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54 **FACILITY FOR PREVENTION OF DISASTERS.**

57 Facility for the prevention of disasters which detects unconnected terminal devices as well as connected terminal devices of no interest, automatically stops monitoring the detected device in the object to be monitored and controlled, and notices operator of the fact, for example, by means of printing, so that it may become easy to detect erroneous setting or erroneous connection without exclusively occupying an indicator window and to cope with emergencies. To realize this, the facility for the prevention of disasters comprises first memory means for storing information unique to each terminal device to be connected, second memory means for storing information unique to each connected terminal device, and registration means responsive to information received from a terminal device to compare the received information with the contents stored in the first memory means and for causing coincident information to be stored in the second memory means, wherein the first and second memory means and the registration means are provided in a receiver section or a relay section of said facility.

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DESCRIPSITON

DISASTER PREVENTION EQUIPMENT

[TECHNICAL FIELD]

This invention relates to a disaster prevention system or equipment which includes a plurality of terminal units or devices such as fire detectors (sensors) or the like and a receiver to which the plurality of terminal devices are connected and which includes storage means for previously registering the terminal devices destined to be connected to the receiver to perform the supervision and control of the terminal devices.

[BACKGROUND TECHNIQUES]

In general, in disaster prevention systems such as those for fires, gas leakage, anti-theft or the like, a plurality of terminal devices such as fire detectors are connected directly to a receiver or connected by way of a repeater station to the receiver, wherein monitoring and various controls are performed by the receiver or the repeater. To this end, the receiver or the repeater is provided with storage means for registering therein the terminal devices to be connected. More specifically, the terminal devices to be connected are previously registered in the storage means, wherein the various monitoring and controlling operations are carried out on the basis of the registered information.

However, the hitherto known methods suffer from the disadvantages mentioned below:

- a) Terminal units not yet connected

Although there are times when the disaster prevention functions are desired from only those terminal devices already connected, even when some of the terminals scheduled to be connected remain unconnected because of construction, etc., according to prior art systems, operation of the system is performed on the assumption that all the terminal devices registered in the storage means are operationally present. Consequently, those units or devices not yet connected are judged to be out of order, whereby the (ID) numbers of the supposedly failed devices (or associated area) are displayed continuously in a display window of the receiver. Consequently, the display window is constantly occupied, easily throwing an operator into confusion upon generation of a fire alarm or the like;

b) Erroneous connection of terminals

There are situations in which even though all terminal devices are connected, the types of devices registered in the storage means may differ from those of the devices actually connected and this may occur through an erroneous connection in the course of installation or through missettings in devices in which the type or classification of terminal device can be set by means of setting mechanisms such as DIP switches. If monitoring/controlling operations are performed under these conditions, signals other than the fire detection signals during fire monitoring for example (such as other disaster detection signals, air conditioning-related signals) will be erroneously recognized as fire detection signals whereby the display show the outbreak of a fire, or a fire protection damper or the like may be mistakenly actuated notwithstanding the fact that control is directed to the actuation of a sounder for a certain local area. The

serious problem can be seen in that the system includes no means for detecting erroneous connections or errors in setting.

As an attempt to solve the problems mentioned above, there has been proposed in Japanese Patent Application Laid-Open No.127292/1983 a system in which classification codes are previously determined for every type of analogue sensor, wherein each of the analogue sensors is adapted to send out the abovementioned classification code at the lead of the transmission of quantized analogue sensor code output.

Further, Japanese Patent Application Laid-Open No.65398/1985 discloses a system for providing fire alarm equipment capable of transmitting the classification information of the detectors to a receiver without influencing the signal bit numbers of the detected information, based on temporarily separating the transmission of the classifying information from that of the detected information, where a terminal device basically responds to the request for the classification information as issued by the receiver by sending back the information corresponding to one of different levels prescribed for the type of detector, respectively, so that the receiver can identify the type or classification of detector. After identifying the detector type, a request for transmission of the detected information is issued by the receiver, which can then determine if there has been an outbreak of fire from the received detection information on the basis of the result of the decision previously performed concerning the type of detector. In either case, if the terminal device is connected erroneously, this fact can not be recognized by the receiver. In other words, the receiver makes

decisions based on the perception that the interconnections are correct.

