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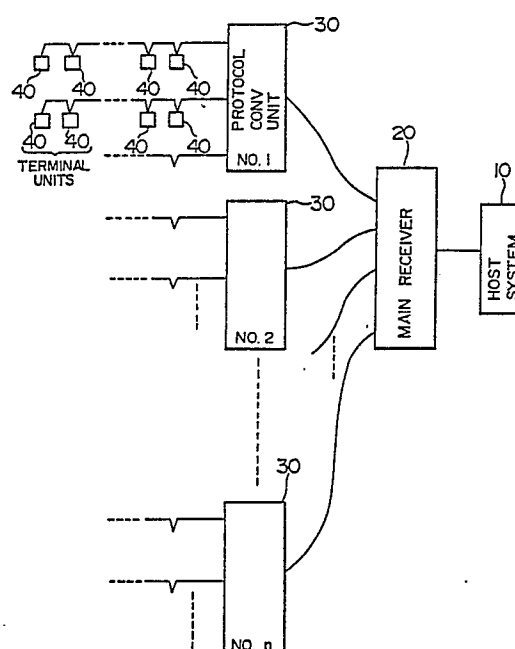
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64 **APPARATUS FOR THE PREVENTION OF DISASTERS.**

57 An apparatus for the prevention of disasters in which a plurality of terminal devices are connected to a receiver which collects data by polling from the terminal devices. Specific data such as the data inherent in the kinds of the terminals are automatically registered in the receiver at the time of initial setting, and there is no need of transmitting specific data from the terminal device to the receiver for each polling. For this purpose, the receiver is provided with first means that collects and stores specific data related to the terminal devices. When a plurality of receivers are arranged in a hierarchical manner, the receiver of the lowest rank is provided with the above first means. Further, each of the receivers includes second means for collecting specific data of terminal devices from a receiver of a lower rank and transferring the collected data to a receiver of a higher rank, and third means for storing the specific data on the terminal device received through the second means from the receiver of the lower rank.



DESCRIPTION

DISASTER PREVENTION SYSTEM

[Technical Field]

This invention relates to a disaster prevention system such as fire alarm systems, gas leakage alarm systems, anti-theft systems and others, and more particularly to a disaster prevention system arranged so as to be capable of effectively managing and knowing the connection status of terminal units by a higher rank unit.

[Background Technics]

In disaster prevention systems in which a plurality of terminal units such as fire sensors, repeaters or the like are connected to a receiver for managing and controlling the terminal units, the receiver must know connection information or classifying information as well as status information of the individual terminal units.

In particular, in disaster prevention systems in which a plurality of receivers are disposed hierarchically with the terminal units being connected to the lowest-rank receivers, it is necessary that the classification information concerning the terminal units as connected be grasped at the side of the higher-rank receiver.

A disaster prevention system in which the classification information of the individual terminal units is transmitted to the receiver together with the supervisory information representative of the operating status of the sensors is disclosed in Japanese Patent Application Laid-Open No.127292/1983.

Further, with a view to providing a fire alarm system capable of transmitting the classification information of detectors to a receiver

without affecting the signal bit number of detected information, Japanese Patent Application Laid-Open No.65398/1985 teaches a fire alarm system whose operation is based on temporally separated transmissions of the classification information and the detected information, and in which the terminal unit responds to a call requesting the classification information as issued by the receiver by sending back the information of a prescribed level which differs from one to another detector in dependence on the classification of the detectors, to thereby allow the receiver to identify the classification of that detector, wherein the call for the detected information is issued in succession to the terminating the classification. The receiver then decides whether a fire has broken out from the detected information as received on the basis of the result of the decision concerning the classification made previously.

However, both of the systems disclosed in the publications mentioned above suffer from the disadvantage that the transmission rate is low, giving rise to problems in respect to operation efficiency, because the classification information must be transmitted upon every polling. Inherently, the classification information is insusceptible to any dynamic variation, which in turn means that the classification information once transmitted needs not be transmitted again. In the systems disclosed in the abovementioned publications, however, the classification information is transmitted upon every polling. Thus, the systems disclosed in the abovementioned publications are disadvantageous in that the information becomes redundant, resulting in reduction in the transmission rate and hence in remarkable delays even in the transmission of urgent information

such as fire information or the like.

It should be additionally mentioned that both of the abovementioned publications contain no description at all concerning the hierarchical disposition of a plurality of receivers and that any attempt for grasping the classification information of the terminal units by the plurality of receivers disposed hierarchically by making use of the means disclosed in the abovementioned publication would result in remarkable reductions in the transmission rate.

[Disclosure of the Invention]

Accordingly, it is an object of this invention to provide a disaster prevention system such as a fire, gas-leakage or theft prevention system which does not bring about a degradation of the transmission rate by registering automatically the inherent information such as classification information of terminal units at the time of initialisation in the form of a classification map at the receiver or at each of the receivers when the receivers are provided hierarchically.

For accomplishing the above object, there is provided according to this invention a disaster prevention system including a receiver having a plurality of terminal units connected thereto, wherein said receiver is adapted to collect information from said terminal units by polling,

characterized in that first means for collecting and storing inherent information concerning said terminal units is provided in said receiver.

With this arrangement, transfer of the inherent information is rendered unnecessary in the ordinary monitoring or supervising

operation of the disaster prevention system to thereby enhance the transmission rate by virtue of provision of the first means provided in the receiver for collecting and storing the inherent information.

Further, according to this invention, there is provided a disaster prevention system in which a plurality of receivers are disposed hierarchically, wherein each of the lowest rank receivers has terminal units connected thereto and is so arranged as to collect information from said terminal units by polling characterized by comprising:

first means provided at each of said lowest rank receivers for storing inherent information concerning said terminal units,

second means provided at each of said receivers for collecting the inherent information of said terminal units from the lower rank receivers to thereby transfer the collected inherent information to higher rank receivers, and

third means provided at the receivers exclusive of the lowest-rank receivers for storing the inherent information of said terminal units collected from the lower rank receivers by said second means.

With the above arrangement, maps of inherent information such as the classification information of the terminal units connected to the lowest rank receivers are transferred sequentially from the hierarchically lowest rank receivers toward the hierarchically highest-rank receiver at first initialization or intermediate initialization in the course of operation, whereby inherent information maps are ultimately collected at the hierarchically highest-rank receiver automatically, while inherent information concerning the assigned area is also held in the receiver in charge of that area in the course of collection of the information, as the result of which a procedure for

preliminarily setting a map concerning the relevant terminals at each of the associated receivers can be done away with, while the transmission rate can be increased because no transfer of the inherent information is performed during the ordinary monitoring operation of the disaster prevention system.

[Brief Description of the Drawings]

Fig. 1 is a block diagram showing a general arrangement of a disaster prevention system to which this invention can be applied, Fig. 2 is a circuit block diagram showing an internal circuit configuration of a high-rank system (highest-rank receiver) 10 shown in Fig. 1, Fig. 3 is a circuit block diagram showing an internal circuit configuration of a main receiver 20 shown in Fig. 2, Fig. 4 is a circuit block diagram showing an internal circuit configuration of a protocol conversion unit (lowest rank receiver) 30 shown in Fig. 1, Fig. 5 is a circuit block diagram showing an internal circuit configuration of a terminal unit 40 shown in Fig. 1, Figs. 6A and 6B show flow charts for illustrating the operation of the protocol conversion unit (lowest rank receiver), Figs. 7A and 7B show flow charts for illustrating the operation of the main receiver, Fig. 8 shows a flow chart for illustrating the operation of the host system (highest-rank receiver), and Fig. 9 shows a flow chart for illustrating the operation of the terminal unit.

(BEST MODE FOR CARRYING OUT THE INVENTION)

In the following, an exemplary embodiment of this invention will be described by reference to the drawings.

Fig. 1 shows a general system arrangement of a fire prevention system to which this invention is applied. Referring to the figure, a main receiver 20 is connected to a host system 10 such as a CRT console or the like, while a plurality of protocol conversion units 30 are connected to the main receiver 20, wherein each of the protocol conversion units 30 have a plurality of terminal units 40 such as sensors, repeaters or the like connected thereto. The host system 10, the main receiver 20 and the protocol conversion units 30 each include a respective CPU and they are essentially implemented so as to serve as receivers. Accordingly, in the following description, the host system 10 is also referred to as the highest-rank receiver with the protocol conversion units 30 being referred to as the lowest-rank receivers.

Fig. 2 shows an internal circuit arrangement of the host system 10 or the highest-rank receiver including CRT equipment. The highest-rank receiver 10 includes a central processing unit CPU1, a read-only memory ROM11 for storing programs, a random access memory RAM11 to serve as a work memory, a random access memory RAM12 for registration of the terminal instruments and devices, a switch circuit SW11 for setting the (ID) numbers of the low-rank instruments/devices as connected, a display unit DP1, an operating (mainipulating) unit OP1, a sounder unit SP1 and transmission/reception units TR11 to TR1n for realizing interconnection with the low-rank instruments/devices, and others.

