US 20030132911A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2003/0132911 A1

Narioka et al. (43) Pub. Date: Jul. 17, 2003

(54) INFORMATION PROCESSING DEVICE AND METHOD, AND INFORMATION PROCESSING PROGRAM

(76) Inventors: **Hiroto Narioka**, Kanagawa (JP); **Takashi Kuwayama**, Tokyo (JP); **Takeo Inagaki**, Tokyo (JP)

Correspondence Address:
William S Frommer
Frommer Lawrence & Haug
745 Fifth Avenue
New York, NY 10151 (US)

(21) Appl. No.: **10/169,428**

(22) PCT Filed: **Oct. 23, 2001**

(86) PCT No.: **PCT/JP01/09300**

(30) **Foreign Application Priority Data**

Oct. 31, 2000 (JP) 2000333572

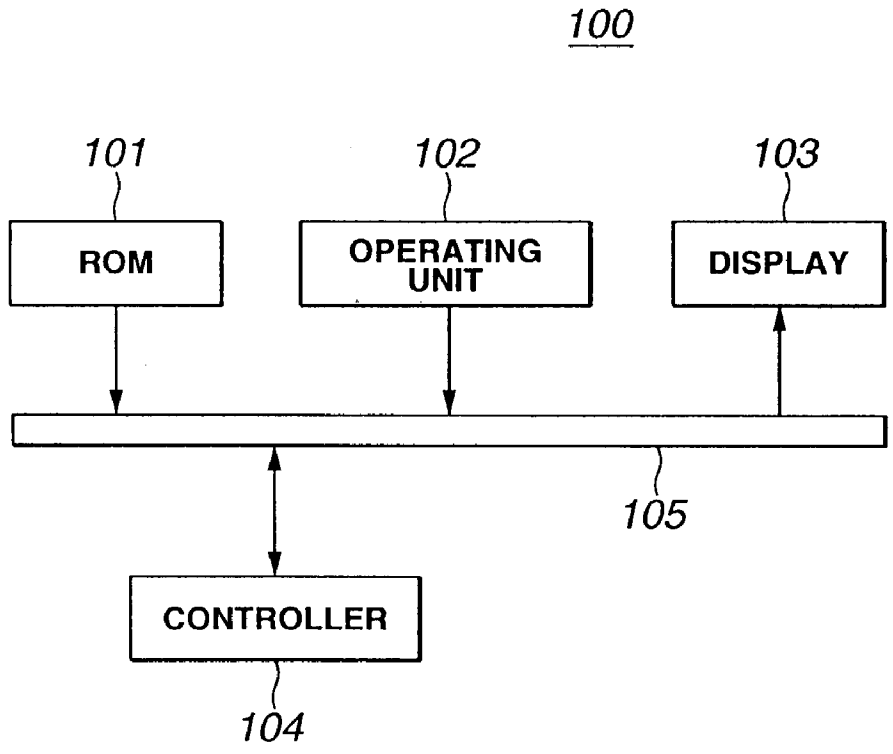
Publication Classification

(51) **Int. Cl.**[7] **G09G 5/00**

(52) **U.S. Cl.** **345/156**

(57) **ABSTRACT**

A hierarchical hysteresis menu area is such an area in which the hysteresis information from the hysteresis of past operations up to the current hierarchical layer is displayed responsive to an operation on an operating unit and-in which selection by a user is made using the operating unit. As the hierarchy progresses, new rows such as "Top Menu", " . . . Menu A", " . . . Menu A-1" are created progressively, until the current layer [. . . menu A-1 " . . . menu A-1"] is demonstrated as the lowermost layer. Indents and marks are used to denote a hierarchical structure. If a cursor is moved by an operating unit to decide on a certain selected layer, reversion may be made directly to the layer. The current menu area indicates the item of the current layer. A folder mark is displayed for a menu having a further lower item. The current hierarchical layer is indicated in this manner in the operating menu system of a hierarchical structure employing a user interface device.



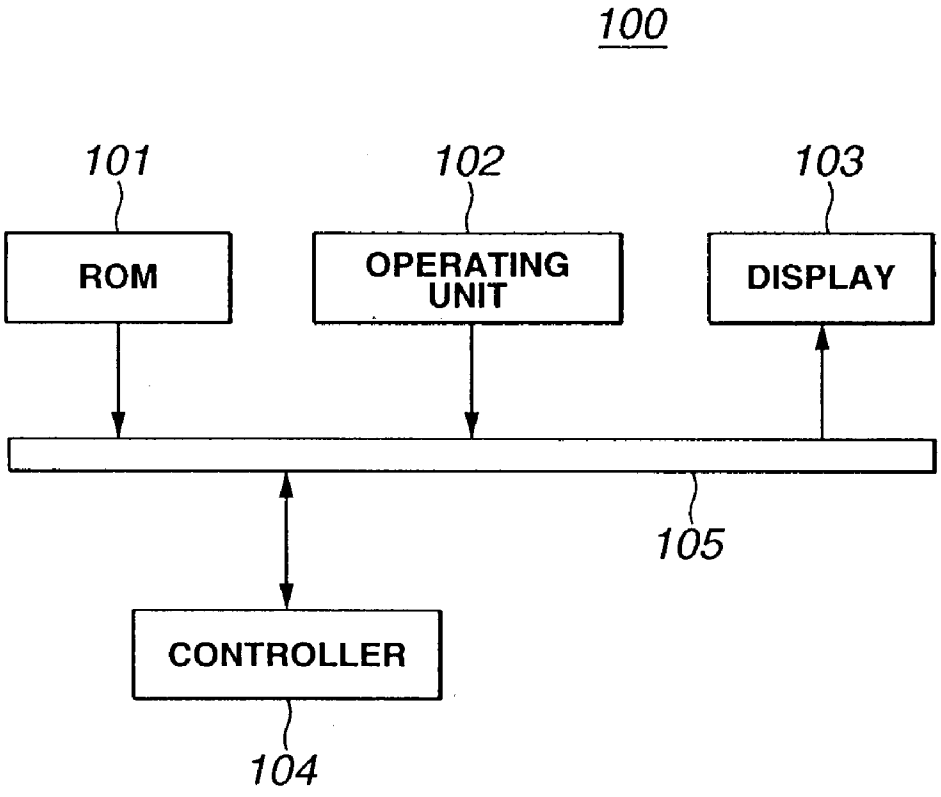

100
101
102
103
ROM
OPERATING UNIT
DISPLAY
105
CONTROLLER
104

FIG.1

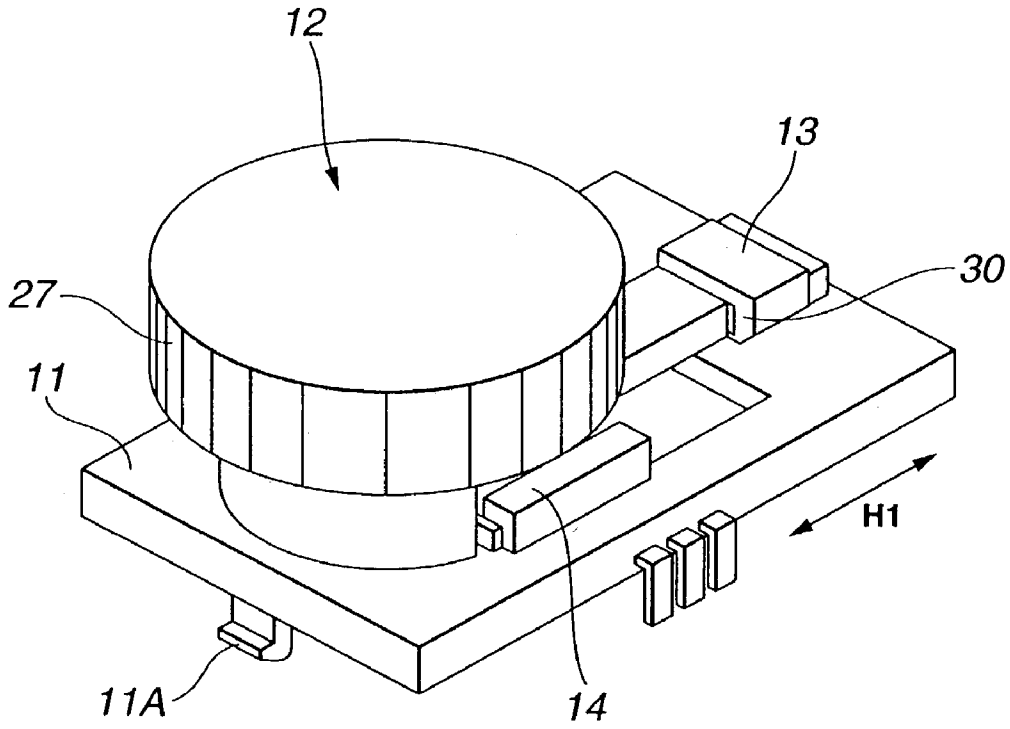


FIG.2

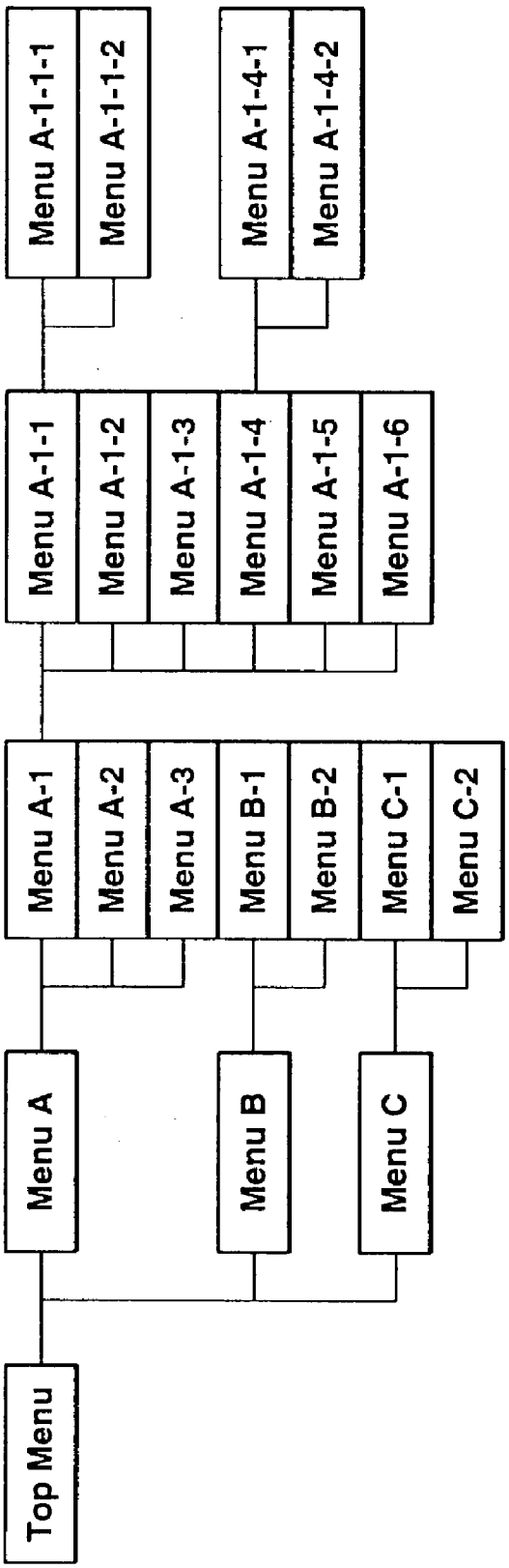

Top Menu
Menu A
Menu B
Menu C
Menu A-1
Menu A-2
Menu A-3
Menu B-1
Menu B-2
Menu C-1
Menu C-2
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
Menu A-1-1-1
Menu A-1-1-2
Menu A-1-4-1
Menu A-1-4-2