[DISCLOSURE OF THE INVENTION]

Accordingly, an object of the present invention is to provide a disaster prevention system which is capable of recognizing the non-connected state of units or devices as well as erroneous connections of units or devices of different types and automatically putting aside the unit or device of concern from a set of objects to be monitored and controlled while informing an operator of this fact through print out or other means to thereby allow error in the settings as well as erroneous connections to be readily detected, without continuous occupation of the display window, to thereby facilitate countermeasures as required.

With the aim of realizing the above object, there is provided according to the invention a disaster prevention system which comprises a receiver or a repeater and which is characterized in that the receiver or the repeater includes first storage means in which information inherent to terminal devices that should be connected to the receiver or the repeater is registered, second storage means for registering the information inherent to terminal devices actually connected, and registering means for collating through comparison the inherent information received from the terminal device with the contents registered in the first storage means and registering the information inherent to the terminal device in the second storage means when coincidence is detected from the collation.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Fig. 1 is a block circuit diagram showing a receiver in a disaster prevention system and terminal units or devices connected to that receiver, Fig. 2 is a flow chart for illustrating operations carried out within the receiver according to this invention, and Fig. 3 is a flow chart for illustrating operations performed in a terminal device.

[BEST MODE FOR CARRYING OUT THE INVENTION]

In the following, an exemplary embodiment of the disaster prevention system according to this invention will be described. Fig. 1 schematically shows fire alarm equipment to which this invention is applied. In the figure, there are shown a receiver and various types of terminal devices connected to the receiver by way of a transmission trunk L. As the terminal devices, there can be mentioned repeaters (station) for sensors, repeaters provided for preventing/expelling smoke, repeater for local area bells installed on the local area-basis, building managing repeaters, analogue sensors and the like. In Fig. 1, there are shown typically a sensor repeater T_1 , a smoke preventing/expelling repeater T_2 and an analogue sensor station T_3 . Although, only the internal configuration of the sensor repeater T_1 in particular is shown in detail in a block circuit diagram, it should however be understood that other repeaters can be implemented substantially in the same internal configuration, wherein in dependence on the type of the interface I/F incorporated in the repeater, individual circuits connected to that interface are allocated with respective functions.

The receiver R to which the terminal devices are connected

includes a CPU, a read-only memory ROM1 for storing programs to be executed by the CPU, a work random access memory RAM1, a display unit DP, an operation unit OP and a sounder SP connected by way of an interface I/F1, a printer P connected by way of an interface I/F2, a transmission/reception unit TR to which the terminal devices are connected, a terminal registering read-only memory, i.e. first storage means ROM2 in which the terminal devices destined to be connected to the receiver R are registered, a first switch S₁ for setting the last polling address, and others connected by way of an interface I/F3, and further on a terminal registering random access memory, i.e. second storage means RAM2 in which the terminal devices actually connected to the receiver R are registered.

The repeater T₁ includes a CPU, a read-only memory ROM11 for storing programs and a work random access memory RAM11 and additionally a second switch S₂ for setting the address or call number of this repeater station T₁, and a third switch S₃ for setting the classification (type) of this repeater T₁, or a classification setting read-only memory ROM12 and so forth, wherein the set classification code or the status information of a fire detector FD is sent back to the receiver R in response to the call number and the call classification as issued by the receiver R.

With the arrangement described above, the read-only memory ROM2 is loaded with the numbers (addresses) of the terminals scheduled to be connected or operated as well as classification or types (smoke sensor, heat sensor, gas sensor, sensor repeater, smoke preventing/expelling repeater or the like) as the information inherent to the individual terminals at the time of shipping from the factory.