An internal circuit arrangement of the main receiver 20 is shown in Fig.3. The main receiver 20 includes a central processing unit CPU2, a read-only memory ROM21 for storing programs, a random access

memory RAM21 serving as the work area, a random access memory RAM22 for registering the terminal units, a switch circuit SW21 for setting presence/absence of interconnection with the higher-rank system, a switch circuit SW22 for setting the (ID) number of the low-rank units as connected, display units DP2, an operating (manipulating) unit OP2, a sounder unit SP2, a printer P2, a transmission/reception unit TR20 for performing communication with the host system 10, transmission/reception units TR21 to TR2n for performing communication with the protocol conversion units 30, and others.

Fig. 4 shows an internal circuit arrangement of the protocol conversion unit 30 serving as the lowest-rank receiver. The protocol conversion unit 30 includes a central processing unit CPU3, a read-only memory ROM31 for storing programs, a read-only memory ROM32 for registering addresses and classification (types) of the terminal units, a random access memory RAM31 serving as the work memory, a random access memory RAM32 for registering the terminal units, a display unit DP3, an operating (manipulating) unit OP3, a sounder unit SP3, a printer P3, a transmission/reception unit TR30, a transmission/reception unit TR31 and others.

Fig. 5 shows in detail an internal structure of one of the terminal units 40 connected to the lowest-rank receiver, i.e. the protocol conversion unit 30 and can be exemplified by a sensor repeater, smoke prevention/discharge repeater, analogue sensor and the like. Although the internal configuration of the sensor repeater is shown in Fig. 5, it should be understood that other repeaters can also be implemented in a similar structure. The illustrated sensor repeater includes a central processing unit CPU4, a read-only memory

ROM41 for storing programs, a classification-setting read-only memory ROM42, a random-access memory RAM41 to serve as the work memory, an address setting switch circuit SW41, a classification setting switch circuit SW42, a transmission/reception unit TR40 for performing communication with the protocol conversion unit 30 and others.

Now, description will be directed to the operation of the disaster prevention system implemented in the structure described above. In precedence thereto, those portions with which this invention is concerned will be briefly described. The read-only memory ROM32 incorporated in the lowest-rank receiver, i.e. the protocol conversion unit 30 is placed with inherent information concerning the addresses and classification or types of the terminal devices connected to this protocol conversion unit 30. At the time of initialization, request for the classification information is issued to each terminal unit or device through first means (blocks 101 to 110 shown in Fig.6A). The classification information sent from each terminal device is compared with the corresponding classification information stored in the read-only memory ROM32. When the comparison results in coincidence, this fact is registered in the terminal registering random access memory RAM32. Subsequently, through second means (blocks 116 to 120 in Fig.6A), the contents registered in the random access memory RAM32 are transferred to the terminal registering random access memory RAM22 incorporated in the main receiver 20. In the main receiver 20, the classification information of the terminal instrument/device as transferred from the protocol conversion unit 30 is registered through second means of the abovementioned main receiver 20 (blocks 201 to 207 and blocks 208 to 211 in Fig. 7A) to the terminal registering random

access memory RAM22 constituting a third means, while this registered terminal classification information is further transferred to an even higher receiver constituting the host system 10. In the host system, the terminal classification information as transferred from the main receiver 20 is registered in the terminal registering random access memory RAM12 which constitutes the third means through second means of the host system 10 (blocks 301 to 307 in Fig.8). By virtue of the operation performed at the time of initialization as described above, the classification information inherent to each terminal device which is necessary for the individual receiver to perform ordinary monitoring and control operations can be derived from the contents of registration in the terminal registering random access memory of each receiver.

Figs. 6A and 6B show flow charts for illustrating operation of the protocol conversion unit 30 shown in Fig.4. At block 100, operation is started. At block 101, initial values are set. At block 102, address is initialized to zero. Thereafter, polling is started to the terminal units. At the end of the polling to the $(n - 1)$ -th terminal, the value of address is incremented by one (block 103), being followed by the polling to the n -th terminal unit, where an address code added with the classification information request command is sent out onto a transmission trunk line L (block 104) and at the same time a timer is activated (block 105). When the terminal unit allocated with the abovementioned address receives the signal from the protocol conversion unit, that terminal unit sends back the terminal information added with the abovementioned address code, by way of example. In the protocol conversion unit, decision is made as to

whether the return signal is received or not from the abovementioned terminal unit within a predetermined time and whether the classification information is issued or not (blocks 106, 107, and 108). When the classification information is not available regardless of whether the return signal is received or not (YES at block 108), it is decided that the terminal unit of concern makes no response, as the result of which the printer P3 prints out that the n-th terminal unit is not present (block 109). Subsequently, unless the final address to be polled is reached (NO at block 110), the address value is incremented by one (block 103), whereupon the similar polling operation takes place at the next address.

When the return signal is received together with the classification information within the predetermined time (YES at block 107), the received classification information A of the n-th terminal unit is stored in the random access memory RAM31 serving as the work memory (block 111). Subsequently, the classification information B for the n-th terminal is read out from the terminal registering read-only memory ROM32 (block 112), whereupon the classification information A is compared with the classification information B (block 113). When coincidence is found between A and B (YES at block 113), the classification information B of the n-th terminal unit is stored in the terminal registering random access memory RAM32 (block 114). If otherwise (NO at block 113), the non-coincidence of the classification information for the n-th terminal is printed out by the printer P3 (block 115). Subsequently, the similar polling operation is repeated from the succeeding address unless the address value has not reached the final address.

Upon completion of the polling for all the terminals units, the terminal registering random access memory RAM32 is in the state of storing the precise classification information, i.e. the inherent information of the terminals currently connected. In this case, according to the illustrative embodiment, the terminal registering random access memory RAM32 is provided with a maximum connectable terminal area in which the address code and the classification information of the terminal for which $A = B$ are stored, while the area for the terminal unit which is not present or for which non-coincidence is found is left blank. It should however be understood that only the (ID) number, the address code and the classification information of the terminal unit for which $A = B$ is valid may be stored in the terminal registering random access memory RAM32 to thereby save capacity in the random access memory.

When the inherent information concerning the terminal units actually connected is collected in the terminal registering random access memory RAM32 upon completion of the polling operation for all the terminal units (YES at block 110), an operation takes place for transferring the collected contents to the main receiver 20 serving as the higher rank unit. At first, it is determined at block 116 whether or not a main receiver 20 is present. If not, ordinary monitoring operation is initiated, starting from the block 121 shown in Fig. 6B. The presence or absence of the main receiver may also be established by a switch or the like. In this case, the decision block 116 may also be omitted.

When a main receiver 20 is connected (YES at block 116), a message is issued to the main receiver 20 that the classification data

is ready to be transferred to the main receiver 20 (block 117), whereupon a relevant interrupt flag is set on the side of the main receiver 20. When the interrupt flag is set at the main receiver 20 in this manner, a transfer request is sent back. Accordingly, it is determined whether the transfer request was sent back or not (block 118). If the transfer request is detected, the stored content of the terminal registering random access memory RAM32 is read out to be subsequently sent to the main receiver 20 (block 119). Subsequently, the transfer request interrupt flag set at the main receiver 20 is cleared, whereby the transfer request message is also cleared (block 120).

Now, the protocol conversion unit enters the ordinary monitoring state with the contents of the terminal registering random access memory RAM32, starting from a block 121 shown in Fig. 6B. In Fig. 6B, the operation for monitoring the outbreak of fire is explained, by way of example.

Referring to Fig. 6B, the address n is initialized to zero at the block 121, being followed by a block 122 where the address value is incremented by one. Thereafter, the polling for the ordinary monitoring operation is started.

Prior to the polling, it is determined by checking the contents of the terminal registering random access memory RAM32 whether the terminal unit of the address to which the polling operation is to be performed is connected or not (block 123). Unless the terminal unit of concern is connected (NO at block 123), the polling operation to that terminal unit is not performed. When the allocated address n is not the final address N for the polling (NO at block 124), the address

value is further incremented by one at the block 122, whereupon the polling operation is changed over to the succeeding address. In this manner, unnecessary polling operations are avoided.

In the polling operation for the terminal unit of the address n , it is first determined whether a control instruction has issued to the n -th terminal unit by checking the content of the work random access memory RAM31 (block 125). If a control instruction has issued, the address code is added with the control instruction before being sent out (block 126). Unless the control instruction is required (No at block 125), the address code added with status information request command is sent out (block 127). In this connection, the control instruction is, for example, an on/off command or the like to a control circuit or a test circuit of the terminal unit.

Upon reception of the signal from the terminal unit (YES at block 128), the received information is stored in the work random access memory RAM31 (block 129), being followed by terminating whether it is fire information or not (block 130). If not, the address value is incremented at block 122 by way of block 124, whereupon the next polling cycle is initiated. If the information is fire information, it is determined whether a fire has occurred or not. If this shows an outbreak of fire (YES at block 131), the region where the fire is taking place is displayed at the display unit DP3. If there is no fire, the succeeding polling operation is performed.