FIG.3

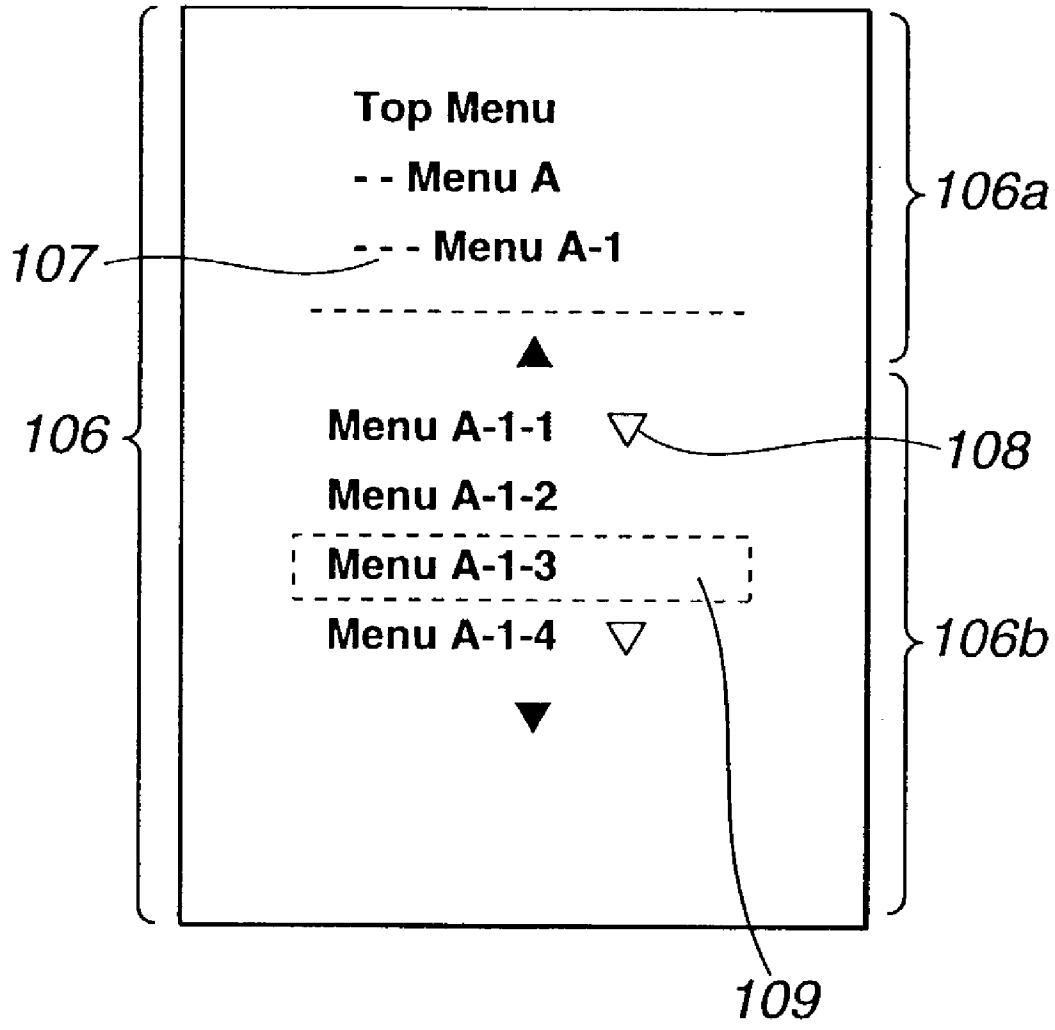

Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
107
106
106a
106b
108
109

FIG.4

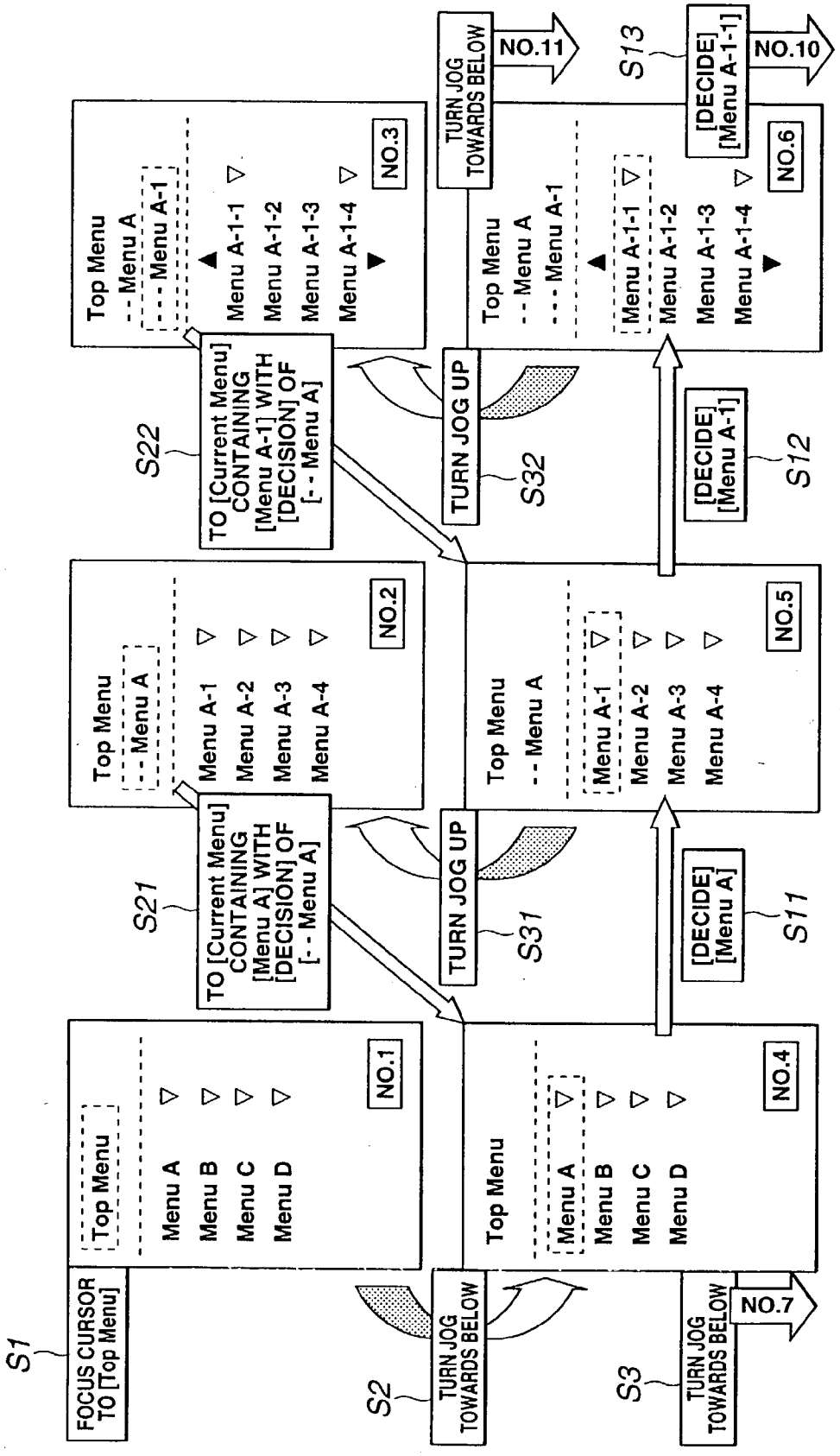

S1
FOCUS CURSOR TO [Top Menu]
Top Menu
Menu A
Menu B
Menu C
Menu D
NO.1
S2
TURN JOG TOWARDS BELOW
S3
TURN JOG TOWARDS BELOW
NO.7
Top Menu
Menu A
Menu A-1
Menu A-2
Menu A-3
Menu A-4
NO.4
[DECIDE] [Menu A]
S11
TURN JOG UP
S31
TO [Current Menu] CONTAINING [Menu A] WITH [DECISION] OF [- - Menu A]
S21
Top Menu
- - Menu A
Menu A-1
Menu A-2
Menu A-3
Menu A-4
NO.2
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.5
[DECIDE] [Menu A-1]
S12
TURN JOG UP
S32
TO [Current Menu] CONTAINING [Menu A-1] WITH [DECISION] OF [- - Menu A]
S22
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.3
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.6
[DECIDE] [Menu A-1-1]
S13
TURN JOG TOWARDS BELOW
NO.11
NO.10

