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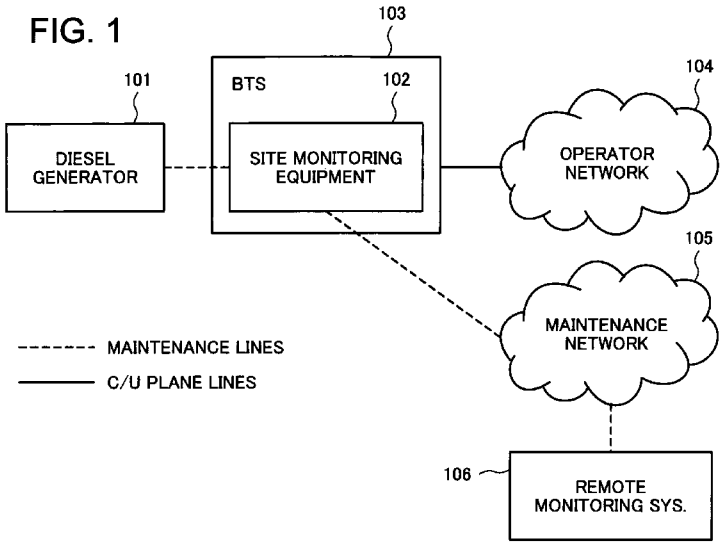
(54) **Title**: A monitoring apparatus, a monitoring system and a monitoring method

FIG. 1



(57) **Abstract**: [Technical Problem] The generators that keep the mobile networks alive suffer from the pilferage of its power source. [Solution to Problem] A monitoring apparatus connected to a generator and an operator comprising: a collecting means for collecting information from the generator; a monitoring means for monitoring the collected information; and a transmitting means for sending the collected information to the operator.

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DESCRIPTION

Title of Invention

A monitoring apparatus, a monitoring system and a monitoring method

Technical Field

This invention relates to telecom sector.

Background Art

All the telecomm providers in India run base stations by providing the power from local grid. The quality of power and availability is very poor in rural India. To run these base stations operators have to spend huge money for fuels as backup energy sources. The major problem for diesel is the pilferage which is making operators lose millions of rupees. The same problem is applicable to South African countries.

[Citation List]

[Non Patent Literature]

[Non Patent Literature 1]

http://www.generatorparts4less.com/panels.html

[Non Patent Literature 2]

http://www.dieselgeneratorcn.com/Generator-Control-System.html

[Non Patent Literature 3]

http://www.dieselserviceandsupply.com/Generator_Control_Panel.aspx

[Non Patent Literature 4]

http://www.alarmspro.com/products/system2000_3000/System2000_3000_Brochure.pdf

Summary of Invention

[Technical Problem]

In order to provide adequate power to the base stations of mobile networks in India, the use of diesel generators (DGs) as alternate power supplies are needed. However, the pilferage of diesel is causing unneeded

loss of money for operators and the stolen diesel causes uncontrolled Green House Gas (GHG) emission. To prevent such things from happening, means to monitor the diesel generators are needed.

The DGs that keep the mobile networks alive in India suffer from the pilferage of its diesel fuels. In order to prevent such from happening, this invention proposes remote monitoring techniques. Here, we define a Site Monitoring Equipment (SME) that would enable the mobile operator to observe the status of the DG and the diesel fuel inside it.

The problem described above may be happening even if the generator does not work by diesel fuel. Therefore, it can be said that the generators that keep the mobile networks alive suffer from the pilferage of its power source.

[Solution to Problem]

A monitoring apparatus in the present invention, which is connected to a generator and an operator comprising: a collecting means for collecting information from the generator; a monitoring means for monitoring the collected information; and a transmitting means for sending the collected information to the operator.

A monitoring system in the present invention comprising: a generator; an operator; and a monitoring apparatus connected to the generator and the operator; wherein the monitoring apparatus comprising: a collecting means for collecting information from the generator; a monitoring means for monitoring the collected information; and a transmitting means for sending the collected information to the operator.

A monitoring method in the present invention comprising: collecting information from a generator; monitoring the collected information; and sending the collected information to an operator.

[Advantageous Effects of Invention]

This invention helps identify Diesel pilferage for BTS (Base Transceiver station) using DG as backup power.

Furthermore, even if the generator is physically far from the operator, it is possible to monitor a status of the generator.

Brief Description of Drawings

[FIG.1] is a block diagram of the system described in the first exemplary embodiment.

[FIG.2] is a block diagram of the system described in the first exemplary embodiment.

[FIG.3] is a block diagram of the system described in the third exemplary embodiment.

[FIG.4] is a flow chart showing the operation described in the third exemplary embodiment.

[FIG. 5] is a flow chart showing the operation described in the fourth exemplary embodiment.

Description of Embodiments

[First exemplary embodiment]

In the GSM (Global System for Mobile Communications) network, Base station subsystem (BSS) will play key role in connecting subscribers or Mobile Stations (MS) to mobile network. The BSS divided into two systems, BSC (Base Station Controller) and BTS. All the radio communication to Mobile subscribers is handled by BTS and BSC control the group of BTSs. To transmit and receive radio signals at any time (24 hours x 7 days), BTS will consistently need power. Normally the BTS is connected to supply grid to tap the power. In some of the countries like India, some of the major problems are availability of power, quality of power, and irregular power cuts. The solution to this problem is to run the BTS system using Diesel Generator (DG) as a backup power source. The problems with this method are diesel pilferage and maintenance. Also a major part of telecom providers' OPEX (Operating Expense) is coming from diesel purchase. It can be easily imagined that the following technologies such as 3G and LTE (Long Term Evolution) will suffer from the same problem.