When information of all the terminals units has been collected through the polling operation performed up to the final terminal unit, operation for transferring this information to the main receiver 20 serving as the higher-rank unit is conducted. At first, at block 133,

it is determined whether the main receiver 20 is present or not. Thereafter, a message is issued to the main receiver 20 that the transfer of information thereto is ready (block 134), whereupon a transfer-ready flag is set at the main receiver. Upon reception of a return signal indicating that the transfer admission flag is set at the main receiver 20 (YES at block 135), the received information in the work random access memory RAM31 is sent out to the main receiver 20 (block 136). On the basis of the information as received, the main receiver issues a request for transfer of the control instruction to the terminal unit, if necessary. Accordingly, if the transfer request is issued by the main receiver after the information has been sent out to the latter, a transfer request flag is set (YES at block 137). The control instruction to the terminal unit from the main receiver is received to be stored in the work random access memory RAM31 (block 138). This control instruction is sent out to the terminal unit upon next polling operation in the fire monitoring cycle (block 126). After the block 138, the ordinary fire monitoring mode is activated, starting from the block 121.

Operation of the main receiver 20 shown in Fig. 3 will be described by reference to flow charts shown in Figs. 7A and 7B.

Referring to Fig. 7A, in succession to a start block 200 and an initialization block 201, the (ID) numbers of the low-rank units, i.e. the protocol conversion units 30 connected to the main receiver 20 are read out from the switch circuit SW22 for setting the (ID) numbers of the low-rank units as connected (block 202). In this conjunction, it is to be noted that the presence or absence of connections of the protocol conversion units are previously set in the switch circuit

SW22 by an operator or other.

After the (ID) numbers of the protocol conversion units 30 as connected have been read out, decisions are sequentially made as to whether the transfer-ready messages has been issued or not by the protocol conversion units of the (ID) numbers as read out (block 203). This decision process can be accomplished by checking sequentially whether the classification information transfer-ready interrupt flags corresponding to the individual protocol conversion units are set or not. If the transfer-ready message has not issued (NO at block 203), it is then decided by way of block 207 whether the similar transfer-ready message to the protocol conversion unit of the succeeding number has issued or not. When the transfer-ready message is detected at the k-th protocol conversion unit (YES at block 203), the transfer request is sent to the k-th protocol conversion unit (block 204). This can be accomplished by first identifying discriminatively the protocol conversion unit which has set the interrupt flag and by setting the classification information transfer interrupt flag for that protocol conversion unit. The classification information of terminal units sent back from the k-th protocol conversion unit in response to the message of the transfer request at the block 204 is stored at a k-th area of the terminal registering random access memory RAM22 (block 205). Subsequently, by clearing the interrupt flag set by the protocol conversion unit for which the transfer or sending-back has been completed, the transfer-ready message from the k-th protocol conversion unit is erased (block 206). Next, the block 203 is regained by way of the block 207 to decide whether the transfer-ready message to the protocol conversion unit of the succeeding number has

been performed.

When all the classification information has been collected at the protocol conversion units (YES at block 207), procedure proceeds to the transfer to the higher-rank unit, starting from block 208. In this case, decision as to whether or not all the information has been collected is made by comparing the (ID) numbers of the lower-rank units read out at block 202 with the contents stored in the terminal registering random access memory RAM22.

At the block 208, it is first decided whether a unit higher in rank than the main receiver 20, i.e. the host system 10 is connected or not. Although this information is previously set at the DIP switch circuit SW21 for discriminating whether or not there is a connection of a host system, the decision mentioned is carried out by checking the contents of the setting. Next, by setting an interrupt flag for the completion of classification information transfer preparations of the host system 10, the host system is informed of the transfer-ready message (block 209). Next, it is decided whether there is a transfer request from the host system by checking whether a classification information transfer request interrupt flag is set or not at the host system (block 210). In response to the transfer request from the host system, if present, the contents stored in the terminal registering random access memory RAM22 are read out to be sent to the host system (block 211).

Referring to the flow chart shown in Fig. 7B and beginning with the block 212, description will be made of the ordinary operation of the main receiver performed on the basis of the information concerning connection of the terminal, which information has been transferred

from the protocol conversion units and stored in the terminal registering random access memory RAM22.

In the first place, decision is made at the block 212 as to whether the terminal information transfer-ready interrupt flag set by the protocol conversion unit is present or not. If present (YES at block 212), the protocol conversion unit which has set that transfer-ready interrupt flag is identified and an interrupt flag indicating the admission of the transfer from the identified protocol conversion unit is set, to thereby allow a transfer admission signal to be sent out to the k-th protocol conversion unit (block 213). Thereafter, the information of the terminals received from the k-th protocol conversion unit is stored in the work random access memory RAM21 (block 214). At block 215, decision is made as to whether or not there is control instruction to the terminal units connected to the k-th protocol conversion unit. If there is, the control instruction is sent out to the k-th protocol conversion unit (block 216), being followed by block 217, which however jumps over from the block 215 when the control instruction is not detected. At the block 217, the transfer-ready signal from the k-th protocol conversion unit is erased, whereupon the sequence for deciding the presence or absence of the transfer-ready signal, starting from the block 212, is regained.

When the result of decision at the block 212 is negative (NO), the terminal information stored in the random access memory RAM21 serving as the work memory is subjected to analysis/decision procedure (block 218) by making reference to the classification information stored in the terminal registering random access memory RAM22 through operations indicated at the blocks 203 to 206, whereupon decision is

made as to the necessity of display on the basis of the result of the decision/analysis procedure (block 219). In case display is necessary, the result of decision is presented on the display unit (block 220). If otherwise or in succession to the display, decision is then made as to the necessity of control at block 221. If so, the control instruction is stored in the random access memory RAM21 serving as the work memory (block 222), and the transfer request is issued to the relevant protocol conversion unit (block 223). If otherwise or in succession thereto, transfer of information to the higher-rank system, i.e. the host system 10 is activated, starting from a block 224.

In the transfer sequence for the host system 10, it is first decided whether there is a higher-rank system (i.e. host system 10) or not (block 224), being followed by the decision as to whether there is a need to the transfer the information to the higher-rank system (block 225). If there is a necessity for the transfer, a flag indicating an information transfer ready-state is set to thereby inform the transfer-ready state to the higher-rank system (block 226). If not or after the transfer, decision is made at a succeeding block 227 as to whether the transfer request has been issued or not. This decision can be realized by detecting if the information transfer request interrupt flag is set at the higher-rank system. When the transfer request is detected (YES at block 227), the terminal information or the result of analysis stored in the random access memory RAM21 is sent out to the higher-rank system (block 228), whereupon the transfer request therefrom is cleared (block 229). If otherwise (NO at block 227) or subsequently, the initial block 212 is

regained, whereupon a similar sequence is repeated.

Fig. 8 is a flow chart for illustrating operation of the host system 10. In this conjunction, it should be mentioned that operation of the part of the host system with which this invention is concerned is similar to that of the main receiver 20. More specifically, through blocks 300 to 307 shown in Fig. 8, the classification information is collected from the lower-rank unit, i.e. the main receiver 20 in the case of the illustrated embodiment. The operation to this end corresponds to the sequence of operation performed through blocks 200 to 207 shown in Fig. 7A for collecting the classification information from the protocol conversion units by the main receiver 20. Similarly, the processing executed through blocks 308 to 319 shown in Fig. 8 corresponds to the processing executed through the blocks 212 to 223 in the flow chart shown in Fig. 7B for the main receiver. Accordingly, no further description will be unnecessary. Further, since the host system 10 is the highest-rank unit having no higher-rank unit in the case of the illustrated embodiment, the sequence corresponding to the series of blocks 224 to 229 shown in Fig. 7B is omitted from illustration in Fig. 8.

Fig. 9 is a flow chart for illustrating, by way of example, operation of terminal unit shown in Fig. 5. After the start at a block 400 and setting of initial values at a block 401, decision is made as to the signal reception (block 402). If the received signal is present, it is then decided whether the received signal coincides with the address of the terminal unit of concern set at the DIP (Dip) switch circuit SW41 (block 403). Upon coincidence, the incoming instruction signal is stored in the random access memory RAM41 serving

as the work memory (block 404). Additionally, the status information issued by the receiver circuit or control circuit, i.e. the status information indicating whether the receiver circuit is receiving a fire signal from a fire sensor or whether control circuit is controlling the device under control is fetched to be subsequently stored in the random access memory RAM41 serving as the work memory (block 405). Subsequently, the instruction signal stored in the memory RAM41 is decoded (block 406), to thereby make decision as to whether it is the requests for the classification information (block 407), whether it is the requests for the information obtained from the monitoring (block 408), whether it is a control instruction (block 409) or whether it is a test command (block 410). In case the classification information is required (YES at block 407), the classification information set at the classification setting switch SW42 or the classification information stored in the classification storing read-only memory ROM42 is read out to be sent out (block 411). When the command requests for the information obtained from monitoring (YES at block 408), the status information stored in the random access memory RAM41 serving as the work memory is read out to be sent out (block 412). In the case of the control command (YES at block 409), the control circuit is turned on or off (block 413). Subsequently, the status information is read out from the random access memory RAM41 serving as the work memory to be sent out (block 412). Finally, in the case of the test command (YES at block 410), a test circuit is turned on or off (block 414), being followed by the read-out of the status information from the random access memory RAM41 serving as the work memory to be sent out subsequently (block 412). After the

classification information or the status information has been sent out, the block 402 is regained to wait for reception of the next signal.