FIG.5

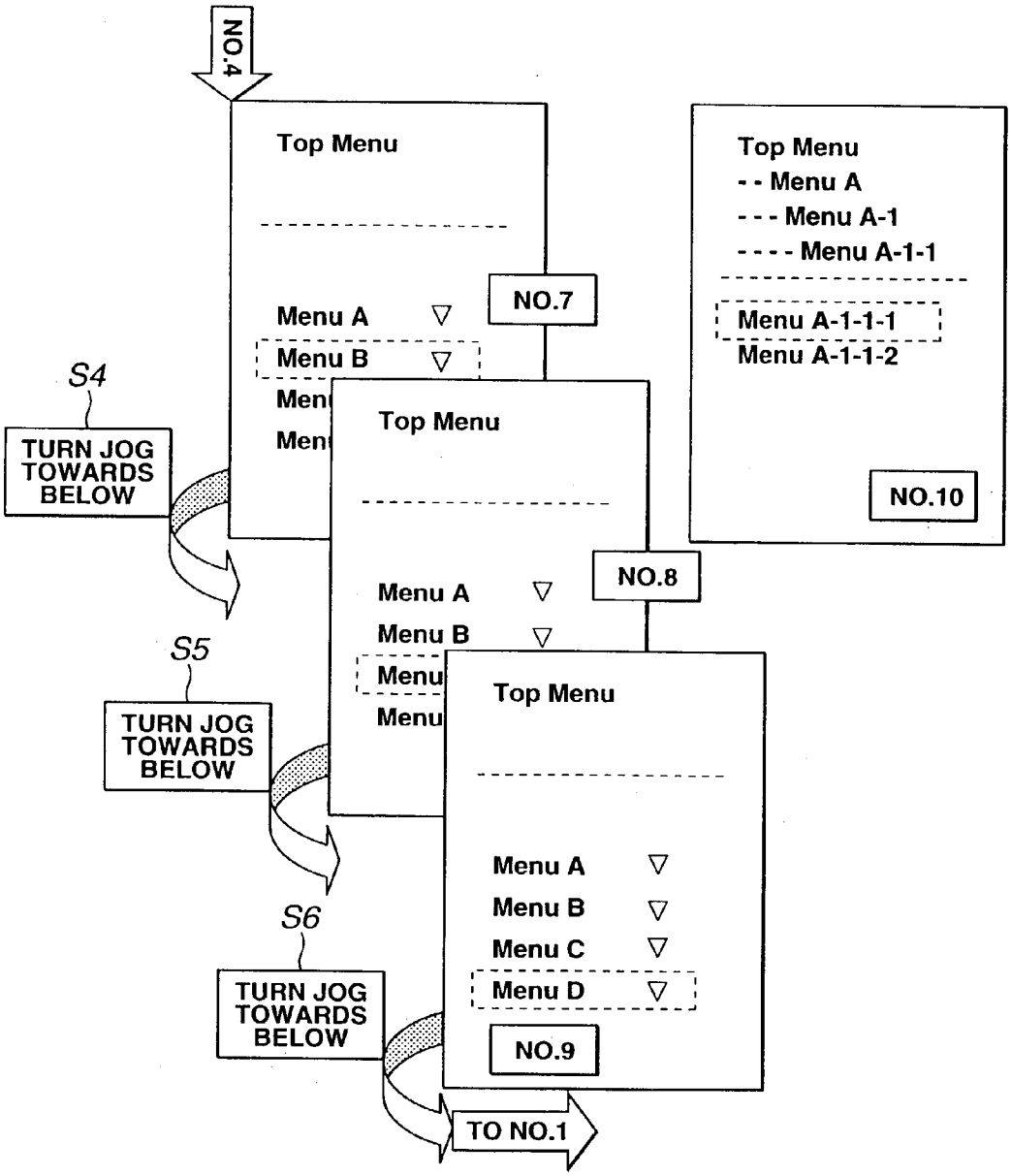

NO.4
Top Menu
Menu A
Menu B
NO.7
Top Menu
- - Menu A
- - - Menu A-1
- - - - Menu A-1-1
Menu A-1-1-1
Menu A-1-1-2
NO.10
S4
TURN JOG TOWARDS BELOW
Top Menu
Menu A
Menu B
NO.8
S5
TURN JOG TOWARDS BELOW
Top Menu
Menu A
Menu B
Menu C
Menu D
NO.9
S6
TURN JOG TOWARDS BELOW
TO NO.1

FIG.6

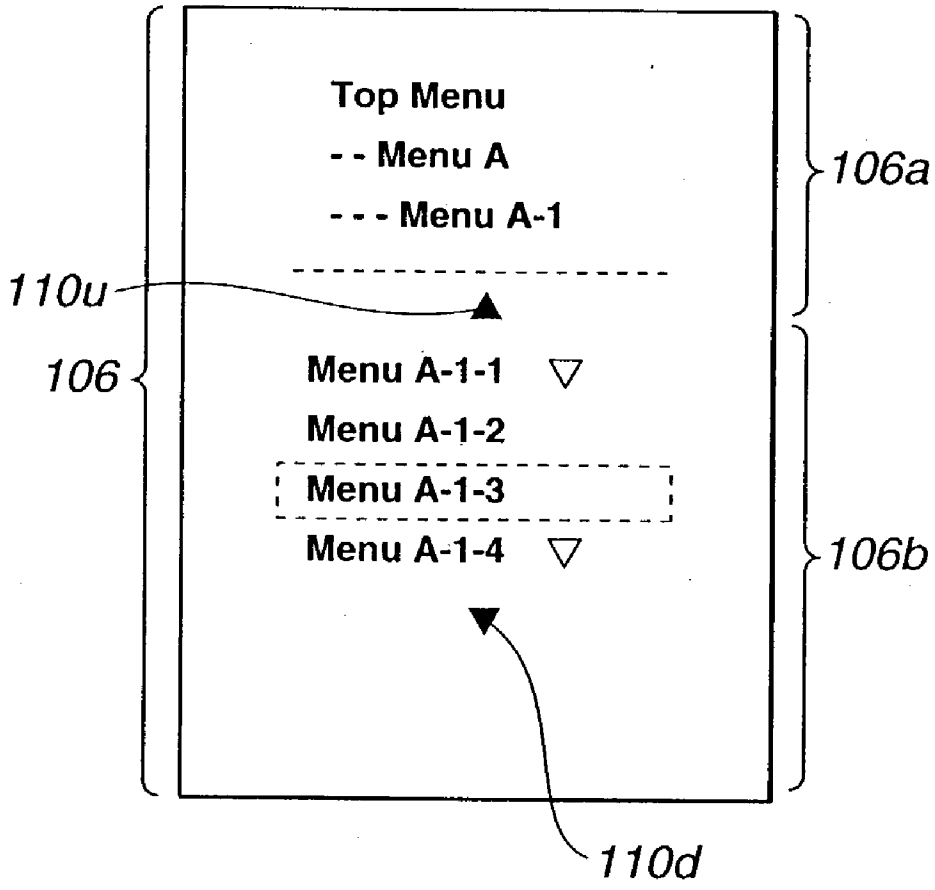

Top Menu
- - Menu A
- - - Menu A-1
110u
106
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
106a
106b
110d

FIG.7

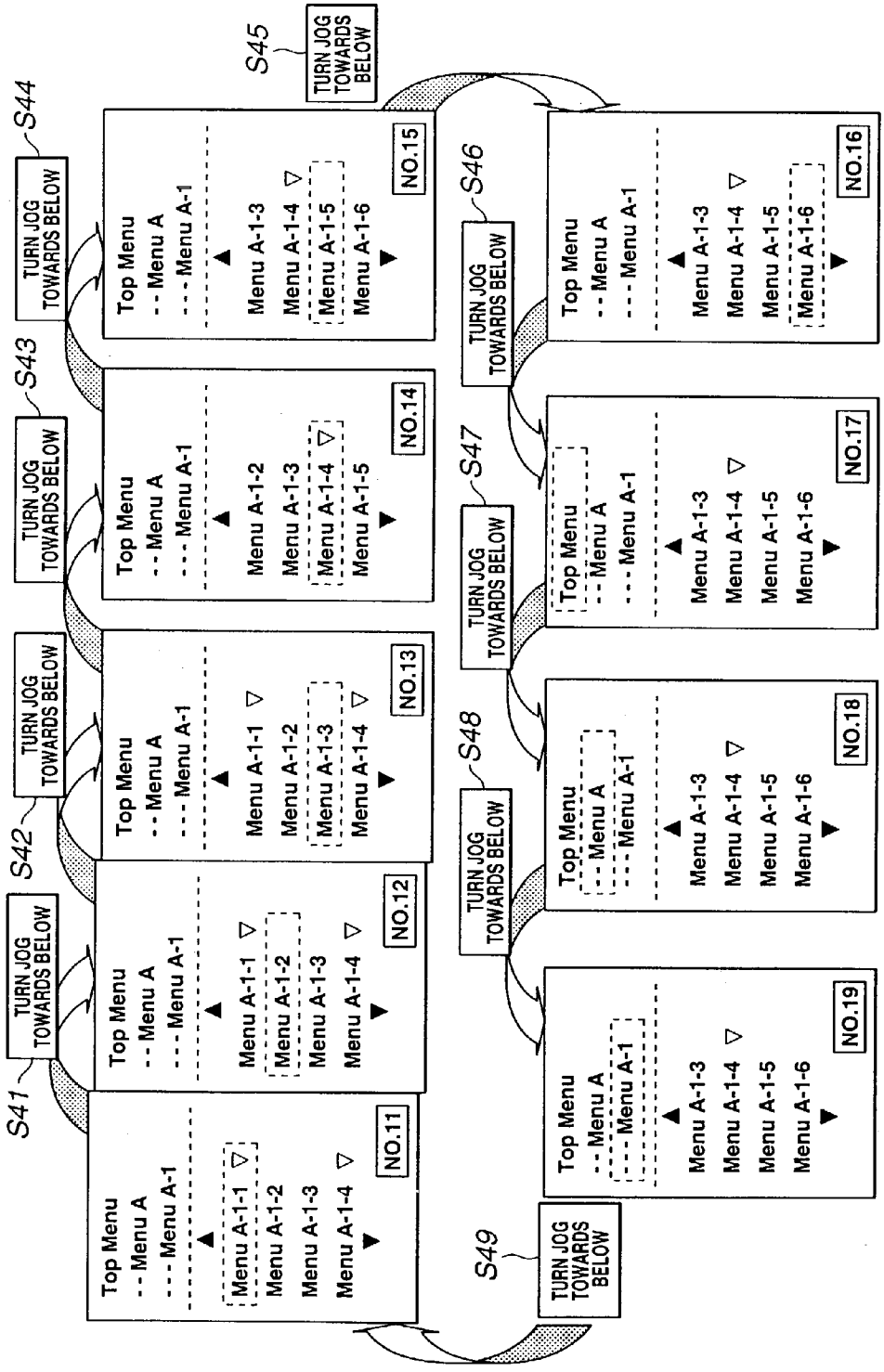

S41
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.11
S42
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.12
S43
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
NO.13
S44
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-2
Menu A-1-3
Menu A-1-4
Menu A-1-5
NO.14
S45
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
NO.15
S46
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
NO.16
S47
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
NO.17
S48
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
NO.18
S49
TURN JOG TOWARDS BELOW
Top Menu
- - Menu A
- - - Menu A-1
Menu A-1-3
Menu A-1-4
Menu A-1-5
Menu A-1-6
NO.19

