragraph [0035] - paragraph [0037]	4,5, 10-13
A	US 5 633 800 A (BANKERT ET AL) 27 May 1997 (1997-05-27) column 2, line 30 - column 3, line 55	1,14-16, 20
A	US 5 914 875 A (MONTA ET AL) 22 June 1999 (1999-06-22)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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)

"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

Date of the actual completion of the international search	Date of mailing of the international search report
13 September 2005	11. 11. 2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kelperis, K

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/004585

Box 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 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 fee, this Authority did not invite payment of any additional fee.

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.:

1-20

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ 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: 1-20

A diagnostics system comprising:
a topological map of a target system that has nodes that correspond to components of the target system and links that correspond to connections between the components;
a knowledge store that has a structure that reflects or corresponds to that of the topological map, the store having a plurality of sections or libraries each of which is provided for storing data associated with one of the nodes defined in the topological map;
means for receiving data from one or more sensors on the target system;
means for including either the received data in the topological map and/or data that is a function of that received data, and
means for diagnosing faults using the data in the topological map and the knowledge store.

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2. claims: 21-30

A method for diagnosing faults in a target system comprising;
receiving sensor data for sensors in the target system;
using the received data to generate system specific data, for example modelled data;
searching for potentially faulty components by applying a plurality of diagnostic tools to the received and/or generated data, which tools are operable to nominate components that are potentially faulty;
storing a fault suspicion indicator for each component that is nominated as being faulty;
focussing the search for potentially faulty components using details of the nominated faulty components, preferably coniponerit specific design information and
creating a list of potentially faulty components based on the results of the steps of searching and focussing.

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3. claims: 31-36

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A diagnostics system comprising: a topological map of a target system that has component nodes that correspond to components of the target system, parameter nodes for storing data relating to an associated component node and links that correspond to connections between the components; means for receiving component data from one or more sensors on the target system; means for up-dating a relevant parameter node of the topological map as and when new sensor data is received, and diagnostics means operable to use the data in the parameter nodes to diagnose faults.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB2004/004585

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5528752 A	18-06-1996	NONE	
US 2003167111 A1	04-09-2003	EP 1236986 A2	04-09-2002
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US 5633800 A	27-05-1997	NONE	
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		FR 2743642 A1	18-07-1997