The lowest-rank receiver (protocol conversion unit) may be so arranged as to store therein the inherent information collected from the terminal units connected thereto and at the same time transfer the inherent information to the higher-rank receiver. Further, it may also be so arranged that the inherent information concerning terminal units previously registered in the terminal registering read only memory, such as during manufacture, is transferred to the higher-rank receiver.

The inherent information transferred from the lowest-rank receiver to the highest-rank receiver may include in addition to the classification information such information as the (ID) number, the address, the presence or absence of the test circuit and other information specific to the terminal unit.

In the case of the embodiment described above, verification, as to whether the terminal units are connected correctly or not is performed at the stage of the protocol conversion unit constituting the lowest-rank receiver. It should however be appreciated that the verification may be performed by the higher-rank receiver or system such as the main receiver serving for discriminative decision of occurrence of fire and preparation of associated control instructions, rather than the lowest-rank receivers.

1. A disaster prevention system including a receiver having a plurality of terminal units connected thereto, wherein said receiver is adapted to collect information from said terminal units by polling, characterized in that first means for collecting and storing inherent information concerning said terminal units is provided in said receiver.

2. A disaster prevention system in which a plurality of receivers are disposed hierarchically, wherein each of the lowest-rank receivers has terminal units connected thereto and is so arranged as to collect information from said terminal units by polling, characterized by comprising:

first means provided at each of said lowest-rank receivers for storing inherent information concerning said terminal units;

second means provided at each of said receivers for collecting the inherent information of said terminal units from the lower-rank receivers to thereby transfer the collected inherent information to the higher-rank receiver; and

third means provided at the receivers exclusive of the lowest-rank receivers for storing the inherent information of said terminal unit collected from the lower-rank receivers by said second means.

3. The disaster prevention system set forth in claim 2, wherein said first means stores therein the inherent information concerning said terminal unit on the basis of information available from said terminal unit at the time of initialization.