However, in view of situations in which the terminals actually connected may differ from the contents stored in the read-only memory ROM2, it is preferred to manage the terminals by automatically detecting those terminals which differ from those stored in the memory. The random access memory RAM2 is provided for this end. More specifically, upon initialization of operation or at the time of power-on, the classification codes collected from the individual terminals are checked as to whether they coincide with the data stored in the read-only memory ROM2, wherein the number and the classification code of the terminal for which the abovementioned coincidence is found are registered as the inherent information in the random access memory RAM2 so that the contents stored therein can be made use of in the course of operation.

Fig. 2 illustrates in a flow chart in more detail the above outlined operation to be performed by the receiver R according to this invention.

At the start (block 100), the receiver R performs a calling or polling operation to the repeaters in sequential order starting from the repeater station allocated with a first address to the repeater of the last address. At a block 101, zero (0) is set for the address n , being followed by a block 102 where the receiver R issues a request for the classification code for the n -th repeater, whereupon a timer TM is activated at a block 103. When the classification code sent back from the n -th repeater to which the request for the classification code has been issued is received by the receiver R (YES at block 104), the abovementioned classification code as received is stored in a register A (not shown) (at block 105) while the

classification code of the n -th repeater stored in the ROM2 is read out to be loaded in a register B (also not shown) (at block 106), being followed by comparison of the contents of both of these registers (at block 107). When coincidence is found between the contents of both registers (YES at block 107), the classification code and the address code of the n -th terminal device or the repeater are registered in the RAM2 at n -th memory location (at block 108). On the other hand, when coincidence is not found (NO at block 107), the fact that discrepancy is found for the n -th classification code is printed out by a printer P (at block 109). Subsequently, unless the value of n reaches the last polling address N set at the first switch S_1 (NO at block 110), the address is incremented by one (at block 111), whereupon a similar polling operation is performed for the repeater of the next address, starting again from the block 102.

In case the result of decision at the block 104 is negative, i.e. unless the receiver R has received the classification code of the repeater assigned with address n , the fact that the n -th repeater is absent is printed out by the printer P (at block 113) after the time set at the timer TM has elapsed with the latter being turned off (YES at block 112). Subsequently, unless the decision results in the current address being the last address N at block 110, the value of the address is incremented by one at block 111, being followed by the similar polling operation for the repeater allocated with a next address.

When it is decided that the polling operation described above has been performed up to the terminal device of the last address (YES at block 110), the ordinary monitoring/controlling operation of

the disaster prevention system is started with the recognition that only the terminal devices registered in the RAM2 through the procedure described above are normally operating terminal devices.

Fig.3 illustrates in a flow chart the operation to be carried out in each of the repeaters. Upon calling from the receiver R (YES at block 201), the terminal collates the address as received with its own address (block 202). When coincidence is found (YES at block 203), then decision is made as to whether the classification code is requested. If the classification code is requested (YES at block 204), the classification code set at the switch S_3 or in the read-only memory ROM12 is sent back to the receiver (block 205). After sending-back the classification code, the operation returns to the beginning to await the arrival of the next call signal. Upon arrival of the next call signal, the sequence starting from block 201 is repeated.

Unless the request for the classification code is present (NO at block 204), decision is then made as to whether monitored information is requested or not. If request for the monitored information is determined to be issued (NO at block 206), the monitored information is sent back (block 207). After sending the monitored information, the operation returns to the beginning to await the arrival of the next call signal. Upon reception of the latter, the sequence starting from block 201 is repeated.

When no request for monitored information is detected (NO at block 206), decision is made as to whether a control information message is present. If so (YES at block 208), a control output is delivered for driving the device as designated or commanded by the

message (block 209). After driving the concerned device or unit, the operation returns to the beginning to await the arrival of the next call signal. Upon arrival of the next call signal, the sequence starting from block 201 is repeated.