The below solutions will help to some extent in reducing the cost for telecom providers. Identifying diesel pilferage can be done by closely monitoring the DG. It can be done by the Site Monitoring Equipment (SME), which can be part of BTS system (as shown in FIG. 1) or SME as a separate Module (as shown in FIG. 2). In case of SME as a separate module, it will be interfaced with Diesel generator and measured data can be sent or received to the remote monitoring equipment via BTS over Ethernet. The below usage scenarios apply for GSM systems, but the solution can similarly used for 3G/LTE systems and any system that would need DG as a backup power source.

(Remote Monitoring using SME embedded in BTS)

A communication system in the first exemplary embodiment is shown in FIG. 1. According to FIG. 1, the communication system includes the following elements: a diesel generator 101, a SME 102, a BTS 103, an operator network 104, a maintenance network 105, and a remote monitoring system 106.

In this proposed solution, the SME 102 is a part of the BTS 103. SNMP (Simple Network Management Protocol) agent will be running in the SME module and it is connected to Remote Monitoring Equipment. In this system, the SME 102 is able to automatically start and stop the DG 101 via remote control signal. When the BTS 103 is running on the DG 101, the parameters like engine speed, Diesel level, oil pressure (Low/High/Normal), engine speed (over/under), engine temperature, battery voltage, RPM parameters, power generated from the DG 101, diesel purity, and GHG emissions will be measured and sent to Remote monitoring system 106. Also the SME 102 will be sending the DG level on frequent intervals. These values are monitored in the Remote station. Also, the monitored values may provide alerts for any necessary actions.

With this solution, operators will get maintenance information such as:

DG running out of fuel,

DG with battery water needed to be filled,

DG emission is more than expected and check for diesel adulteration,

Any service required for DG for higher emissions. Maintenance may help in reducing GHG emission,

Regular Fuel level measurement gives accountability of fuel usage and avoids fuel pilferage,

Over temperature and any fault in the system, and

Grid power information and power outage information.

(Remote Monitoring using SME outside BTS)

In this proposed solution, the SME 202 is placed outside the BTS 203 as shown in FIG. 2. The procedure and functionality is the same as explained above. In this proposed solution, no changes required to be done to the Base station (BTS 103) and the SME 102. The BTS 203 and the SME 202 will work as independent module. Usually in India, third parties will be maintaining the towers and equipments. In this case the monitoring equipment does not depend on the BS manufacturer.

In FIG. 2, the SME 202 and the BTS 203 are both independent as described above.

(Example Usage)

The remote operation and monitoring of DGs can be easily done with the solutions given in figures 1 and 2.

1. When the base station is run by the power from the power grid, the SME would give notice to the remote monitoring system that the DG is off, the amount of diesel fuel the DG has, and the purity of that diesel fuel.

2. While the DG is not running, if the amount of diesel fuel goes down or the purity is altered, the SME would send an alarm to the remote monitoring system.

3. If in any case the power from the grid becomes inadequate, the

SME would send a starter message to the DG.

4. If the DG does not start running, the SME will resend the starter message for given tries at selected intervals. If the DG does not respond, it would send an alert message to the remote monitoring system.

5. After the DG starts up, the DG sends needed information while its running and sends alert messages in case fuel is running out, GHG emission is higher than expected, or diesel efficiency is lower than expected.

(Benefits)

1. This invention helps identify Diesel pilferage for BTS using DG as backup power.

2. Single point maintenance, accountability, remote monitoring helps service providers save money and man power.

3. Preventive maintenance, effective planning and easy maintenance of DGs will cut operator costs.

In addition, although the generator in the above first exemplary embodiment is disclosed as the diesel generator (DG), the power source of the generator is not limited to diesel. The power source of the generator may be grid, battery, solar or wind.

[Second exemplary embodiment]

The system described in the first exemplary embodiment may further include the following features from (1) to (9).

(1) SNMP (Simple Network Management Protocol) agent running in SME should support the following private MIB (Management Information Base) :

(a) SNMP OID (Object Identifier) to start and stop the DG via remote control signal (operate relays) and can be configurable to three positions includes manual, auto and stop,

(b) SNMP OID to identify DG started successfully when grid power/battery backup (low battery) is not available. This will contain the information about BTS power type (Grid/Battery/DG/solar/wind),

(c) SNMP OID for the engine speed,

(d) SNMP OID for diesel level in DG,

(e) SNMP OID to know oil pressure (Low/High/Normal),

(f) SNMP OID to know engine speed (over/under),

(g) SNMP OID to know engine temperature,

(h) SNMP OID for battery voltage,

(i) SNMP OID for RPM (Revolutions per minute) parameters etc,

(j) SNMP OID for getting measured emission value when DG is running,

(k) SNMP OID for set/get the retries for starting the generator from SME,

(l) SNMP OID for contaminated or adulterated diesel,

(m) SNMP OID for running hours of a given time, and

(n) SNMP OID for diesel consumed for a given time.