FIG. 1

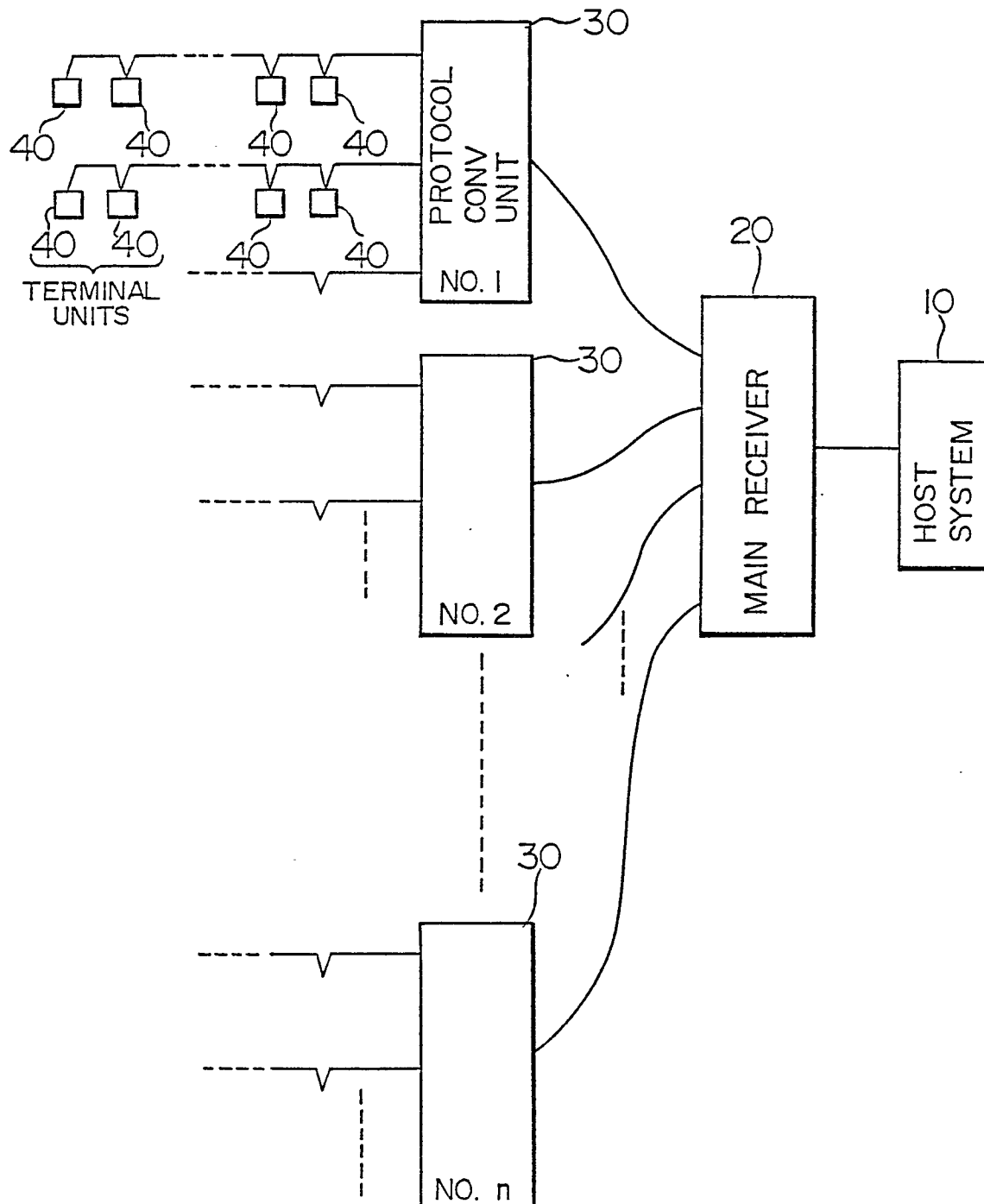


FIG. 2

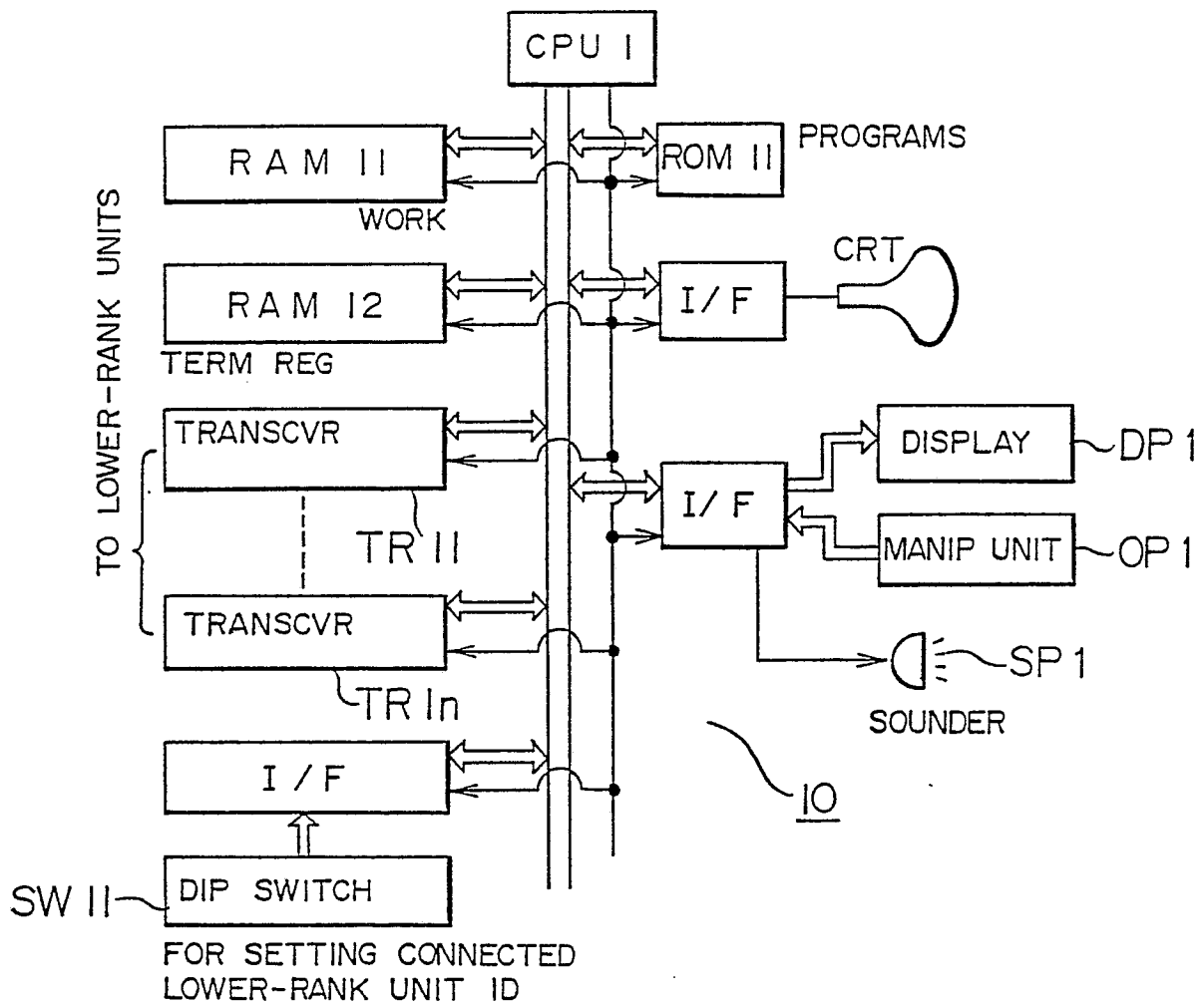


FIG. 3

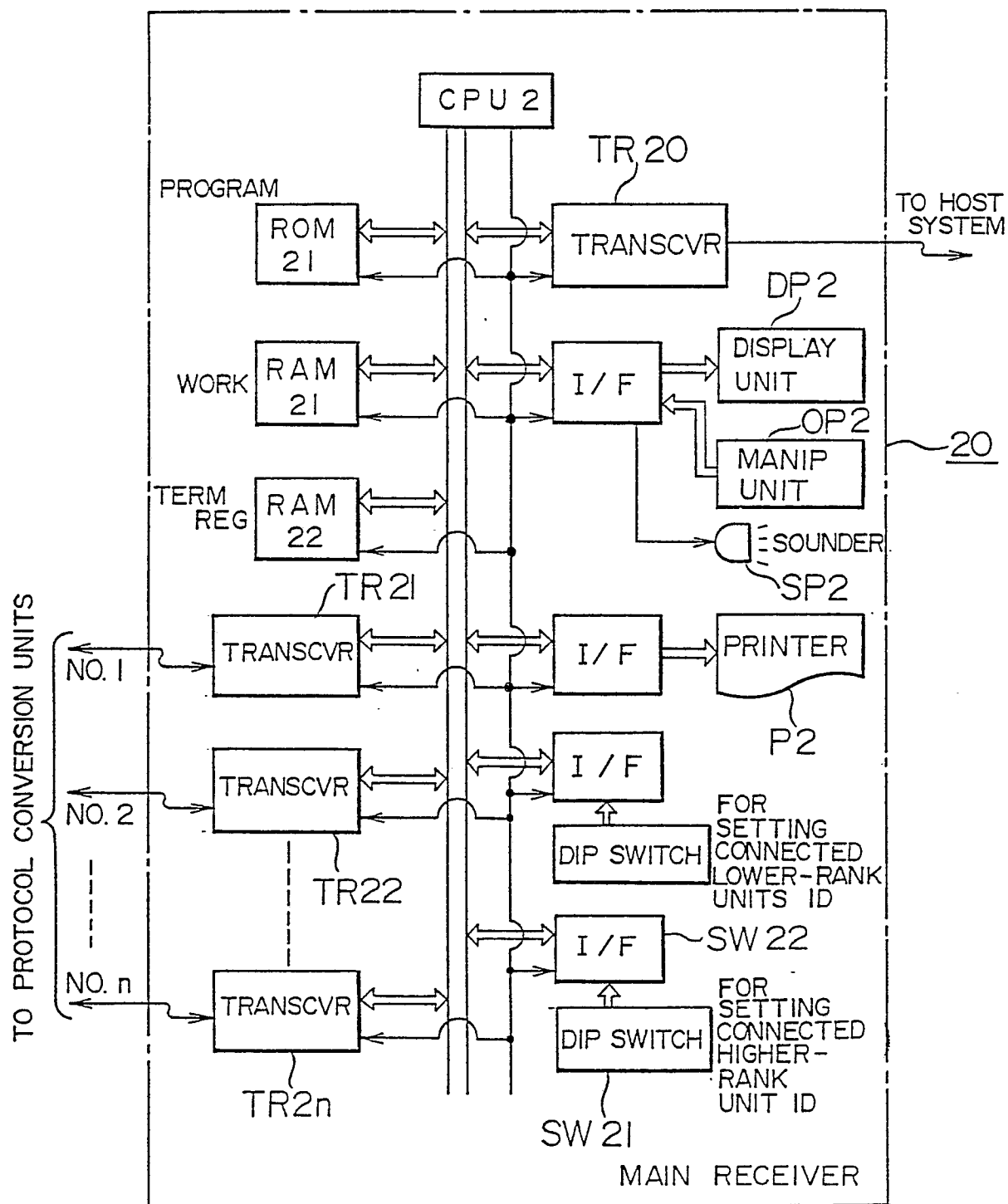


FIG. 4

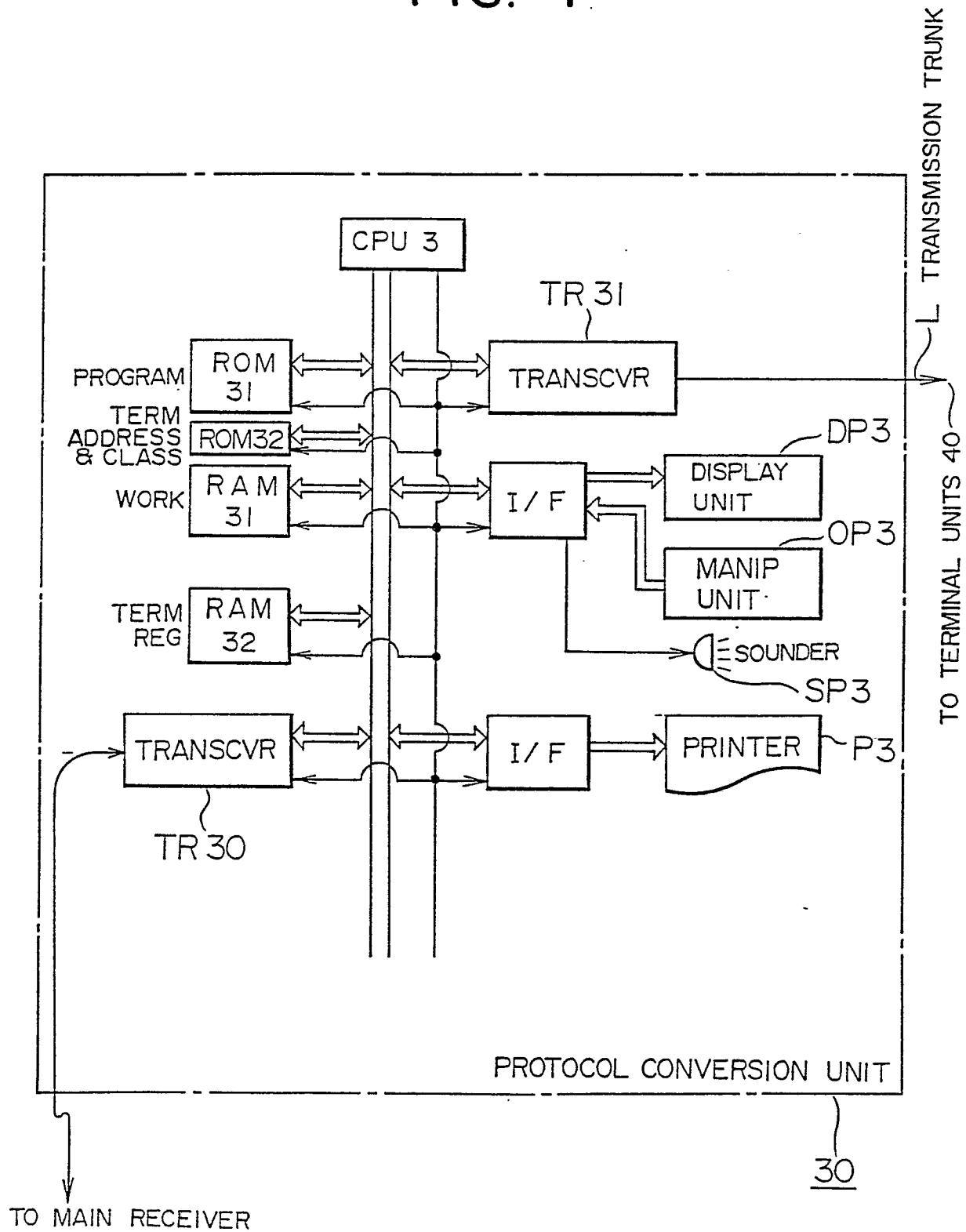


FIG. 5

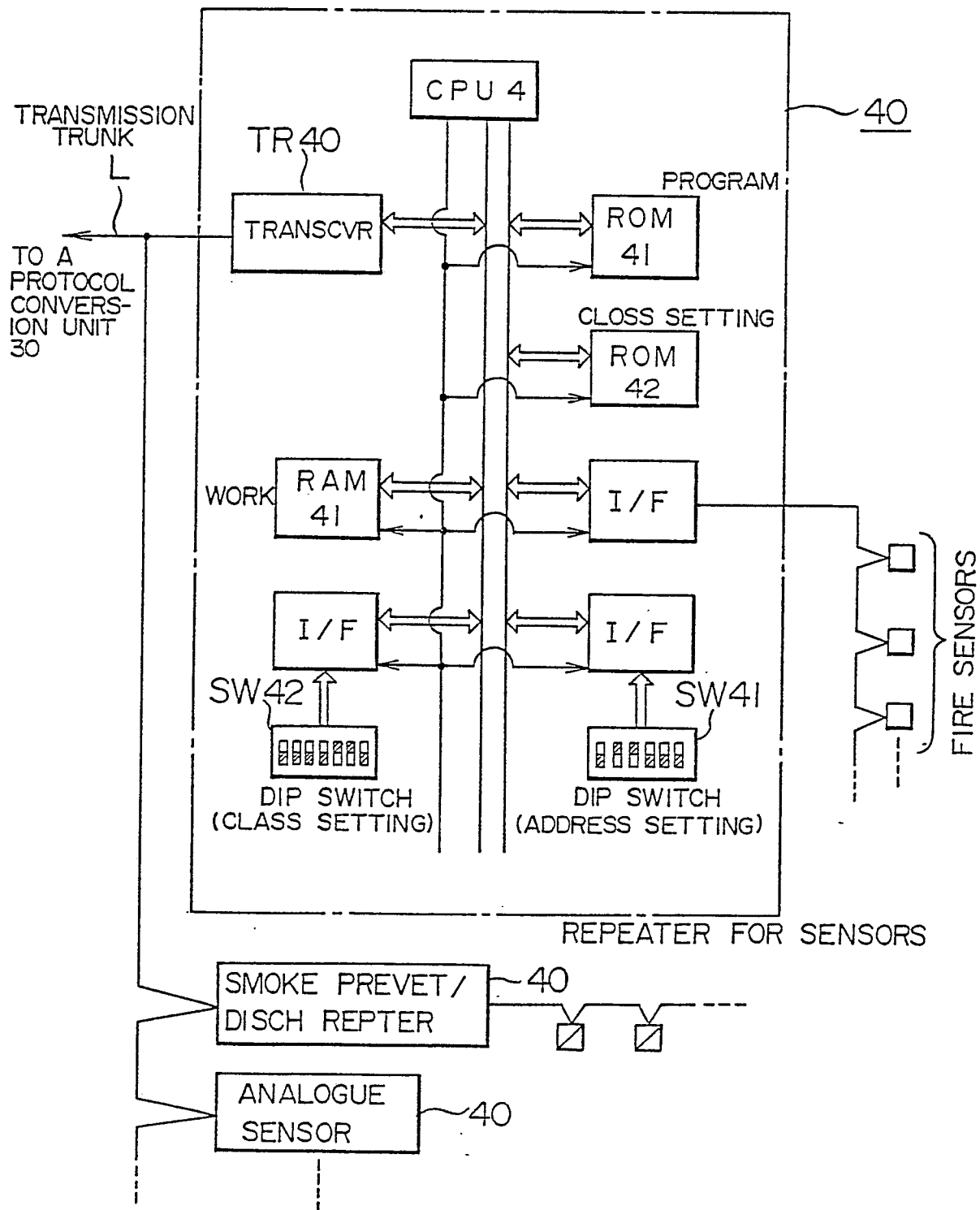


FIG. 6A

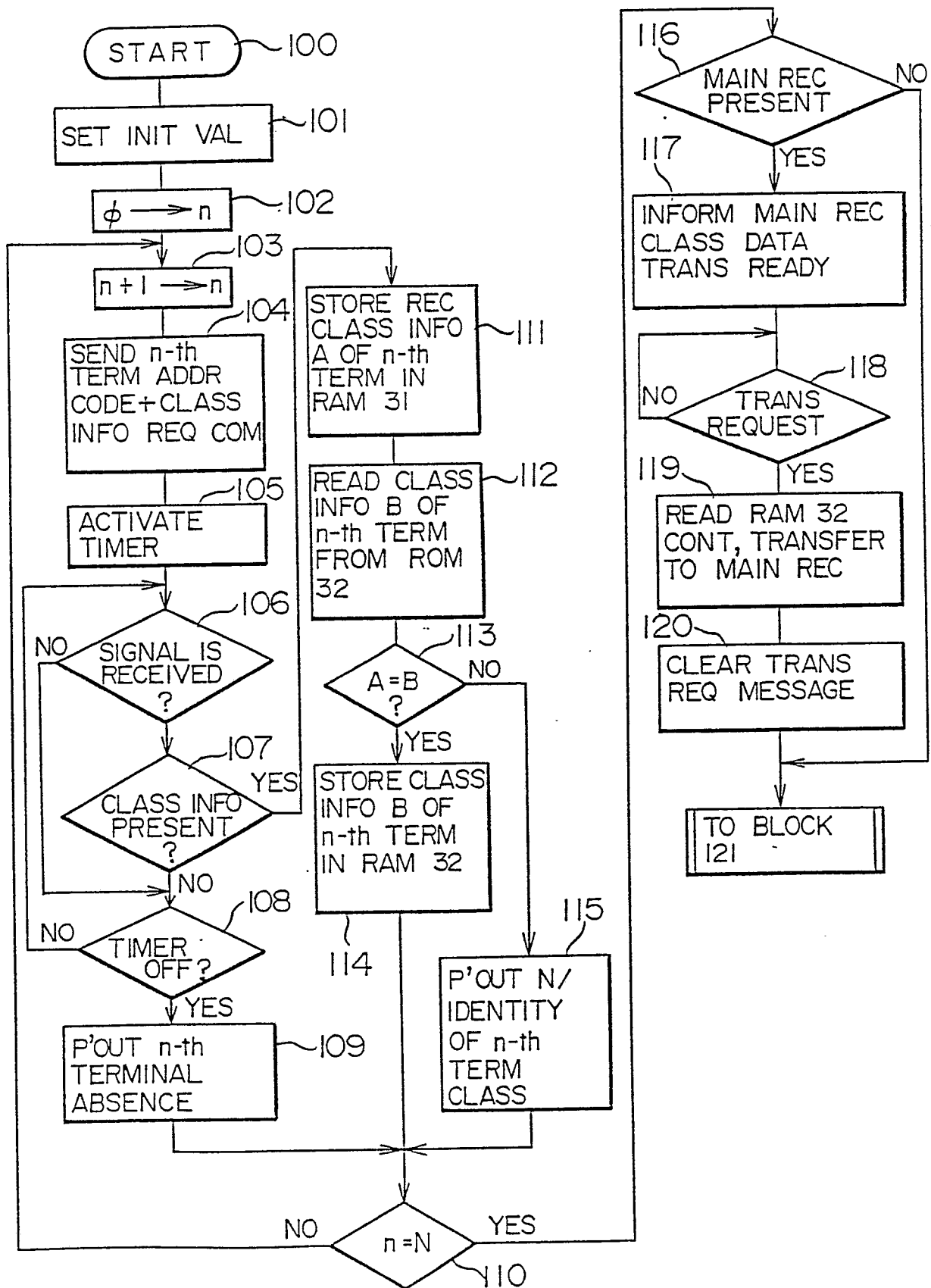


FIG. 6B

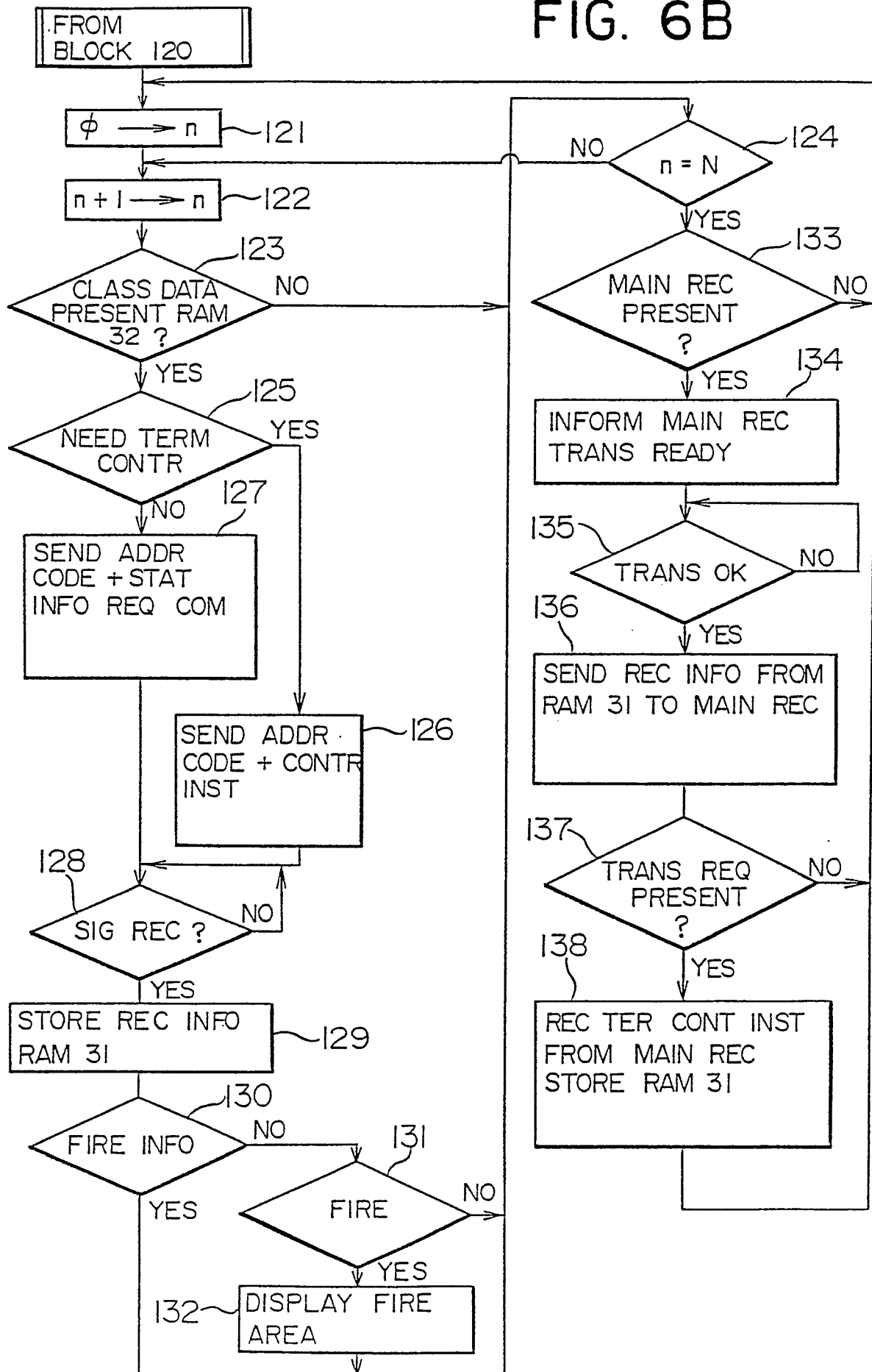


FIG. 7A

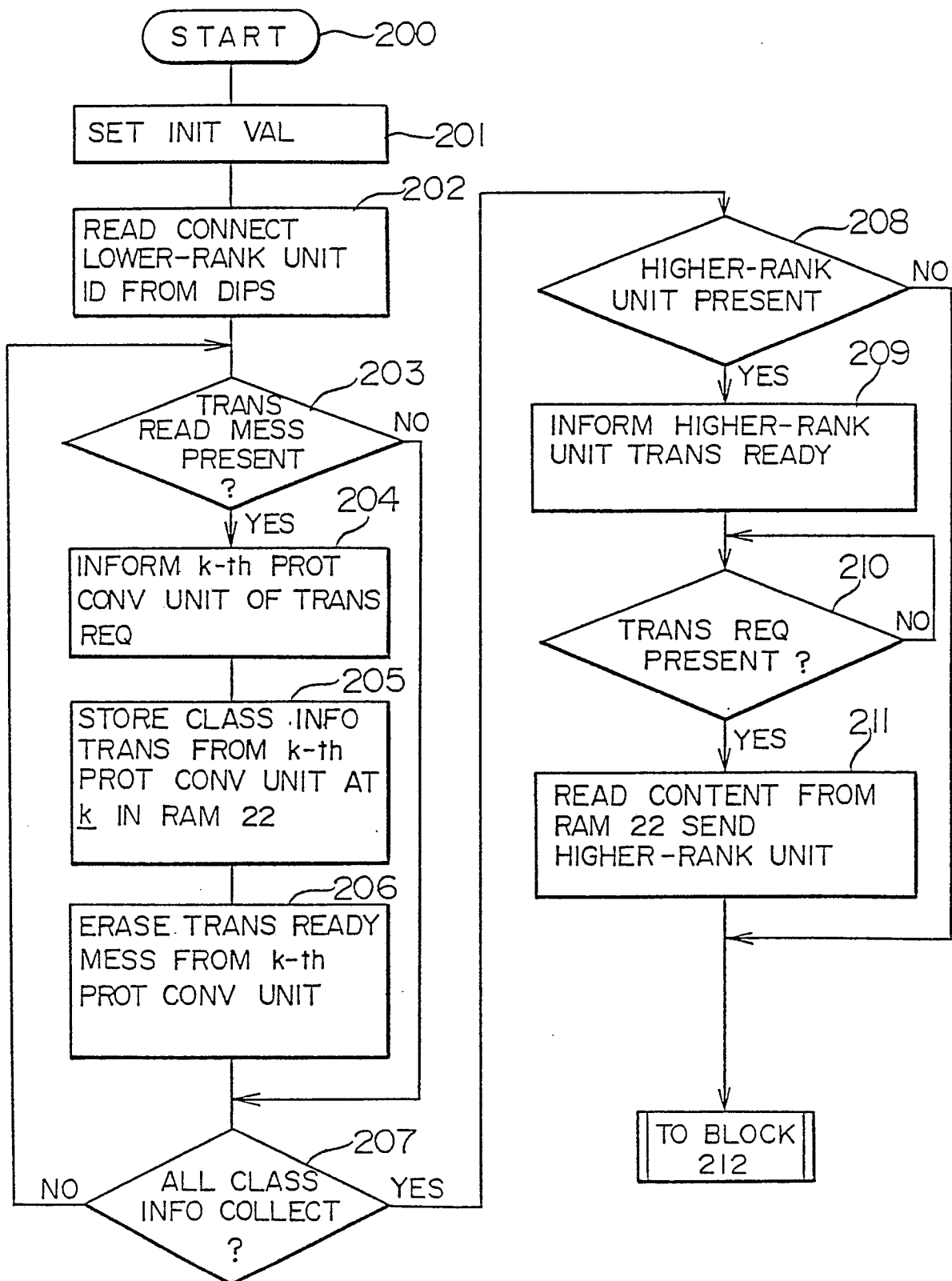


FIG. 7B