Unless the control information message is detected (NO at block 208), decision is then made as to whether a test request is issued or not. If so (YES at block 210), the test circuit is driven (block 211). After driving the test circuit, the operation returns to the beginning to await the arrival of the next call signal. Upon arrival of the next call signal, the sequence starting from block 201 is repeated.

When no test request is detected (NO at block 210), the operation returns to the beginning to await the next call signal. At the time point when the next call signal is received, the sequence starting from block 201 is repeated.

Although the foregoing description has been made on the assumption that the terminal devices are constituted by analogue sensors or repeaters, it should be mentioned that a circuit of similar structure as described above may be provided between the terminal device such as the fire detector and the repeater station.

Further, this invention can be equally applied to equipment other than fire detection equipment such as gas leakage alarm equipment, anti-theft equipment, etc.

As will now be appreciated from the foregoing description, it is taught according to this invention that the receiver or repeater in the disaster prevention system comprises the first storage means for registering the terminal devices destined to be connected to the

receiver or repeater, and the second storage means for registering the terminal devices, actually connected, wherein upon reception of the inherent information such as classification or type from the terminal device, the received information is collated through comparison with the contents registered in the first storage means to thereby register the inherent information of the terminal device for which coincidence is detected from the collation in the second storage means. With this arrangement, it is possible to easily recognize that a device or unit is not connected as well as different classifications of the connected devices or unit, whereby the unit or device of concern can be not only automatically put aside from the set of the objects to be monitored or controlled but also the operator can be informed of this fact by a printer or other means. Thus, the management of the disaster prevention system can be readily accomplished to advantageous effect. Further, errors in settings as well as erroneous connections or similar undesirable states can be easily detected without the need for providing a display window destined only for this purpose, as in the case of the hitherto known systems.

CLAIMS

1 . A disaster prevention system comprising a receiver or a repeater characterized in that the receiver or the repeater includes:

first storage means in which terminal devices destined to be connected to the receiver or the repeater are registered;

second storage means for registering therein the terminal devices actually connected; and

registering means for collating through comparison the inherent information received from the terminal device with the contents registered in the first storage means and registering said inherent information of the terminal device in the second storage means when coincidence is detected from the collation.

2 . A disaster prevention system as set forth in claim 1, wherein upon detection of noncoincidence, the registering means discards the concerned inherent information and puts aside the associated terminal device from those objects to be monitored/controlled.

3 . A disaster prevention system as set forth in claim 1 or 2, wherein unless inherent information is received, the registering means decides that the associated terminal device is absent.

4 . A disaster prevention system as set forth in any one of claims 1 to 3, wherein the registering means is realized as a part of initialization processing executed in succession to the turn-on of power supply.