(2) When SME detects a power outage, it sends signal to DG starter and informs Remote Monitoring station via SNMP Trap message.

(3) When DG doesn't start then after 10 seconds, it will disengage the starter for 10 seconds before trying to start the generator again. SME will try for three times (retries can be selective) before informing to Remote station.

(4) When DG starts it senses the engine speed by measuring the frequency of generator output. SME informs the engine speed to Remote station by sending SNMP event.

(5) Once DG is in running condition, SME starts monitoring the Diesel level, oil pressure (Low/High/Normal), engine speed (over/under), engine temperature, battery voltage, RPM parameters etc. In a given specified interval (need to be defined) SME will be informing to remote station through SNMP events.

(6) When BTS equipment running on DG, in frequent intervals SME will be sending the fuel level and power generated from DG to the Remote Monitoring station. This information is used to calculate the DG efficiency.

(7) In case of any faults in DG functionality, SME will send alarms to

Remote station and it helps to take corrective action by the maintenance team.

(8) Pollution measurement sensor measure the emission generated from DG and send this value to Remote Base station using SNMP OID.

(9) SME will be sending the DG fuel level and diesel purity information to Remote station on frequent intervals, even if the DG is not running.

In addition, although the generator in the above second exemplary embodiment is disclosed as the diesel generator (DG), the power source of the generator is not limited to diesel. The power source of the generator may be grid, battery, solar or wind.

[Third exemplary embodiment]

Hereinafter, a third exemplary embodiment of the present invention is described by referring to FIG. 3 and 4.

(Configuration of the third exemplary embodiment)

An exemplary configuration of a monitoring apparatus in the third exemplary embodiment is shown in FIG. 3. According to FIG. 3, a monitoring apparatus 1000 includes a collecting unit 1001, a monitoring unit 1002, and a transmitting unit 1003. Furthermore, the monitoring apparatus 1000 is connected to a generator and an operator, which are not shown in the figures.

The collecting unit 1001 collects information from the generator.

The monitoring unit 1002 monitors the information collected by the collecting unit 1001.

The transmitting unit 1003 sends the collected information to the operator.

(Operation of the third exemplary embodiment)

By referring to FIG. 4, an operation of the third exemplary embodiment is described.

According to FIG. 4, the collecting unit 1001 collects information

from the generator at first (S1001).

Next, the monitoring unit 1002 monitors the collected information (S1002).

At last, the transmitting unit 1003 sends the collected information to the operator (S1003).

(Advantageous effect of the third exemplary embodiment)

According to the third exemplary embodiment, the transmitting unit 1003 sends the information of the generator, which is collected by the colleting unit 1001, to the operator.

Therefore, even if the generator is physically far from the operator, it is possible to monitor a status of the generator via the monitoring apparatus 1000 of the third exemplary embodiment.

[Fourth exemplary embodiment]

Hereinafter, a fourth exemplary embodiment of the present invention is described by referring to FIG. 5.

(Configuration of the fourth exemplary embodiment)

A configuration of a monitoring apparatus in the fourth exemplary embodiment may be the same as that of the third exemplary embodiment, which is shown in FIG. 3. Also, the monitoring apparatus 1000 may be included in the communication system of the first exemplary embodiment or the second exemplary embodiment, as shown in FIG. 1 and FIG. 2 respectively. Hereinafter, the monitoring apparatus 1000 in the fourth exemplary embodiment will be described by referring to FIG. 3 and FIG. 5.

(Operation of the fourth exemplary embodiment)

By referring to FIG. 5, an operation of the fourth exemplary embodiment is described.

According to FIG. 5, the collecting unit 1001 collects information from the generator at first (S1101).

Next, the monitoring unit 1002 monitors the collected information (S1102).

Then, the monitoring unit 1002 determines if an alert is needed to be sent to the operator according to the collected information (S1103). If the monitoring unit 1002 determines that an alert is not needed to be sent, then the monitoring unit 1002 continues to monitor the collected information.

Examples of parameters monitored by the monitoring unit 1002 are as follows: engine speed of the generator, diesel/grid/battery/solar/wind level in the generator, oil pressure (Low/High/Normal) in the generator, engine speed of the generator (e.g. whether it is over or under the predetermined amount), engine temperature, battery voltage, RPM parameters, emission value or pollution measurement.

At last, S1104 is processed if the monitoring unit 1002 determines that an alert is needed to be sent. If so, the transmitting unit 1003 sends an alert to the operator (S1104). The transmitting unit 1003 may also send the collected information or the other information to the operator.

(Advantageous effect of the fourth exemplary embodiment)

According to the fourth exemplary embodiment, the transmitting unit 1003 sends the information of the generator, which is collected by the collecting unit 1001, to the operator.

Therefore, even if the generator is physically far from the operator, it is possible to monitor a status of the generator via the monitoring apparatus 1000 of the fourth exemplary embodiment.

Furthermore, according to the fourth exemplary embodiment, it is possible for the operator, to identify diesel (or the other power sources) pilferage for the generator.

Also, according to the fourth exemplary embodiment, since the operator monitors the status of the generator via the monitoring apparatus, it helps service providers save money and man power. As the same reason as above, preventive maintenance, effective planning and easy maintenance of the generator may cut operator costs.

While the invention has been particularly shown and described with

reference to exemplary embodiments thereof, the invention is not limited to these embodiments. It will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the claims.