FIG.8

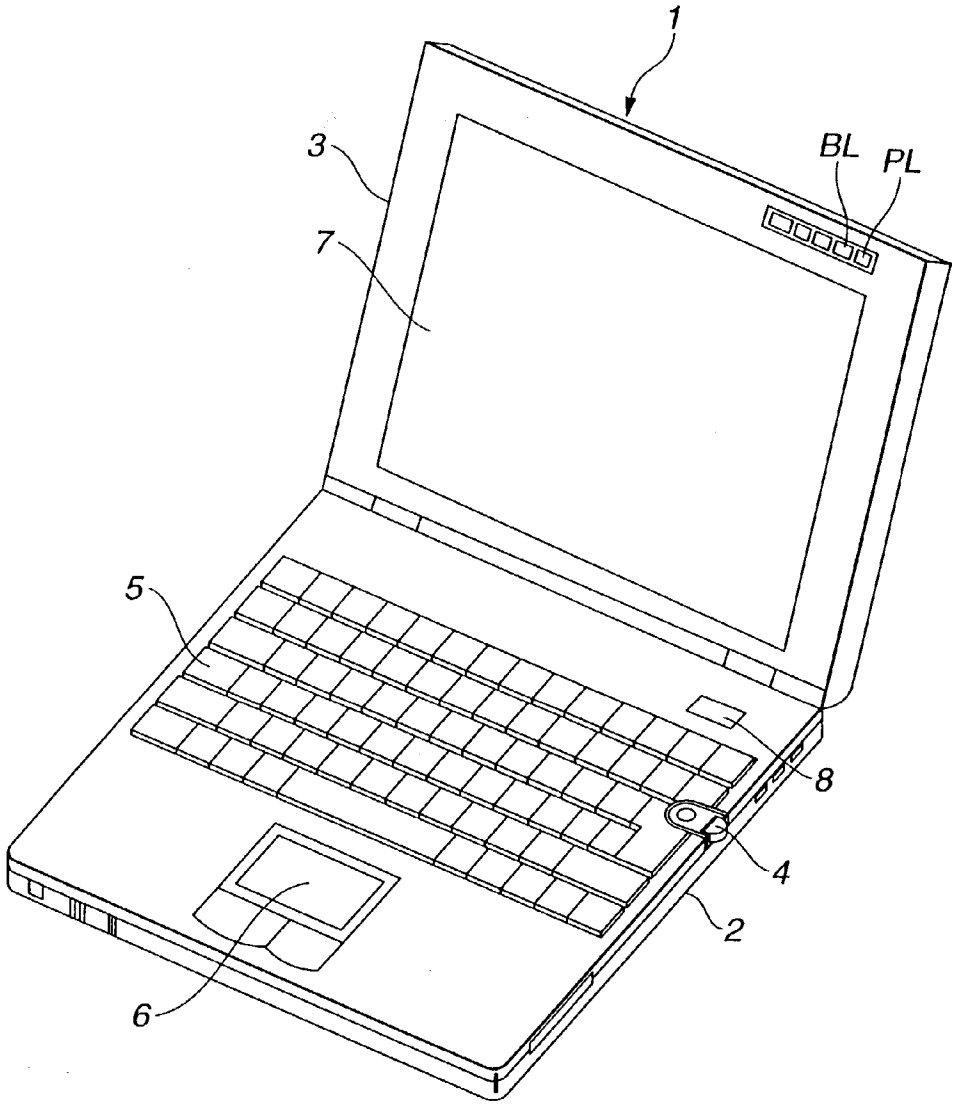


FIG.9

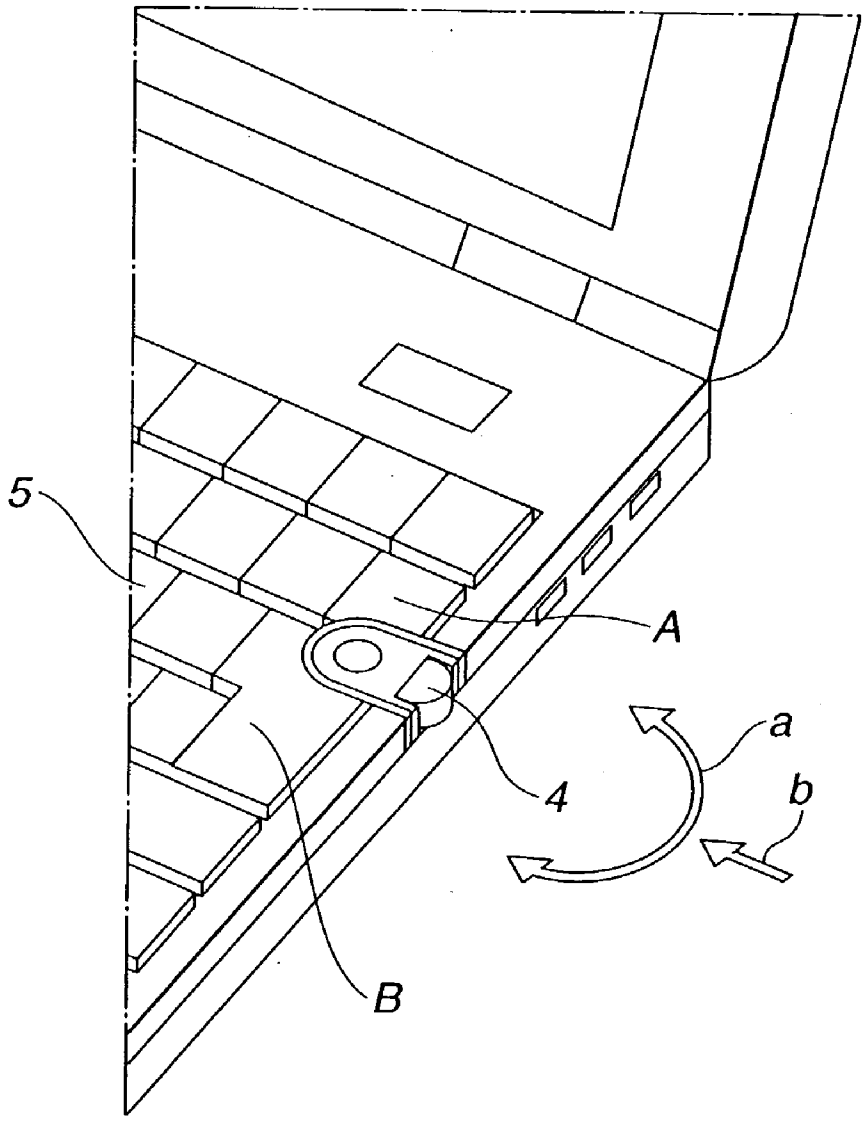


FIG.10

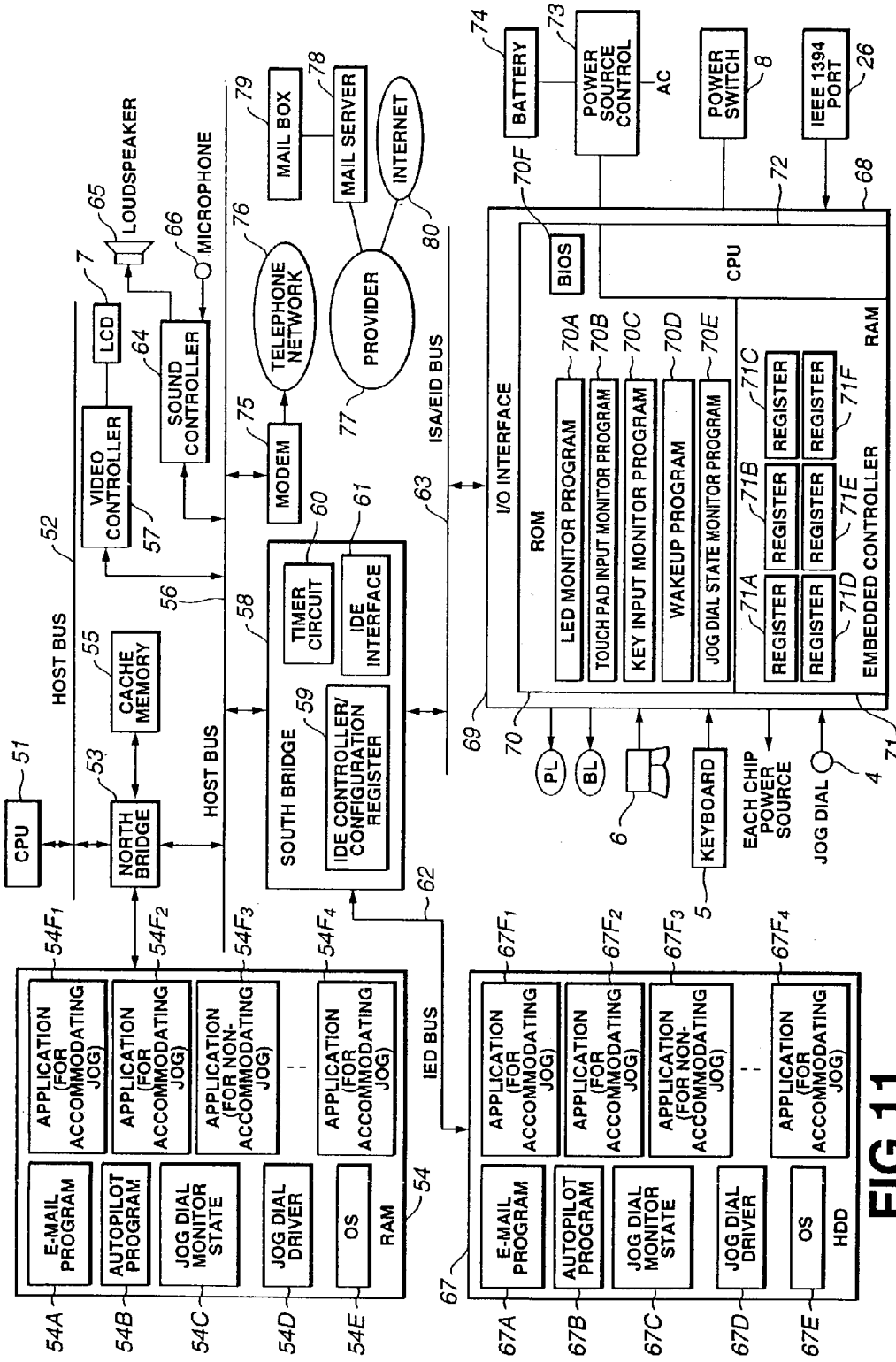

CPU
NORTH BRIDGE
HOST BUS
CACHE MEMORY
VIDEO CONTROLLER
LCD
SOUND CONTROLLER
LOUDSPEAKER
MICROPHONE
SOUTH BRIDGE
TIMER CIRCUIT
IDE INTERFACE
IDE CONTROLLER/ CONFIGURATION REGISTER
MODEM
TELEPHONE NETWORK
PROVIDER
MAIL BOX
MAIL SERVER
INTERNET
ISA/EID BUS
I/O INTERFACE
ROM
LED MONITOR PROGRAM
TOUCH PAD INPUT MONITOR PROGRAM
KEY INPUT MONITOR PROGRAM
WAKEUP PROGRAM
JOG DIAL STATE MONITOR PROGRAM
BIOS
CPU
REGISTER
EMBEDDED CONTROLLER
RAM
BATTERY
POWER SOURCE CONTROL
AC
POWER SWITCH
IEEE 1394 PORT
PL
BL
KEYBOARD
EACH CHIP POWER SOURCE
JOG DIAL
IED BUS
APPLICATION (FOR ACCOMMODATING JOG)
APPLICATION (FOR NON-ACCOMMODATING JOG)
E-MAIL PROGRAM
AUTOPILOT PROGRAM
JOG DIAL MONITOR STATE
JOG DIAL DRIVER
OS
RAM
HDD