FIG. 1

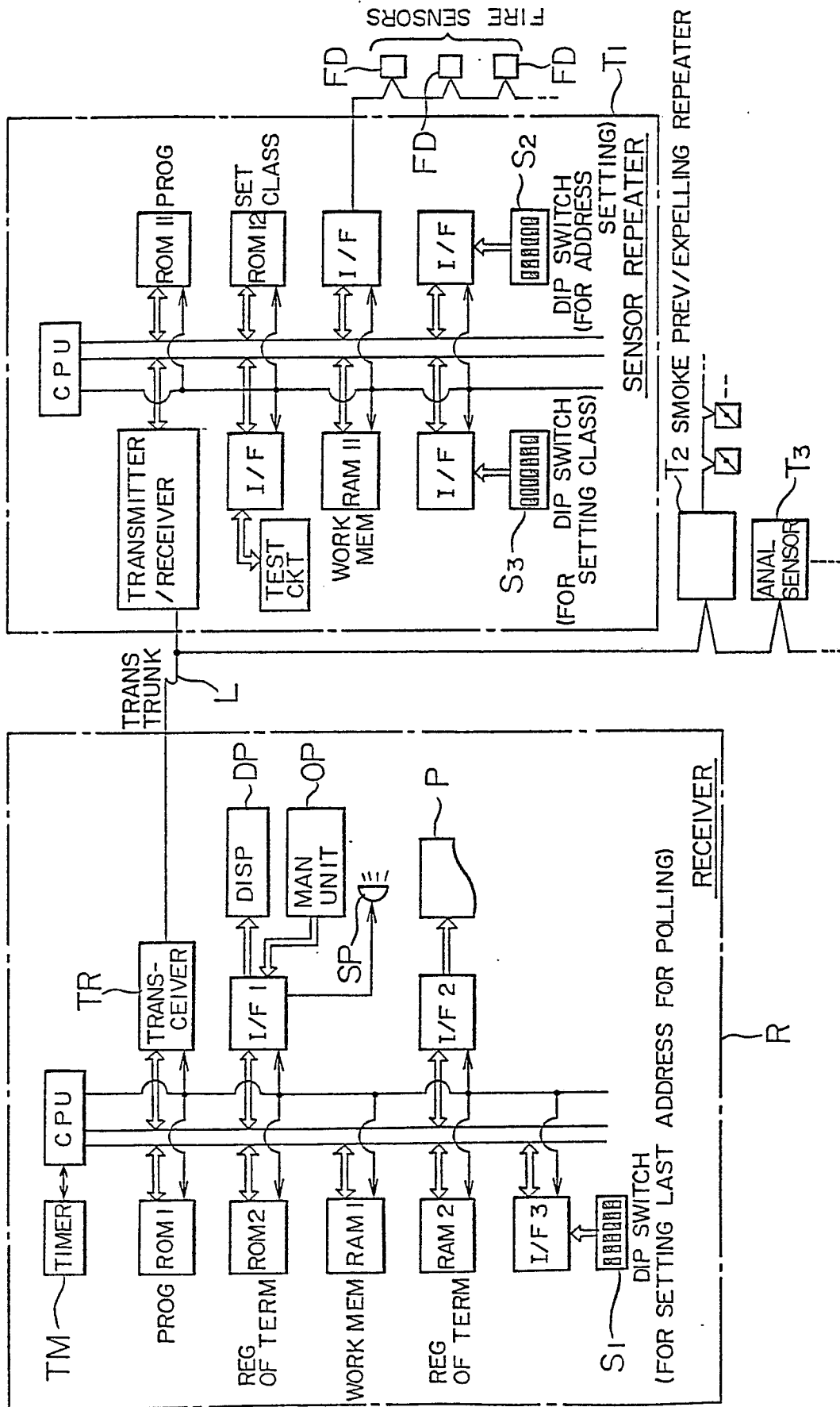


FIG. 2

