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Sugauchi et al.

(54) **INFORMATION PROVIDING SYSTEM HAVING A NETWORK TERMINAL AND NETWORK MANAGEMENT SYSTEM WHICH MANAGES A NETWORK AND PROVIDES INFORMATION OF THE NETWORK TO THE NETWORK TERMINAL**

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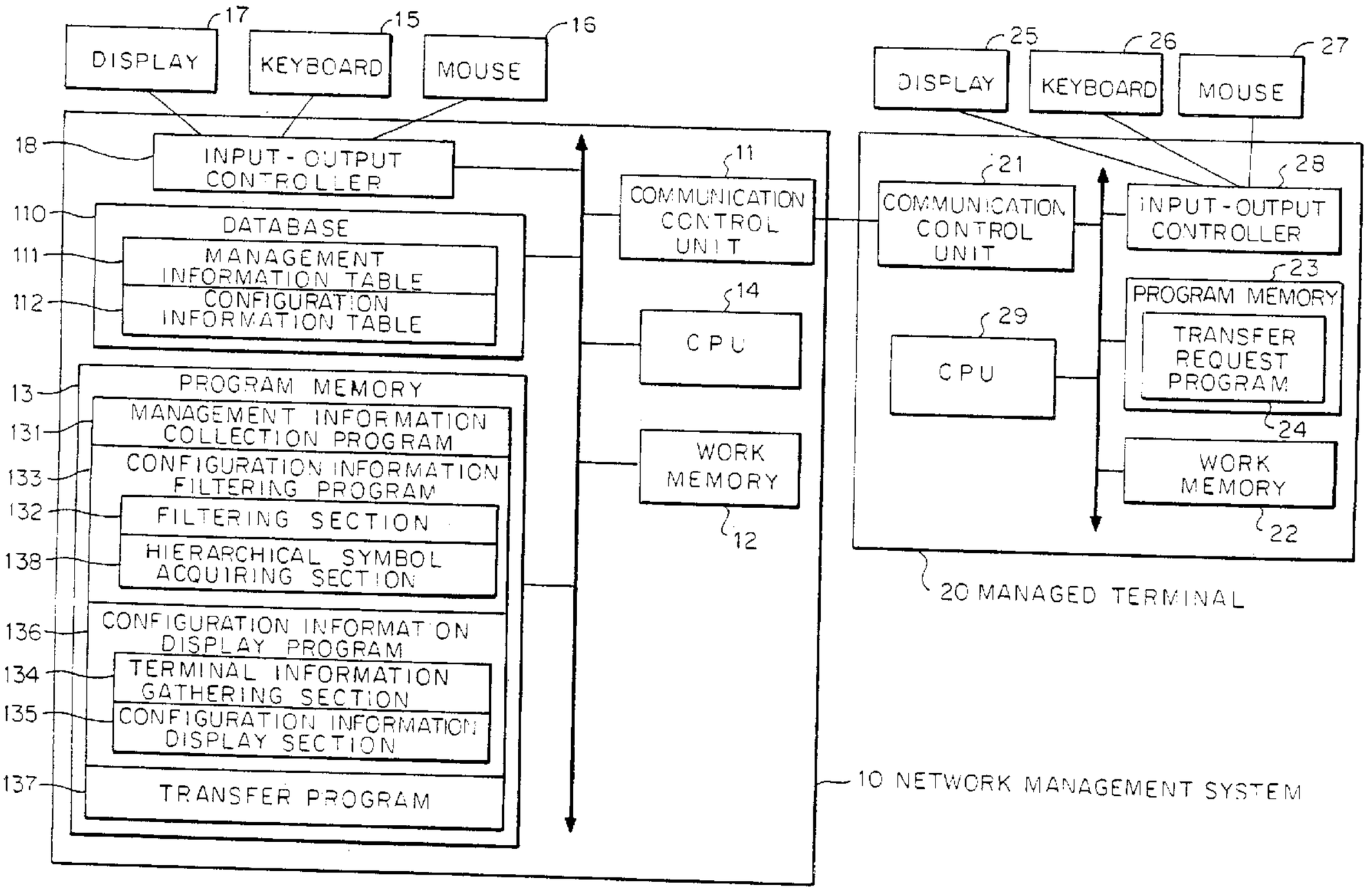
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(52) **U.S. Cl.** **345/736**

(57) **ABSTRACT**

A method, apparatus and computer program for displaying partial information related to network equipment connected to a network being managed by a network management system. The partial information is required for network management to be conducted from the network equipment. A managed terminal is included in each network equipment. The network management system collects management information from each network equipment and stores management information therein. When conducting network management, the managed terminal sends a request for network management. The network management system in response transfers a program for managing the network to the managed terminal. The transferred program informs the network management system of the identification of the managed terminal. Partial information is transferred to the managed terminal based on the identification. The managed terminal then displays the transferred partial information.



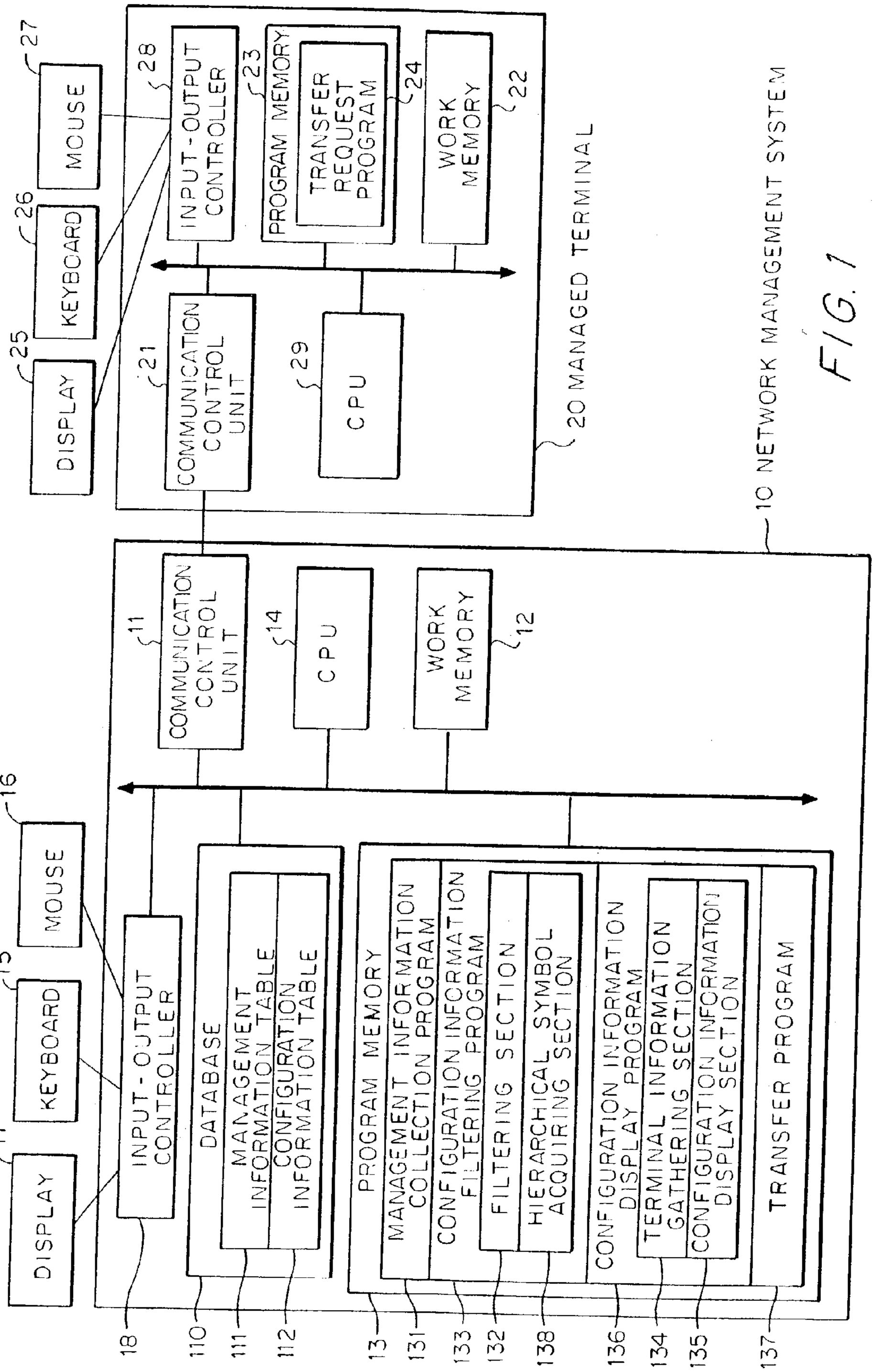

10 NETWORK MANAGEMENT SYSTEM
20 MANAGED TERMINAL
22 WORK MEMORY
23 PROGRAM MEMORY
24 TRANSFER REQUEST PROGRAM
25 DISPLAY
26 KEYBOARD
27 MOUSE
28 INPUT-OUTPUT CONTROLLER
29 CPU
21 COMMUNICATION CONTROL UNIT
12 WORK MEMORY
14 CPU
11 COMMUNICATION CONTROL UNIT
16 MOUSE
15 KEYBOARD
17 DISPLAY
INPUT-OUTPUT CONTROLLER
DATABASE
MANAGEMENT INFORMATION TABLE
CONFIGURATION INFORMATION TABLE
PROGRAM MEMORY
MANAGEMENT INFORMATION COLLECTION PROGRAM
CONFIGURATION INFORMATION FILTERING PROGRAM
FILTERING SECTION
HIERARCHICAL SYMBOL ACQUIRING SECTION
CONFIGURATION INFORMATION DISPLAY PROGRAM
TERMINAL INFORMATION GATHERING SECTION
CONFIGURATION INFORMATION DISPLAY SECTION
TRANSFER PROGRAM
18
110
111
112
13
131
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135
137

FIG. 1

FIG. 2

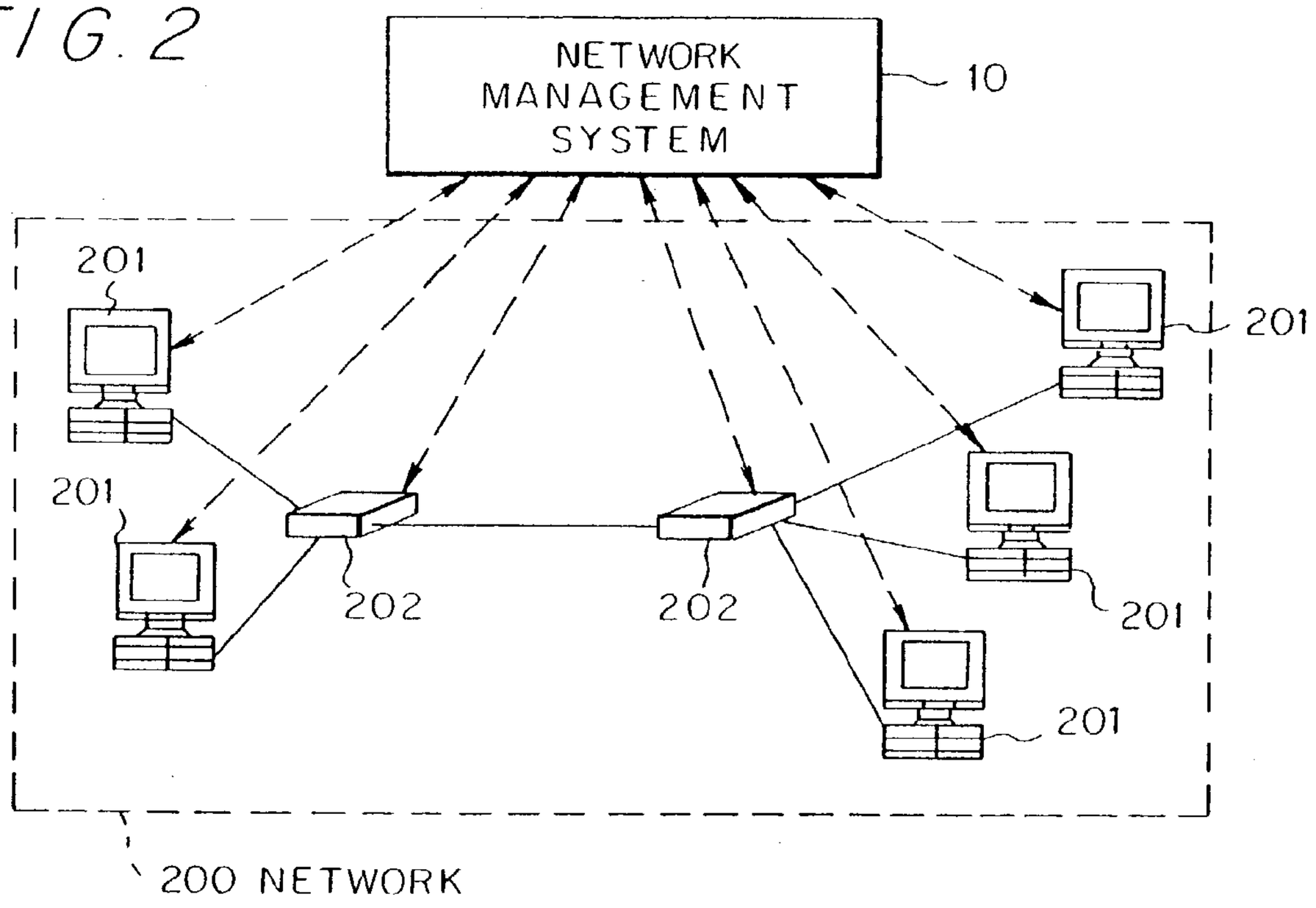
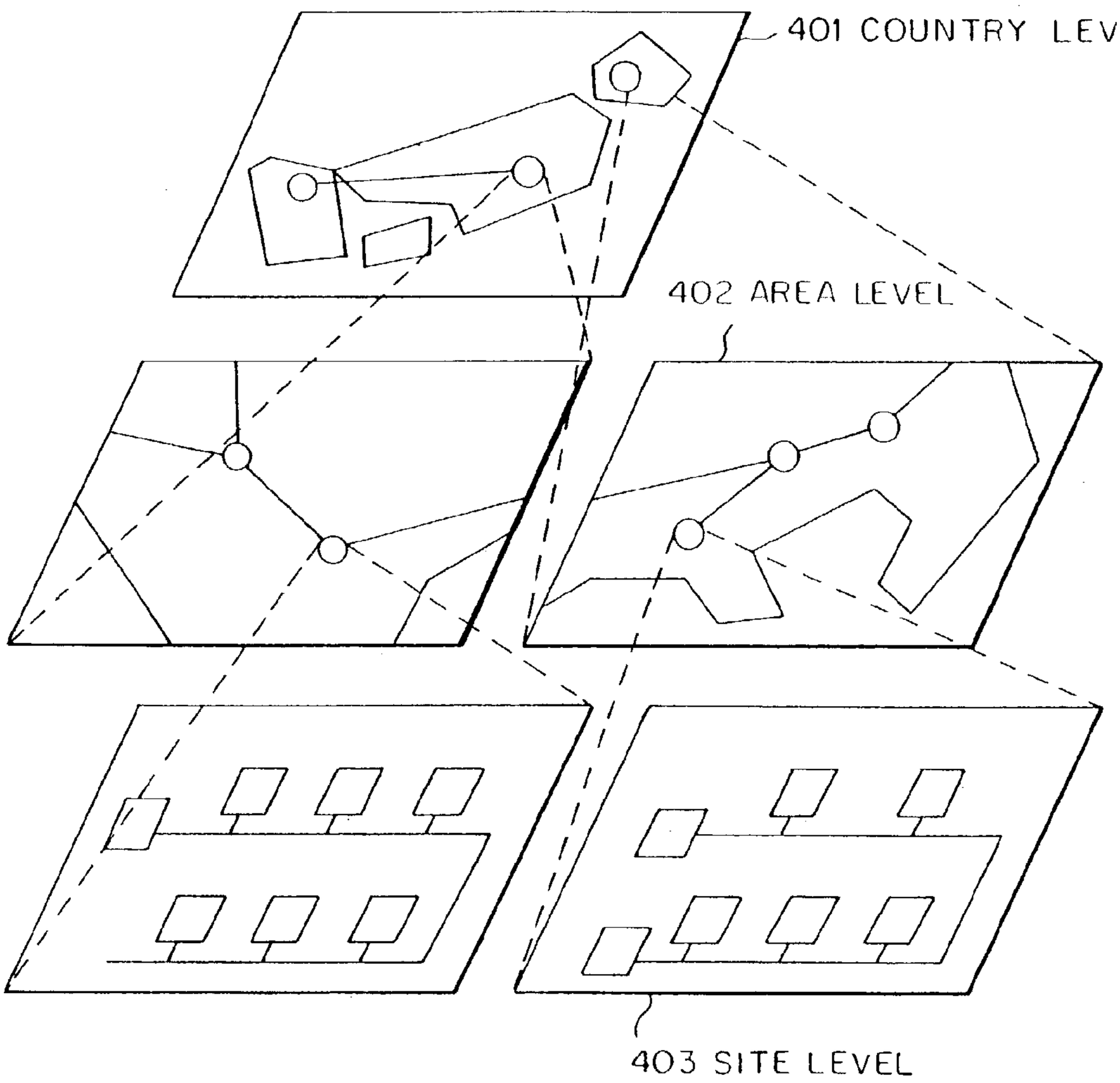


FIG. 3

302 IDENTIFIER	303 HOST NAME	304 IP ADDRESS
1	PC11	AA, AB, AC, AD
2	PC12	AA, AB, AC, AE
3	PC13	AA, AB, AC, AF
4	PC21	AA, AB, AG, AH
5	PC22	AA, AB, AG, AI
6	PC31	AA, AB, AJ, AK
⋮	⋮	⋮

111 MANAGEMENT INFORMATION TABLE

FIG. 4

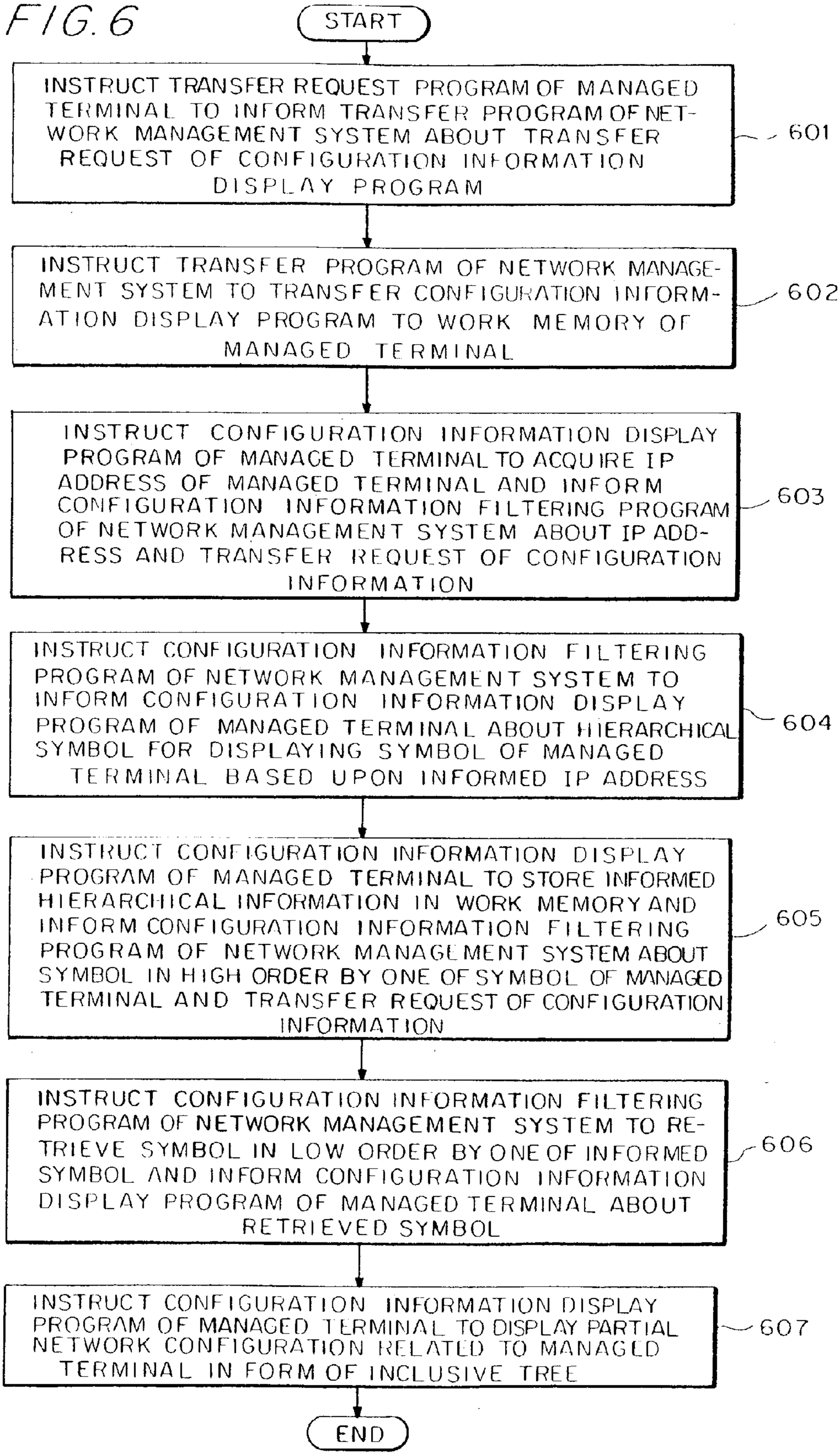


IDENTIFIER (502)	SYMBOL NAME (503)	HIGH ORDER SYMBOL (504)	CORRESPONDING NODE (505)	STATE (506)	CLASS (507)
1000	AREA 1	-	-	NORMAL	NETWORK
1001	AREA 2	-	-	NORMAL	NETWORK
1002	SECTOR1	1000	-	NORMAL	SUBNETWORK
1003	SECTOR2	1000	-	NORMAL	SUBNETWORK
1004	SECTOR3	1001	-	NORMAL	SUBNETWORK
1005	PC11	1002	1	NORMAL	COMPUTER
1006	PC12	1002	2	WARNING	COMPUTER
1007	PC13	1002	3	NORMAL	COMPUTER
1008	PC21	1003	4	NORMAL	COMPUTER
1009	PC22	1003	5	NORMAL	COMPUTER
1010	PC31	1004	6	NORMAL	COMPUTER
⋮	⋮	⋮	⋮	⋮	⋮

112 CONFIGURATION INFORMATION TABLE

FIG. 5

FIG. 6


START
INSTRUCT TRANSFER REQUEST PROGRAM OF MANAGED TERMINAL TO INFORM TRANSFER PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT TRANSFER REQUEST OF CONFIGURATION INFORMATION DISPLAY PROGRAM
601
INSTRUCT TRANSFER PROGRAM OF NETWORK MANAGEMENT SYSTEM TO TRANSFER CONFIGURATION INFORMATION DISPLAY PROGRAM TO WORK MEMORY OF MANAGED TERMINAL
602
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO ACQUIRE IP ADDRESS OF MANAGED TERMINAL AND INFORM CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT IP ADDRESS AND TRANSFER REQUEST OF CONFIGURATION INFORMATION
603
INSTRUCT CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM TO INFORM CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL ABOUT HIERARCHICAL SYMBOL FOR DISPLAYING SYMBOL OF MANAGED TERMINAL BASED UPON INFORMED IP ADDRESS
604
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO STORE INFORMED HIERARCHICAL INFORMATION IN WORK MEMORY AND INFORM CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT SYMBOL IN HIGH ORDER BY ONE OF SYMBOL OF MANAGED TERMINAL AND TRANSFER REQUEST OF CONFIGURATION INFORMATION
605
INSTRUCT CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM TO RETRIEVE SYMBOL IN LOW ORDER BY ONE OF INFORMED SYMBOL AND INFORM CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL ABOUT RETRIEVED SYMBOL
606
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO DISPLAY PARTIAL NETWORK CONFIGURATION RELATED TO MANAGED TERMINAL IN FORM OF INCLUSIVE TREE
607
END