FIG.11

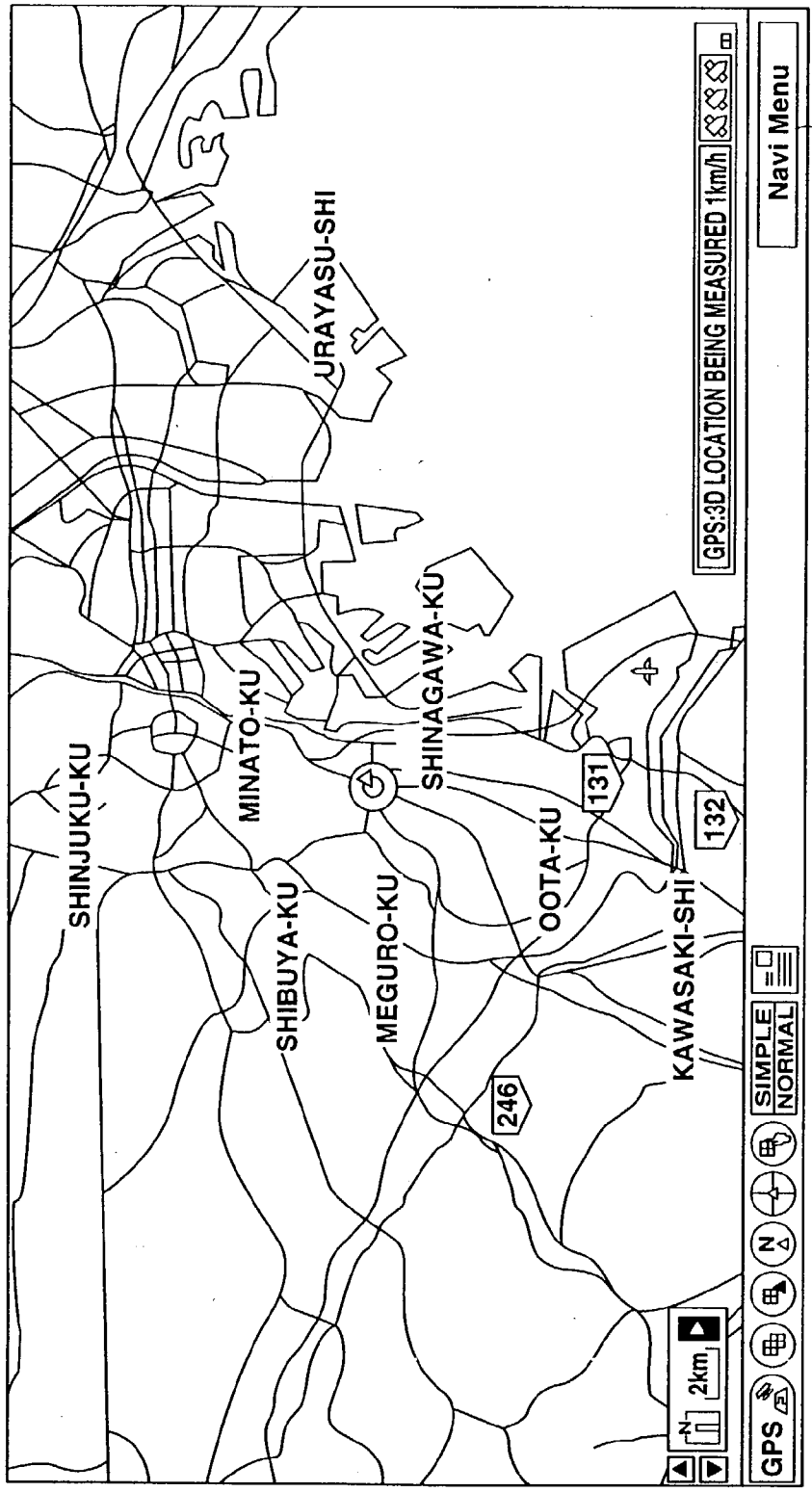

SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
URAYASU-SHI
246
131
132
GPS:3D LOCATION BEING MEASURED 1km/h
Navi Menu
120
GPS
SIMPLE
NORMAL
2km

FIG.12

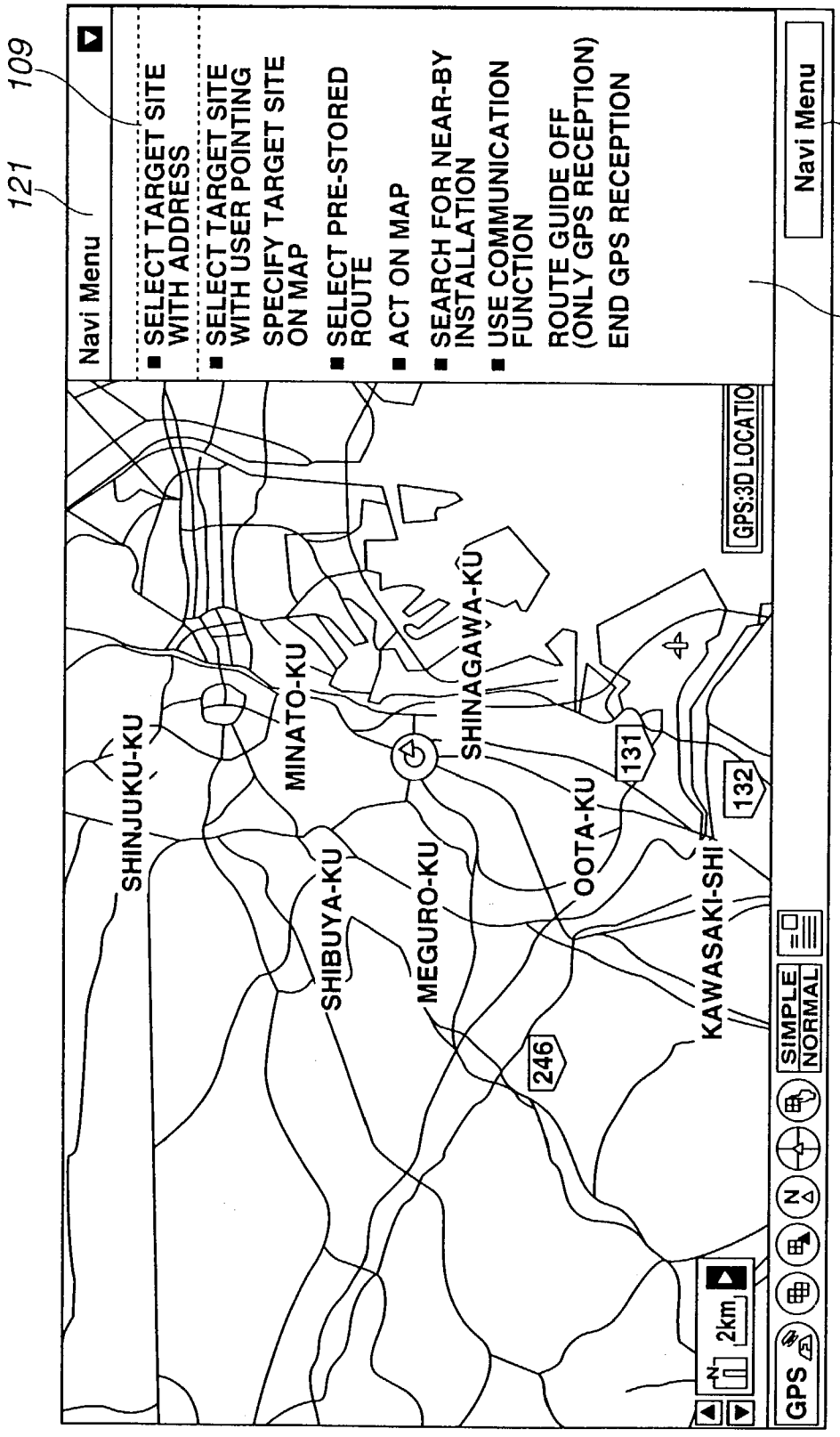

121
109
Navi Menu
SELECT TARGET SITE WITH ADDRESS
SELECT TARGET SITE WITH USER POINTING
SPECIFY TARGET SITE ON MAP
SELECT PRE-STORED ROUTE
ACT ON MAP
SEARCH FOR NEAR-BY INSTALLATION
USE COMMUNICATION FUNCTION
ROUTE GUIDE OFF (ONLY GPS RECEPTION)
END GPS RECEPTION
106
Navi Menu
120
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS:3D LOCATIO
2km
GPS
SIMPLE
NORMAL

FIG.13

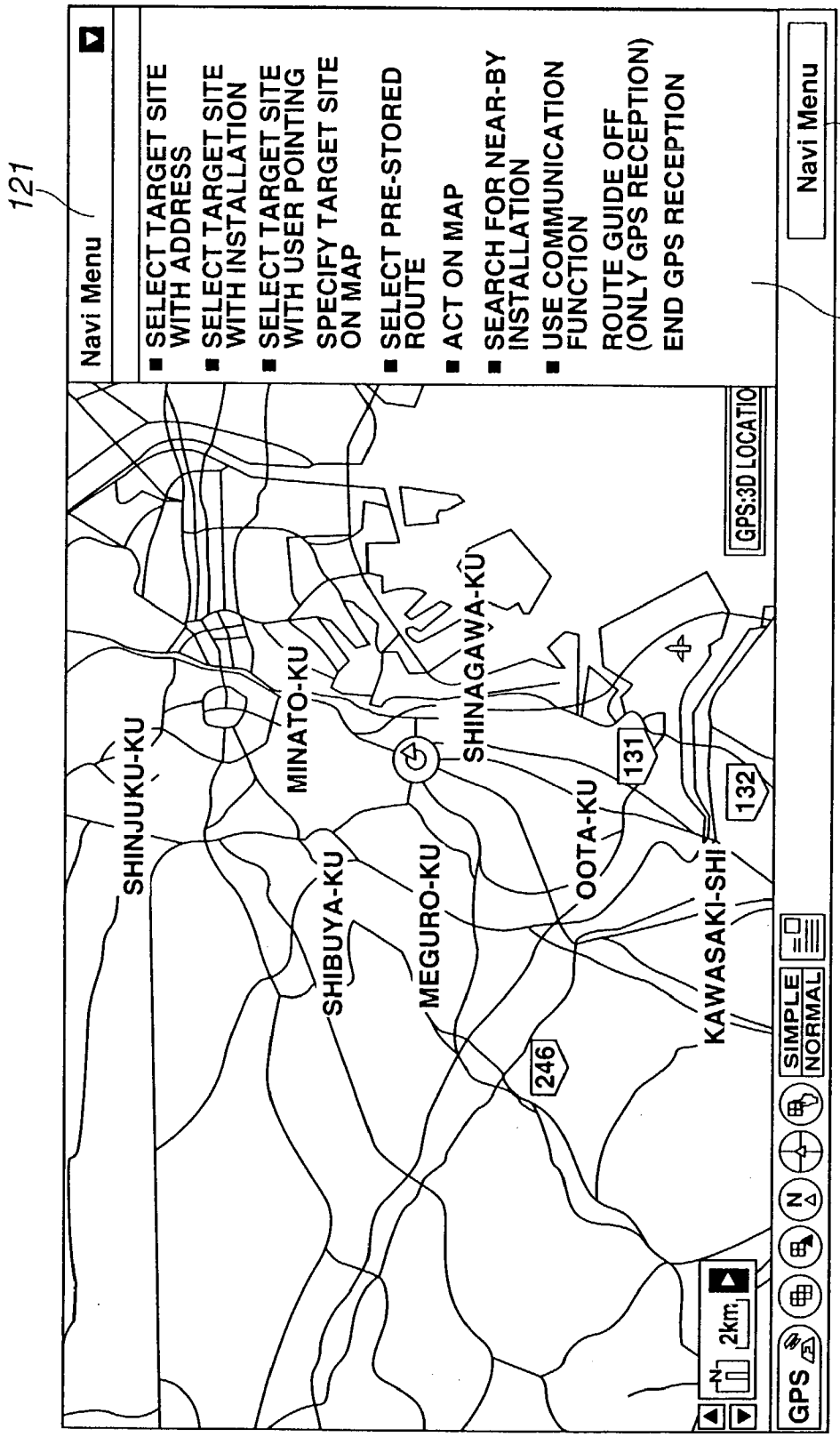

121
Navi Menu
SELECT TARGET SITE WITH ADDRESS
SELECT TARGET SITE WITH INSTALLATION
SELECT TARGET SITE WITH USER POINTING
SPECIFY TARGET SITE ON MAP
SELECT PRE-STORED ROUTE
ACT ON MAP
SEARCH FOR NEAR-BY INSTALLATION
USE COMMUNICATION FUNCTION
ROUTE GUIDE OFF (ONLY GPS RECEPTION)
END GPS RECEPTION
106
Navi Menu
120
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.14