Moreover, it is also possible that the system, which has been described in the exemplary embodiment mentioned above, has structure of a logical combination of plural apparatuses, and has a configuration in which functions of each apparatus are intermingled.

This application is based upon and claims the benefit of priority from Japanese patent application No. 2010-272729, filed on December 7, 2010, the disclosure of which is incorporated herein in its entirety by reference.

The whole or part of the exemplary embodiments disclosed above can be described as, but not limited to, the following supplementary notes.

(Supplementary note 1)

A monitoring apparatus connected to a generator and an operator comprising:

a collecting means for collecting information from the generator;

a monitoring means for monitoring the collected information; and

a transmitting means for sending the collected information to the operator.

(Supplementary note 2)

The monitoring apparatus according to supplementary note 1,

wherein the monitoring means determines if an alert is needed to be sent to the operator according to the collected information; and

wherein the transmitting means sends the alert to the operator, if the monitoring means determined to sent an alert.

(Supplementary note 3)

The monitoring apparatus according to supplementary note 1 or 2,

wherein the monitoring means determines that the alert is needed to be sent, when the monitoring means detects a power outage of the generator according to the collected information.

(Supplementary note 4)

The monitoring apparatus according to any one of supplementary notes 1 to 3,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

(Supplementary note 5)

A monitoring system comprising:

a generator;

an operator; and

a monitoring apparatus connected to the generator and the operator;

wherein the monitoring apparatus comprises:

a collecting means for collecting information from the generator;

a monitoring means for monitoring the collected information; and

a transmitting means for sending the collected information to the operator.

(Supplementary note 6)

The monitoring system according to supplementary note 5,

wherein the monitoring means determines if an alert is needed to be sent to the operator according to the collected information; and

wherein the transmitting means sends the alert to the operator, if the monitoring means determined to sent an alert.

(Supplementary note 7)

The monitoring apparatus according to supplementary notes 5 or 6,

wherein the monitoring means determines that the alert is needed to

be sent, when the monitoring means detects a power outage of the generator according to the collected information.

(Supplementary note 8)

The monitoring apparatus according to any one of supplementary note 5 to 7,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

(Supplementary note 9)

A monitoring method comprising:

collecting information from a generator;

monitoring the collected information; and

sending the collected information to an operator.

(Supplementary note 10)

The monitoring method according to supplementary note 9 further comprising:

determining if an alert is needed to be sent to the operator according to the collected information; and

sending the alert to the operator, if the alert is determined to be sent.

(Supplementary note 11)

The monitoring method according to supplementary note 9 or 10,

wherein the alert is determined to be sent, when a power outage of the generator is detected according to the collected information.

(Supplementary note 12)

The monitoring method according to any one of supplementary notes 9 to 11,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

Reference Signs List

101 Diesel Generator

102, 202 Site Monitoring Equipment

103, 203 BTS

104 Operator Network

105 Maintenance Network

106 Remote Monitoring System

1000 Monitoring apparatus

1001 Collecting unit

1002 Monitoring unit

1003 Transmitting unit

Claims

[Claim 1]

A monitoring apparatus connected to a generator and an operator comprising:

a collecting means for collecting information from the generator;

a monitoring means for monitoring the collected information; and

a transmitting means for sending the collected information to the operator.

[Claim 2]

The monitoring apparatus according to claim 1,

wherein the monitoring means determines if an alert is needed to be sent to the operator according to the collected information; and

wherein the transmitting means sends the alert to the operator, if the monitoring means determined to sent an alert.

[Claim 3]

The monitoring apparatus according to claim 1 or 2,

wherein the monitoring means determines that the alert is needed to be sent, when the monitoring means detects a power outage of the generator according to the collected information.

[Claim 4]

The monitoring apparatus according to any one of claims 1 to 3,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

[Claim 5]

A monitoring system comprising:

a generator;

an operator; and

a monitoring apparatus connected to the generator and the

operator;

wherein the monitoring apparatus comprises:

a collecting means for collecting information from the generator;

a monitoring means for monitoring the collected information; and

a transmitting means for sending the collected information to the operator.

[Claim 6]

The monitoring system according to claim 5,

wherein the monitoring means determines if an alert is needed to be sent to the operator according to the collected information; and

wherein the transmitting means sends the alert to the operator, if the monitoring means determined to sent an alert.

[Claim 7]

The monitoring apparatus according to claim 5 or 6,

wherein the monitoring means determines that the alert is needed to be sent, when the monitoring means detects a power outage of the generator according to the collected information.

[Claim 8]

The monitoring apparatus according to any one of claims 5 to 7,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

[Claim 9]

A monitoring method comprising:

collecting information from a generator;

monitoring the collected information; and

sending the collected information to an operator.

[Claim 10]

The monitoring method according to claim 9 further comprising:

determining if an alert is needed to be sent to the operator according to the collected information; and

sending the alert to the operator, if the alert is determined to be sent.

[Claim 11]

The monitoring method according to claim 9 or 10,

wherein the alert is determined to be sent, when a power outage of the generator is detected according to the collected information.

[Claim 12]

The monitoring method according to any one of claims 9 to 11,

wherein the collected information includes at least one of the following:

diesel level, oil pressure, engine speed, engine temperature, battery voltage, and RPM (Revolutions Per Minute) parameter.