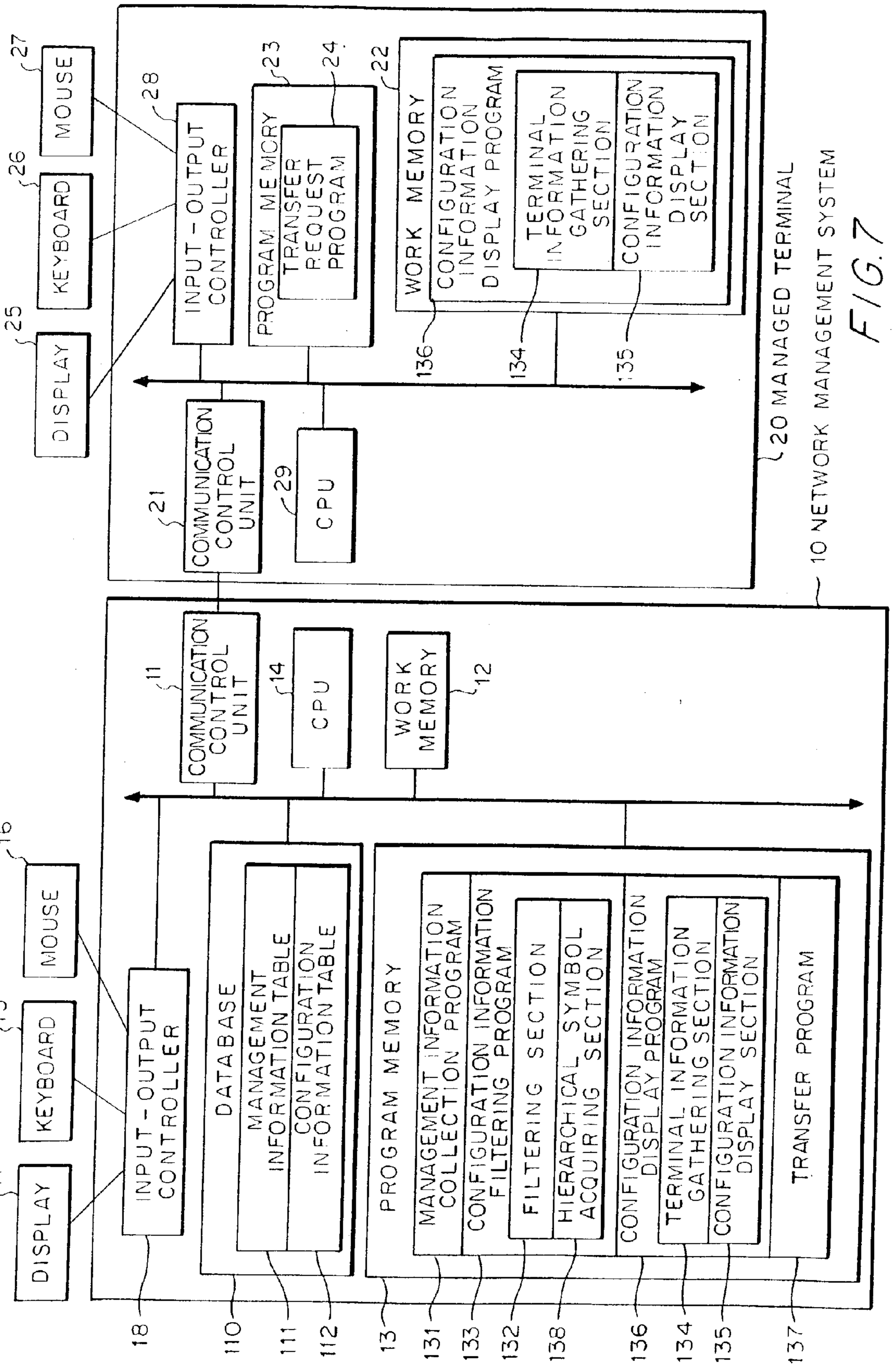

10 NETWORK MANAGEMENT SYSTEM
20 MANAGED TERMINAL
WORK MEMORY
CONFIGURATION INFORMATION DISPLAY PROGRAM
TERMINAL INFORMATION GATHERING SECTION
CONFIGURATION INFORMATION DISPLAY SECTION
PROGRAM MEMORY
TRANSFER REQUEST PROGRAM
INPUT-OUTPUT CONTROLLER
COMMUNICATION CONTROL UNIT
CPU
MOUSE
KEYBOARD
DISPLAY
DATABASE
MANAGEMENT INFORMATION TABLE
CONFIGURATION INFORMATION TABLE
MANAGEMENT INFORMATION COLLECTION PROGRAM
CONFIGURATION INFORMATION FILTERING PROGRAM
FILTERING SECTION
HIERARCHICAL SYMBOL ACQUIRING SECTION
CONFIGURATION INFORMATION DISPLAY PROGRAM
TERMINAL INFORMATION GATHERING SECTION
CONFIGURATION INFORMATION DISPLAY SECTION
TRANSFER PROGRAM
11
12
13
14
15
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FIG. 7

FIG. 8

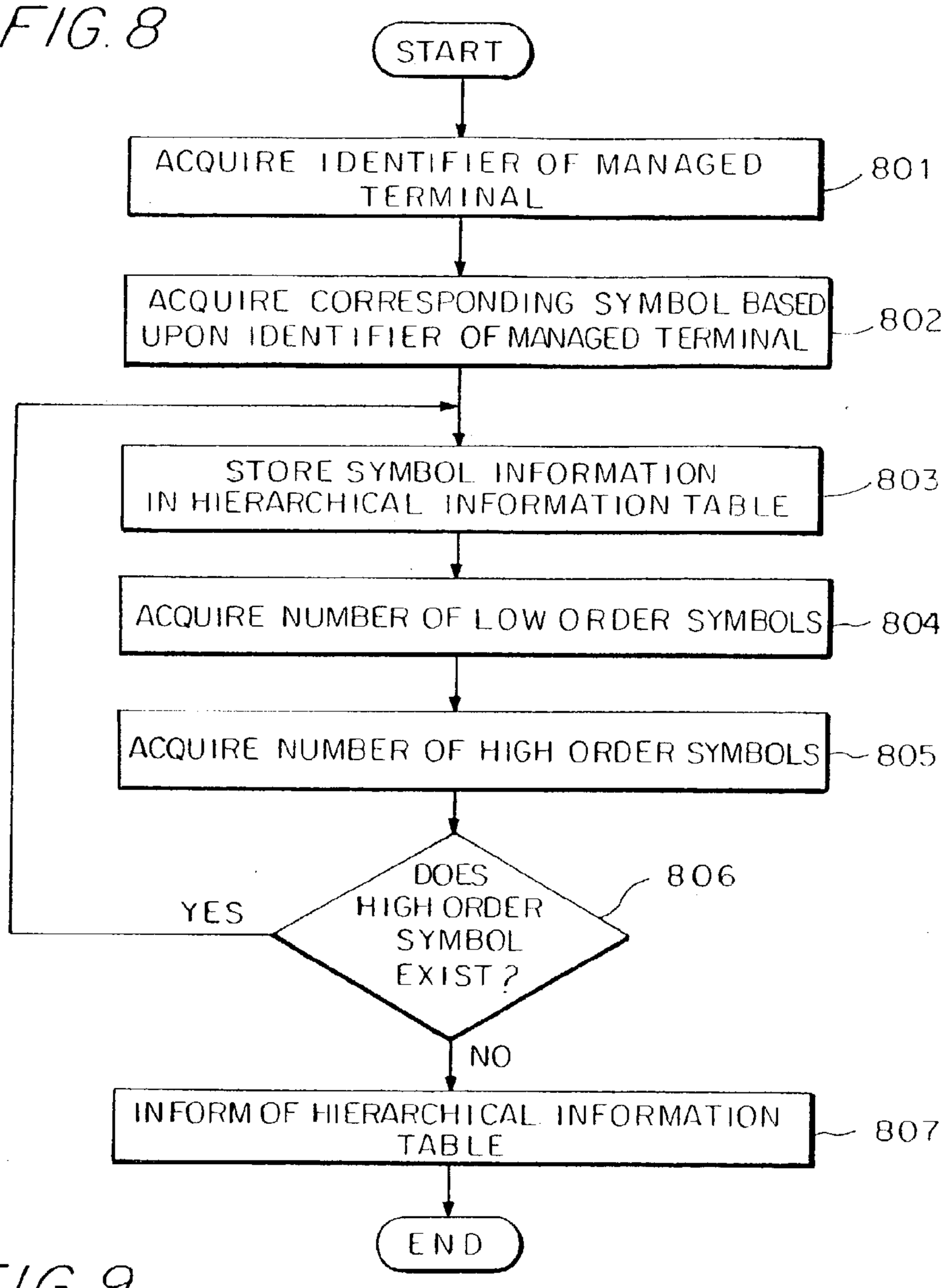


FIG. 9

902 IDENTIFIER	903 SYMBOL NAME	904 STATE	905 CLASS	906 NUMBER OF LOW ORDER SYMBOLS
1005	PC11	NORMAL	COMPUTER	0
1002	SECTOR1	NORMAL	SUBNETWORK	3
1000	AREA1	NORMAL	NETWORK	3

901 HIERARCHICAL INFORMATION TABLE

FIG. 10

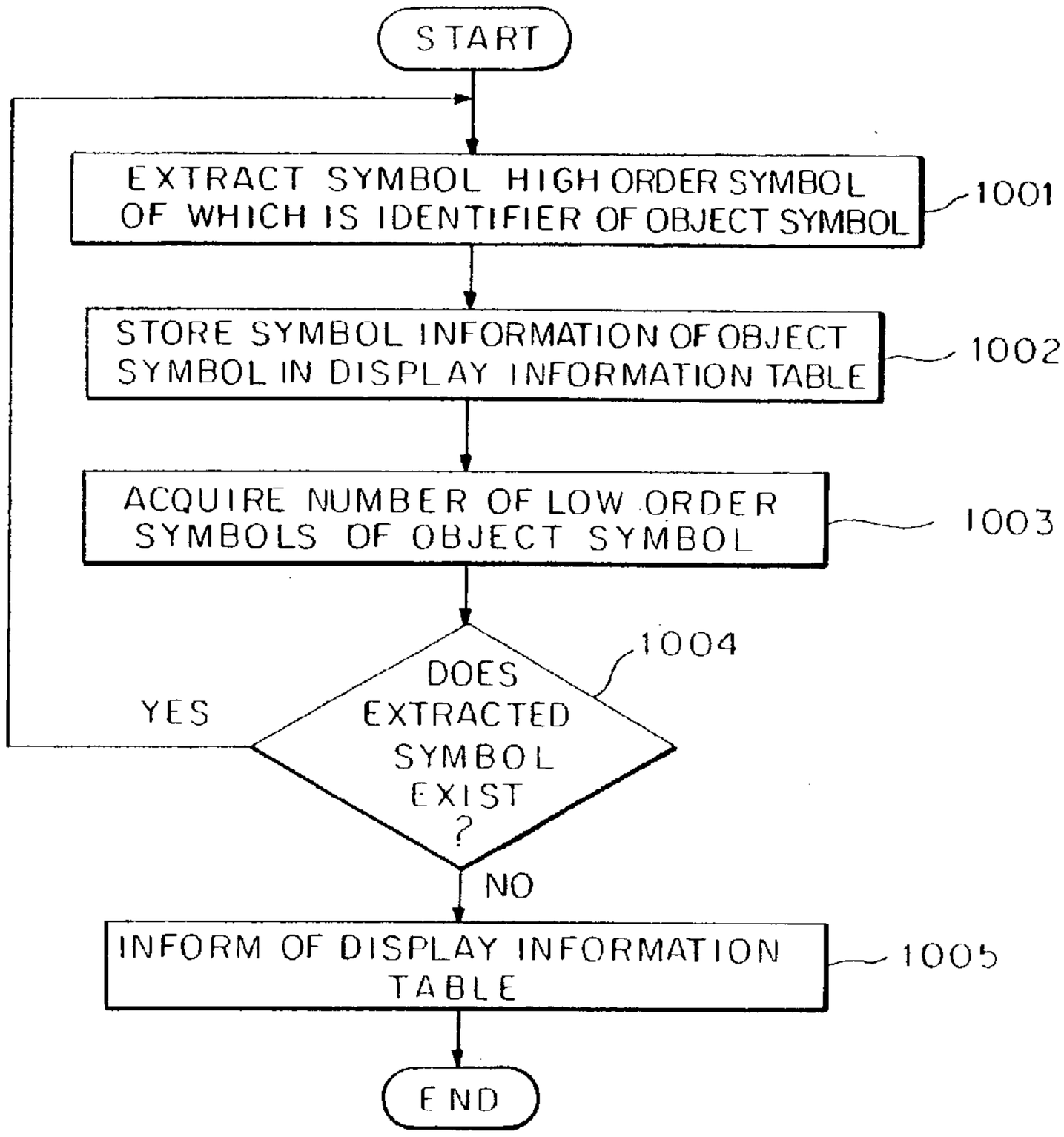


FIG. 11

1101 DISPLAY INFORMATION TABLE

1102 IDENTIFIER	1103 SYMBOL NAME	1104 CLASS	1105 STATE	1106 NUMBER OF LOW ORDER SYMBOLS
1005	PC 11	COMPUTER	NORMAL	0
1006	PC 12	COMPUTER	WARNING	0
1007	PC 13	COMPUTER	NORMAL	0

FIG. 12

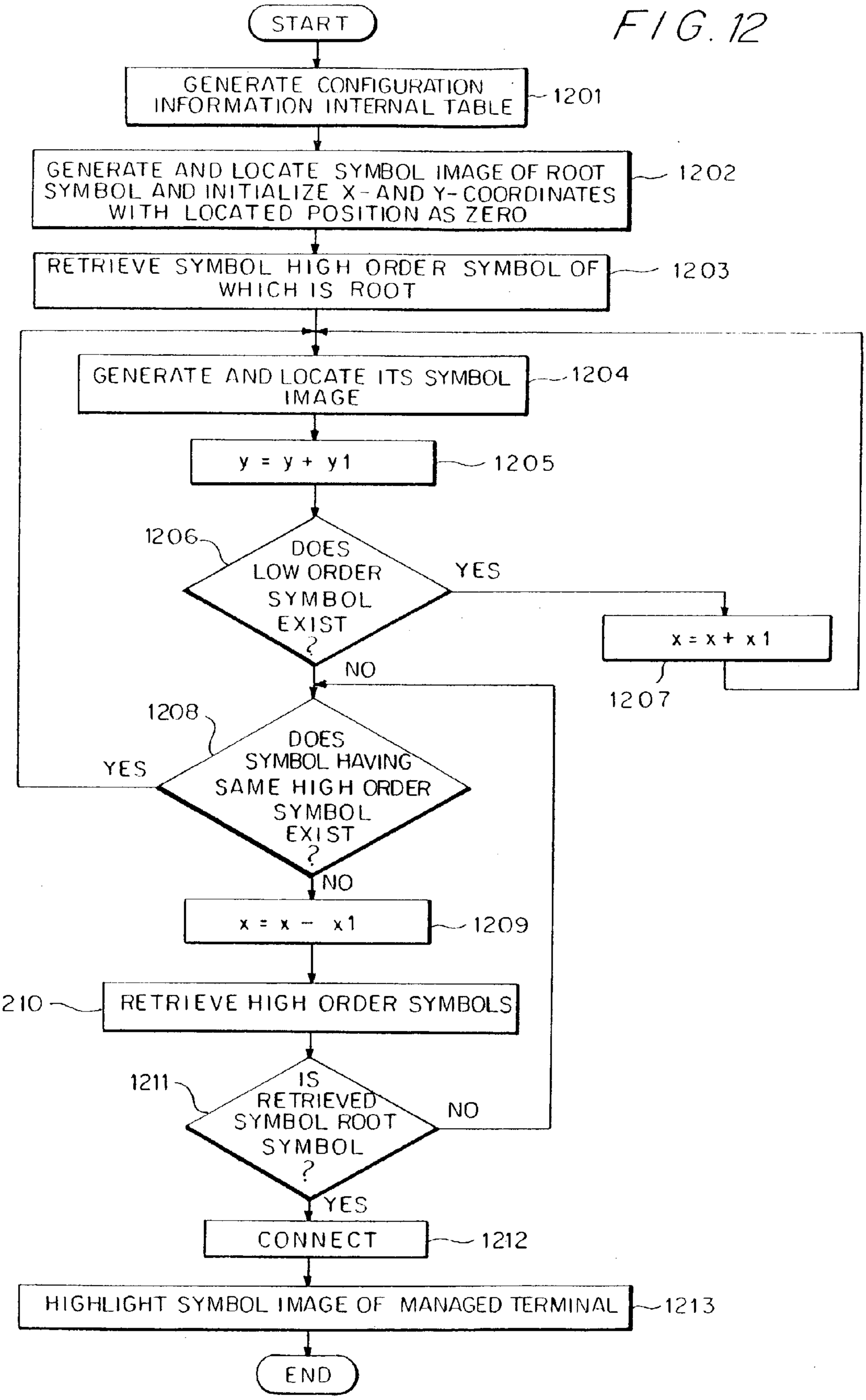

START
GENERATE CONFIGURATION INFORMATION INTERNAL TABLE
1201
GENERATE AND LOCATE SYMBOL IMAGE OF ROOT SYMBOL AND INITIALIZE X- AND Y- COORDINATES WITH LOCATED POSITION AS ZERO
1202
RETRIEVE SYMBOL HIGH ORDER SYMBOL OF WHICH IS ROOT
1203
GENERATE AND LOCATE ITS SYMBOL IMAGE
1204
y = y + y1
1205
1206
DOES LOW ORDER SYMBOL EXIST ?
YES
x = x + x1
1207
NO
1208
DOES SYMBOL HAVING SAME HIGH ORDER SYMBOL EXIST ?
YES
NO
x = x - x1
1209
1210
RETRIEVE HIGH ORDER SYMBOLS
1211
IS RETRIEVED SYMBOL ROOT SYMBOL ?
NO
YES
CONNECT
1212
HIGHLIGHT SYMBOL IMAGE OF MANAGED TERMINAL
1213
END

FIG. 13

1301 CONFIGURATION INFORMATION INTERNAL TABLE

1302 IDENTIFIER	1303 CLASS	1304 STATE	1305 SYMBOL NAME	1306 HIERARCHY	1307 NUMBER OF LOW ORDER SYMBOLS	1308 HIGH ORDER SYMBOL
0	ROOT	NORMAL	ROOT	0	—	—
1000	NETWORK	NORMAL	AREA 1	1	3	0
1002	SUBNETWORK	NORMAL	SECTOR 1	2	3	1000
1005	COMPUTER	NORMAL	PC 11	3	0	1002
1006	COMPUTER	WARNING	PC12	3	0	1002
1007	COMPUTER	NORMAL	PC13	3	0	1002

1309

FIG. 14

CLASS	ICON FORMAT
NETWORK	○
SUBNETWORK	○
COMPUTER	□

1402 1403

1401 CLASS/ICON RELATING INTERNAL TABLE

FIG. 15

STATE	ICON COLOR
NORMAL	GREEN
WARNING	YELLOW

1502 1503

1501 STATE/ICON COLOR RELATING INTERNAL TABLE

FIG. 16

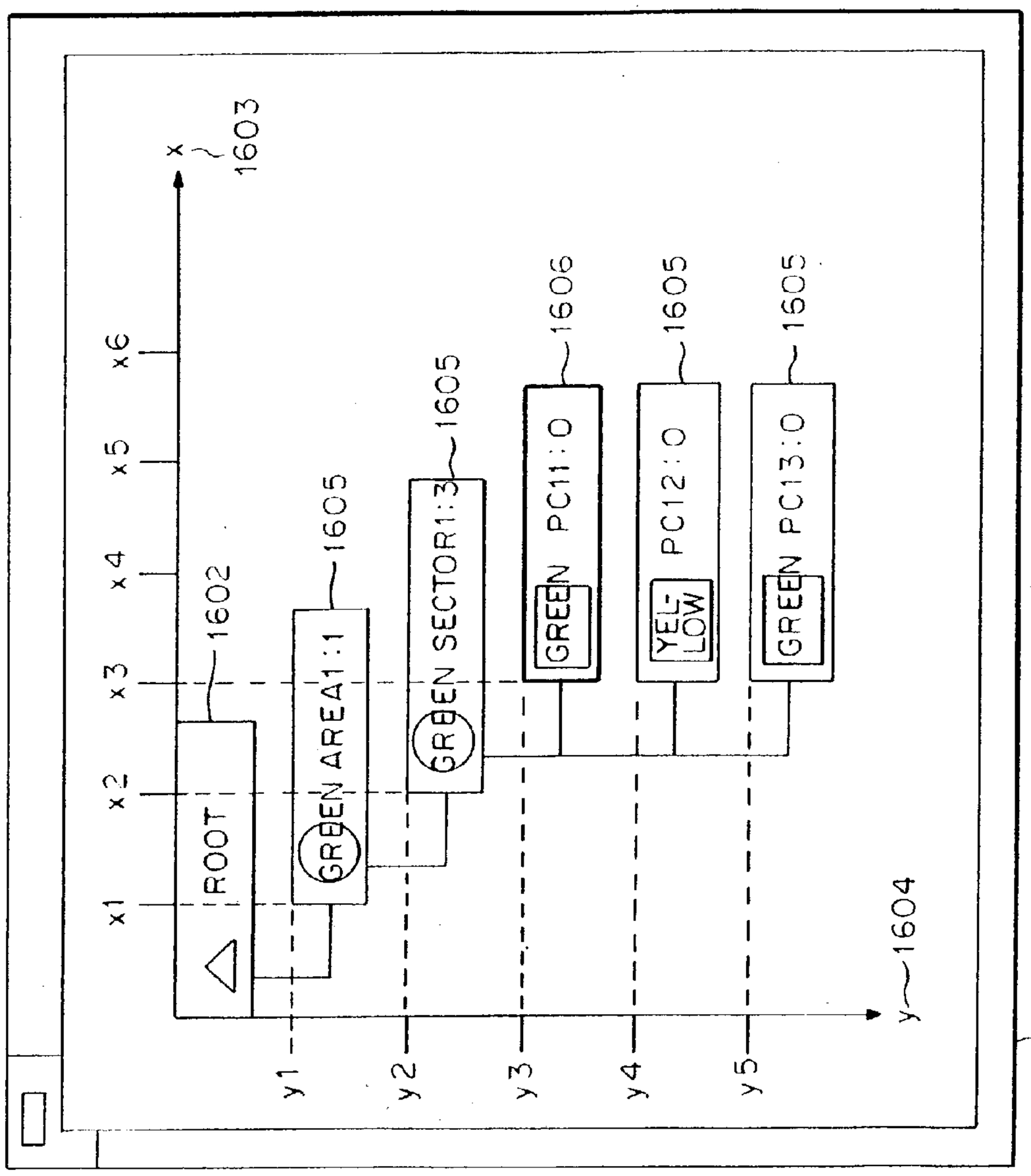

x
1603
x1
x2
x3
x4
x5
x6
ROOT
1602
GREEN AREA1:1
1605
GREEN SECTOR1:3
1605
GREEN PC11:0
1606
YEL-LOW PC12:0
1605
GREEN PC13:0
1605
y
1604
y1
y2
y3
y4
y5
1601 INCLUSIVE TREE SCREEN