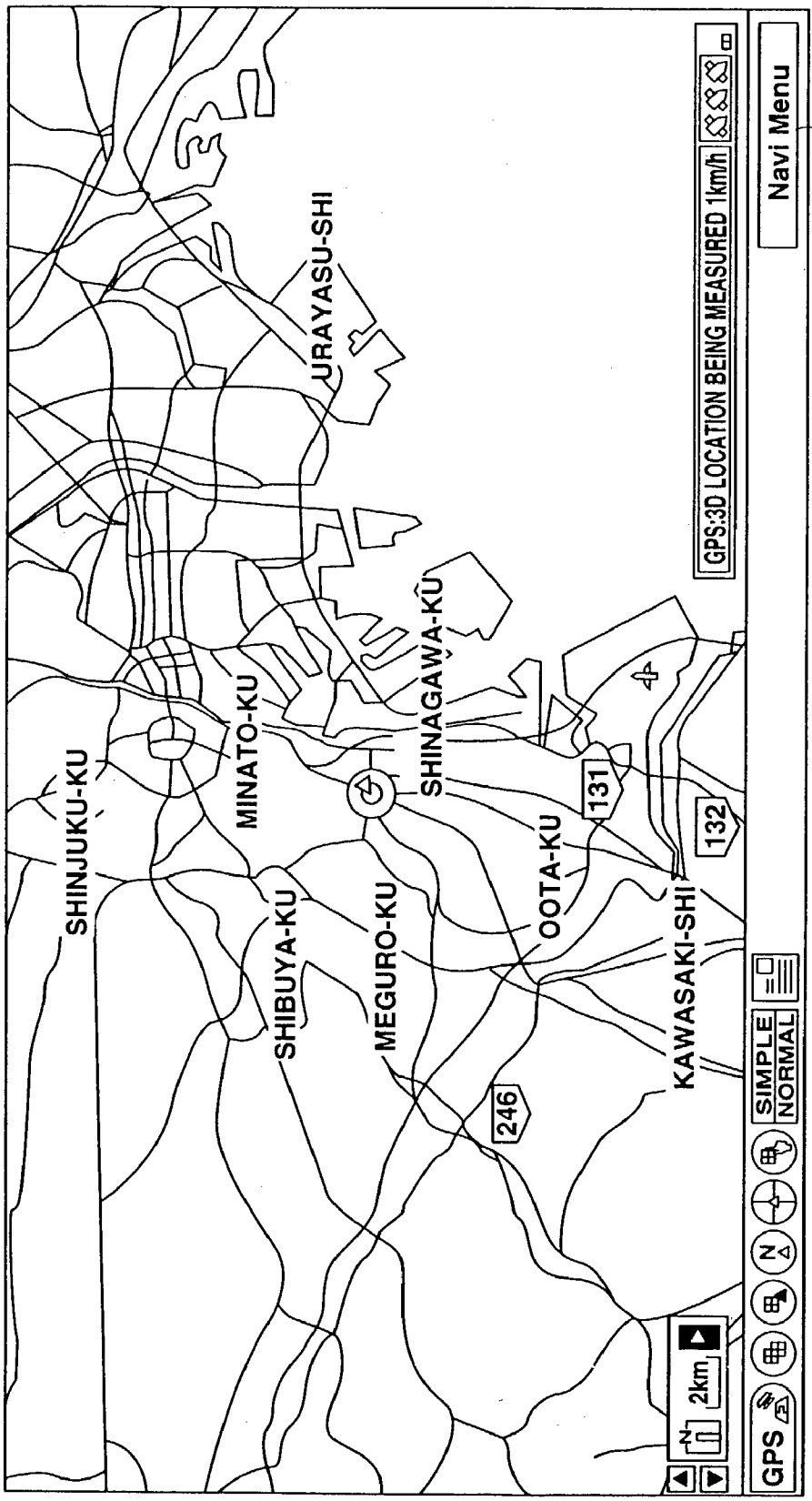

GPS:3D LOCATION BEING MEASURED 1km/h
Navi Menu
120
URAYASU-SHI
SHINAGAWA-KU
MINATO-KU
SHINJUKU-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.15

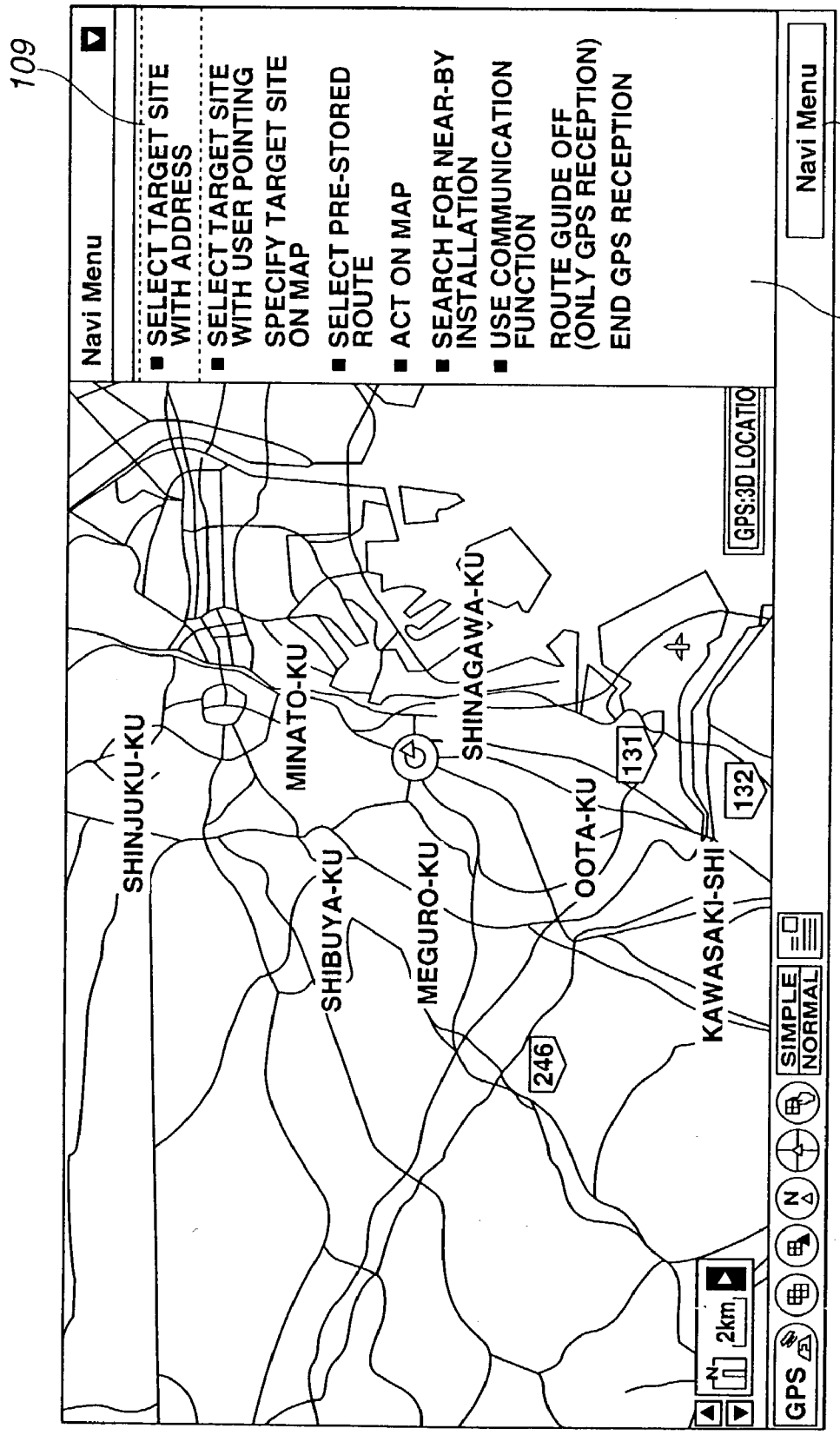

109
Navi Menu
SELECT TARGET SITE WITH ADDRESS
SELECT TARGET SITE WITH USER POINTING
SPECIFY TARGET SITE ON MAP
SELECT PRE-STORED ROUTE
ACT ON MAP
SEARCH FOR NEAR-BY INSTALLATION
USE COMMUNICATION FUNCTION
ROUTE GUIDE OFF (ONLY GPS RECEPTION)
END GPS RECEPTION
106
Navi Menu
120
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS:3D LOCATIO
GPS
N
2km
SIMPLE
NORMAL

FIG.16

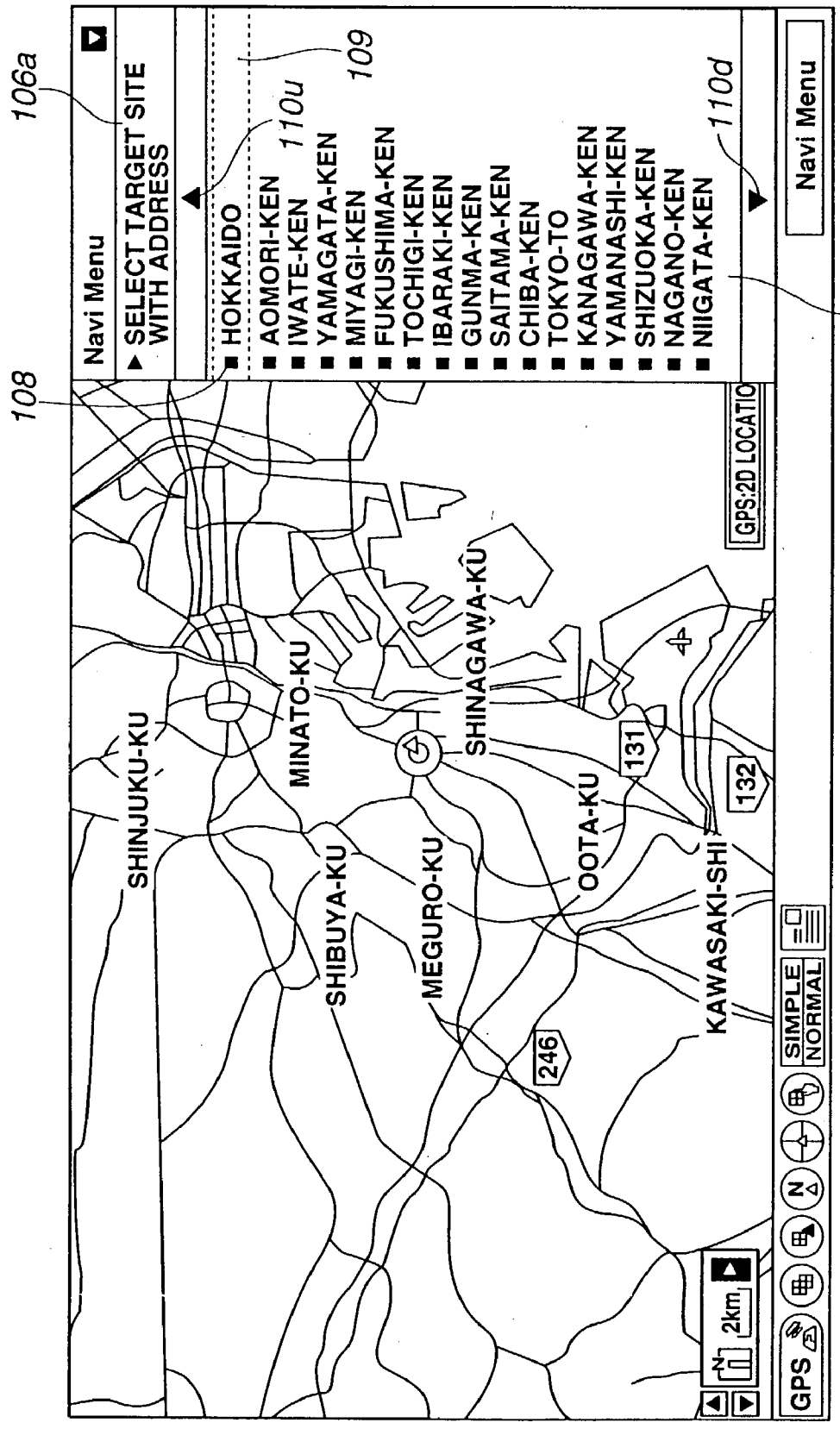

106a
108
Navi Menu
SELECT TARGET SITE WITH ADDRESS
HOKKAIDO
AOMORI-KEN
IWATE-KEN
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
110u
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.17