FIG. 1

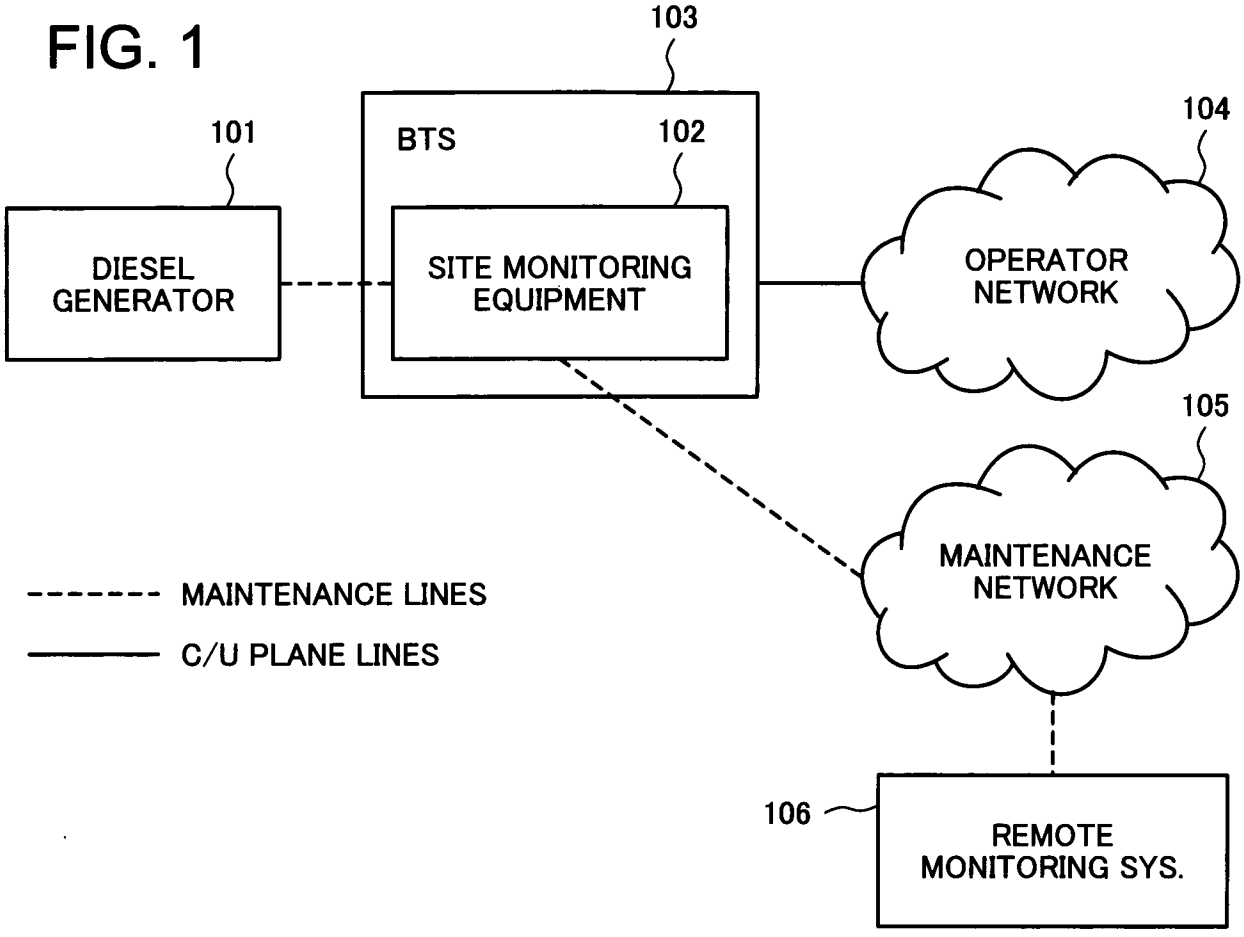

103
BTS
101
102
104
DIESEL GENERATOR
SITE MONITORING EQUIPMENT
OPERATOR NETWORK
105
MAINTENANCE NETWORK
MAINTENANCE LINES
C/U PLANE LINES
106
REMOTE MONITORING SYS.

