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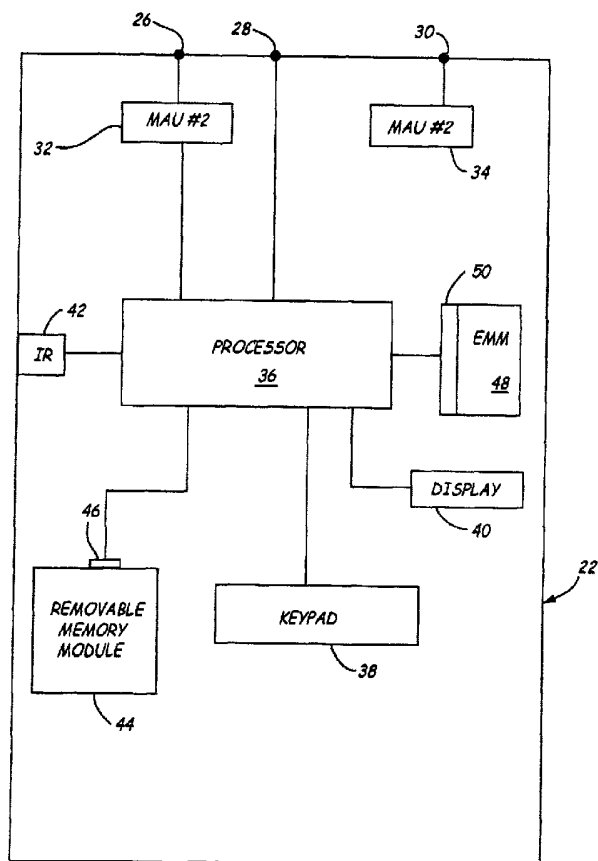
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(54) Title: INTRINSICALLY SAFE FIELD MAINTENANCE TOOL



(57) Abstract: An improved intrinsically safe field maintenance tool 22 is provided. The tool 22 is operable with process communication loops 18 in accordance with a plurality of process industry standard protocols. Aspects of the invention include hardware features such as an infrared port 42; removable memory module 44; and an expansion memory module 48. Additional aspects of the invention include protocol-specific diagnostic methods executable with the improved intrinsically safe field maintenance tool 22.

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European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK,
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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G05B23/02

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G05B G07C

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.
A	WO 00 55700 A (ROSEMOUNT INC) 21 September 2000 (2000-09-21) page 5, line 21 -page 7, line 23 ---	1,2,7
A	US 6 324 607 B1 (LAKE HAROLD ET AL) 27 November 2001 (2001-11-27) column 3, line 17 -column 6, line 12 ---	1,2,7
A	US 6 236 334 B1 (TAPPERSON GARY ET AL) 22 May 2001 (2001-05-22) figure 2 ---	1,2,7
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A	US 6 094 600 A (SHARPE JR RICHARD R ET AL) 25 July 2000 (2000-07-25) column 6, line 56 -column 7, line 54 ---	1,2,7
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☒ 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.

G document member of the same patent family

Date of the actual completion of the international search

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 022 626 A (FISHER CONTROLS INT) 26 July 2000 (2000-07-26) column 38, line 24 -column 39, line 46 -----	11,13,15
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A	US 6 307 483 B1 (PIECHOWSKI TODD A ET AL) 23 October 2001 (2001-10-23) figure 2 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/38891

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

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

1. Claims: 1-10

An intrinsically safe field maintenance tool comprising terminals couplable to a loop according to a standard communication protocol, first and second media access units communicating according to a first and second communication protocol respectively.

2. Claims: 11-12

A method for diagnosing a fieldbus process communications loop comprising identifying devices on the loop, comparing a list of identified devices on the loop with a live list and generating a diagnostic output based upon the comparison.

3. Claims: 13-14

A method of diagnosing a fieldbus process communication loop comprising communicating in turn rapidly with each device on the loop, recording a list of communication errors for each device and communicating data indicative of communication errors

4. Claims: 15-17

A method of diagnosing a HART process communication loop comprising: Attempting to communicate with a Hart device in a normal communication mode, observing whether the response is received from the HART device, attempting to communicate in an enhanced mode, observing whether the response is received from the HART device and generating diagnostic information based upon at least one of the responses

INTERNATIONAL SEARCH REPORT

Information on patent family members

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