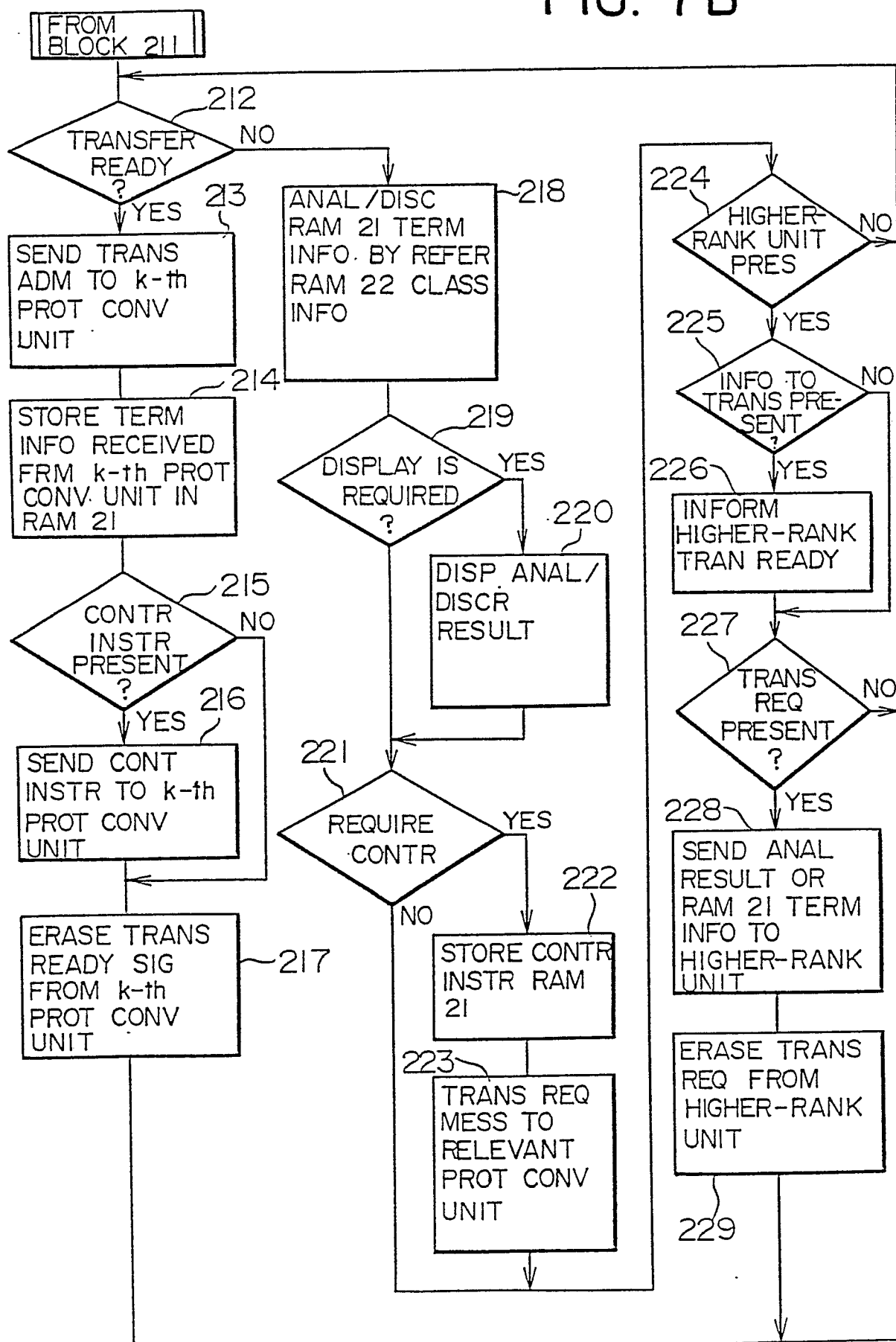


FIG. 8

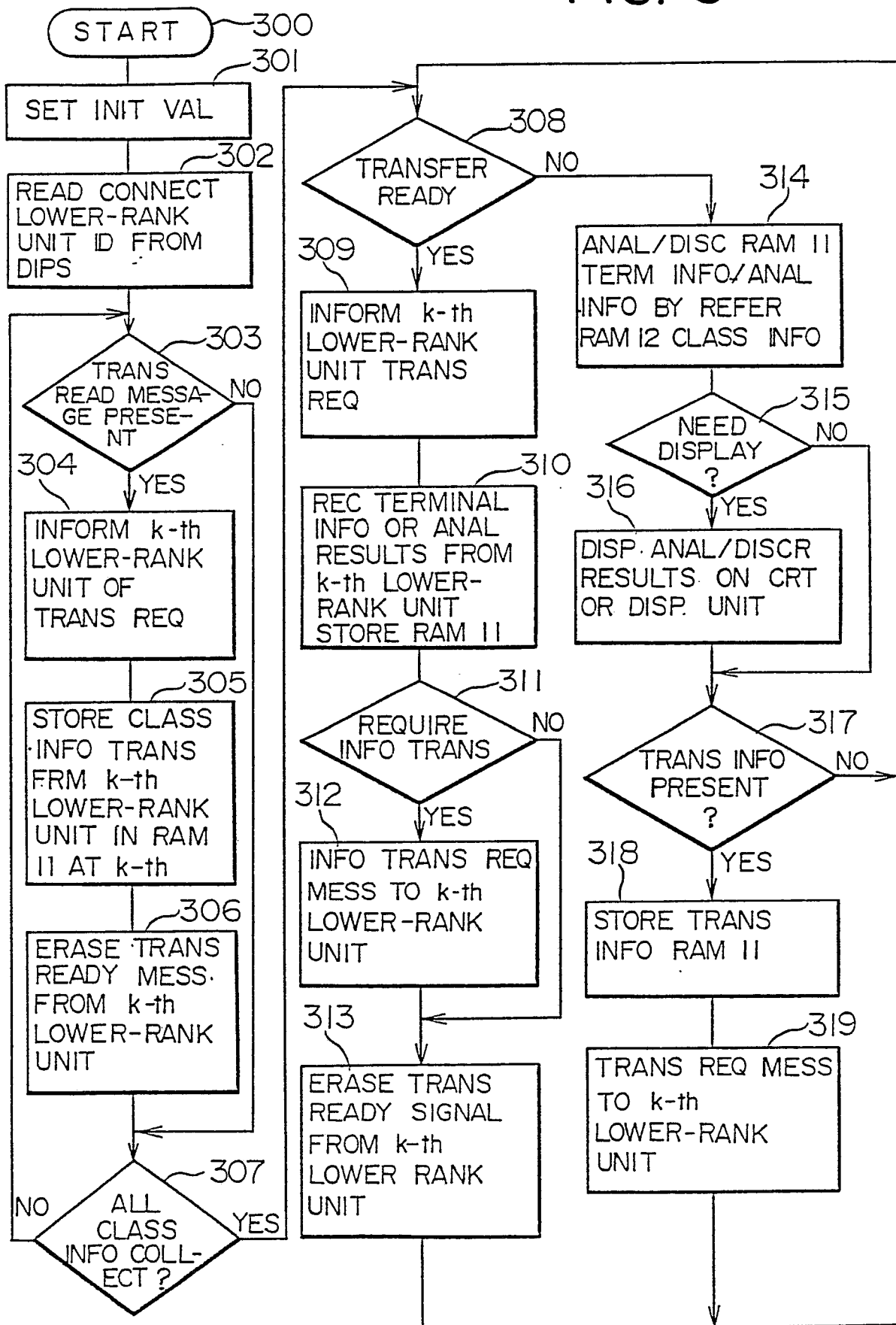
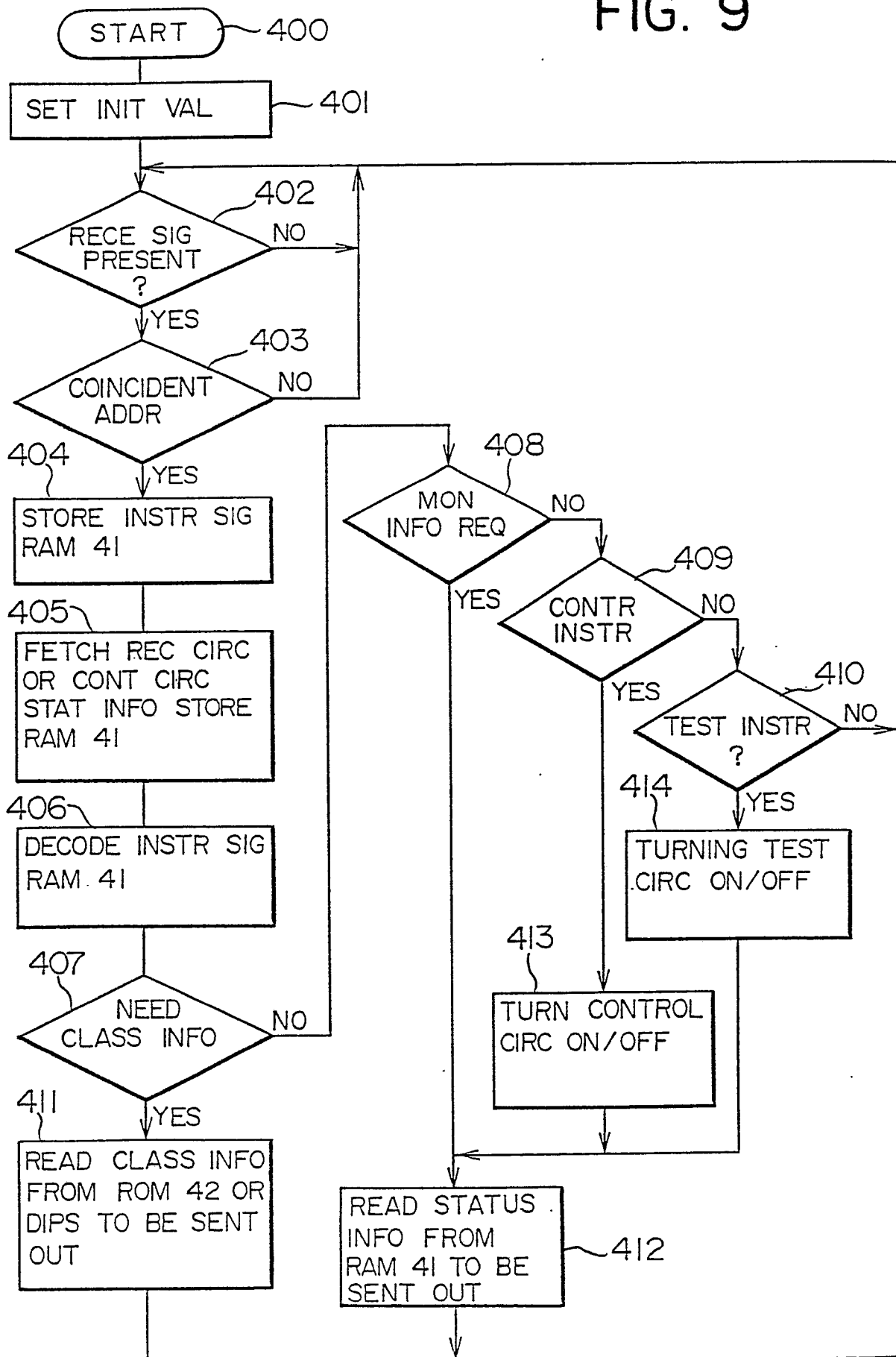


FIG. 9



INTERNATIONAL SEARCH REPORT

International Application No.

00298133
PCT/JP88/00037

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁴		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl ⁴ G08B25/00, G08B26/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
IPC	G08B25/00, G08B26/00	
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 ⁶	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	JP, A, 52-25993 (Matsushita Electric Works, Ltd.) 26 February 1977 (26. 02. 77) (Family: none)	1-3
Y	JP, A, 54-62799 (Omron Tateisi Electronics Co.) 21 May 1979 (21. 05. 79) (Family: none)	1-3
Y	JP, A, 55-119795 (Taiko Denki Seisakusho Kabushiki Kaisha) 13 September 1980 (13. 09. 80) (Family: none)	1-3
Y	JP, A, 57-50094 (Koizumi Toshihiro) 24 March 1982 (24. 03. 82) (Family: none)	1-3
¹⁵ 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 "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		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ²
April 14, 1988 (14. 04. 88)		April 25, 1988 (25. 04. 88)
International Searching Authority ¹		Signature of Authorized Officer ²⁰
Japanese Patent Office		