FIG. 17

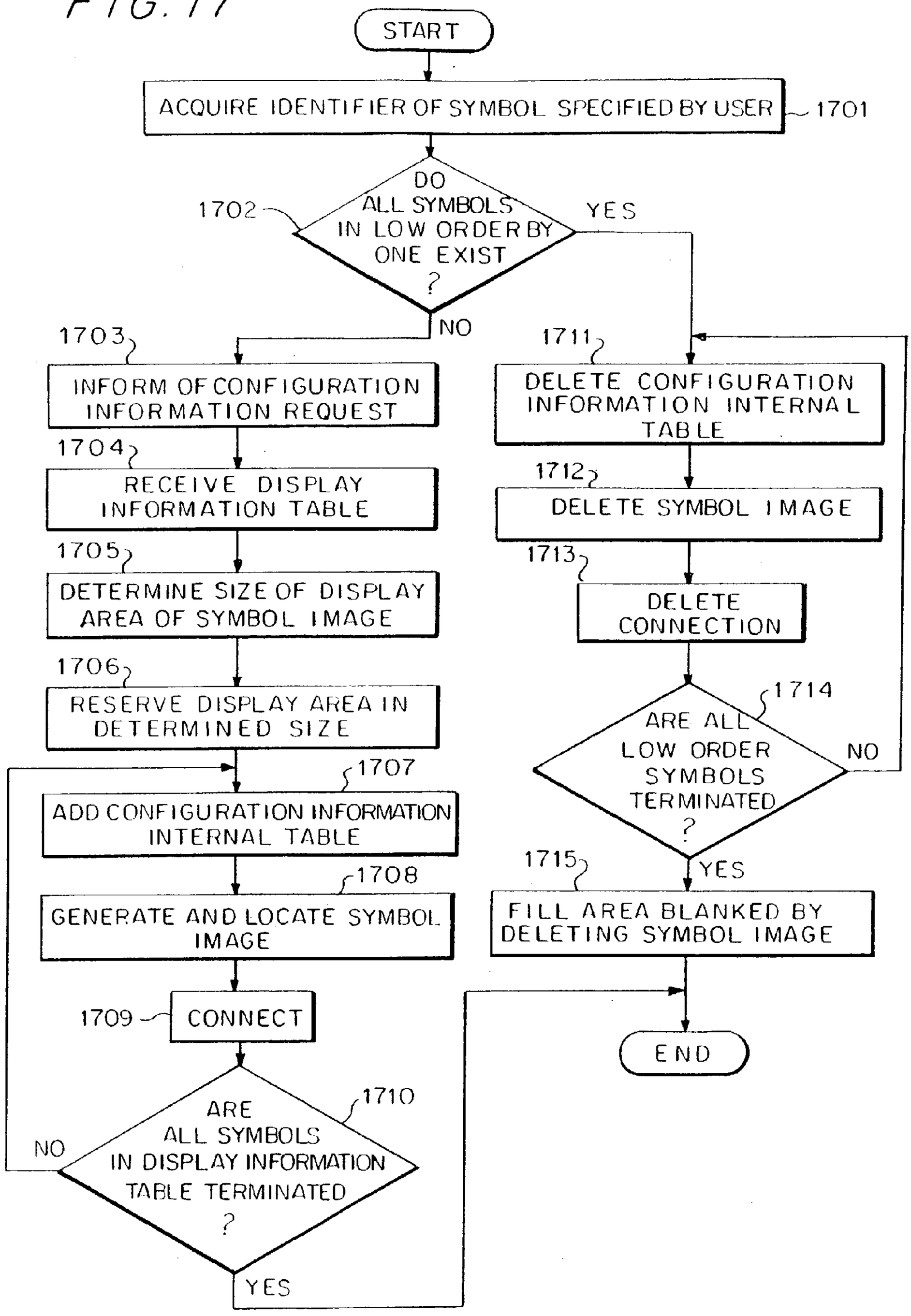

START
ACQUIRE IDENTIFIER OF SYMBOL SPECIFIED BY USER
1701
1702
DO ALL SYMBOLS IN LOW ORDER BY ONE EXIST ?
YES
NO
1703
INFORM OF CONFIGURATION INFORMATION REQUEST
1704
RECEIVE DISPLAY INFORMATION TABLE
1705
DETERMINE SIZE OF DISPLAY AREA OF SYMBOL IMAGE
1706
RESERVE DISPLAY AREA IN DETERMINED SIZE
1707
ADD CONFIGURATION INFORMATION INTERNAL TABLE
1708
GENERATE AND LOCATE SYMBOL IMAGE
1709
CONNECT
1710
ARE ALL SYMBOLS IN DISPLAY INFORMATION TABLE TERMINATED ?
NO
YES
1711
DELETE CONFIGURATION INFORMATION INTERNAL TABLE
1712
DELETE SYMBOL IMAGE
1713
DELETE CONNECTION
1714
ARE ALL LOW ORDER SYMBOLS TERMINATED ?
NO
YES
1715
FILL AREA BLANKED BY DELETING SYMBOL IMAGE
END

FIG. 18

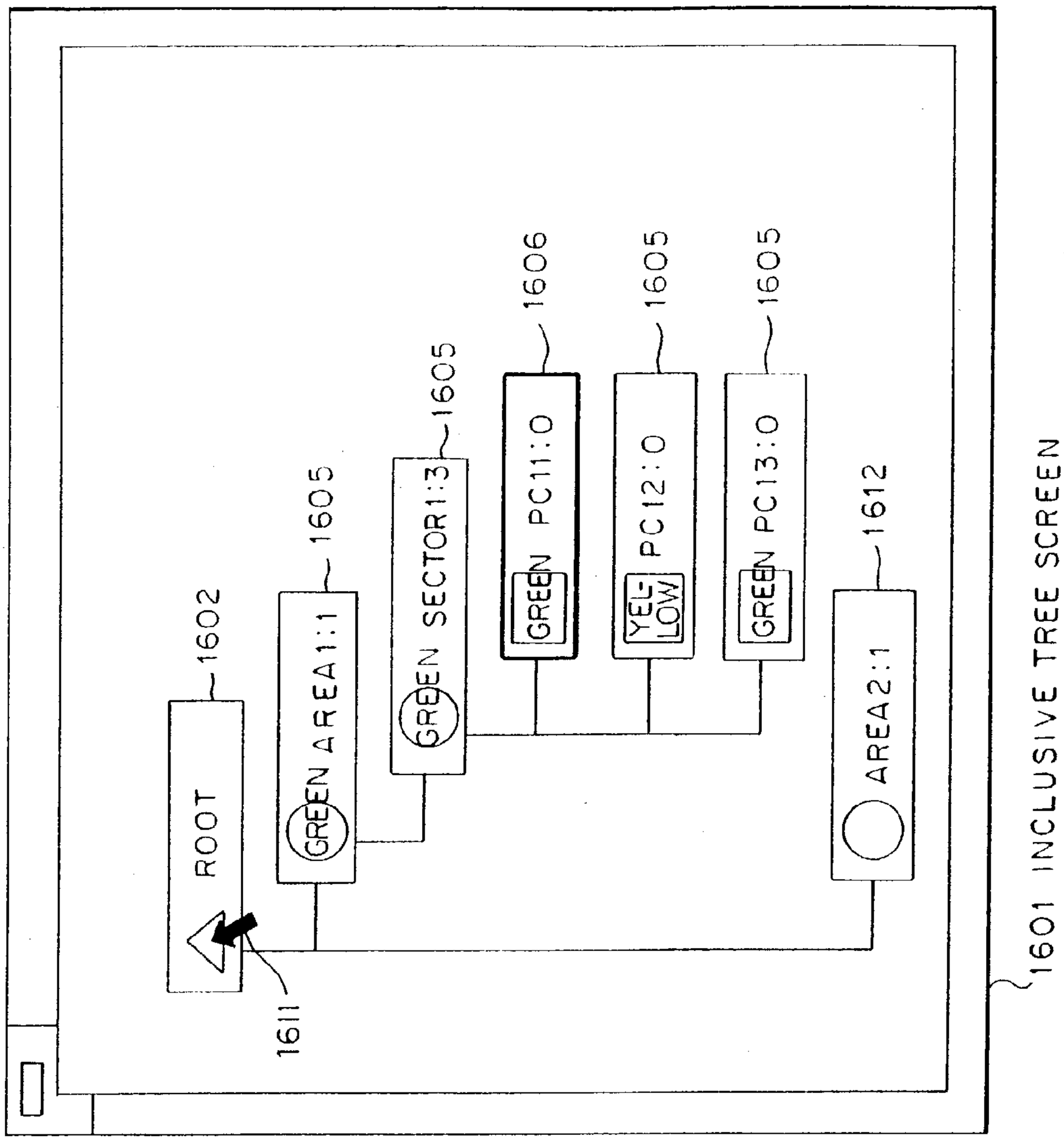
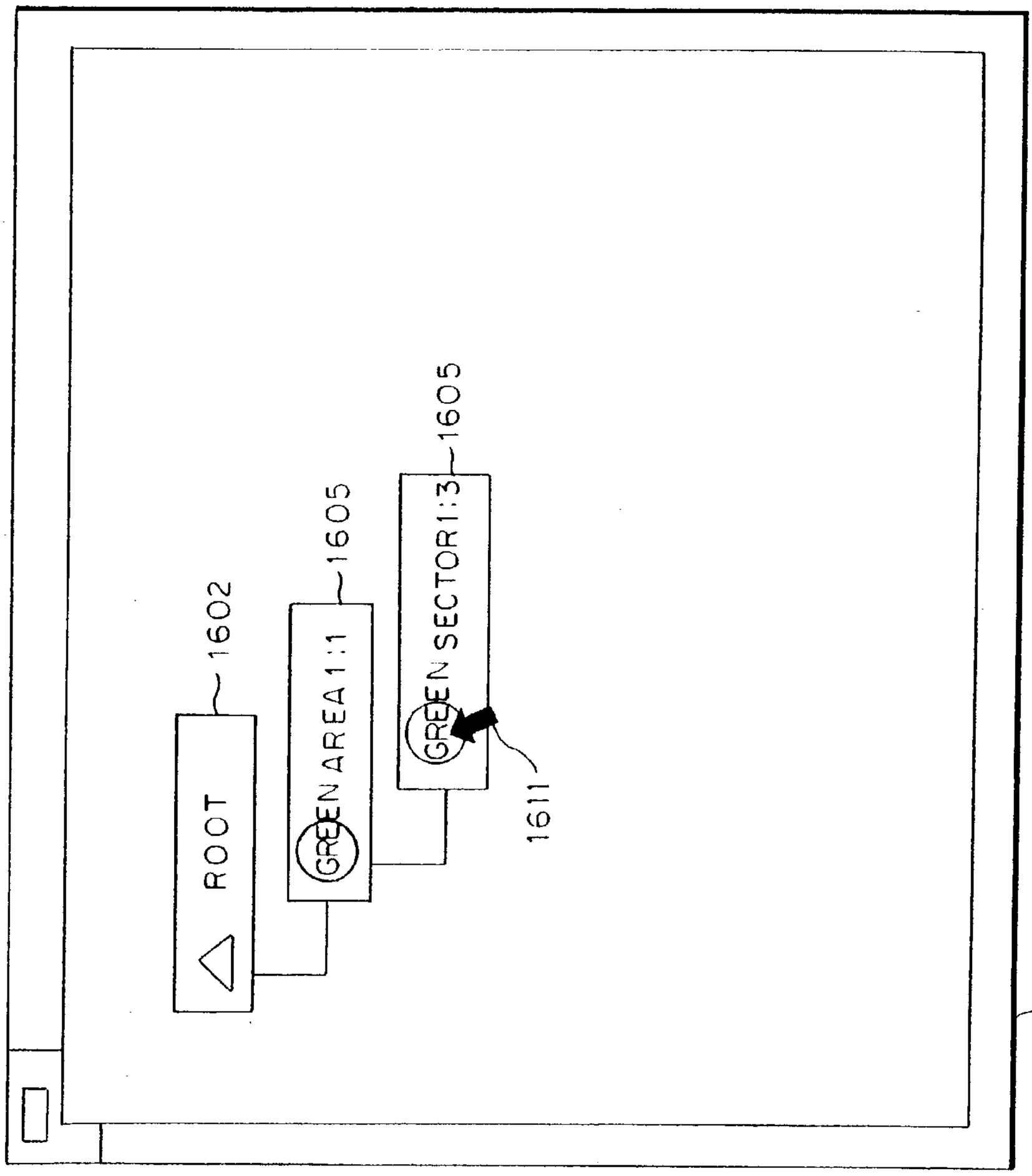

1601
ROOT
1602
GREEN AREA 1:1
1605
GREEN SECTOR 1:3
1605
GREEN PC 11:0
1606
YEL-LOW PC 12:0
1605
GREEN PC 13:0
1605
AREA 2:1
1612
1611
1 INCLUSIVE TREE SCREEN

FIG. 19


ROOT
1602
GREEN AREA 1:1
1605
GREEN SECTOR 1:3
1605
1611
INCLUSIVE TREE SCREEN
1601

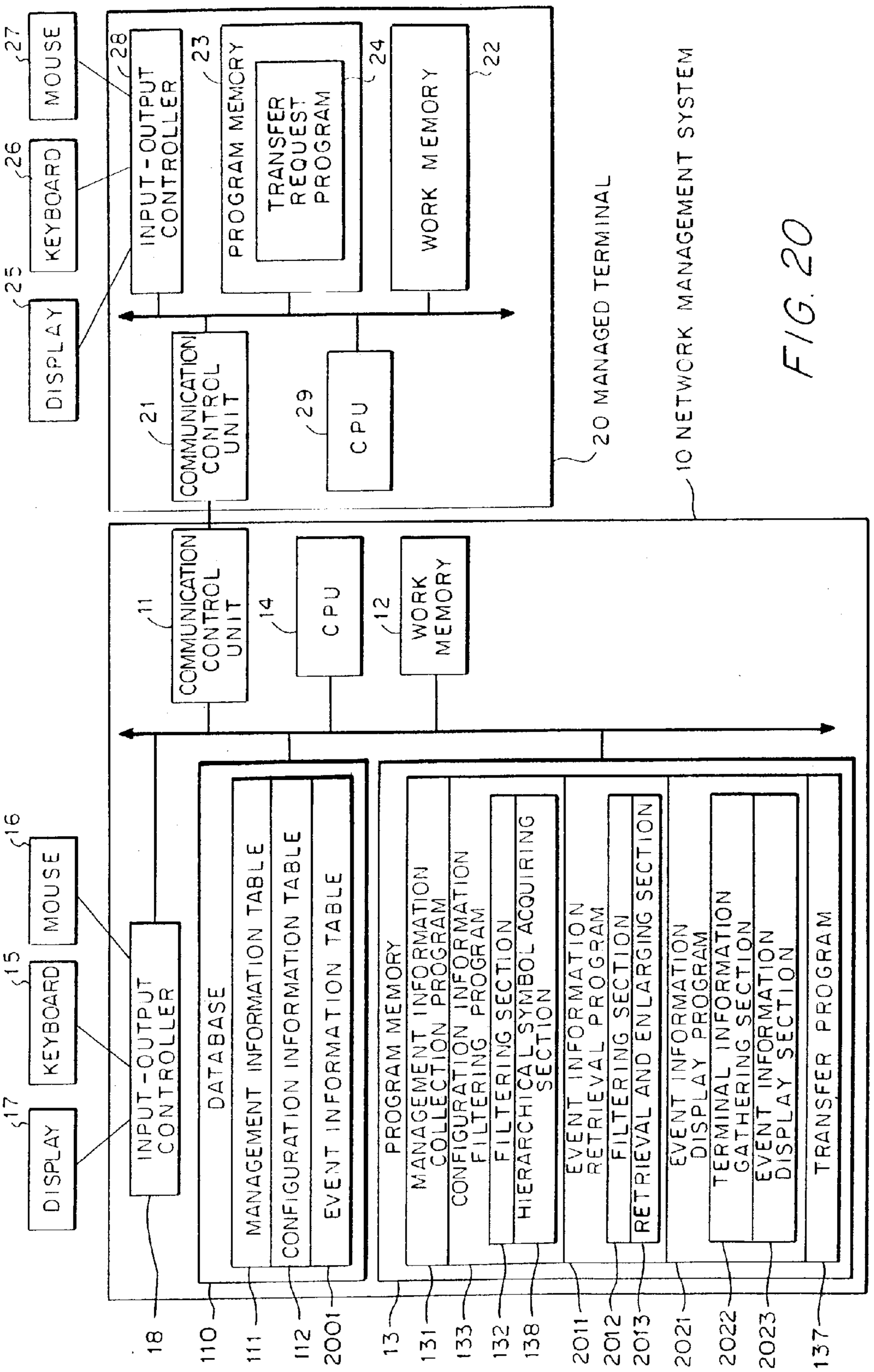

10 NETWORK MANAGEMENT SYSTEM
20 MANAGED TERMINAL
22 WORK MEMORY
23 PROGRAM MEMORY
24 TRANSFER REQUEST PROGRAM
25 DISPLAY
26 KEYBOARD
27 MOUSE
28 INPUT-OUTPUT CONTROLLER
29 CPU
21 COMMUNICATION CONTROL UNIT
11 COMMUNICATION CONTROL UNIT
14 CPU
12 WORK MEMORY
16 MOUSE
15 KEYBOARD
17 DISPLAY
INPUT-OUTPUT CONTROLLER
DATABASE
MANAGEMENT INFORMATION TABLE
CONFIGURATION INFORMATION TABLE
EVENT INFORMATION TABLE
PROGRAM MEMORY
MANAGEMENT INFORMATION COLLECTION PROGRAM
CONFIGURATION INFORMATION FILTERING PROGRAM
FILTERING SECTION
HIERARCHICAL SYMBOL ACQUIRING SECTION
EVENT INFORMATION RETRIEVAL PROGRAM
FILTERING SECTION
RETRIEVAL AND ENLARGING SECTION
EVENT INFORMATION DISPLAY PROGRAM
TERMINAL INFORMATION GATHERING SECTION
EVENT INFORMATION DISPLAY SECTION
TRANSFER PROGRAM
18
110
111
112
2001
13
131
133
132
138
2011
2012
2013
2021
2022
2023
137

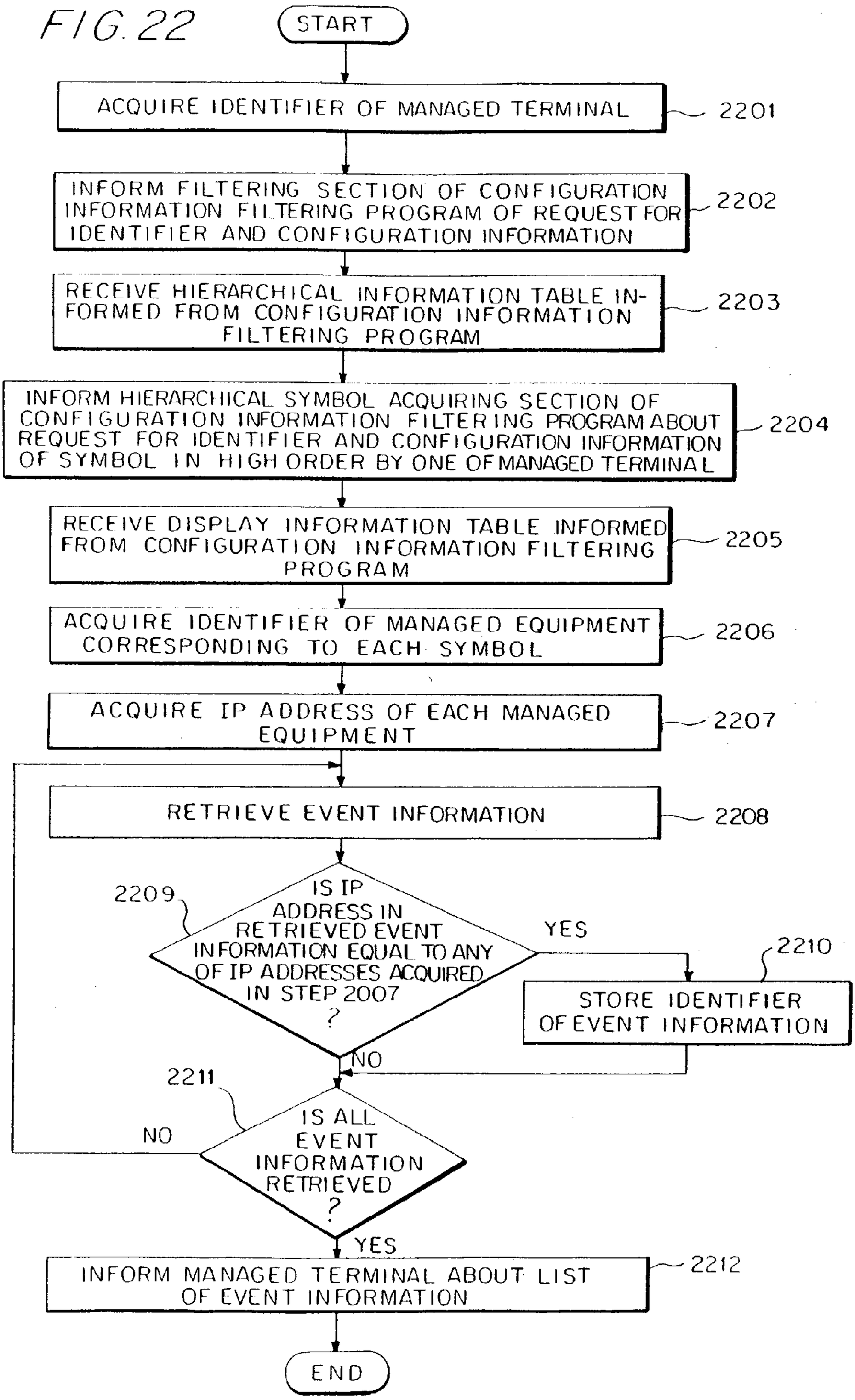
FIG. 20

FIG. 21

2001 EVENT INFORMATION TABLE

2102 IDENTIFIER	2103 IP ADDRESS	2104 INFORMED TIME	2105 INFORMED CONTENTS	2106 INFORMED TYPE
1	AA, AB, AC, AD	11:43:02	xxxxxxxxxxxxxxxx	99999
2	AA, AB, AC, AD	11:42:03	yyyyyyyyyyyyyyyy	99998
3	AA, AB, AC, AE	11:42:03	zzzzzzzzzzzzzzzz	99997
4	AA, AB, AC, AF	11:42:03	oooooooooooooooo	99990
5	AA, AB, AG, AH	11:42:02	pppppppppppppppp	99991
6	AA, AB, AJ, AI	11:42:02	zzzzzzzzzzzzzzzz	99997
---	---	---	---	---

FIG. 22


START
ACQUIRE IDENTIFIER OF MANAGED TERMINAL
2201
INFORM FILTERING SECTION OF CONFIGURATION INFORMATION FILTERING PROGRAM OF REQUEST FOR IDENTIFIER AND CONFIGURATION INFORMATION
2202
RECEIVE HIERARCHICAL INFORMATION TABLE INFORMED FROM CONFIGURATION INFORMATION FILTERING PROGRAM
2203
INFORM HIERARCHICAL SYMBOL ACQUIRING SECTION OF CONFIGURATION INFORMATION FILTERING PROGRAM ABOUT REQUEST FOR IDENTIFIER AND CONFIGURATION INFORMATION OF SYMBOL IN HIGH ORDER BY ONE OF MANAGED TERMINAL
2204
RECEIVE DISPLAY INFORMATION TABLE INFORMED FROM CONFIGURATION INFORMATION FILTERING PROGRAM
2205
ACQUIRE IDENTIFIER OF MANAGED EQUIPMENT CORRESPONDING TO EACH SYMBOL
2206
ACQUIRE IP ADDRESS OF EACH MANAGED EQUIPMENT
2207
RETRIEVE EVENT INFORMATION
2208
2209
IS IP ADDRESS IN RETRIEVED EVENT INFORMATION EQUAL TO ANY OF IP ADDRESSES ACQUIRED IN STEP 2007 ?
YES
2210
STORE IDENTIFIER OF EVENT INFORMATION
NO
2211
IS ALL EVENT INFORMATION RETRIEVED ?
NO
YES
INFORM MANAGED TERMINAL ABOUT LIST OF EVENT INFORMATION
2212
END