FIG. 2

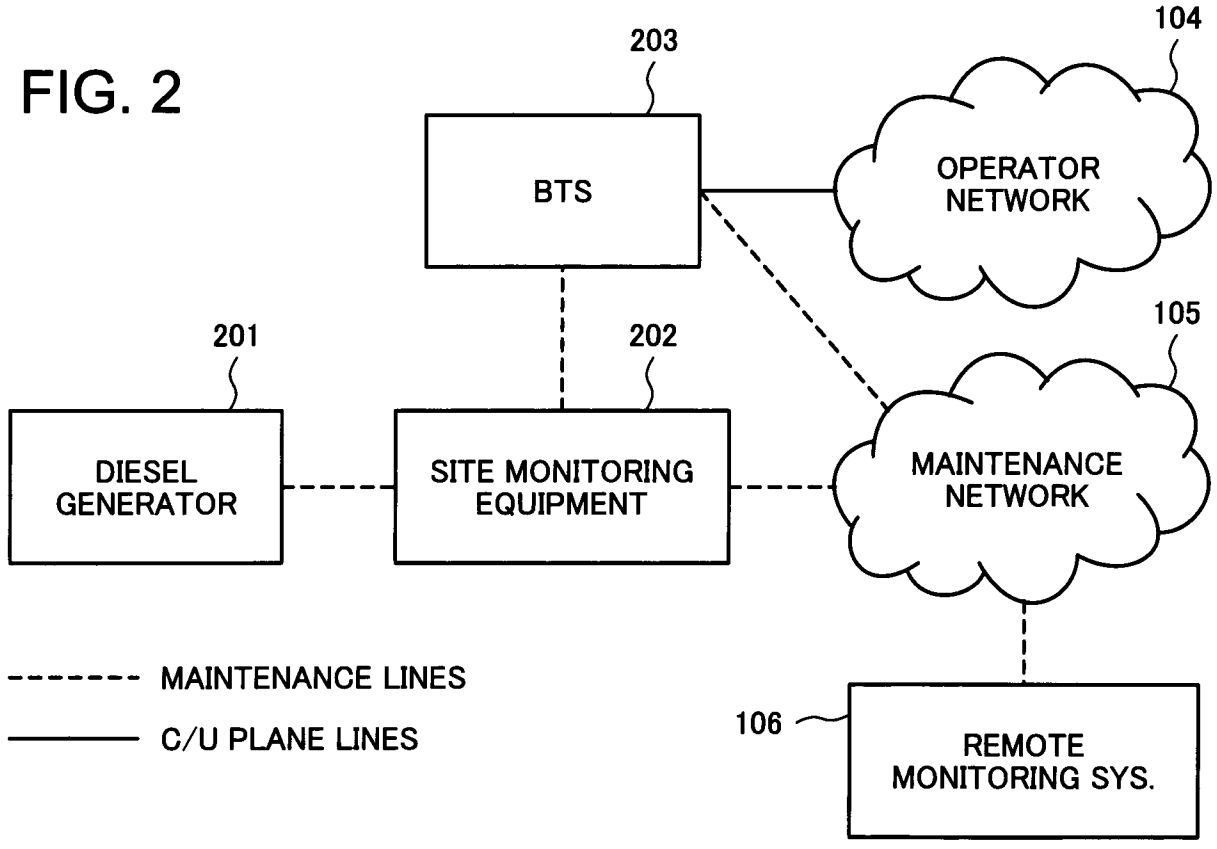

104
203
BTS
OPERATOR NETWORK
105
201
202
DIESEL GENERATOR
SITE MONITORING EQUIPMENT
MAINTENANCE NETWORK
MAINTENANCE LINES
C/U PLANE LINES
106
REMOTE MONITORING SYS.