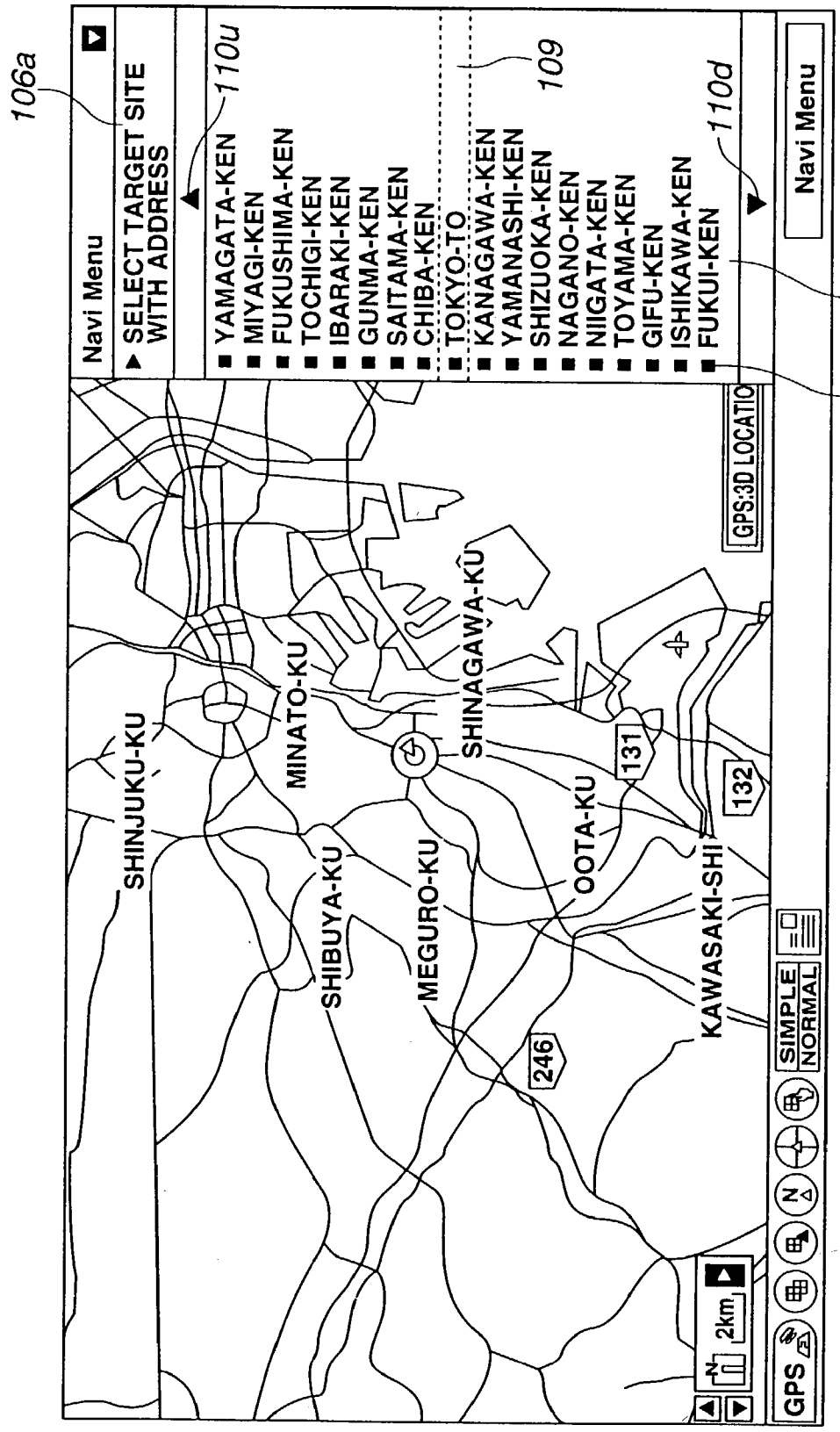

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
TOYAMA-KEN
GIFU-KEN
ISHIKAWA-KEN
FUKUI-KEN
109
110d
108
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
SIMPLE
NORMAL
GPS
2km

FIG.18

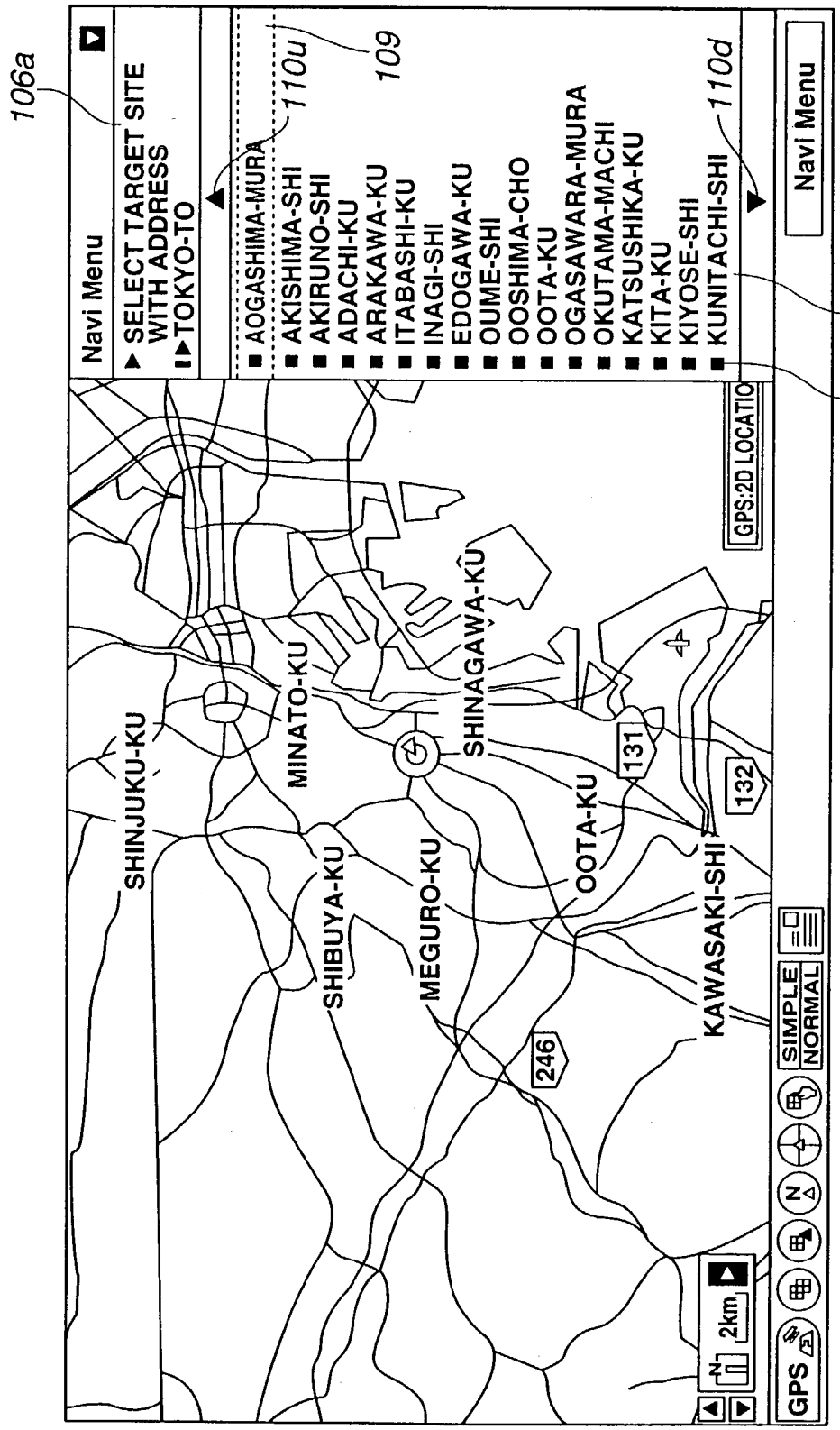

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
AOGASHIMA-MURA
AKISHIMA-SHI
AKIRUNO-SHI
ADACHI-KU
ARAKAWA-KU
ITABASHI-KU
INAGI-SHI
EDOGAWA-KU
OUME-SHI
OOSHIMA-CHO
OOTA-KU
OGASAWARA-MURA
OKUTAMA-MACHI
KATSUSHIKA-KU
KITA-KU
KIYOSE-SHI
KUNITACHI-SHI
110u
109
110d
108
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.19