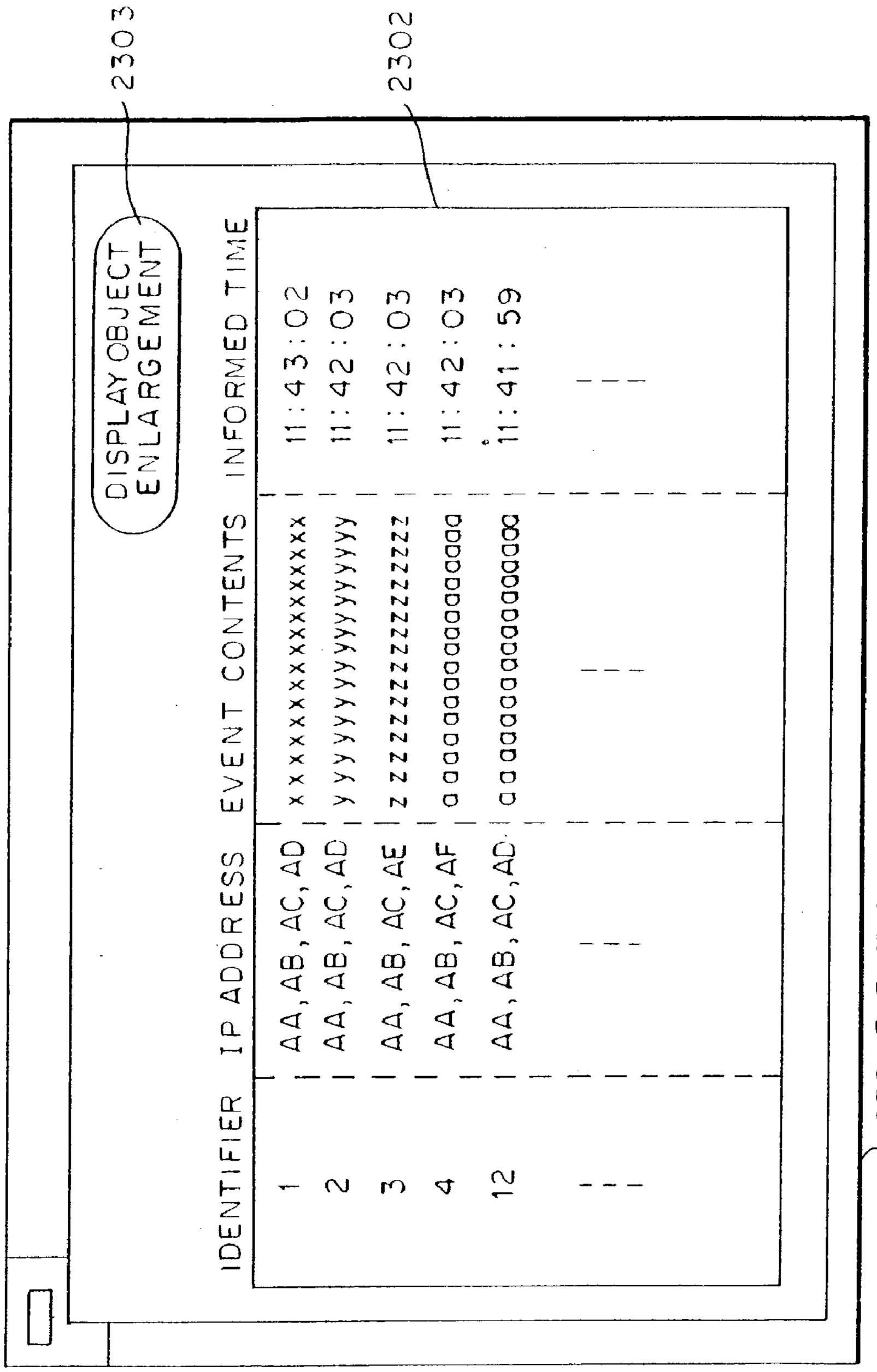

2303
2302
DISPLAY OBJECT ENLARGEMENT
IDENTIFIER
IP ADDRESS
EVENT CONTENTS
INFORMED TIME
1
AA, AB, AC, AD
xxxxxxxxxxxxxxxx
11:43:02
2
AA, AB, AC, AD
yyyyyyyyyyyyyyyy
11:42:03
3
AA, AB, AC, AE
zzzzzzzzzzzzzzzz
11:42:03
4
AA, AB, AC, AF
aaaaaaaaaaaaaaaa
11:42:03
12
AA, AB, AC, AD
aaaaaaaaaaaaaaaa
11:41:59
2301 EVENT DISPLAY SCREEN

FIG. 23

FIG. 24

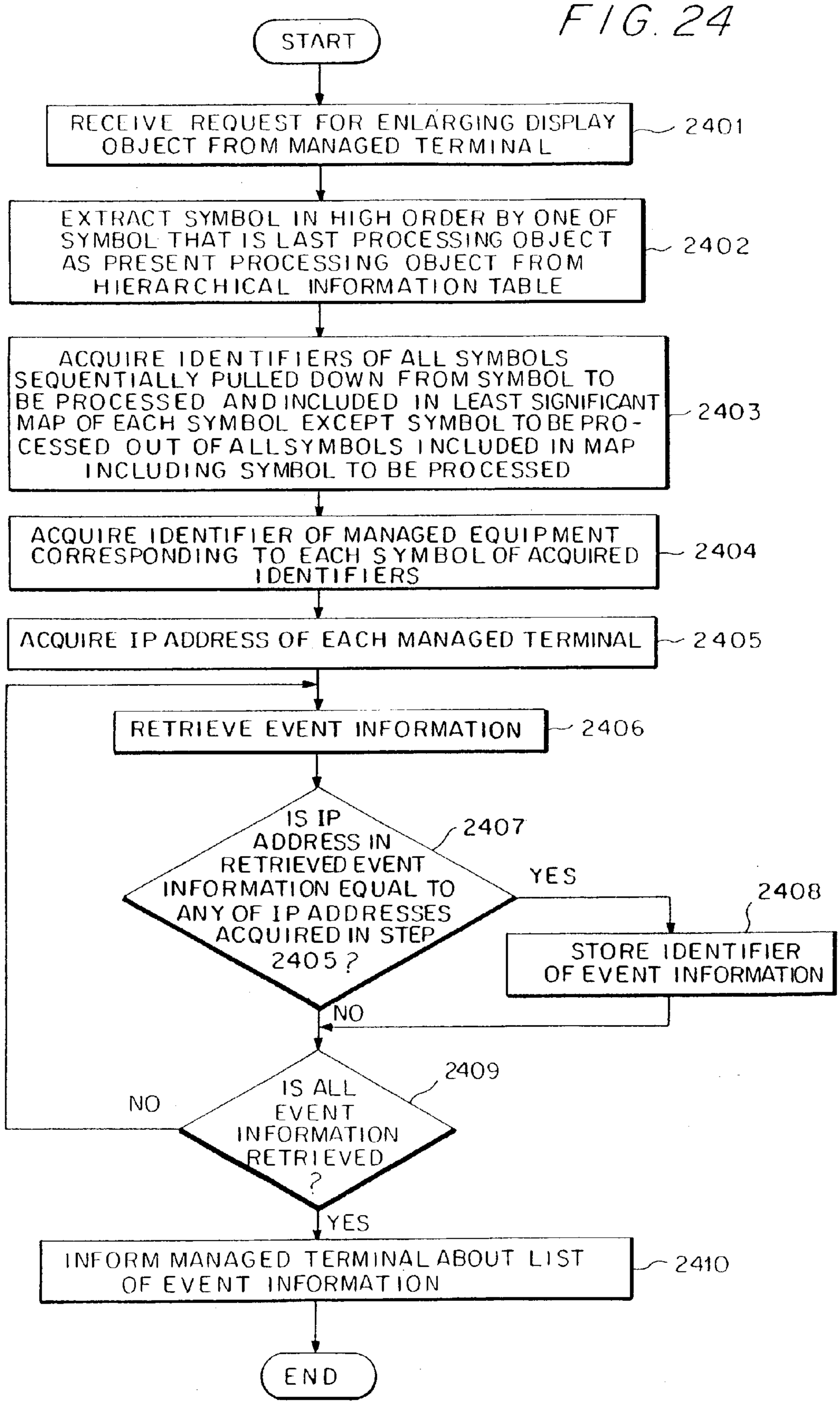

START
RECEIVE REQUEST FOR ENLARGING DISPLAY OBJECT FROM MANAGED TERMINAL
2401
EXTRACT SYMBOL IN HIGH ORDER BY ONE OF SYMBOL THAT IS LAST PROCESSING OBJECT AS PRESENT PROCESSING OBJECT FROM HIERARCHICAL INFORMATION TABLE
2402
ACQUIRE IDENTIFIERS OF ALL SYMBOLS SEQUENTIALLY PULLED DOWN FROM SYMBOL TO BE PROCESSED AND INCLUDED IN LEAST SIGNIFICANT MAP OF EACH SYMBOL EXCEPT SYMBOL TO BE PROCESSED OUT OF ALL SYMBOLS INCLUDED IN MAP INCLUDING SYMBOL TO BE PROCESSED
2403
ACQUIRE IDENTIFIER OF MANAGED EQUIPMENT CORRESPONDING TO EACH SYMBOL OF ACQUIRED IDENTIFIERS
2404
ACQUIRE IP ADDRESS OF EACH MANAGED TERMINAL
2405
RETRIEVE EVENT INFORMATION
2406
IS IP ADDRESS IN RETRIEVED EVENT INFORMATION EQUAL TO ANY OF IP ADDRESSES ACQUIRED IN STEP 2405 ?
2407
YES
2408
STORE IDENTIFIER OF EVENT INFORMATION
NO
IS ALL EVENT INFORMATION RETRIEVED ?
2409
NO
YES
INFORM MANAGED TERMINAL ABOUT LIST OF EVENT INFORMATION
2410
END

FIG. 25

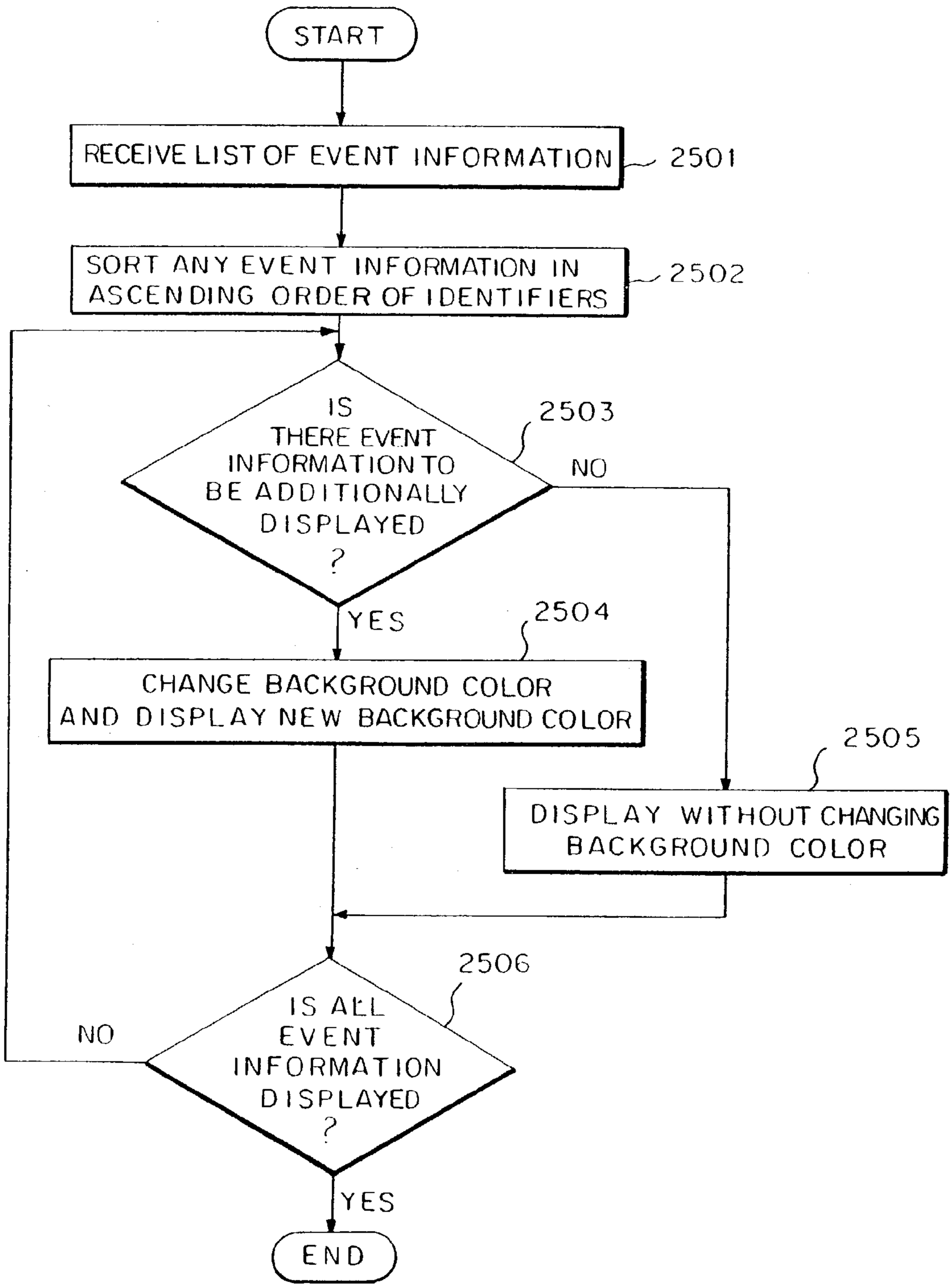
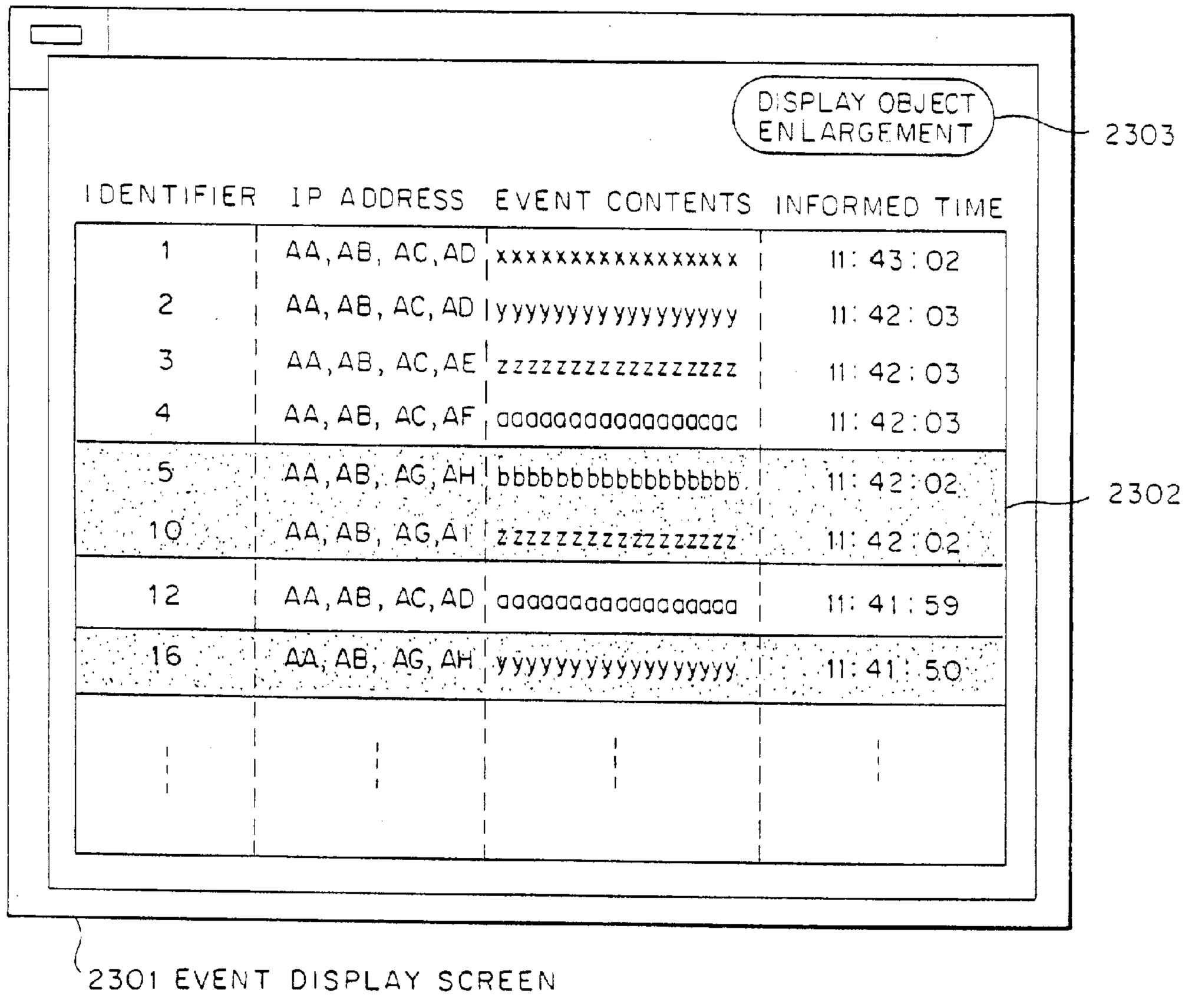

START
RECEIVE LIST OF EVENT INFORMATION
2501
SORT ANY EVENT INFORMATION IN ASCENDING ORDER OF IDENTIFIERS
2502
IS THERE EVENT INFORMATION TO BE ADDITIONALLY DISPLAYED ?
2503
NO
YES
2504
CHANGE BACKGROUND COLOR AND DISPLAY NEW BACKGROUND COLOR
2505
DISPLAY WITHOUT CHANGING BACKGROUND COLOR
IS ALL EVENT INFORMATION DISPLAYED ?
2506
NO
YES
END

FIG. 26


DISPLAY OBJECT ENLARGEMENT
2303
IDENTIFIER
IP ADDRESS
EVENT CONTENTS
INFORMED TIME
1
AA,AB,AC,AD
xxxxxxxxxxxxxxxxx
11:43:02
2
AA,AB,AC,AD
yyyyyyyyyyyyyyyyy
11:42:03
3
AA,AB,AC,AE
zzzzzzzzzzzzzzzzz
11:42:03
4
AA,AB,AC,AF
aaaaaaaaaaaaaaaaa
11:42:03
5
AA,AB,AG,AH
bbbbbbbbbbbbbbbbb
11:42:02
10
AA,AB,AG,AI
zzzzzzzzzzzzzzzzz
11:42:02
12
AA,AB,AC,AD
aaaaaaaaaaaaaaaaa
11:41:59
16
AA,AB,AG,AH
yyyyyyyyyyyyyyyyy
11:41:50
2302
2301 EVENT DISPLAY SCREEN

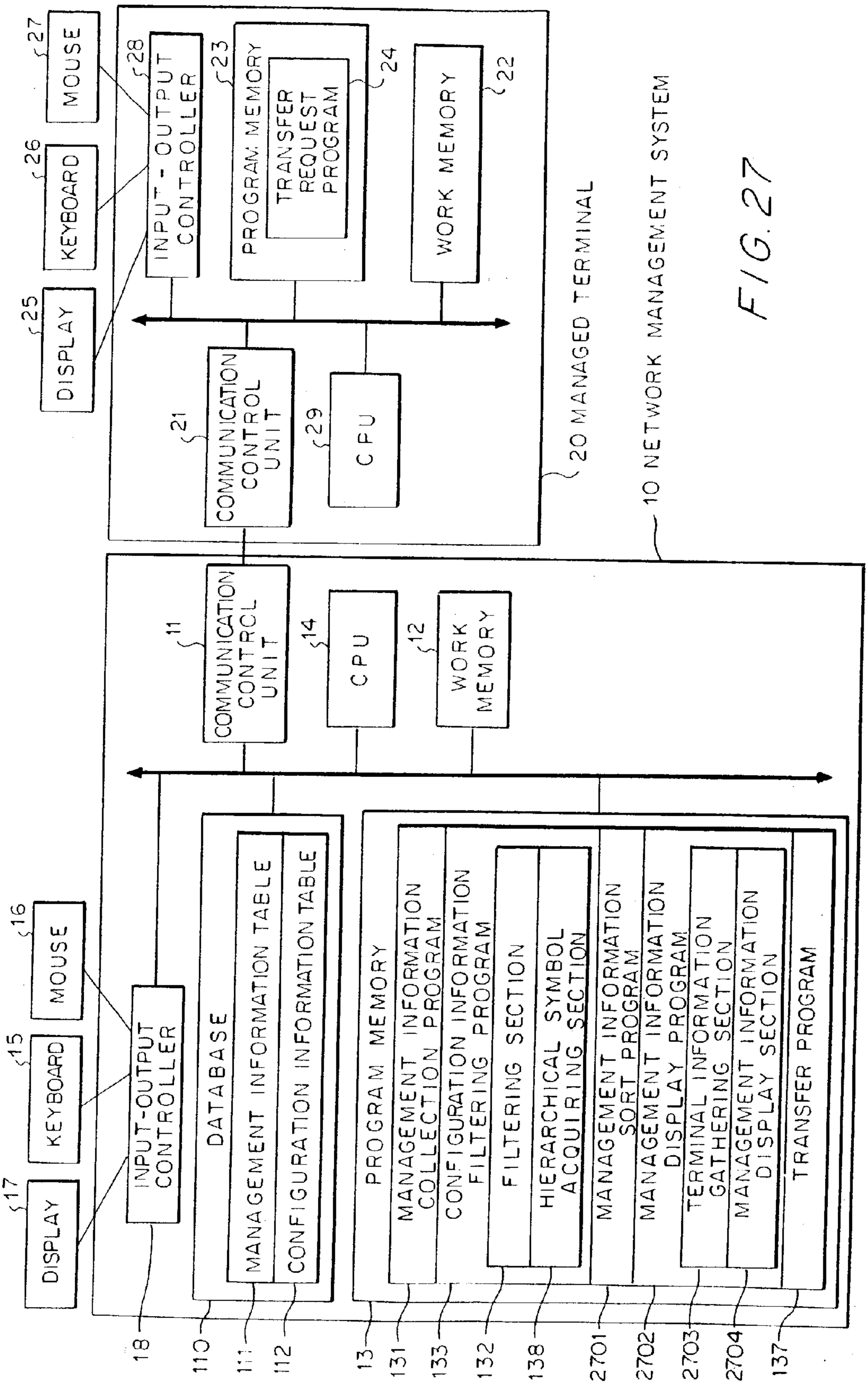

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21 COMMUNICATION CONTROL UNIT
29 CPU
11 COMMUNICATION CONTROL UNIT
14 CPU
12 WORK MEMORY
17 DISPLAY
15 KEYBOARD
16 MOUSE
INPUT-OUTPUT CONTROLLER
18
DATABASE
MANAGEMENT INFORMATION TABLE
CONFIGURATION INFORMATION TABLE
110
111
112
PROGRAM MEMORY
MANAGEMENT INFORMATION COLLECTION PROGRAM
CONFIGURATION INFORMATION FILTERING PROGRAM
13
131
133
FILTERING SECTION
132
HIERARCHICAL SYMBOL ACQUIRING SECTION
138
MANAGEMENT INFORMATION SORT PROGRAM
2701
MANAGEMENT INFORMATION DISPLAY PROGRAM
2702
TERMINAL INFORMATION GATHERING SECTION
2703
MANAGEMENT INFORMATION DISPLAY SECTION
2704
TRANSFER PROGRAM
137