FIG. 3

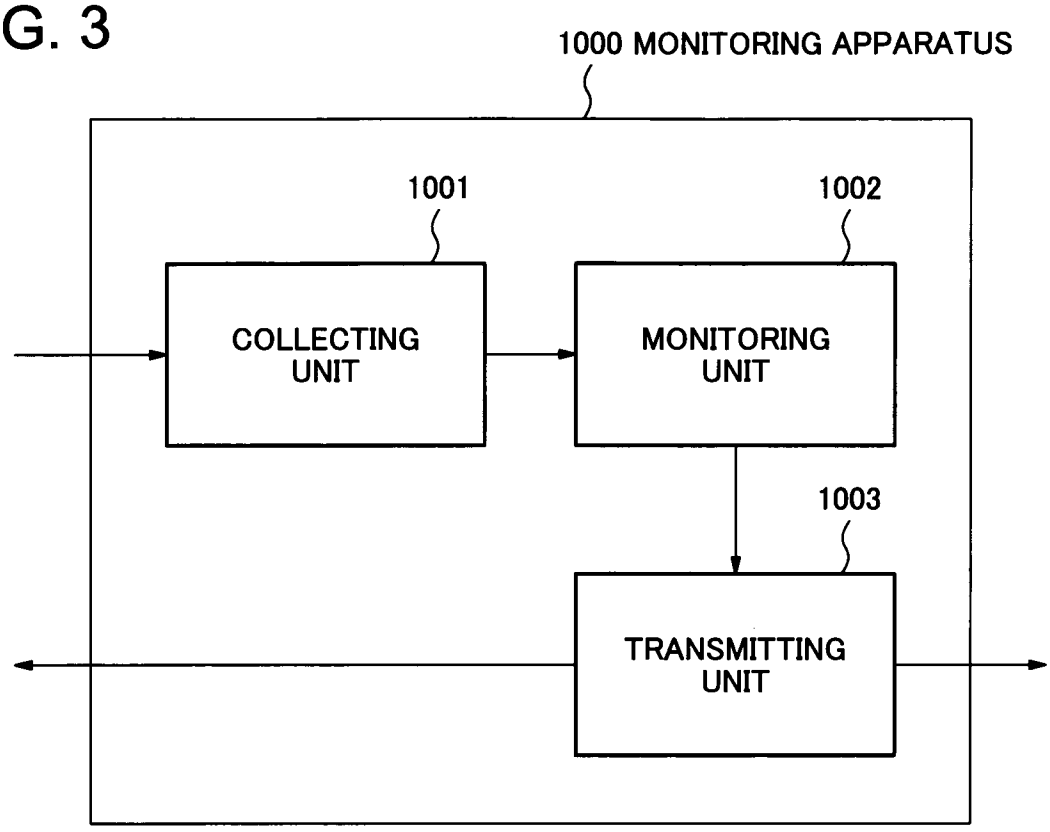

1000 MONITORING APPARATUS
1001
1002
COLLECTING UNIT
MONITORING UNIT
1003
TRANSMITTING UNIT

FIG. 4

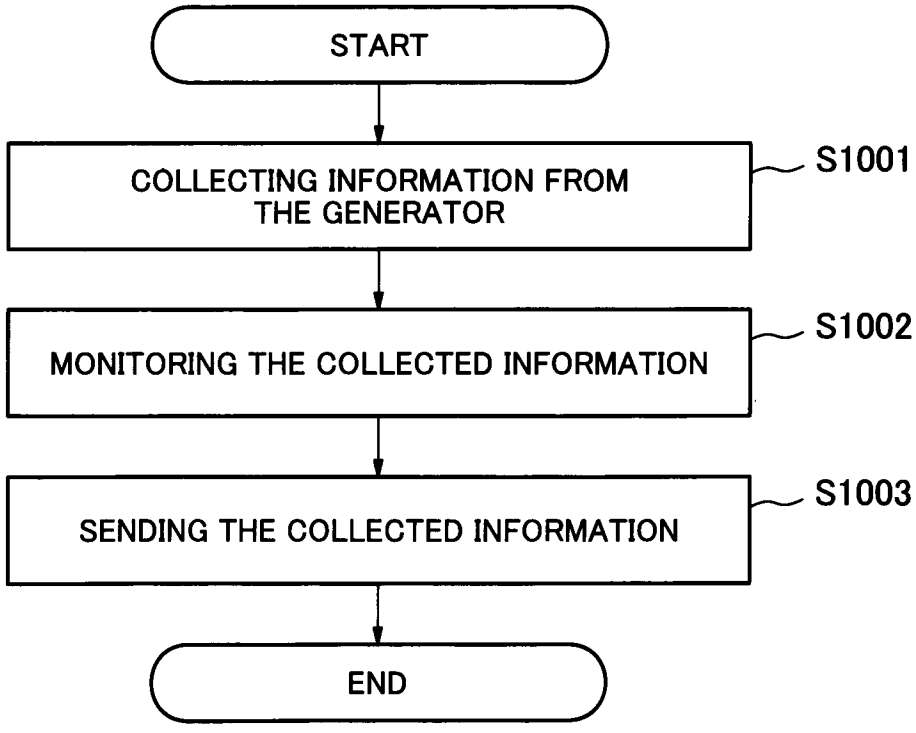
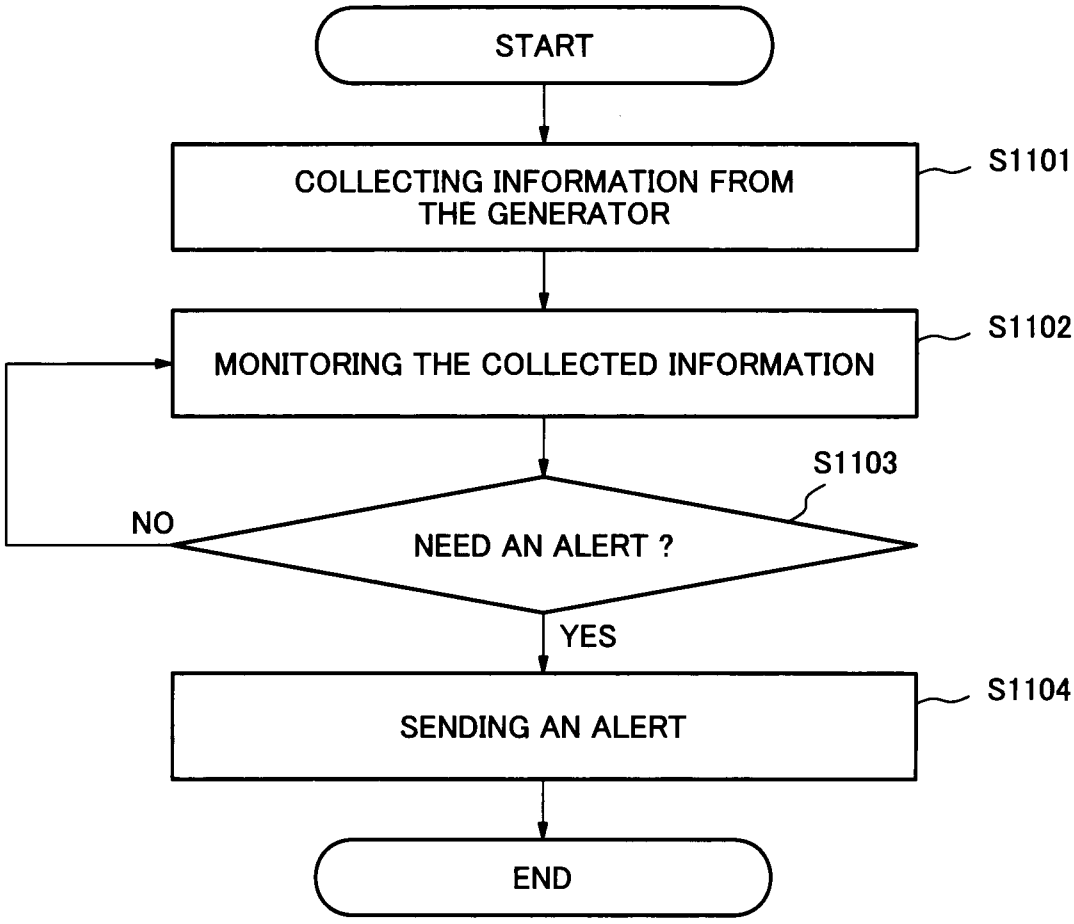