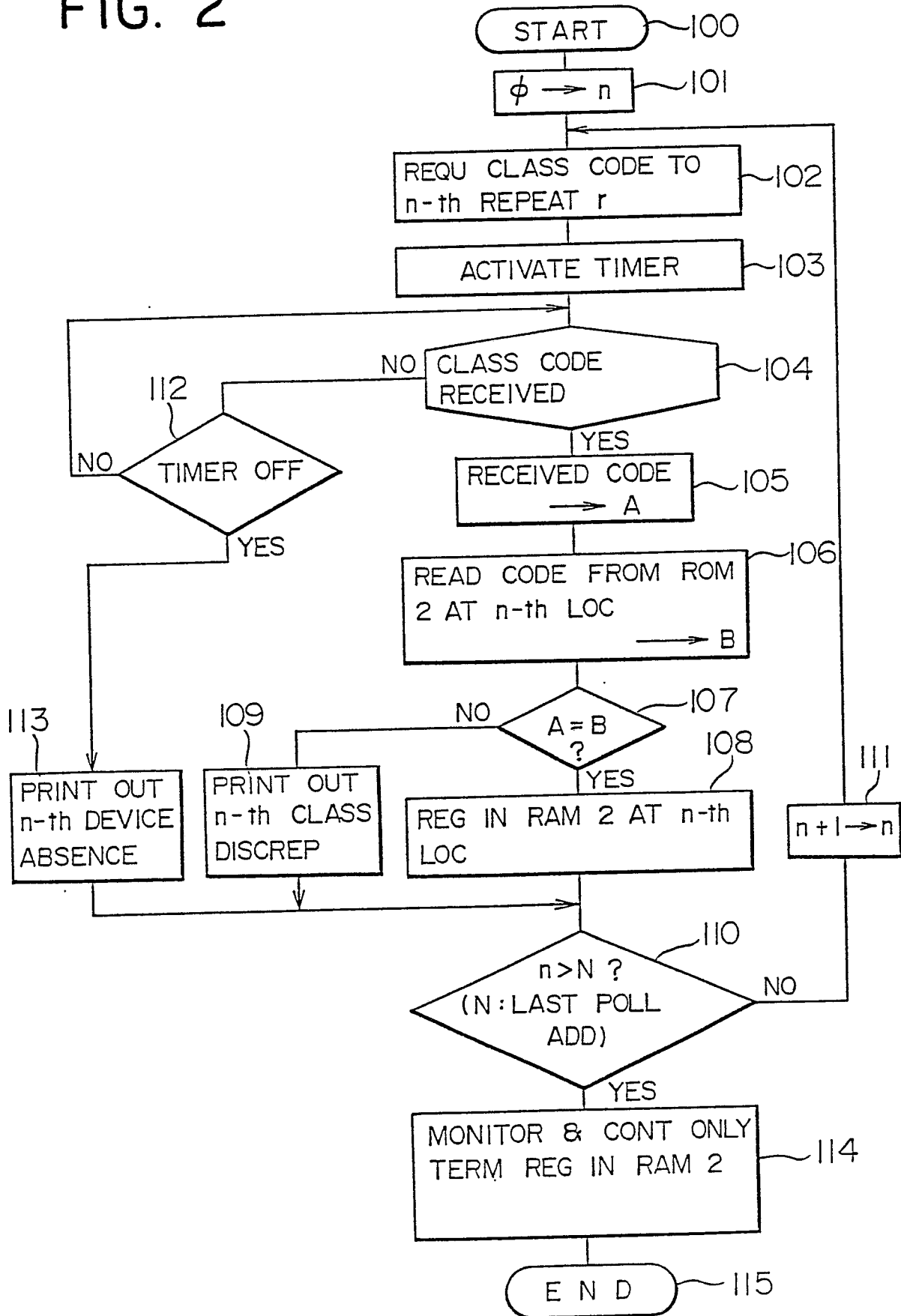
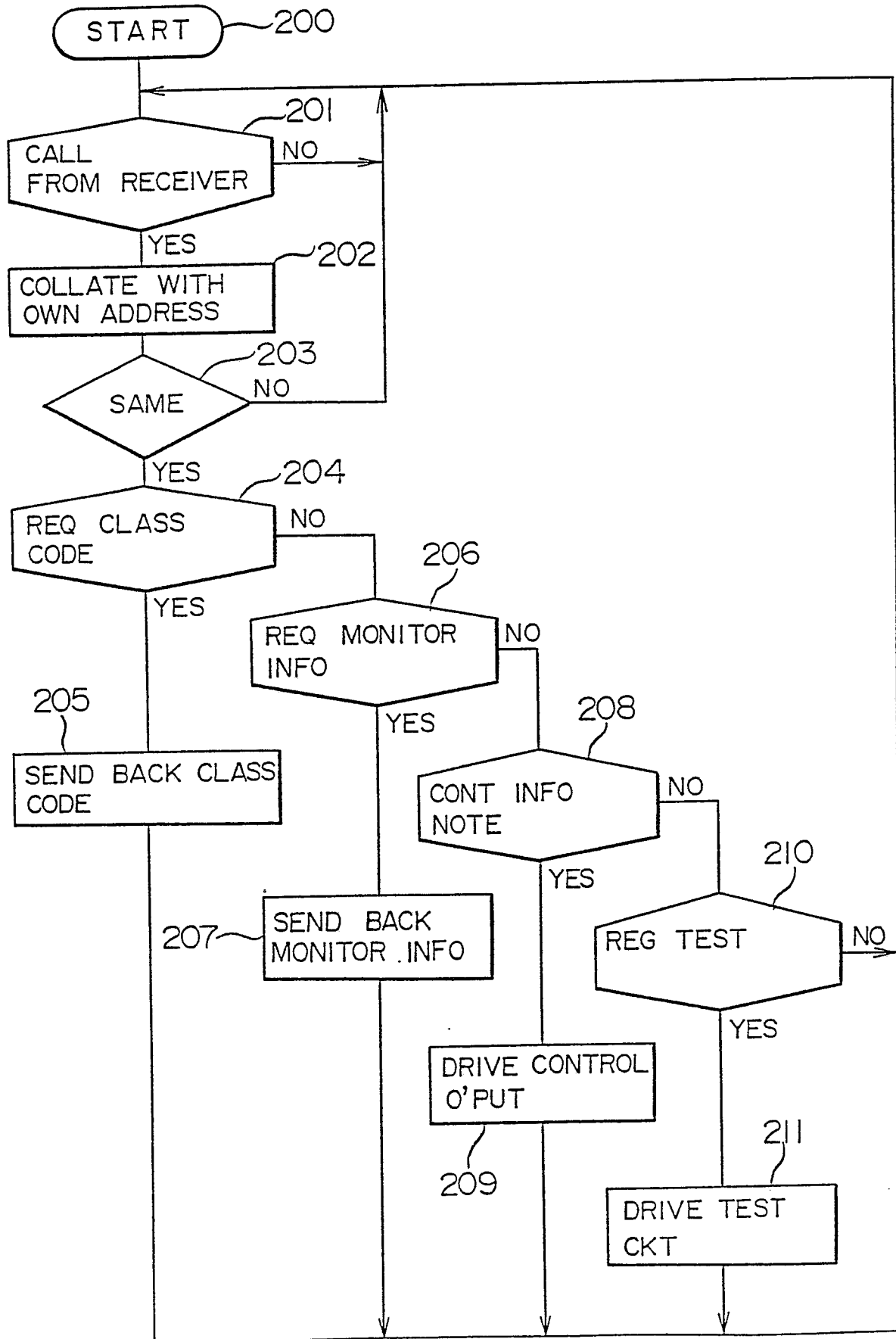