FIG. 27

FIG. 28

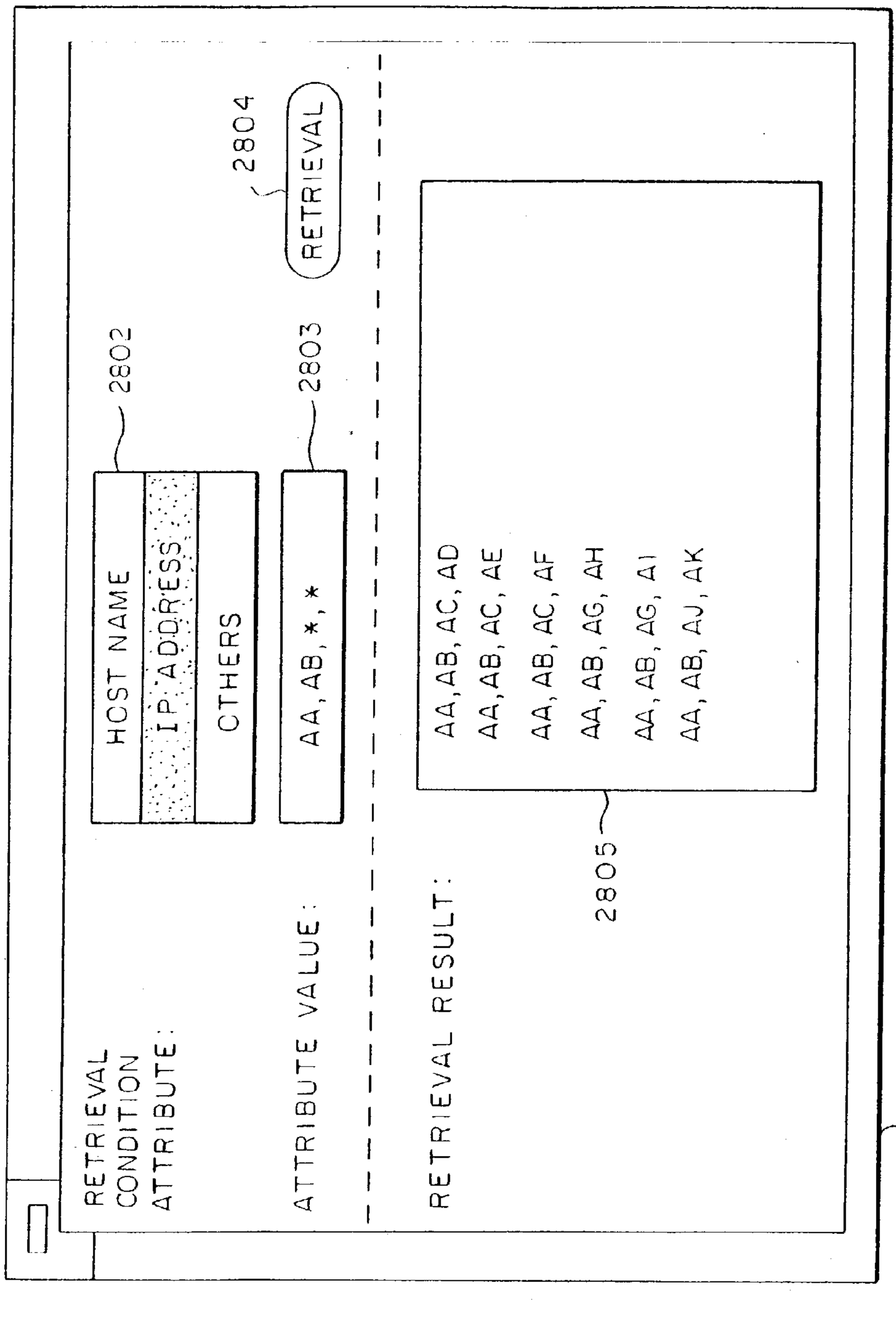
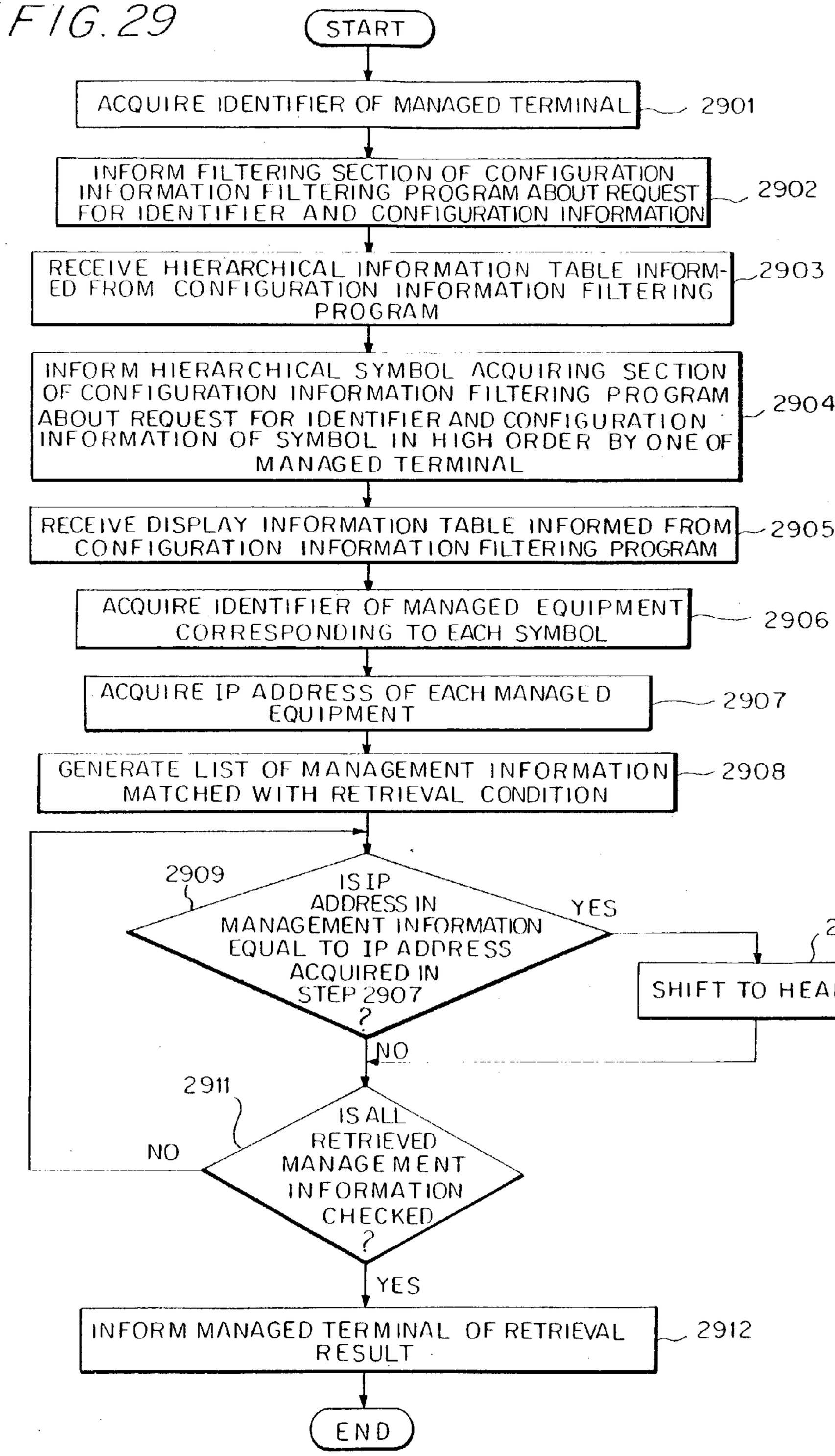

2801 RETRIEVAL SCREEN
RETRIEVAL CONDITION ATTRIBUTE:
ATTRIBUTE VALUE:
RETRIEVAL RESULT:
2805
AA, AB, AC, AD
AA, AB, AC, AE
AA, AB, AC, AF
AA, AB, AG, AH
AA, AB, AG, AI
AA, AB, AJ, AK
2804
RETRIEVAL
2802
HOST NAME
IP ADDRESS
OTHERS
2803
AA, AB, *, *

FIG. 29


START
ACQUIRE IDENTIFIER OF MANAGED TERMINAL
2901
INFORM FILTERING SECTION OF CONFIGURATION INFORMATION FILTERING PROGRAM ABOUT REQUEST FOR IDENTIFIER AND CONFIGURATION INFORMATION
2902
RECEIVE HIERARCHICAL INFORMATION TABLE INFORMED FROM CONFIGURATION INFORMATION FILTERING PROGRAM
2903
INFORM HIERARCHICAL SYMBOL ACQUIRING SECTION OF CONFIGURATION INFORMATION FILTERING PROGRAM ABOUT REQUEST FOR IDENTIFIER AND CONFIGURATION INFORMATION OF SYMBOL IN HIGH ORDER BY ONE OF MANAGED TERMINAL
2904
RECEIVE DISPLAY INFORMATION TABLE INFORMED FROM CONFIGURATION INFORMATION FILTERING PROGRAM
2905
ACQUIRE IDENTIFIER OF MANAGED EQUIPMENT CORRESPONDING TO EACH SYMBOL
2906
ACQUIRE IP ADDRESS OF EACH MANAGED EQUIPMENT
2907
GENERATE LIST OF MANAGEMENT INFORMATION MATCHED WITH RETRIEVAL CONDITION
2908
2909
IS IP ADDRESS IN MANAGEMENT INFORMATION EQUAL TO IP ADDRESS ACQUIRED IN STEP 2907 ?
YES
2910
SHIFT TO HEAD
NO
2911
IS ALL RETRIEVED MANAGEMENT INFORMATION CHECKED ?
NO
YES
INFORM MANAGED TERMINAL OF RETRIEVAL RESULT
2912
END

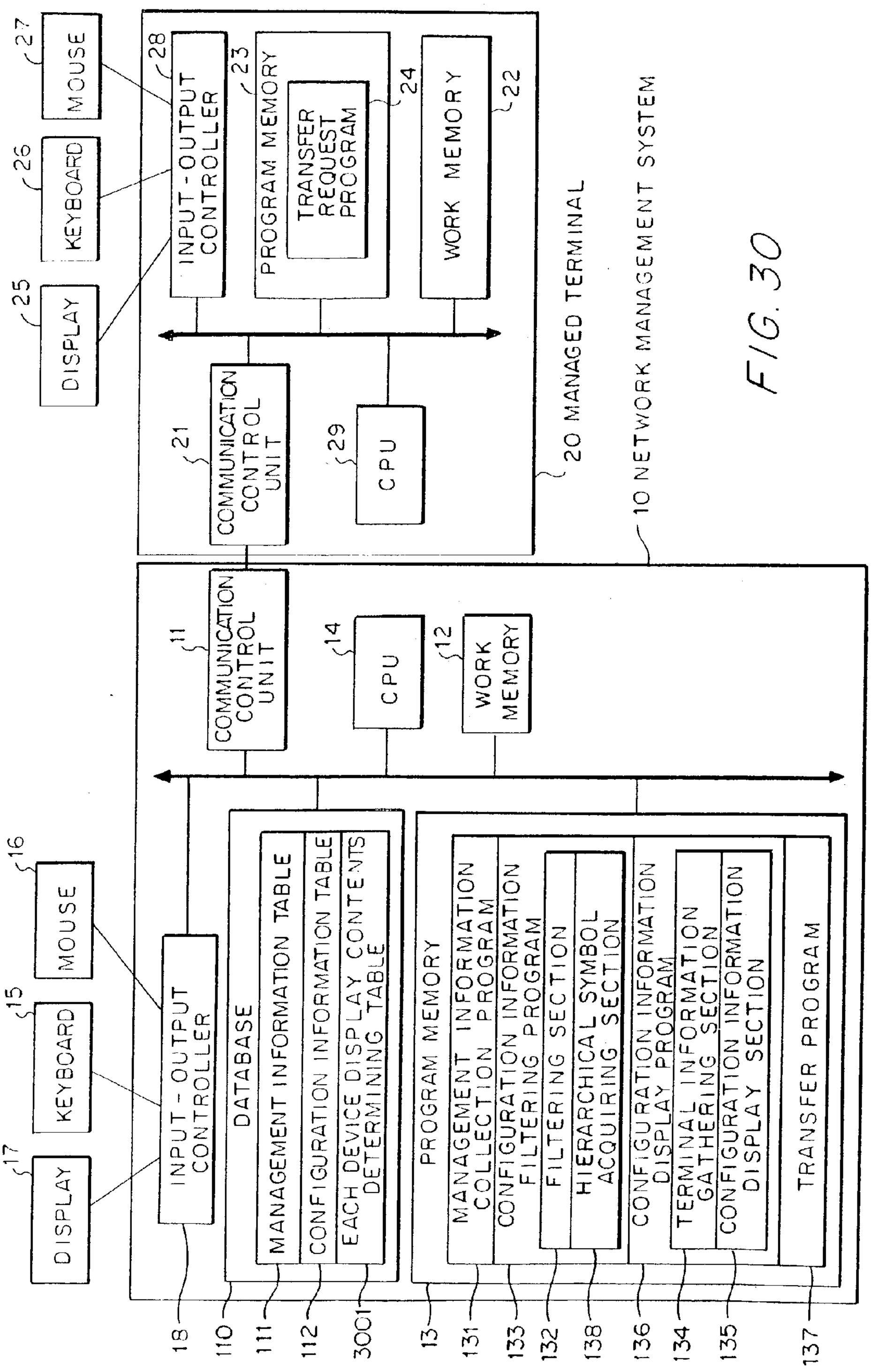

10 NETWORK MANAGEMENT SYSTEM
20 MANAGED TERMINAL
22 WORK MEMORY
23 PROGRAM MEMORY
24
25
26 KEYBOARD
27 MOUSE
28 INPUT-OUTPUT CONTROLLER
29 CPU
21 COMMUNICATION CONTROL UNIT
TRANSFER REQUEST PROGRAM
DISPLAY
11 COMMUNICATION CONTROL UNIT
14 CPU
12 WORK MEMORY
15 KEYBOARD
16 MOUSE
17 DISPLAY
INPUT-OUTPUT CONTROLLER
DATABASE
MANAGEMENT INFORMATION TABLE
CONFIGURATION INFORMATION TABLE
EACH DEVICE DISPLAY CONTENTS DETERMINING TABLE
PROGRAM MEMORY
MANAGEMENT INFORMATION COLLECTION PROGRAM
CONFIGURATION INFORMATION FILTERING PROGRAM
FILTERING SECTION
HIERARCHICAL SYMBOL ACQUIRING SECTION
CONFIGURATION INFORMATION DISPLAY PROGRAM
TERMINAL INFORMATION GATHERING SECTION
CONFIGURATION INFORMATION DISPLAY SECTION
TRANSFER PROGRAM
18
110
111
112
3001
13
131
133
132
138
136
134
135
137

FIG. 30

FIG. 31

3103 / CPU TYPE / MEMORY CAPACITY	CPU-A	CPU-B	CPU-C
SMALLER THAN 10 MB	ONLY SYMBOL NAME	EXCEPT NUMBER OF LOW ORDER SYMBOLS	ALL
10 TO 20 MB	SYMBOL TYPE, SYMBOL NAME	EXCEPT NUMBER OF LOW ORDER SYMBOLS	ALL
LARGER THAN 20MB	ALL	ALL	ALL

3102

3001 ELEMENTS DETERMINING TABLE EACH DEVICE DISPLAY CONTENTS

FIG. 32

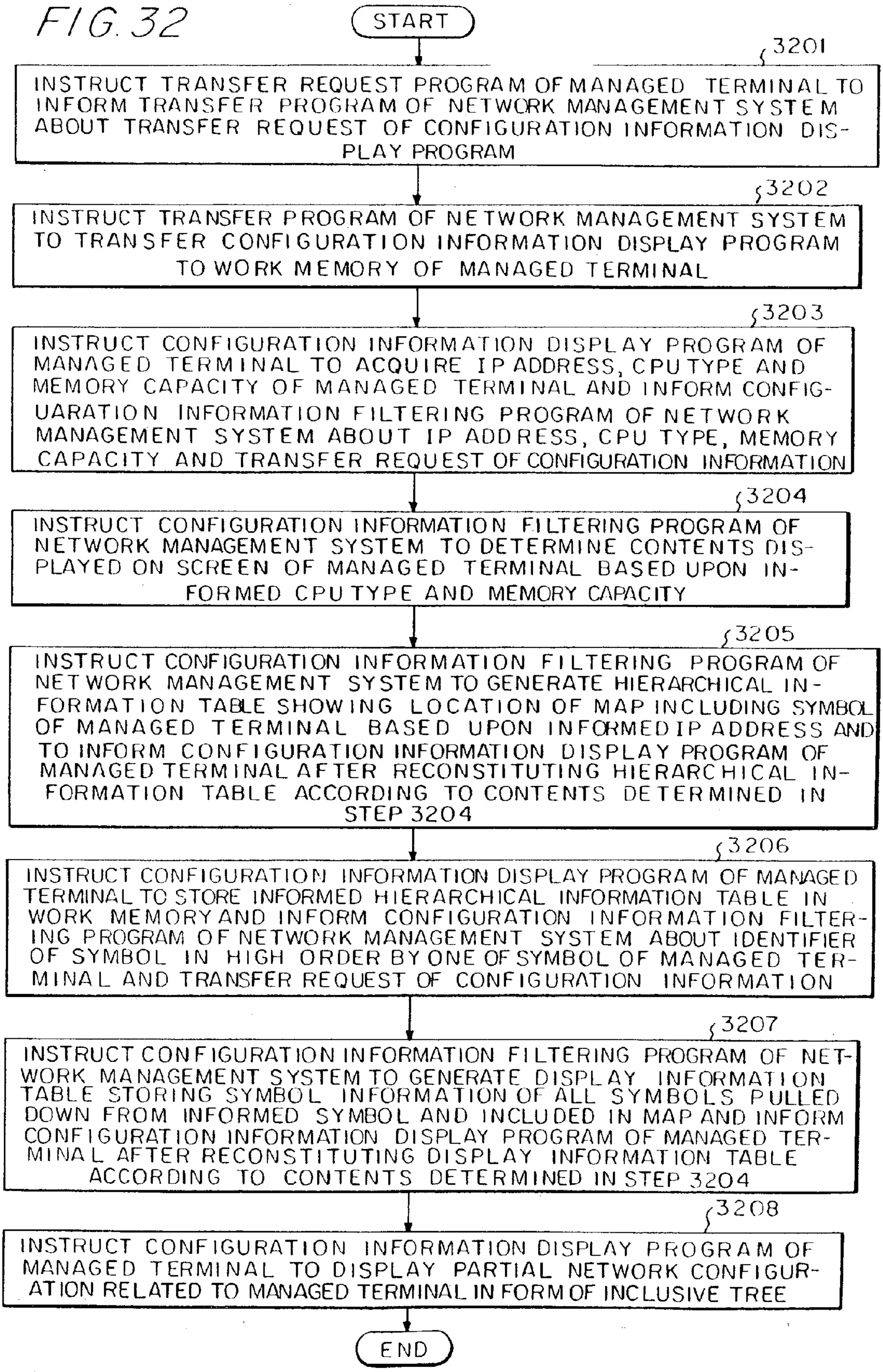

START
3201
INSTRUCT TRANSFER REQUEST PROGRAM OF MANAGED TERMINAL TO INFORM TRANSFER PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT TRANSFER REQUEST OF CONFIGURATION INFORMATION DISPLAY PROGRAM
3202
INSTRUCT TRANSFER PROGRAM OF NETWORK MANAGEMENT SYSTEM TO TRANSFER CONFIGURATION INFORMATION DISPLAY PROGRAM TO WORK MEMORY OF MANAGED TERMINAL
3203
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO ACQUIRE IP ADDRESS, CPU TYPE AND MEMORY CAPACITY OF MANAGED TERMINAL AND INFORM CONFIGUARATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT IP ADDRESS, CPU TYPE, MEMORY CAPACITY AND TRANSFER REQUEST OF CONFIGURATION INFORMATION
3204
INSTRUCT CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM TO DETERMINE CONTENTS DISPLAYED ON SCREEN OF MANAGED TERMINAL BASED UPON INFORMED CPU TYPE AND MEMORY CAPACITY
3205
INSTRUCT CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM TO GENERATE HIERARCHICAL INFORMATION TABLE SHOWING LOCATION OF MAP INCLUDING SYMBOL OF MANAGED TERMINAL BASED UPON INFORMED IP ADDRESS AND TO INFORM CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL AFTER RECONSTITUTING HIERARCHICAL INFORMATION TABLE ACCORDING TO CONTENTS DETERMINED IN STEP 3204
3206
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO STORE INFORMED HIERARCHICAL INFORMATION TABLE IN WORK MEMORY AND INFORM CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM ABOUT IDENTIFIER OF SYMBOL IN HIGH ORDER BY ONE OF SYMBOL OF MANAGED TERMINAL AND TRANSFER REQUEST OF CONFIGURATION INFORMATION
3207
INSTRUCT CONFIGURATION INFORMATION FILTERING PROGRAM OF NETWORK MANAGEMENT SYSTEM TO GENERATE DISPLAY INFORMATION TABLE STORING SYMBOL INFORMATION OF ALL SYMBOLS PULLED DOWN FROM INFORMED SYMBOL AND INCLUDED IN MAP AND INFORM CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL AFTER RECONSTITUTING DISPLAY INFORMATION TABLE ACCORDING TO CONTENTS DETERMINED IN STEP 3204
3208
INSTRUCT CONFIGURATION INFORMATION DISPLAY PROGRAM OF MANAGED TERMINAL TO DISPLAY PARTIAL NETWORK CONFIGURATION RELATED TO MANAGED TERMINAL IN FORM OF INCLUSIVE TREE
END

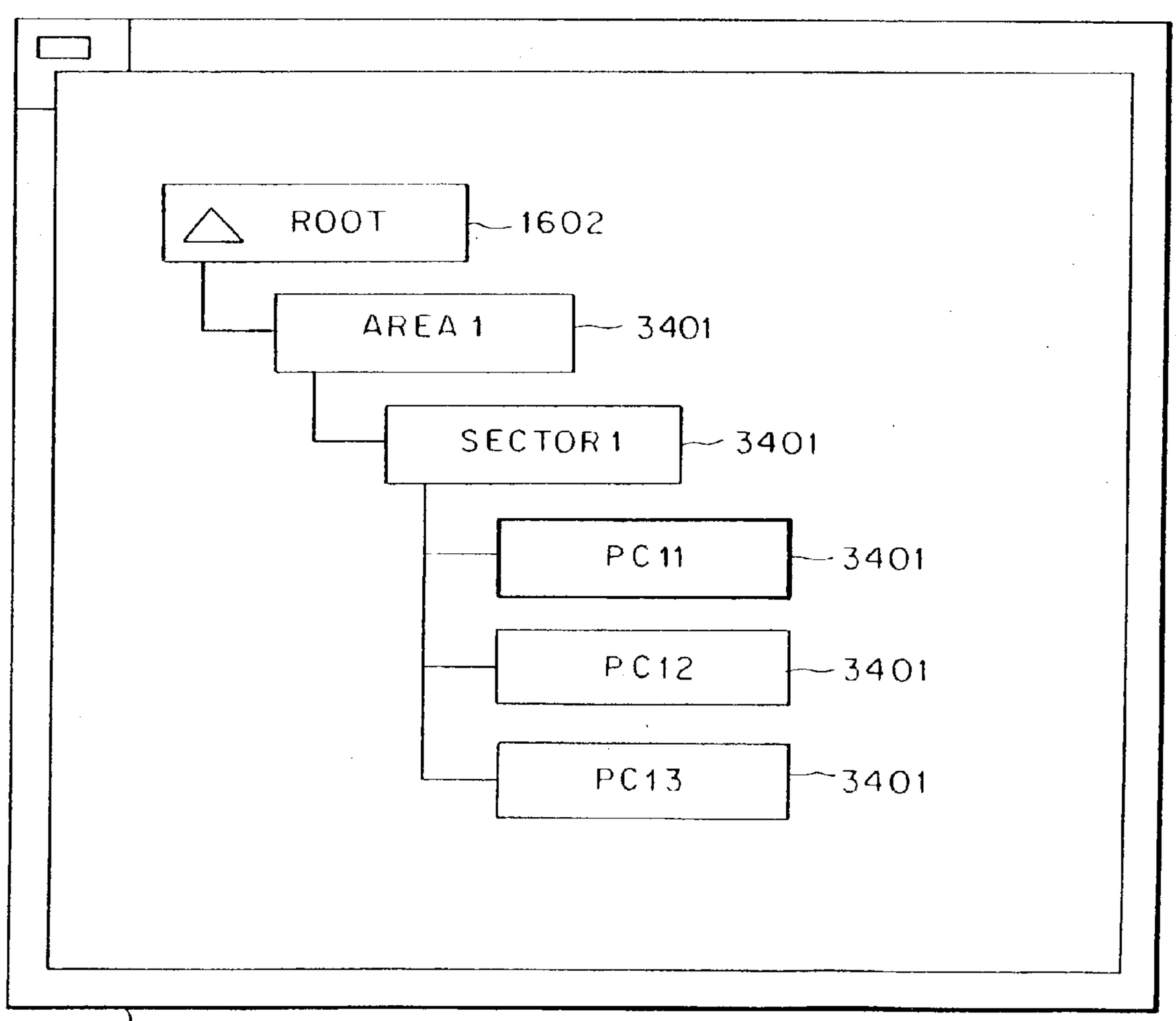
FIG. 33

1102 1103

IDENTIFIER	SYMBOL NAME
1005	PC 11
1006	PC 12
1007	PC 13

1101 DISPLAY INFORMATION TABLE

FIG. 34



1601 INCLUSIVE TREE SCREEN

INFORMATION PROVIDING SYSTEM HAVING A NETWORK TERMINAL AND NETWORK MANAGEMENT SYSTEM WHICH MANAGES A NETWORK AND PROVIDES INFORMATION OF THE NETWORK TO THE NETWORK TERMINAL

[0001] The present application is a continuation of application Ser. No. 10/026,830, filed Dec. 27, 2001; which is a continuation of application Ser. No. 09/516,500, filed Mar. 1, 2000, now U.S. Pat. No. 6,339,789; which is a continuation of application Ser. No. 09/027,202, filed Feb. 20, 1998, now U.S. Pat. No. 6,049,827, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to a network management system for managing a network. More particularly, the present invention relates to a method, apparatus and computer program for allowing management of a network by use of network equipment, being managed on the network by a network management system, by preferentially displaying partial information related to the network equipment that is required for network management on the network equipment.