START
COLLECTING INFORMATION FROM THE GENERATOR
S1001
MONITORING THE COLLECTED INFORMATION
S1002
SENDING THE COLLECTED INFORMATION
S1003
END

FIG. 5


START
COLLECTING INFORMATION FROM THE GENERATOR
S1101
MONITORING THE COLLECTED INFORMATION
S1102
S1103
NEED AN ALERT ?
NO
YES
SENDING AN ALERT
S1104
END

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2011/078833

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01F23/00 H01L31/042 G08B21/18 G08B13/00 G08B25/14
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)
G01F H01L G08B B60K

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,P	WO 2011/051949 A1 (M S E MONITORING SYSTEM ENGINEERING LTD [IL]; RAPPAPORT DAVID [IL]) 5 May 2011 (2011-05-05) last paragraph; page 13 page 14, line 28 - page 21, line 4; figures 1b-4 page 25, line 16 - page 26, line 30	1-12
X	US 2006/032862 A1 (MILLER WOJTEK [US]) 16 February 2006 (2006-02-16) paragraphs [0003], [0007] - [0011], [0022] - [0028], [0031] - [0044], [0062] - [0068]; figures 1, 2, 6	1-12

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[X] Further documents are listed in the continuation of Box C.

[X] 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)

"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
18 April 2012	04/05/2012

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, Fax: (+31-70) 340-3016	Pariset, Nadia

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/083197 A1 (GLENN GREGORY M [US] ET AL) 21 April 2005 (2005-04-21) paragraphs [0008], [0041] - [0049], [0096]; figure 1	1-12
X	US 2005/159905 A1 (BOND STUART K [US] ET AL) 21 July 2005 (2005-07-21) paragraphs [0003], [0005], [0011], [0015] - [0019], [0029] - [0032], [0063]; figure 1	1-12
X	US 4 551 719 A (CARLIN JOHN A [US] ET AL) 5 November 1985 (1985-11-05) column 1, lines 13-22; figures 1, 2, 4 column 6, line 49 - column 8, line 28 column 9, line 5 - column 10, line 15 column 15, lines 37-52	1-12
X	US 5 757 664 A (ROGERS WARREN F [US] ET AL) 26 May 1998 (1998-05-26) column 5, line 43 - column 7, line 67; figure 1	1-12
X	US 2004/004551 A1 (EARLY GAY M [US]) 8 January 2004 (2004-01-08) paragraphs [0007], [0032] - [0039]; figure 1	1-12
A	GB 2 055 208 A (NICOLAI WALTER) 25 February 1981 (1981-02-25) page 1, lines 11-24, 43-95 page 2, line 7 - page 3, line 5; figure 1	1-12

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/078833

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.: 1-12(partially)
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:

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.:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/JP2011/078833

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011051949 A1	05-05-2011	NONE	
US 2006032862 A1	16-02-2006	US 2006032862 A1	16-02-2006
		WO 2006020906 A2	23-02-2006
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		DE 3009549 A1	24-09-1981
		FR 2461927 A1	06-02-1981
		GB 2055208 A	25-02-1981
		US 4353245 A	12-10-1982

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 1-12(partially)

Present claims 1, 5, 9 relate to an extremely large number of possible monitoring apparatus, systems and methods, as they cover the monitoring of any parameters of any type of generators including but not only electric power generator which source of power may be diesel, grid, battery, solar for instance (description, p. 6, l. 15-18); Although the additional technical features of claims 4, 8, 12 restrict the scope of protection, said claims still relate to an extremely large number of possible monitoring apparatus, systems and methods, as the added technical features simply concern a list possible parameters to monitor without given any technical effect achieved. Furthermore, claims 1-3, 5-7, 9-11 attempt to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result: a) the subject-matter of claims 1, 5, 9 merely defines the basic principle of monitoring, said principle being collecting data, analysing (monitoring) said data and sending the collected data and/or analysis. b) the subject-matter of claims 2, 6, 10 again defines the basic principle of generating an alarm as a result of data monitoring without indicating which collected data are nor how. c) the subject-matter of claims 3, 7, 11 aims at detecting power outage without indicating which specific data are analysed neither how. The initial phase of the search revealed a very large number of documents relevant to the issue of novelty. So many documents were retrieved that it is impossible to determine which parts of the claims 1-12 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, the search was performed taking into consideration the non-compliance in determining the extent of the search of claims 1-12 and the search of claims 1-12 was restricted to the main embodiment of the description which aims at solving the problem disclosed in the description as preventing the pilferage of diesel from diesel generators (e.g. p. 1, l. 9- p. 2 l. 12): A monitoring apparatus connected to a diesel generator and an operator comprising: a collecting means for collecting information concerning the amount/level of diesel fuel from the generator; a monitoring means for monitoring the collected Information and for determining if an alert is needed to be sent to the operator according to the collected amount/level of diesel; and a transmitting means for sending the alert to to the operator, if the monitoring means determines to send an alert.

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 Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.