FIG. 3



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International Application No **PCT/JP88/00034**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int. Cl ⁴				
G08B25/00				
II. FIELDS SEARCHED				
Minimum Documentation Searched ⁴				
Classification System	Classification Symbols			
IPC	G08B25/00			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵				
Jitsuyo Shinan Koho	1933 - 1988			
Kokai Jitsuyo Shinan Koho	1971 - 1988			
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴				
Category *	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸		
Y	JP, A, 54-62799 (Omron Tateisi Electronics Co.) 21. May. 1979 (21. 05. 79) (Family: none)	1-4		
Y	JP, A, 55-119795 (Daiko Denshi Seisakusho Kabushiki Kaisha) 13. September. 1980 (13. 09. 80) (Family: none)	1-4		
Y	JP, A, 57-50094 (Koizumi Toshihiro) 24. March. 1982 (24. 03. 82) (Family: none)	1-4		
Y	JP, A, 50-93399 (Pacific Keibi Hosho Kabushiki Kaisha) 25. July. 1975 (25. 07. 75) (Family: none)	1-4		
<p>* Special categories of cited documents: ¹⁵</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; border: none;"> <p>"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</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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</p> <p>"&" document member of the same patent family</p>
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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</p> <p>"&" document member of the same patent family</p>			
IV. CERTIFICATION				
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ²			
April 7, 1988 (07. 04. 88)	April 18, 1988 (18. 04. 88)			
International Searching Authority ¹	Signature of Authorized Officer ²⁰			
Japanese Patent Office				