[0003] Generally, a network management system for collecting management information from each of plural network equipment existing in a network and storing the management information in the network management system is used for managing a network. Information required for network management including the collected management information is displayed by the network management system. Particularly, the network management information being displayed includes a configuration of the network being managed in the form of a map in which the network is schematically shown.

[0004] A network is divided into hierarchies such as geographical classification, management classification and detailed information and is displayed in the form of a map having a plurality of hierarchical levels as described on pages 60 to 65 in "Hewlet-Packard Journal", April 1990. Such is performed so that a management operator can readily grasp a large-scale complicated network configuration at an instant. A technique for changing displayed contents of a configuration according to a management operator in consideration of a case that a network management system is used by plural managers is disclosed in Japanese published unexamined patent application No. 7-312596. A technique for enabling an arbitrary computer except a network management system, to access the same contents as contents displayed by the network management system utilizing a web browser is disclosed on pages 38 and 39 in "Nikkei Computer" November 11 Appendix 1996 as a type of network management in the environment of an Internet/intranetwork. However, in such a technique, a web browser which can access only one screen at a time cannot access plural maps simultaneously when, for example, in case a network management system displays a map for each hierarchy level. Thus, there is a problem that the display of a network configuration using a web browser is difficult to grasp. The utilization of a web browser allows network equipment which is managed by a network management system, to access the same contents displayed by the network management system and to execute network management.

[0005] For a user who executes network management via network equipment which is managed by a network management system may be either an end user or a management operator. However, an end user often requires partial information related to the managed network equipment being used of information required for network management. Similarly, a management operator may also require partial information related to the managed networks equipment being used. Such partial information is not supplied. Thus, a user who uses managed equipment is required to find the partial information related to the managed equipment being used. That is, the user must find partial information corresponding to the same contents as that displayed by a network management system. However, as the information volume of contents displayed by a network management system is enormous, the operation to find such partial information is very burdensome.

[0006] In conventional apparatus disclosed in Japanese published unexamined patent application No. 7-312596, only a change in the displayed contents performed by a management operator at, for example, a network management system which manages network equipment on a network are effected. Thus, when a management operator executes network management via a managed network equipment on the network the contents of the display are not changed.

SUMMARY OF THE INVENTION

[0007] An object of the present invention is to enable preferentially displaying partial information, related to network equipment being managed on the network by a network management system, equipment of information required for network management when network management is to be executed on the network equipment.

[0008] To achieve the above object, the present invention provides a network which is managed by a network management system. The network management system collects management information from each of a plurality of network equipment existing in the network and stores the management information collected from the plural network equipment. Network management of the network can be accomplished in response to a request from one of the network equipment by accessing the network management system and causing the network management system to transfer a program for managing the network to the network equipment requesting network management. The network equipment requesting network management informs the network management system of identification information for identifying the network equipment using the transferred program. The network management system then transfers partial information related to the network equipment as indicated by the identification information. The partial information includes information required for network management by the network equipment. The network equipment then displays the transferred partial information.

[0009] According to the present invention since partial information related to the network equipment requesting network management is transferred from the network management system to the network equipment and displayed on the network equipment, a user is not required to find partial information related to the network equipment being used. Therefore, the user can immediately execute network management.

[0010] If a browser has been installed in the network equipment and a program for managing a network has not been installed in the network equipment, then the network equipment can still effect management of the network according to the present invention. In the present invention the network equipment displays partial information obtained by a program for managing a network transferred from a network management system. Thus, a user can execute network management via the network equipment utilizing the browser. Therefore, the present invention provides a network management tool that can be installed in a network management system.

[0011] It should be noted that the present invention can be implemented using a computer program written in the JAVA programming language (JAVA is a trademark of Sun Microsystems Inc.) or the ACTIVE X programming language (ACTIVE X is a trademark of Microsoft Inc.). The ACTIVE X programming language is similar in operation to the JAVA programming language. In the present invention the program transferred from the network management system to the network equipment requesting network management can be written in the form of an "Applet" which causes the display of the partial information on the network equipment. An Applet is a special program transferable on a network that can be executed in the receiving computer. The Applet is activated when transferred from the network management system to the network equipment.

[0012] A first embodiment of the present invention provides a network management tool that can be installed in a network management system for collecting management information from each of a plurality of network equipment connected to a network, storing the management information therein and displaying the configuration of the network in the form of a plurality of hierarchically arranged maps. The network management system includes a display program which is activated when it is transferred to a network equipment. The display program, which can be an Applet in the JAVA or ACTIVE X programming languages, causes the display of information required for network management on a network equipment requesting network management of the network. The network management system also includes a transfer program for transferring the display program to the network equipment requesting management (hereinafter called "management request equipment") and an information program for informing the display program transferred to the management request equipment of information required for display to effect network management.

[0013] The first embodiment of the present invention also provides a managed terminal included in each of the network equipment connected to the network. The managed terminal includes a transfer request program for requesting transfer of the display program when network management is to be conducted from the network equipment in which the managed terminal is installed.

[0014] The information program of the network management system executes processing for generating inclusive relationship information showing inclusive relationships among components on the network related to the network equipment specified by the display program transferred to the management request equipment. The network equipment is included in the hierarchically arranged maps that the network management system displays. The information program informs the display program of the generated inclusive relationship information. The display program executes processing for specifying the management request equipment by collecting identification information for identifying the management request equipment, informing the information program of the collected identification information and causing the display of a partial network configuration related to the management request equipment in the form of an inclusive tree based upon the inclusive relationship information informed by the information program.

[0015] According to the first embodiment, the partial network configuration related to the management request equipment can be preferentially displayed on the management request equipment. Particularly, as the hierarchically arranged maps are displayed in the form of an inclusive tree shown on one screen in the management request equipment, a user using the management request equipment can readily grasp the partial network configuration related to the management request equipment. Management in the above-described manner can be effected even if a browser being used can access only one screen at a time.

[0016] If a partial network configuration related to the management request equipment is not necessarily required to be displayed on one screen, the network management system may be constructed so that the information program executes processing for informing the display program of a partial map related to the network equipment specified by the display program transferred to the management request equipment. The display program executes processing for specifying the management request equipment by collecting identification information for identifying the management request equipment and informing the information program of the collected identification information. Thereafter the display program executes a processing for causing the display of the partial map as informed by the information program.

[0017] Also, if one screen is used and partial network configuration related to the management request equipment is not necessarily required to be displayed, the network management system may be constructed so that the information program executes processing for generating inclusive relationship information showing inclusive relationships among components included in each of the hierarchically arranged maps that the network management system displays. The information program also executes a processing for informing the display program of the generated inclusive relationship information. The display program executes processing for causing the display of the configuration of the network in the form of an inclusive tree based upon the inclusive relationship information from the information program.

[0018] In the above-described first embodiment, the display program can further execute a processing for causing the deletion of components selected by an external device if the selected components are shown in an inclusive tree, a processing for acquiring the inclusive relationship information from the information program of components selected by an external device not shown in an inclusive tree and a processing for causing the addition of a partial network configuration, related to a selected component of an inclusive tree, to the inclusive relationship information from the

information program. The partial network configuration is obtained in response to a request for inclusive relationship information.

[0019] The information program can further execute a processing for generating inclusive relationship information showing inclusive relationships among components. The inclusive relationship information is required by the display program which causes the display of components included in each of the hierarchically arranged maps that a network management system displays and requested by the management request equipment for network management. The information program also executes a processing for informing the display program of the generated inclusive relationship information. Using the above-described features of the present invention a user of the management request equipment can delete an unnecessary part of the information being displayed and can add information to a part of the information being displayed deemed insufficient.

[0020] Further, in the above-described first embodiment, the information program can further execute a processing for calculating the number of components included in a map of a lower order level of the hierarchically arranged maps. The components correspond to components in each of the higher order level maps. The hierarchically arranged maps are displayed by the network management system. The components of the lower order level maps are hereinafter called "lower order components". The information program also executes a processing of informing the display program transferred to the management request equipment of the calculated number of low order components. The display program executes a processing for causing the display of the number of lower order components from the information program together with all of the components shown in an inclusive tree. Using the above-described features of the present invention a user of the management request equipment can be informed of the number of components included in each of the components included in an inclusive tree by seeing the displayed number of lower order components.

[0021] Further, in the above-described first embodiment, the display program can further execute a processing for causing a part of the information displayed on the management request equipment related to the management request equipment to be highlighted. Using the above-described features of the present invention a user of the management request equipment can readily find a part related to the management request equipment within the displayed information.

[0022] A second embodiment of the present invention, similar to the first embodiment, provides a network management tool having a network management system and a managed terminal included in each of the network equipment as described above. However, the configuration of the network management system in the second embodiment is different from the first embodiment in that the network management system periodically collects event information from each of the network equipment connected to the network. The event information collected from the network equipment is stored in the network management system as an event log which includes information concerning the IP address of the network equipment in which an event has occurred, the time of the event, and information concerning the type of event. The display program when transferred to the management request equipment and activated by the transfer is informed of event information by the network management system. Thereafter the display program causes the display of event information from the network management system related to the management request equipment so as to permit network management. The second embodiment allows a user to expand the details of the event information being displayed on the management request equipment.

[0023] A third embodiment of the present invention, similar to the first embodiment, provides a network management tool having a network management system and a managed terminal included in each of the network equipment as described above. However the configuration of the network management system in the third embodiment is different from that in the first embodiment in that the network management system allows for retrieval of management information which satisfies a particular retrieval condition set by a user at a managed terminal which is included in a network equipment management request equipment. The management information which satisfies the set retrieval condition is management information related to the management request equipment. The user when using the managed terminal in the third embodiment may set the attribute of a retrieval condition through a retrieval screen displayed on the management request equipment.

[0024] A fourth embodiment of the present invention, similar to the first embodiment, provides a network management tool having a network management system and a managed terminal included in each of the network equipment as described above. However, the configuration of the network management system is different from that in the first embodiment in that a network management system determines the performance capabilities of the management request equipment and transfers an amount of management information to the management request equipment according to the determined performance capabilities. This feature of the fourth embodiment allows for the details of the display of management information to be set in accordance with the performance capabilities of the management request equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention will be more apparent from the following detailed description, when taken in conjunction with the accompanying drawings, in which:

[0026] **FIG. 1** is a block diagram illustrating the configuration of a network management system and a managed terminal respectively equivalent to a first embodiment;

[0027] **FIG. 2** is an explanatory drawing illustrating an example of the configuration of a network managed by the network management system;

[0028] **FIG. 3** is an explanatory drawing illustrating the construction of a management information table in the first embodiment;

[0029] **FIG. 4** is an explanatory drawing illustrating a hierarchical map displayed on the display of the network management system;

[0030] **FIG. 5** is an explanatory drawing illustrating a configuration information table in the first embodiment;

[0031] **FIG. 6** is a flowchart illustrating the outline of the operation of the network management system and the managed terminal in the first embodiment;

[0032] **FIG. 7** is an explanatory drawing illustrating a state after a configuration information display program is transferred to the managed terminal in the first embodiment;

[0033] **FIG. 8** is a flowchart illustrating the outline of the operation of the filtering section of a configuration information filtering program in the first embodiment;

[0034] **FIG. 9** is an explanatory drawing illustrating a hierarchical information table in the first embodiment;

[0035] **FIG. 10** is a flowchart illustrating the outline of the operation of the hierarchical symbol acquiring section of the configuration information filtering program in the first embodiment;

[0036] **FIG. 11** is an explanatory drawing illustrating a display information table in the first embodiment;

[0037] **FIG. 12** is a flowchart illustrating the outline of the operation of the configuration information display section of the configuration information display program in the first embodiment;

[0038] **FIG. 13** is an explanatory drawing illustrating the construction of a configuration information internal table in the first embodiment;

[0039] **FIG. 14** is an explanatory drawing illustrating a class/icon relating internal table in the first embodiment;

[0040] **FIG. 15** is an explanatory drawing illustrating a state/icon color relating internal table in the first embodiment;

[0041] **FIG. 16** is an explanatory drawing illustrating contents displayed on an inclusive tree screen in the first embodiment;

[0042] **FIG. 17** is a flowchart illustrating the outline of symbol expanding/closing processing executed by the configuration information display section of the configuration information display program in the first embodiment;

[0043] **FIG. 18** is an explanatory drawing illustrating contents displayed on the inclusive tree screen after symbol expanding processing is executed in the first embodiment;

[0044] **FIG. 19** is an explanatory drawing illustrating contents displayed on the inclusive tree screen after symbol closing processing is executed in the first embodiment;

[0045] **FIG. 20** is a block diagram illustrating the configuration of a network management system and a managed terminal respectively equivalent to a second embodiment;

[0046] **FIG. 21** is an explanatory drawing illustrating an event information table in the second embodiment;

[0047] **FIG. 22** is a flowchart illustrating the outline of the operation of the filtering section of an event information retrieval program in the second embodiment;

[0048] **FIG. 23** is an explanatory drawing illustrating contents displayed on an event display screen in the second embodiment;

[0049] **FIG. 24** is a flowchart illustrating the outline of enlargement processing executed by the retrieval and enlargement section of the event information retrieval program in the second embodiment;

[0050] **FIG. 25** is a flowchart illustrating the outline of additional display processing executed by the event information display section of an event information display program in the second embodiment;

[0051] **FIG. 26** is an explanatory drawing illustrating contents displayed on the event display screen after additional display processing is executed in the second embodiment;

[0052] **FIG. 27** is a block diagram illustrating the construction of a network management system and a managed terminal respectively equivalent to a third embodiment;

[0053] **FIG. 28** is an explanatory drawing illustrating contents displayed on a retrieval screen in the third embodiment;

[0054] **FIG. 29** is a flowchart illustrating the outline of the operation of a management information sort program in the third embodiment;

[0055] **FIG. 30** is a block diagram illustrating the configuration of a network management system and a managed terminal respectively of a fourth embodiment;

[0056] **FIG. 31** is an explanatory drawing illustrating an each device display contents determining table in the fourth embodiment;

[0057] **FIG. 32** is a flowchart illustrating the outline of the operation of the network management system and the managed terminal in the fourth embodiment;

[0058] **FIG. 33** is an explanatory drawing illustrating a reconstituted display information table in the fourth embodiment; and

[0059] **FIG. 34** is an explanatory drawing illustrating contents displayed on an inclusive tree screen displayed in the fourth embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0060] Referring to the drawings, embodiments to which a network management tool according to the present invention is applied will be described below.

[0061] First, referring to FIGS. **1** to **17**, a first embodiment of the present invention will be described.

[0062] The first embodiment enables partial network configuration related to a network equipment to be preferentially displayed in the form of a containment tree if network management is executed from an arbitrary network equipment provided with a display function (hereinafter called a managed terminal) which is equipment managed by a network management system.

[0063] **FIG. 1** is a block diagram showing the configuration of a network management system and a managed terminal respectively equivalent to the first embodiment. As shown in **FIG. 1, a** reference number **10** denotes a network management system which collects management information from each of a plurality of network equipment **201** and **202** defined as managed equipment including, for example, a computer or a transfer equipment connected to a network

200 as shown in **FIG. 2**. Upon collecting the management information, the network management system **10** stores the management information therein. As also shown in **FIG. 1, a** reference number **20** denotes a managed terminal which is included in each network equipment **201** and **202** as shown in **FIG. 2**.

[**0064**] As shown in **FIG. 1**, the network management system **10** is provided with a communication control unit **11** for controlling communication between the network management system **10** and the network equipment **201** and/or **202** represented by the managed terminal **20**, a database **110** for storing a management information table **111** which stores management information collected from each of the network equipment **201** and **202** and a configuration information table **112** which stores configuration information required for displaying the configuration of the network **200**, a work memory **12** which functions as an operation area when a processing is conducted for storing information in the database **110** and a temporary storage area when a processing is conducted for retrieving required information from the database **110**, a program memory **13** for storing a management information collection program **131**, a configuration information filtering program **133**, a configuration information display program **136** and a transfer program **137**, and a central processing unit (CPU) **14** for controlling access to the work memory **12** and the database **110** and for executing each of the programs in the program memory **13**. Further, the network management system **10** is provided with a keyboard **15**, a mouse **16**, a display **17** and an input-output controller **18** for controlling the input-output of data to and from these elements.

[**0065**] The management information collection program **131** is a program for collecting management information from each of the computers **201** and **202** which are managed equipment and managing the registration/update of management information in the management information table **111**. The configuration information filtering program **133** is a program for acquiring configuration information required for displaying partial network configuration related to the managed terminal **20** and is provided with a filtering section **132** and hierarchical symbol acquiring section **138**. The configuration information display program **136** is a program transferred to the managed terminal **20** and activated in the managed terminal **20** for causing the display of partial network configuration related to the managed terminal **20** on the managed terminal **20** and is provided with a terminal information gathering section **134** and a configuration information display section **135**. The transfer program **137** is a program for transferring the configuration information display program **136** to the managed terminal **20**.

[**0066**] The configuration information display program **136** can be what is known in the art as an Applet which is a type of program transferable across networks according to the JAVA or the ACTIVE X programming languages. JAVA is a trademark of Sun Microsystems Inc., an ACTIVE X is a trademark of Microsoft Inc.

[**0067**] As shown in **FIG. 1**, the managed terminal **20** is provided with a communication control unit **21** for controlling communication between the managed terminal **20** and the network management system **10**, a work memory **22** which functions as an operation area when the configuration information display program **136** transferred from the network management system **10** is executed, a program memory **23** in which a transfer request program **24** for requesting the network management system **10** to transfer the configuration information display program **136** is stored and a CPU **29** for controlling access to the work memory **22** and for executing each of the programs stored in the program memory **23**. Further, the managed terminal **20** is provided with a keyboard **26**, a mouse **27**, a display **25** and an input-output controller **28** for controlling the input-output of data to and from these elements.

[**0068**] In the network management system **10**, CPU **14** periodically collects management information from each of the network equipment **201** and **202** represented by the managed terminal **20** via the communication control unit **11** and stores the collected management information in the management information table **111** by executing the management information collection program **131**.

[**0069**] **FIG. 3** shows an example of the construction of the management information table **111**. For the purpose of example a TCP/IP communication protocol is used in the network **200**. Any other communication protocol can be used. As shown in **FIG. 3**, the management information table **111** includes for each identifier **302** of managed equipment representing network equipment **201** and **202**, the host name **303** of managed equipment and the IP address **304** of the managed equipment.

[**0070**] Further, CPU **14** displays a map hierarchically representing the configuration of the network **200** geographically expanded as shown in **FIG. 4** for example based upon management information stored in the management information table **111** on the display **17**. As shown in **FIG. 4, a** reference number **401** denotes a map showing the whole configuration, for example, at a country level of the network **200**. The detailed configuration of the network **200** is hierarchically represented by sequentially pulling down from the map **401** to a map **402** showing partial configuration at, for example, an area level and a map **403** showing partial configuration at, for example, a site level. A table used when these maps **401** to **403** are displayed is the configuration information table **112** as shown in **FIG. 5**.

[**0071**] The configuration information table **112** includes for each identifier **502** of managed equipment representing the network equipment **201** and **202**, the name **503** of a symbol, a high order symbol **504** which is the identifier of a symbol included in a high order level of a map, the corresponding node **505** which is the identifier of managed equipment shown by the symbol, the state **506** of the managed equipment shown by the symbol and the class **507** of the managed equipment shown by the symbol for each identifier **502**. Each symbol **503** represents, for example, a managed equipment **20** for representing network equipment **201** and **202** included in the map **401** displayed as shown in **FIG. 4** based upon management information stored in the management information table **111**.

[**0072**] The operation of the first embodiment will be described below.

[**0073**] **FIG. 6** is a flowchart showing the outline of the operation of the network management system **10** and the managed terminal **20**. It should be noted that each of the steps of the flowchart correspond to code of a computer program.

[0074] As shown in **FIG. 6**, when a user instructs the managed terminal **20** to execute network management, first, the transfer request program **24** informs the transfer program **137** of the network management system **10** of a request for transferring the configuration information display program **136** (step **601**). When the transfer program **137** receives the request for transferring the configuration information display program **136** from the managed terminal **20**, the transfer program **137** transfers the configuration information display program **136** stored in the program memory **13** to the work memory **22** of the managed terminal **20** (step **602**).

[0075] When the configuration information display program **136** is transferred from the network management system **10** to the work memory **22**, it is automatically activated. **FIG. 7** shows the state of the managed terminal **20** after the configuration information display program **136** has been transferred to the work memory **22** of the managed terminal **20**. When the configuration information display program **136** is activated in the managed terminal **20**, first, the terminal information gathering section **134** acquires the IP address of the managed terminal **20** and informs the configuration information filtering program **133** of the network management system **10** of the request for transferring configuration information together with the acquired IP address (step **603**).

[0076] As an alternative to the acquiring of the IP address of the managed terminal **20** the terminal information gathering section **134** can be included in the configuration information filtering program **133** on the network management system **10**. The terminal information gathering section **134** of this construction acquires the IP address of the managed terminal from a transfer log provided in the network management system **10**. The transfer log has stored therein log records providing information of the terminal that requested transfer of the configuration information display program **136**. The log records are caused to be generated by the transfer program **137** when the transfer program **137** transfers the configuration information display program **136** to the managed terminal **20**.

[0077] When the configuration information filtering program **133** receives the request for transferring configuration information and the IP address from the managed terminal **20**, the configuration information filtering program **33** acquires hierarchical information showing a location in a map including the symbol of the managed terminal **20** by filtering required information from the configuration information table **112** based upon the received IP address, and informs the configuration information display program **136** of the managed terminal **20** of the acquired hierarchical information (step **604**).

[0078] **FIG. 8** is a flowchart showing the outline of the operation of the filtering section **132** of the configuration information filtering program **133**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[0079] As shown in **FIG. 8**, the filtering section **132** first retrieves an IP address **304** equal to the IP address received from the managed terminal **20** from the management information table **111** and acquires for selecting an identifier **302** corresponding to the retrieved IP address **304**, that is, the identifier **302** of the managed terminal **20** (step **801**). Next, the filtering section **132** acquires a symbol having the identifier **302** acquired in step **801** as the corresponding node **505**, that is, the symbol of the managed terminal **20** from the configuration information table **112** (step **802**). Next, the filtering section **132** specifies the symbol of the managed terminal **20** acquired in step **802** for a symbol to be acquired and stores the symbol information of the acquired symbol in a hierarchical information table **901** shown in **FIG. 9** (step **803**).

[0080] As shown in **FIG. 9**, contents stored as symbol information includes the identifier **902** of an acquired symbol, the symbol name **903** of the acquired symbol, the state **904** of managed terminal shown by the acquired symbol, the class **905** of the managed terminal shown by the acquired symbol and the number of subordinate symbols **906** which is the number of symbols included in lower order levels of the map under the acquired symbol. The information **902** to **905** except the number of subordinate symbols **906**, are transferred from the configuration information table **112**. The number of subordinate symbols **906** can be acquired by checking the number of symbols the high order symbol **504** of which is a symbol to be acquired in the configuration information table **112** (step **804**).

[0081] When the symbol information of the acquired symbol is stored in the hierarchical information table **901** as described above, the filtering section **132** specifies that high order symbols **504** be acquired and stored in the hierarchical information table **901** (step **805**).

[0082] If a higher order symbol exist, then steps **803** to **805** are repeated until no high order symbol **504** exists (step **806**). If no higher order symbols **504** exist then the hierarchical information table **901** showing location in a map including the symbol of the managed terminal **20** is generated. When the generation of the hierarchical information table **901** is finished, the filtering section **132** informs the configuration information display section **135** of the managed terminal **20** of the generated hierarchical information table **901** (step **807**).

[0083] When the configuration information display section **135** receives the hierarchical information table **901** from the filtering section **132** of the network management system **10** as shown in **FIG. 6**, the configuration information display section **135** stores the received hierarchical information table **901** in the work memory **22** and informs the configuration information filtering program **133** of the network management system **10** of a request for transferring configuration information together with the identifier **902** of a symbol in a higher order level of the map of the managed terminal **20** in the hierarchical information table **901** (a step **605**). When the configuration information filtering program **133** receives the request for transferring configuration information and the identifier **902** of the symbol from the managed terminal **20**, configuration filtering program **133** informs the configuration information display section **135** of the managed terminal **20** of all symbols included in maps of lower order levels related to a symbol shown by the received identifier **902** by the hierarchical symbol acquiring section **138**. That is, all symbols included in lower order level maps related to the symbol of the managed terminal **20** (a step **606**) are informed.

[0084] **FIG. 10** is a flowchart showing the outline of the operation of the hierarchical symbol acquiring section **138** of the configuration information filtering program **133**. It

should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[0085] As shown in **FIG. 10**, the hierarchical symbol acquiring section **138** extracts a symbol having the identifier **902** of a symbol received from the managed terminal **20** as a high order symbol **504** from the configuration information table **112** (step **1001**). Next, the hierarchical symbol acquiring section **138** specifies the symbol extracted in the step **1001** for a symbol to be acquired and stores symbol information of the acquired symbol in a display information table **1101** shown in **FIG. 11** (step **1002**).

[0086] As shown in **FIG. 11**, the display information table **1101** includes symbol information consisting of an identifier **1102** of an acquired symbol, a symbol name **1103** of the acquired symbol, a class **1104** of managed equipment shown by the acquired symbol, a state **1105** of the managed equipment shown by the acquired symbol and the number of subordinate symbols **1106** which is the number of symbols included in lower order level maps under the acquired symbol. The information **1102** to **1105**, except the number of subordinate symbols **1106**, are picked up from the configuration information table **112**. The number of subordinate symbols **1106** can be acquired by checking the number of symbols the high order symbol **504** of which is an acquired symbol in the configuration information table **112** (step **1003**).

[0087] When the symbol information of the acquired symbol is stored in the display information table **1101** as described above, the hierarchical symbol acquiring section **138** returns processing to step **1001** to store the symbol information of the following symbols in the display information table **1101** until no other symbol having the identifier **902** of the symbol received from the managed terminal **20** as a high order symbol **504** exists (step **1004**). When the steps **1001** to **1004** are repeated, the display information table **1101** in which the symbol information of all symbols included in a map including the symbol of the managed terminal **20** is stored is generated. When the generation of the display information table is finished, the hierarchical symbol acquiring section **138** informs the configuration information display section **135** of the managed terminal **20** of the generated display information table **1101** (step **1005**).

[0088] As shown in **FIG. 6**, in the managed terminal **20**, when the configuration information display section **135** of the configuration information display program **136** receives the display information table **1101** from the hierarchical symbol acquiring section **138** of the network management system **10**, the configuration information display section **135** causes the display of a partial network configuration related to the managed terminal **20** in the form of an containment tree based upon the hierarchical information table **901** and the display information table **1101** (step **607**). The display information table **1101** and the hierarchical information table **901** stored in the work memory **22** in the step **605** are equivalent to containment relationship information showing containment relationship among symbols related to the managed terminal **20**.

[0089] **FIG. 12** is a flowchart showing the outline of the operation of the configuration information display section **135** of the configuration information display program **136**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[0090] As shown in **FIG. 12**, the configuration information display section **135** first generates a configuration information internal table **1301** shown in **FIG. 13** based upon the received display information table **1101** and the hierarchical information table **901** stored in the work memory **22** (step **1201**). **FIG. 13** shows the construction of the configuration information internal table **1301**.

[0091] As shown in **FIG. 13**, the configuration information internal table **1301** includes for each identifier **1302**, a class **1303** of managed equipment shown by a symbol, a state **1304** of the managed equipment shown by the symbol, a symbol name **1305** of the symbol, a hierarchy **1306** of the symbol, a number of symbols under the symbol **1307** and a high order symbol **1308**. Symbols of each identifier **1302** are displayed in the form of an containment tree. In the configuration information internal table **1301**, a symbol the identifier **1302** of which is zero, '0' is definitely set beforehand so that the corresponding class **1303** and symbol name **1305** are a root **1309**. A symbol which is the root **1309** is located at the highest order of all symbols and therefore, a hierarchy **1306** corresponding to the symbol is set to zero, "0". Also, the information **1302** to **1305** and **1307**, except the hierarchy **1306** and the high order symbol **1308** are transferred from the hierarchical information table **901** or the display information table **1101**.

[0092] However, the configuration information display section **135** stores a value showing the number of low order symbols **1307** relative to the symbol which is the root **1309** in the field of the hierarchy **1306** according to hierarchical relationship shown in the hierarchical information table **901** and stores the identifier of a symbol in a high order by one in the field of the high order symbol **1308**.

[0093] Next, the configuration information display section **135** locates each of the symbols to be displayed in an inclusive tree based upon the contents of the configuration information internal table **1301** generated in the step **1201** by repeating the steps **1202** to **1211**. That is, first, the configuration information display section **135** generates the symbol image **1602** of the symbol which is the root **1309**, locates the generated symbol image **1602** in a predetermined position on an inclusive tree screen **1601** shown in **FIG. 16** and respectively sets initial values y1 and x1 having the location as an origin at an x-coordinate **1603** and at a y-coordinate **1604** (step **1202**). The x-coordinate **1603** and the y-coordinate **1604** at which the initial values are set show positions in which the symbol image of a symbol in a low order by one of the symbol which is the root **1309** is to be located.

[0094] Next, the configuration information display section **135** retrieves a symbol of the identifier of the high order symbol **1308** of which is equal to the identifier **1302** of the symbol which is the root **1309** from the configuration information internal table **1301** (step **1203**), generates the symbol image of the retrieved symbol and locates the generated symbol image in a position shown by values set at an x-coordinate **1603** and at a y-coordinate **1604** on the inclusive tree screen **1601** (step **1204**).

[0095] The details of step **1204** provides that the configuration information display section **135** determines the icon format of an acquired symbol based upon the contents of a class/icon relating internal table **1401** which stores relationships between the class **1402** of managed equipment shown

by the symbol and an icon format **1403** shown in **FIG. 14**. The configuration information display section **135** determines the color of the determined icon format based upon the contents of a state/icon color relating internal table **1501** which stores relationship information indicating relationships between the state **1501** of the managed equipment shown by the acquired symbol and an icon color **1502** shown in **FIG. 15**. Further, the configuration information display section **135** creates symbol images **1605** and **1606** shown in **FIG. 16** by adding a symbol name **1305** and the number of subordinate symbols **1307**. Finally, the configuration information display section **135** locates the created symbol images **1605** and **1606** in positions shown by the respective values set at an x-coordinate **1603** and at a y-coordinate **1604** on the inclusive tree screen **1601**.

[**0096**] Next, the configuration information display section **135** adds a predetermined value y1 to a value at a y-coordinate **1604** in a step **1205** and judges whether a symbol in a lower order level of the maps related to the symbol image of which is located in the step **1204** exists or not (step **1206**). The judgment can be executed by retrieving a symbol, the higher order symbol of which has the identifier **1302**, of the symbol image of which is located in the step **1204** for example. If such a symbol exists, the configuration information display section **135** returns processing to step **1204** after adding a predetermined value x1 to a value at an x-coordinate **1603** (step **1207**).

[**0097**] If no such symbol exists, the configuration information display section **135** judges whether a symbol in a higher order level of the map related to the symbol image of which is located in step **1204** exists or not (step **1208**). The judgment can be executed by retrieving a symbol having the same symbol as the higher order symbol **1308** of the symbol, the symbol image of which, is located in step **1204** as a high order symbol **1308** for example. If such a symbol exists, the configuration information display section **135** returns processing to step **1204**, generates and locates the symbol image of such a symbol. If no such symbol exists, the configuration information display section subtracts a predetermined value x1 from a value at an x-coordinate **1603** (step **1209**), next retrieves a symbol having the higher order symbol **1308** of the symbol retrieved in step **1208** as the identifier **1302** (step **1210**), repeats processing until a symbol to be next retrieved is the symbol which is the root **1309** (step **1211**) and returns processing to step **1208**.

[**0098**] Thus, if a symbol to be next retrieved is the symbol which is the root **1309** (step **1211**), the symbol images **1602**, **1605** and **1606** of all symbols to be displayed in an inclusive tree are located on the inclusive tree screen **1601**. Afterward, the configuration information display section **135** completes the inclusive tree screen **1601** by connecting the symbol images **1602**, **1605** and **1606** located on the inclusive tree screen **1601** (step **1212**). It is desirable that the configuration information display section **135** causes the symbol image **1606** equivalent to the managed terminal **20** on the inclusive tree screen **1601** shown in **FIG. 16** to be highlighted (step **1213**).

[**0099**] As described above, according to the first embodiment, if network management is executed from the managed terminal **20**, which is equipment managed by the network management system **10**, a user who uses the managed terminal **20** is not required to retrieve the symbol of the managed terminal **20**. Therefore, the user can immediately execute network management because partial network configuration related to the managed terminal **20** can be preferentially displayed in an inclusive tree. However, as is conceivable a user of the managed terminal **20** may wish to access various network configurations outside of the partial network configuration related to the managed terminal **20**.

[**0100**] To enable the display of the configurations of various networks outside of the partial network configuration in an inclusive tree, if the symbol images of all symbols in a lower order level related to a symbol specified by a user are not located on the inclusive tree screen **1601**, symbol developing processing in which the symbol images of such symbols are newly located is further executed according to the first embodiment. Also, to enable displaying the configurations of various networks outside of the partial network configuration in an inclusive tree, if the symbol images of all symbols in a lower order level of the maps related to a symbol specified by a user are located on the inclusive tree screen **1601**, symbol closing processing in which the symbol images of such symbols are deleted is further executed according to the first embodiment.

[**0101**] **FIG. 17** is a flowchart showing the outline of the symbol developing/closing processing executed by the configuration information display section **135** of the configuration information display program **136**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[**0102**] As shown in **FIG. 17**, when a desired symbol is specified by selecting the corresponding symbol image on the inclusive tree screen **1601** by a user operating the mouse **27**, the configuration information display section **135** of the configuration information display program **136** in the managed terminal **20** acquires the identifier **1302** of the symbol specified by the user from the configuration information internal table **1301** (step **1701**). Next, the configuration information display section **135** judges whether each of the symbols in lower level maps relate to the symbol specified by the user. That is whether each of the symbols having the symbol specified by the user as the higher order symbol **1308** are stored in the configuration information internal table **1301** or not (step **1702**). The judgment can be executed by retrieving symbols having the symbol specified by the user as the respective higher order symbol **1308** of the same number as the number of subordinate symbols **1308** corresponding to the identifier **1302** of the symbol specified by the user from the configuration information internal table **1301**.

[**0103**] First, the symbol developing processing executed when information indicating a relation between each of the symbols in a lower order level of the maps related to a symbol specified by a user is not stored in the configuration information internal table **1301** will be described.

[**0104**] In the symbol developing processing, the configuration information display section **135** first informs the hierarchical symbol acquiring section **138** of the network management system **10** of the identifier **1302** of a symbol specified by a user and a request for transferring configuration information (step **1703**). In the network management system **10**, the hierarchical symbol acquiring section **138** generates the display information table **1101** storing the symbol information of each of the symbols, the higher order

symbol **504** of which, has the identifier **1302** informed by the configuration information display section **135** of the managed terminal **20** as described in the flowchart shown in **FIG. 10**, and informs the configuration information display section **1305** of the managed terminal **20** of the generated display information table **1101**.

[**0105**] When the configuration information display section **135** receives the display information table **1101** from the hierarchical symbol acquiring section **138** of the network management system **10** (step **1704**), the configuration information display section **135** determines the size of a display area required to locate the symbol images based upon the number of symbols, the symbol information of which, is stored in the display information table **1101** (step **1705**). Next, the configuration information display section **135** acquires all symbols, the symbol images of which are located at the y-coordinate of a value larger than the y-coordinate of a position at which the symbol image of a symbol specified by a user is located and shifts the y-coordinates of the respective locations of the symbol images of the acquired symbols so that a display area of the size determined in step **1705** can be secured (step **1706**). Thereafter the configuration information display section **135** adds the information of symbols, the symbol information of which is stored in the display information table **1101** received in the step **1704**, into the configuration information internal table **1301** (step **1707**). The configuration information display section **135** creates and locates the symbol images of the above symbols (step **1708**), and connects them (step **1709**).

[**0106**] As described above, the symbol images of all symbols in a lower order level of the maps related to one symbol specified by the user are newly located on the inclusive tree screen **1601** by repeating steps **1707** to **1709** for each symbol, the symbol information of which is stored in the display information table **1101**, received from the hierarchical symbol acquiring section **138** of the network management system **10** (step **1710**).

[**0107**] Next, the symbol closing processing executed when the information of all symbols in a lower order level of the maps related to a symbol specified by a user is stored in the configuration information internal table **1301** will be described.

[**0108**] In the symbol closing processing, the configuration information display section **135** repeats processing for first deleting the information of each symbol from the configuration information internal table **1301** (step **1711**), deleting the symbol image of each symbol from the inclusive tree screen **1601** (step **1712**) and deleting a line connecting the symbol images of the symbols from the inclusive tree screen **1601** (step **1713**) for each symbol in a lower order level of the maps related to a symbol specified by a user (step **1714**). Next, the configuration information display section **135** acquires all symbols, the symbol images of which are located at the y-coordinate, of a value larger than the y-coordinate of a position in which the symbol image of the symbol specified by the user is located and shifts the y-coordinates of locations of the symbol images of the acquired symbols so that an area blanked by deleting all the symbol images in the step **1712** is filled (step **1715**). Thus, the symbol images of all the symbols in a lower order level of the maps related to the symbol specified by the user are deleted from the inclusive tree screen **1601**.

[**0109**] For example, when the symbol which is the root is specified by a user moving a cursor **1611** to the symbol image **1602** which is the root on the inclusive tree screen **1601** shown in **FIG. 16** as shown in **FIG. 18** and the user operates the mouse, the symbol developing processing is executed. As a result, the symbol image **1612** of a symbol in a lower order level of the map, related to the symbol which is the root, is newly located on the inclusive tree screen **1601**. Also, for example, when a symbol which is a sector **1** is specified by a user moving the cursor **1611** to a symbol image **1605** which is the sector **1** on the inclusive tree screen **1601** shown in **FIG. 16** as shown in **FIG. 19** and the user operates the mouse, the symbol closing processing is executed. As a result, the symbol image of a symbol in a lower order level of the maps related to the symbol which is the sector **1** is deleted from the inclusive tree screen **1601**. Thus, the configurations of various networks including partial network configuration and whole network configurations can be displayed in an inclusive tree by executing the above described symbol developing/closing processing.

[**0110**] Next, referring to **FIGS. 9, 10, 12** and **20** to **25**, a second embodiment of the present invention will be described.

[**0111**] According to the second embodiment, when network management is executed from the managed terminal **20**, event information related to the managed terminal **20** collected by the network management system **10** from network equipment **201** and **202** each including a managed equipment **20** and stored in the network management system **10**, can be preferentially displayed.

[**0112**] **FIG. 20** is a block diagram showing the configuration of a network management system **10** and a managed terminal **20** of the second embodiment.

[**0113**] In the second embodiment, the configuration of the managed terminal **20** is the same as in the first embodiment. In the second embodiment, the configuration of the network management system **10** is similar to that in the first embodiment. However, the configuration of the network management system **10** in the second embodiment is different from the first embodiment in that an event information display program **2021** is stored in program memory **13** in place of the configuration information display program **136**. The event information display program **2021**, similar to the configuration information display program **136**, can be an Applet as per the JAVA and ACTIVE X programming languages. Also an event information retrieval program **2011** is stored in the program memory **13** and an event information table **2001** is stored in the database **110**.

[**0114**] The event information display program **2021** is a program activated in a managed terminal **20** when it is transferred to the managed terminal **20** for causing the display of event information related to the managed terminal **20** on the managed terminal **20**. The event information display program **2021** is provided with a terminal information gathering section **2022** and an event information display section **2023**. The event information retrieval program **2011** is a program for acquiring event information related to a managed terminal **20** and is provided with a filtering section **2012** and a retrieval and enlargement section **2013**.

[**0115**] In the network management system **10**, CPU **14** periodically collects management information from each of

network equipment **201** and **202** each including a managed terminal **20** via a communication control unit **11** by executing a management information collection program **131** as in the first embodiment. The collected management information is stored in a management information table **111**. In the second embodiment, CPU **14** further receives an event log spontaneously informed by each of the network equipment **201** and **202** via the communication control unit **11** by executing the management information collection program **131**. The event information of the received event log is stored in the event information table **2001** shown in **FIG. 21**. Contents stored as event information include an identifier **2102** uniquely showing an event log, an IP address **2103** of managed equipment informed about the event log, an informed time **2104** showing time in which the event log is informed, informed contents **2105** showing the contents of the event log and an information type **2106** showing the type of the event log as shown in **FIG. 21**. The identifier **2102** is a number given so that the closer to the present time the informed time **2104** is, the smaller the number is.

[**0116**] The operation of the second embodiment will be described below.

[**0117**] When a user instructs the managed terminal **20** to execute network management under the above environment, a transfer request program **24** first informs the transfer program **137** of the network management system **10** of a request for transferring the event information display program **2021**. In the network management system **10**, when the transfer program **137** receives the request for transferring the event information display program **2021** to the managed terminal **20**, the transfer program **137** transfers the event information display program **2021** stored in the program memory **13** to the work memory **22** of the managed terminal **20**. In the managed terminal **20**, when the event information display program **2021** is transferred to the work memory **22** from the network management system **10**, the event information display program **2021** is automatically activated. When the event information display program **2021** is activated in the managed terminal **20**, the terminal information gathering section **2022** first acquires the IP address of the managed terminal **20**, same as the terminal information gathering section **134** of the configuration information display program **136** in the first embodiment, and informs the event information retrieval program **2011** of the network management system **10** of the request for transferring event information together with the acquired IP address. In the network management system **10**, when the event information retrieval program **2011** receives the request for transferring event information and the IP address from the managed terminal **20**, the filtering section **2012** is operated as shown in the flowchart in **FIG. 22**.

[**0118**] **FIG. 22** is a flowchart showing the outline of the operation of the filtering section **2012** of the event information retrieval program **2011**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[**0119**] As shown in **FIG. 22**, the filtering section **2012** of the event information retrieval program **2011** first retrieves an IP address **304** equal to the IP address received from the managed terminal **20** from the management information table **111** and acquires an identifier **302** corresponding to the retrieved IP address **304**, that is, the identifier **302** of the managed terminal **20** (step **2201**). Next, the filtering section **2012** of the event information retrieval program **2011** informs the filtering section **132** of a configuration information filtering program **133** of a request for configuration information together with the identifier **302** acquired in step **2201** (step **2202**).

[**0120**] When the filtering section **132** of the configuration information filtering program **133** is informed of the request for configuration information and the identifier **302** by the filtering section **2012** of the event information retrieval program **2011**, the filtering section **132** generates a hierarchical information table **901** showing a location in a map including a symbol having the informed identifier **302** as the corresponding node **505**, that is, the symbol of the managed terminal **20**. The filtering section **132** also informs the filtering section **2012** of the event information retrieval program **2011** of the generated hierarchical information table **901** same as the operations described in the flowchart shown in **FIG. 8**. When the filtering section **2012** of the event information retrieval program **2011** is informed of the hierarchical information table **901** from the filtering section **132** of the configuration information filtering program **133** (step **2203**), the filtering section **2012** informs a hierarchical symbol acquiring section **138** of the configuration information filtering program **133** of a request for configuration information together with the identifier **902** of a symbol in a high order related to the symbol of the managed terminal **20** in the hierarchical information table **901** (step **2204**).

[**0121**] When the hierarchical symbol acquiring section **138** of the configuration information filtering program **133** is informed of the request for configuration information and the identifier **902** of the symbol by the filtering section **2012** of the event information retrieval program **2011**, the hierarchical symbol acquiring section **138** generates the display information table **1101** which stores the symbol information of all symbols, the higher order symbol **504** of which has the informed identifier **902** of the symbol, that is, all symbols included in a map including the symbol of the managed terminal **20**. The hierarchical symbol acquiring section **138** also informs the filtering section **2012** of the event information retrieval program **2011** of the generated display information table **1101** same as the operations described in the flowchart shown in **FIG. 10**.

[**0122**] When the filtering section **2012** of the event information retrieval program **2011** is informed of the display information table **1101** by the hierarchical symbol acquiring section **138** of the configuration information filtering program **133** (step **2205**), the filtering section **2012** of the event information retrieval program **2011** acquires the identifier of managed equipment corresponding to each symbol, the symbol information of which is stored in the display information table **1101** (step **2206**). In step **2206**, the filtering section **2012** of the event information retrieval program **2011** retrieves the node **505** corresponding to a symbol having an identifier equivalent to an identifier **1102** stored in the display information table **1101** as the identifier **502** from a configuration information table **112**. Next, the filtering section **2012** of the event information retrieval program **2011** acquires the IP address of each managed equipment, the identifier of which is acquired in step **2206** (step **2207**).

[**0123**] In step **2207**, the filtering section **2012** of the event information retrieval program **2011** retrieves an IP address

304 corresponding to an identifier **302** equal to the corresponding node **505** from the management information table **111** because the corresponding node **505** retrieved in step **2206** is equivalent to an identifier **302** in the management information table **111**. The IP address **304** of any managed equipment existing in a partial network related to the managed terminal **20** is acquired by the above operation.

[**0124**] Afterward, the filtering section **2012** of the event information retrieval program **2011** checks whether event information corresponding to any managed equipment, the IP address **304** of which is acquired in step **2207** is stored in the event information table **2001** or not. If event information has been stored, the filtering section **2012** informs the event information display program **2021** of the managed terminal **20** of a list of such event information. That is, the filtering section **2012** of the event information retrieval program **2011** retrieves event information stored in the event information table **2001** in the order of identifiers **2102** (step **2208**), checks whether an IP address **2103** of the retrieved event information is equal to any of the IP addresses **304** acquired (step **2207**) or not (step **2209**) and if so, the filtering section stores the identifiers **2102** of the retrieved event information (step **2210**).

[**0125**] After steps **2208** to **2210** are repeated for each event information stored in the event information table **2001** (step **2211**), the filtering section **2012** of the event information retrieval program **2011** extracts event information shown by the identifiers **2102** based upon all the identifiers **2102** stored in (step **2210**) from the event information table **2001** and informs the event information display program **2021** of the managed terminal **20** of a list of the extracted event information (step **2212**). In the managed terminal **20**, when the event information display section **2023** of the event information display program **2021** receives the list of event information from the filtering section **2012** of the network management system **10**, the managed terminal **20** displays the list of the received event information in an event list display area **2302** on an event display screen **2301** as shown in **FIG. 23**.

[**0126**] As described above, event information, related to a managed terminal **20** is collected from the network equipment **201** and **202** including the managed terminal **20** by the network management system **10** and stored therein. Such event information can be preferentially displayed according to the second embodiment when network management is executed from the managed terminal **20**. A user who uses the managed terminal **20** is not required to retrieve the event information of the managed terminal **20** and can immediately execute network management.

[**0127**] However, it is conceivable that a user of a managed terminal **20** may want to access various event information except event information related to the managed terminal **20**. To enable displaying of the various event information, in the second embodiment, enlargement processing for gradually enlarging event information to be displayed according to the instruction of a user is further executed.

[**0128**] **FIG. 24** is a flowchart showing the outline of enlargement processing executed by the retrieval and enlargement section **2013** of the event information retrieval program **2011**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[**0129**] As shown in **FIG. 23, a** display object enlarging button **2303** used by a user to instruct the enlargement of event information to be displayed on the event display screen **2301**. When a user instructs the enlargement of event information to be displayed by actuating the display object enlarging button **2303** via the mouse **27**, the event information display program **2021** of the managed terminal **20** informs the retrieval and enlargement section **2013** of the event information retrieval program **2011** of the network management system **10** of a request for enlarging a displayed object.

[**0130**] In the network management system **10**, when the retrieval and enlargement section **2013** of the event information retrieval program **2011** receives the request for enlarging the displayed object from the event information display program **2021** of the managed terminal **20** as shown in **FIG. 24** (step **2401**), the filtering section **2012** of the event information retrieval program **2011** retrieves a symbol in a higher order level map related to the enlarged symbol in the last enlargement processing from the hierarchical information table **901** informed by the filtering section **132** of the configuration information filtering program **133** in the operation described in the flowchart shown in **FIG. 22**. That is, the hierarchical information table **901** shows a location in a map including the symbol of the managed terminal **20** and enlarges the above symbol (step **2402**).

[**0131**] In the step **2402**, in case this enlargement processing is the first enlargement processing after displaying a list of event information related to a managed terminal **20**, the retrieval and enlargement section **2013** receives and enlarges a symbol in a higher order level maps related to the symbol of the managed terminal **20**. Next, the retrieval and enlargement section **2013** acquires the identifiers of all symbols included in the least significant map sequentially pulled down from each symbol, except a symbol to be retrieved and enlarged, of all symbols included in a map including the above symbol to be retrieved and enlarged (step **2403**).

[**0132**] In step **2403**, the retrieval and enlargement section **2013** first informs the hierarchical symbol acquiring section **138** of the configuration information filtering program **133** of a request for configuration information and the identifier **902** of a symbol in a higher order level map related to the symbol to be retrieved and enlarged. If the symbol information of a symbol in a higher order level map related to the symbol to be retrieved and enlarged is not stored in the hierarchical information table **901**, the retrieval and enlargement section **2013** informs that the above symbol in a higher order level map is the most significant symbol in place of the identifier **902**.

[**0133**] When the hierarchical symbol acquiring section **138** is informed of the request for configuration information and the identifier **902** of the symbol by the retrieval and enlargement section **2013**, the hierarchical symbol acquiring section **138** generates the display information table **1101** which stores the symbol information of all symbols, the higher order symbol **504** of which includes the informed identifier **902** of the symbol. In other words, all symbols included in a map including the symbol to be retrieved and enlarged as the operation described in the flowchart shown in **FIG. 10**. The hierarchical symbol acquiring section **138** also informs the retrieval and enlargement section **2013** of the generated display information table **1101** when the hierarchical symbol acquiring section **138** is informed of information that the symbol is the most significant symbol

by the retrieval and enlargement section **2013**. The hierarchical symbol acquiring section **138** generates the display information table **1101** which stores the symbol information of all symbols, of which no higher order symbol **504** exists, and informs such to the display information table.

[**0134**] When the retrieval and enlargement section **2013** is informed of the display information table **1101** by the hierarchical symbol acquiring section **138**, the retrieval and enlargement section **2013** informs the hierarchical symbol acquiring section **138** of a request for configuration and the identifier **1102** of each symbol, except the symbol to be retrieved and enlarged, of all symbols the symbol information of which is stored. This is done since the symbol information of the symbol to be retrieved and enlarged is also stored in the display information table **1101**. Thus, the display information table **1101** which stores the symbol information of symbols in a lower order level of the maps including the symbol to be retrieved and enlarged is informed by the hierarchical symbol acquiring section **138**.

[**0135**] As described above, if the display information table **1101** is informed by the hierarchical symbol acquiring section **138** of the identifiers **1102** of all symbols included in the least significant map sequentially pulled down from each symbol, except the symbol to be retrieved and enlarged then symbols included in a map including the symbol to be retrieved and enlarged can be acquired from the informed display information table **1101**. When the number of subordinate symbols **1106** in the symbol information is zero "0", acquiring cannot occur. The retrieval and enlargement section **2013** acquires the identifier of managed terminal corresponding to each symbol of all the identifiers **1102** acquired in step **2403** respectively (step **2404**).

[**0136**] In step **2404**, the retrieval and enlargement section **2013** retrieves the node **505** corresponding to a symbol, the identifier **502** of which is equal to each identifier **1102** acquired in step **2403** from the configuration information table **112**. Next, the retrieval and enlargement section **2013** acquires the IP address of each managed terminal, the identifier of which is acquired in step **2404** (step **2405**).

[**0137**] In step **2405**, the retrieval and enlargement section **2013** retrieves the IP address **304** corresponding to an identifier **302** which is equivalent to the corresponding node **505** from the management information table **111**. This is done since the corresponding node **505** retrieved in step **2404** is equivalent to an identifier **302** in the management information table **111**. The IP addresses **304** of the managed terminal corresponding to all symbols included in the least significant map sequentially pulled down from each symbol are acquired by the above processing. All symbols are acquired except a symbol to be retrieved and enlarged.

[**0138**] Afterward, the retrieval and enlargement section **2013** checks whether event information corresponding to each managed terminal, the IP address **304** of which is acquired in the step **2405**, is stored in the event information table **2001** or not. If so, the retrieval and enlargement section **2013** informs the event information display program **2021** of the managed terminal **20** about a list of such event information.

[**0139**] The retrieval and enlargement section **2013** retrieves event information stored in the event information table **2001** in ascending order of identifiers **2102** (step **2406**). The retrieval and enlargement section **2013** also checks whether the IP address **2103** in the retrieved event information is equal to any of the IP addresses acquired in step **2405** or not (step **2407**). If so, the identifier **2102** in the retrieved event information is stored (step **2408**).

[**0140**] After steps **2406** to **2408** are repeated for each event information stored in the event information table **2001** (step **2409**), the retrieval and enlargement section **2013** extracts event information shown by all the identifiers **2102** stored in step **2408** from the event information table **2001** and informs the event information display program **2021** of the managed terminal **20** of a list of the extracted event information (step **2410**). In the managed terminal **20**, when the event information display section **2023** of the event information display program **2021** receives the list of event information from the retrieval and enlargement section **2013** of the network management system **10**, the managed terminal **20** adds the received list of event information to the event list display area **2302** on the event display screen **2301** and displays it.

[**0141**] **FIG. 25** is a flowchart showing the outline of additional display processing executed when the event information display section **2023** adds and displays the list of the event information. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[**0142**] As shown in **FIG. 25**, when the event information display section **2023** receives the list of event information from the retrieval and enlargement section **2013** of the network management system **10** (step **2501**), the event information display section **2023** sorts the received event information and any event information already displayed in the event list display area **2302** on the event display screen **2301** in ascending order of identifiers **1802** (step **2502**). Next, the event information display section **2023** judges whether each event information sorted in step **2506** is event information to be additionally displayed or not (step **2503**). This judgment can be executed by judging whether the above sorted event information is the event information received in the step **2501** or not. If the above event information is event information to be additionally displayed, the event information display section **2023** displays the event information and changes the color of the background of the event information (step **2504**). If the event information is not event information to be additionally displayed, the event information display section **2023** displays the event information without a change in the color of the background of the event information (step **2505**). When the display of event information is finished as described above, the event display screen **2301** shown in **FIG. 23** is changed as shown in **FIG. 26**.

[**0143**] In **FIG. 26** the event information **5**, **10** and **16** on the event display screen **2301** indicate that they are event information additionally displayed after a user activates the display object enlarging button **2303** via the mouse **27**. According to processing shown in the flowchart in **FIG. 25**, the event information display section **2023** changes the color of the background of event information when event information to be additionally displayed is displayed. This is executed to permit a user to easily identify the event information that is event information additionally displayed. However, the present invention is not limited to this embodiment, for example, event information to be additionally

displayed may be underlined and the color of the event information itself may be also changed. Event information to be displayed can be gradually enlarged by executing the above enlargement processing and additional display processing.

[0144] Next, referring to FIGS. **27** to **29**, a third embodiment of the present invention will be described.

[0145] The third embodiment enables preferentially displaying management information related to a managed terminal and matched with a retrieval condition set by a user who uses the managed terminal **20** when network management is executed from the managed terminal **20**. **FIG. 27** is a block diagram showing the configuration of a network management system **10** and a managed terminal **20** included in the third embodiment.

[0146] In the third embodiment, the configuration of the managed terminal **20** is the same as in the first embodiment. Also, in the third embodiment, the configuration of the network management system **10** is similar to that in the first embodiment. However, the configuration of the network management system in the third embodiment is different from that in the first embodiment in that a management information display program **2702** is stored in program memory **13** in place of a configuration information display program **136** and a management information sort program **2701** is stored in the program memory **13**. Here again the management information display program **2701**, similar to the configuration information display program **136**, can be an Applet according to the JAVA and ACTIVE X programming languages.

[0147] The management information display program **2702** is a program activated in a managed terminal **20** when it is transferred to the managed terminal **20** for causing the display of management information matched with a retrieval condition set by a user using the managed terminal **20**. The management information display program **2702** is provided with a terminal information gathering section **2703** and a management information display section **2704**. The management information sort program **2701** is a program for sorting management information so that the display of management information related to a managed terminal **20** is effected. In the network management system **10**, CPU **14** periodically collects management information from each network equipment **201** and **202** each including a managed terminal **20** via a communication control unit **11** by executing a management information collection program **131** as in the first embodiment and stores the collected management information in a management information table **111**.

[0148] The operation of the third embodiment will be described below.

[0149] When a user instructs a managed terminal **20** to execute network management under the above environment, a transfer request program **24** first informs the transfer program **137** of the network management system **10** of a request for transferring the management information display program **2702**. In the network management system **10**, when the transfer program **137** receives the request for transferring the management information display program **2702** from the managed terminal **20**, the transfer program **137** transfers the management information display program **2702** stored in the program memory **13** to the work memory **22** of the managed terminal **20**. In the managed terminal **20**, the management information display program **2702** is automatically activated when it is transferred from the network management system **10** to the work memory **22**.

[0150] In the managed terminal **20**, when the management information display program **2702** is activated, the terminal information gathering section **2703** first causes the display of a retrieval screen **2801** shown in **FIG. 28** for example on a display **25** after acquiring the IP address of the managed terminal **20** similar to the terminal information gathering section **134** of the configuration information display program **136** in the first embodiment. The management information display program **2702** then waits for a user to set a retrieval condition and instruct the execution of a retrieval using the set retrieval condition.

[0151] As shown in **FIG. 28**, the retrieval screen **2801** includes a retrieval condition attribute setting area **2802** for allowing a user to set the attribute of a retrieval condition, an attribute value input area **2803** for allowing a user to input an attribute value equivalent to the retrieval condition, a retrieval button **2804** for allowing a user to instruct the execution of retrieval and a retrieval result display area **2805** for displaying the result of the retrieval. On the retrieval screen **2801** shown in **FIG. 28**, an example is illustrated where a user sets an IP address as the attribute of a retrieval condition and inputs "AA. AB. *.*" as an attribute value so as to set a retrieval condition. The above code means that a user wants to retrieve an IP address in the format of "AA. AB.*.*". After the user sets the retrieval condition, the execution of the retrieval by activating the retrieval button **2804** via the mouse **27** is instructed.

[0152] In the managed terminal **20**, when the user instructs the execution of the retrieval, the terminal information gathering section **2703** informs the management information sort program **2701** of the network management system **10** of a request for transferring management information together with the already acquired IP address and the retrieval condition set by the user. In the network management system **10**, when the management information sort program **2701** receives the request for transferring management information, the IP address and the retrieval condition from the managed terminal **20**, the network management system **10** is operated as shown in the flowchart in **FIG. 29**.

[0153] **FIG. 29** is a flowchart showing the outline of the operation of the management information sort program **2701**. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[0154] As shown in **FIG. 29**, the management information sort program **2701** first acquires the IP address of any managed equipment existing in a partial network related to the managed terminal **20** by executing the same operation in steps **2901** to **2907** as steps **2201** to **2207** shown in **FIG. 22** executed by the filtering section **2012** of the event information retrieval program **2011**. That is, the management information sort program **2701** retrieves an IP address **304** equal to the IP address received from the managed terminal **20** from the management information table **111** and acquires an identifier **302** corresponding to the retrieved IP address **304**. The identifier **302** is of the managed terminal **20** (step **2901**). Next, the management information sort program **2701** informs the filtering section **132** of the configuration infor-

mation filtering program **133** of a request for configuration information together with the identifier **302** acquired in step **2901** (step **2902**).

[**0155**] As the hierarchical information table **901** showing a location in a map including the symbol of the managed terminal **20** is informed by the filtering section **132** of the configuration information filtering program **133** (step **2903**), the management information sort program **2701** informs the hierarchical symbol acquiring section **138** of the configuration information filtering program **133** of the request for configuration information together with the identifier **902** of a symbol in a higher order level map which includes a symbol of the managed terminal **20** in the hierarchical information table **901** (step **2904**). As the display information table **1101** which stores the symbol information of all symbols included in a map including the symbol of the managed terminal **20** is supplied by the hierarchical symbol acquiring section **138** of the configuration information filtering program **133** (step **2905**), the management information sort program **2701** acquires the identifier of managed equipment corresponding to each symbol, the symbol information of which is stored in the display information table **1101** (step **2906**).

[**0156**] In step **2906**, the management information sort program **2701** retrieves the node **505** corresponding to a symbol provided with an identifier **502** equal to an identifier **1102** stored in the display information table **1101** from the configuration information table **112**. Next, the management information sort program **2701** acquires the IP address of each managed equipment the identifier of which is acquired in step **2906** (step **2907**). In the step **2907**, as the corresponding node **505** retrieved in step **2906** is equivalent to an identifier **302** in the management information table **111**, the management information sort program **2701** retrieves the IP address **304** corresponding to an identifier **302** equal to the corresponding node **505** from the management information table **111**. The IP address **304** of any managed equipment existing in a partial network related to the managed terminal **20** is acquired by the above operation.

[**0157**] Thereafter, the management information sort program **2701** generates a list of the management information matched with the retrieval condition received from the managed terminal **20** and retrieved from the management information table **111** (step **2908**). In step **2908**, as shown in **FIG. 28**, retrieval condition set by a user on a retrieval screen **2801** provides, for example, that the management information sort program **2701** retrieves an IP address **304** according to a format of "AA. AB.*.*", that is, "AA. AB. AC. AD", "AA. AB. AC. AE", "AA. AB. AC. AF", "AA. AB. AG. AH", "AA. AB. AG. AI" and "M. AB. AJ. AK".

[**0158**] Next, the management information sort program **2701** checks whether the IP address **304** corresponding to each management information, the list of which is generated in step **2908** (step **2911**), is equal to any of the IP addresses **304** acquired in step **2907** or not (step **2909**). If so the management information sort program **2701** shifts such management information at the head of the list (step **2910**). The management information related to the managed terminal **20** is located in a higher order by sorting the list of management information generated in step **2908** as described above. Thereafter, the management information sort program **2701** informs the management information display program **2702** of the managed terminal **20** of a sorted list of management information (step **2911**).

[**0159**] In the managed terminal **20**, when the management information display section **2704** of the management information display program **2702** receives the list of management information from the management information sort program **2701** of the network management system **10**, the managed terminal **20** displays the list of management information in the retrieval result display area **2805** on the retrieval screen **2801** shown in **FIG. 28** as the result of retrieval. As described above, according to the third embodiment, management information related to a managed terminal can be located in a higher order when a list of management information matched with a retrieval condition set by a user is displayed on the managed terminal **20** and when network management is executed from the managed terminal **20**. The management information is displayed in such manner to allow the user of the managed terminal **20** to readily recognize management information related to the managed terminal **20**.

[**0160**] In the third embodiment, the management information sort program **2701** of the network management system **10** may inform a list of management information related to a managed terminal **20** and a list of other management information separately to the managed terminal **20**. The management information display section **2704** of a managed terminal **20** may also display a boundary line between both lists.

[**0161**] Next, referring to FIGS. **30** to **34**, a fourth embodiment of the present invention will be described.

[**0162**] The fourth embodiment enables preferentially displaying partial network configuration related to a managed terminal **20** in an inclusive tree as in the first embodiment when network management is executed from the managed terminal **20**. The fourth embodiment also allows for the contents of the display of the partial network configuration to be changed according to the performance of the managed terminal **20**.

[**0163**] **FIG. 30** is a block diagram showing the configuration of a network management system **10** and a managed terminal **20** of the fourth embodiment. The configuration of a managed terminal **20** in the fourth embodiment is the same as in the first embodiment. Also, the configuration of the network management system **10** in the fourth embodiment is similar to that in the first embodiment. However, the network management system of the fourth embodiment is different from that in the first embodiment in that an each device display contents determining table **3001** is stored in the database **110**. **FIG. 31** shows an example of the each device display contents determining table **3001**.

[**0164**] As shown in **FIG. 31**, the each device display contents determining table **3001** is a matrix table relating contents displayed on a managed terminal **20** to keys of the memory capacity **3102** of work memory **22** and the CPU format **3103** of CPU **29**. For example, on a managed terminal **20** the memory capacity **3102** of the work memory **22** is 10 MB or less and the CPU format of CPU **29** is CPU-A. Partial network configuration related to the managed terminal **20** is displayed in an inclusive tree in which symbol images, each of which includes a symbol name, are connected.

[0165] The operation of the fourth embodiment will be described below.

[0166] **FIG. 32** is a flowchart showing the outline of the operation of the network management system **10** and a managed terminal **20** in the fourth embodiment of the present invention. It should be noted that each of the steps of the flowchart corresponds to code of a computer program.

[0167] As shown in **FIG. 32**, when a user instructs the managed terminal **20** to execute network management, a transfer request program **24** first informs the transfer program **137** of the network management system **10** of a request for transferring a configuration information display program **136** as in the first embodiment (step **3201**). In the network management system **10**, when the transfer program **137** receives the request for transferring the configuration information display program **136** from the managed terminal **20**, the network management system **10** transfers the configuration information display program **136** stored in the program memory **13** to the work memory **22** of the managed terminal **20** as in the first embodiment (step **3202**).

[0168] In the managed terminal **20**, when the configuration information display program **136** is transferred from the network management system **10** to the work memory **22**, the configuration information display program **136** is automatically activated. When the configuration information display program **136** is activated, a terminal information gathering section **134** first acquires the IP address of the managed terminal **20** as in the first embodiment. However, in the fourth embodiment, the terminal information gathering section further gathers the CPU format of CPU **29** and the memory capacity of the work memory **22**. The terminal information gathering section **134** informs the configuration information filtering program **133** of the network management system **10** of a request for transferring configuration information together with the gathered IP address, CPU format and memory capacity (step **3203**).

[0169] In the network management system **10**, when the configuration information filtering program **133** receives the request for transferring configuration information together with the IP address, CPU format and memory capacity from the managed terminal **20**, the network management system **10** first determines contents to be displayed on the managed terminal **20** by retrieving the each device display contents determining table **3001** using the CPU format and the memory capacity respectively received from the managed terminal **20** as keys in the fourth embodiment (step **3204**). Thereafter, the configuration information filtering program **133** generates a hierarchical information table **901** showing a location in a map including the symbol of the managed terminal **20** by the filtering section **132** which filters required information from a configuration information table **112** based upon the IP address received from the managed terminal **20** as in the first embodiment. However, in the fourth embodiment, the configuration information filtering program **133** further informs the configuration information display program **136** of the managed terminal **20** of a relocated (modified) hierarchical information table **901** after the generated hierarchical information table **901** is relocated according to the contents determined in the step **3204** (step **3205**).

[0170] For example, in a managed terminal **20** the memory capacity **3102** of the work memory **22** is 10 MB or less and the CPU format of CPU **29** is CPU-A. A partial network configuration related to the managed terminal **20** is displayed in an inclusive tree in which symbol images, each of which includes a symbol name, are connected. The symbol information of each symbol includes the identifier **902** and the symbol name **903** in the relocated hierarchical information table **901**. In the managed terminal **20**, when the configuration information display section **135** receives the hierarchical information table **901** from the configuration information filtering program **133** of the network management system **10**, the configuration information display section **135** stores the received hierarchical information table **901** in the work memory **22** and informs the configuration information filtering program **133** of a request for transferring configuration information together with the identifier **902** of a symbol in a high order of the symbol of the managed terminal **20** in the hierarchical information table **901** as in the first embodiment (step **3206**).

[0171] In the network management system **10**, when the configuration information filtering program **133** receives the request for transferring configuration information and the identifier **902** of the symbol from the managed terminal **20**, the hierarchical symbol acquiring section **138** of the configuration information filtering program generates a display information table **110** storing the symbol information of all symbols included in a map pulled down from the symbol shown by the received identifier **902**. Thus, the display includes all symbols included in a map including the symbol of the managed terminal **20** as in the first embodiment. However, in the fourth embodiment, the hierarchical symbol acquiring section **138** further informs the configuration information display program **136** of the managed terminal **20** of a relocated (modified) display information table **1101** after relocating the generated display information table **1101** according to contents determined in the step **3204** (step **3207**).

[0172] For example, in a managed terminal **20** the memory capacity **3102** of the work memory **22** is 10 MB or less and the CPU format of CPU **29** is CPU-A. Partial network configuration related to the managed terminal **20** is displayed in an inclusive tree in which symbol images, each of which includes only a symbol name, are connected. The symbol information of each symbol includes the identifier **1102** and the symbol name **1103** as shown in **FIG. 33** in the relocated display information table **1101**.

[0173] In the managed terminal **20**, the configuration information display section **135** of the configuration information display program **136** receives the display information table **1101** from the configuration information filtering program **133** of the network management system **10**. The configuration information display section **135** displays partial network configuration related to the managed terminal **20** based upon the display information table **1101** and the hierarchical information table **901** stored in the work memory **22** in step **3206**. The partial network configuration is displayed in an containment tree as in the first embodiment (step **3208**).

[0174] In step **3208**, the configuration information display section **135** of the configuration information display program **136** executes the operation shown in the flowchart in **FIG. 12**. However, in the fourth embodiment, the contents of the configuration information internal table **1301** gener-

ated in the step **1201** are different according to the hierarchical information table **901** and the display information table **110** respectively received from the configuration information filtering program **133** of the network management system **10**. The symbol image created in the step **1204** is also different according to the configuration information internal table **1301**.

[**0175**] For example, in a managed terminal **20** the memory capacity **3102** of the work memory **22** is 10 MB or less and the CPU format of CPU **29** is CPU-A. As the symbol information of each symbol respectively includes the identifier **902**, **1102** and the symbol name **903**, **1103** in the received hierarchical information table **901** and display information table **1101**, the configuration information display section **135** generates a configuration information internal table **1301** including items of the identifier **1302**, the symbol name **1305**, the hierarchy **1306** and the higher order symbol **1308**. Also, as the configuration information display section **135** generates and locates a symbol image including the symbol name **1305**, if such a configuration information internal table **1301** is generated, an containment tree screen **1601** in which symbol images **3401**, each of which includes the symbol name **1305** connected as shown in **FIG. 34**, is displayed on the display **25** of the managed terminal **20**.

[**0176**] As described above, according to the fourth embodiment, partial network configuration related to a managed terminal **20** can be preferentially displayed in an containment tree as in the first embodiment. When network management is executed from the managed terminal **20** a user using the managed terminal **20** is not required to retrieve the symbol of the managed terminal **20** and can immediately execute network management.

[**0177**] Further, according to the fourth embodiment, contents to be displayed can be changed according to the performance of the managed terminal **20**. For example, a part of display information can be deleted when partial network configuration related to the managed terminal **20** is displayed in an inclusive tree. Thus, the load of the managed terminal **20** can be reduced.

[**0178**] In the fourth embodiment, the performance of a managed terminal is defined by the memory capacity **3102** of its work memory **22** and the CPU format **3103** of CPU **29**. However, the fourth embodiment is not limited to a situation where only information defining the performance of a managed terminal **20** effects the processing of the configuration information display program **136**. Any other information can be collected by the terminal information gathering section **134** and used to effect processing of the configuration information display program **136**.

[**0179**] As described above, the fourth embodiment is based upon the application of the first embodiment. The second and third embodiments are respectively independent of the first embodiment. However, it should be well understood by those of ordinary skill in the art that two or more of the first (or the fourth) to the third embodiments may be combined.

[**0180**] As described above, the present invention provides for partial information related to a managed terminal of information required for network management to be preferentially displayed on the managed terminal when network management is executed from the managed terminal. The present invention permits a user to easily manage the network by use of the network management system at any location in the network.

[**0181**] The present invention further provides for partial network configuration related to a managed terminal to be preferentially displayed in the form of an containment tree when the configuration of a network displayed in the form of a hierarchical map by a network management system is displayed on the managed terminal. The present invention permits a user to easily grasp the layout of the partial network configuration related to the managed terminal on one screen.

[**0182**] While the present invention has been described in detail and pictorially in the accompanying drawings it is not limited to such details since many changes and modifications recognizable to those of ordinary skill in the art may be made to the invention without departing from the spirit and the scope thereof.

We claim:

1. A network management tool on a storage medium for execution by a network management system which collects management information from each of a plurality of network equipment connected to a network, and stores the collected management information, said network management tool comprising:

a display program which is activated when transferred to a network equipment requesting network management, said display program causes the display of information required for network management on said network equipment;

a transfer program for transferring said display program to said network equipment; and

an information program for informing said display program transferred to said network equipment of information required for network management to be displayed on said network equipment,

wherein said information program executes processing for informing said display program of a partial map related to said network equipment, and

wherein said display program executes processing for specifying said network equipment by collecting identification information for identifying said network equipment, informing said information program of the collected identification information and causing the display of said partial map informed by said information program on said network equipment.

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