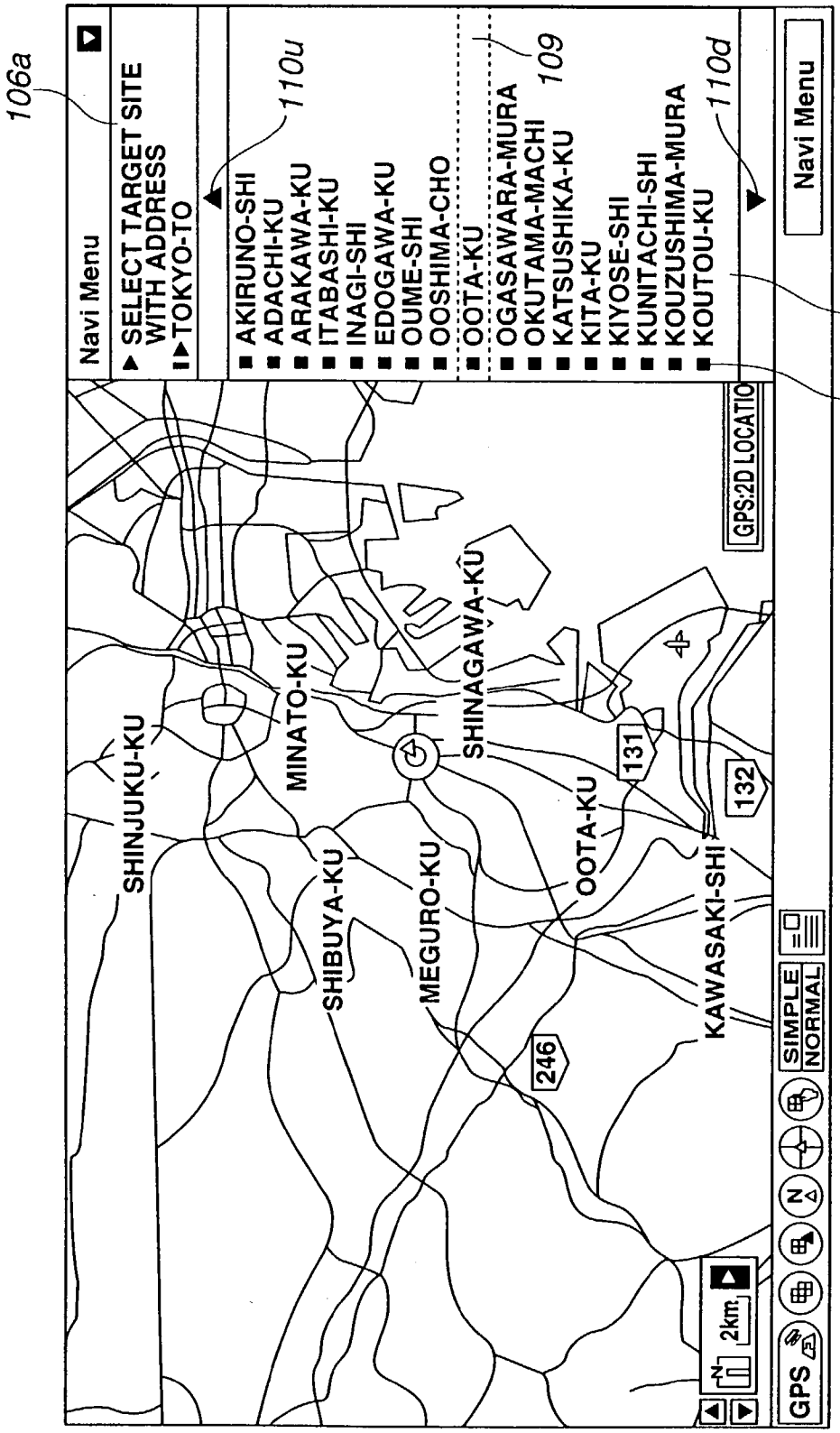

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
AKIRUNO-SHI
ADACHI-KU
ARAKAWA-KU
ITABASHI-KU
INAGI-SHI
EDOGAWA-KU
OUME-SHI
OOSHIMA-CHO
OOTA-KU
OGASAWARA-MURA
OKUTAMA-MACHI
KATSUSHIKA-KU
KITA-KU
KIYOSE-SHI
KUNITACHI-SHI
KOUZUSHIMA-MURA
KOUTOU-KU
110u
109
110d
108
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
2km
GPS
SIMPLE
NORMAL

FIG.20

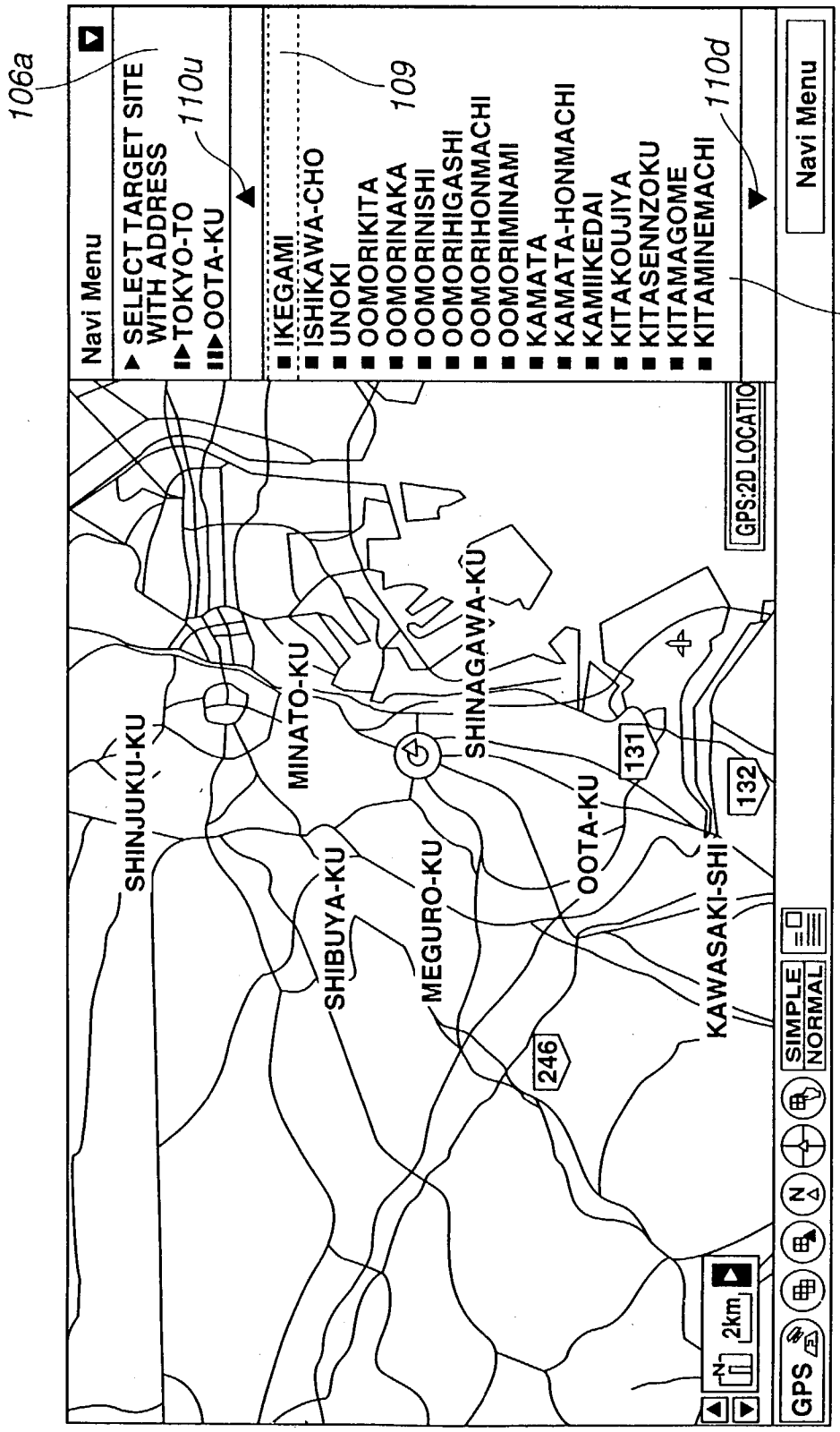

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
OOTA-KU
110u
IKEGAMI
ISHIKAWA-CHO
UNOKI
OOMORIKITA
OOMORINAKA
OOMORINISHI
OOMORIHIGASHI
OOMORIHONMACHI
OOMORIMINAMI
KAMATA
KAMATA-HONMACHI
KAMIIKEDAI
KITAKOUJIYA
KITASENNZOKU
KITAMAGOME
KITAMINEMACHI
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.21

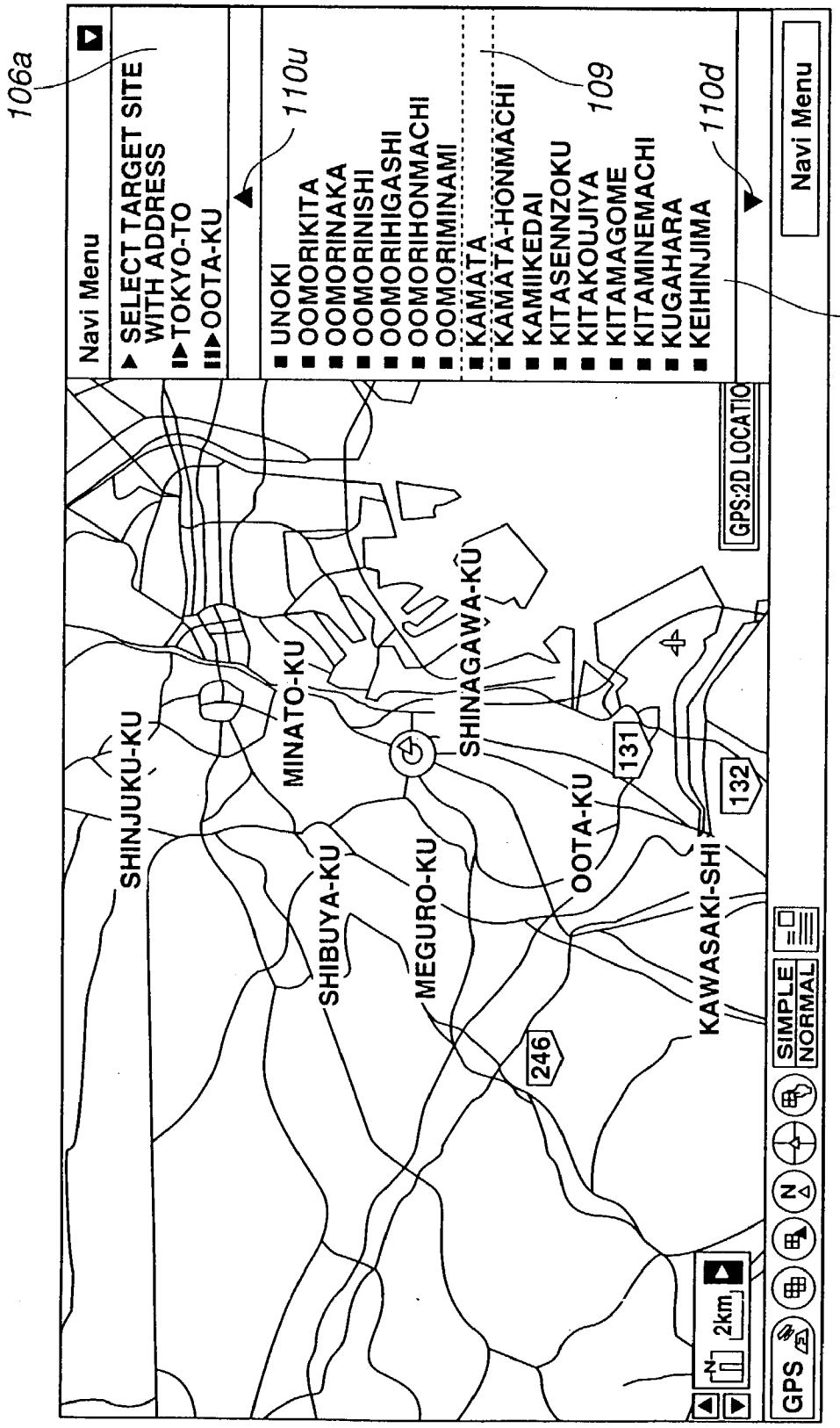

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
OOTA-KU
110u
UNOKI
OOMORIKITA
OOMORINAKA
OOMORINISHI
OOMORIHIGASHI
OOMORIHONMACHI
OOMORIMINAMI
KAMATA
109
KAMATA-HONMACHI
KAMIIKEDAI
KITASENNZOKU
KITAKOUJIYA
KITAMAGOME
KITAMINEMACHI
KUGAHARA
KEIHINJIMA
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.22

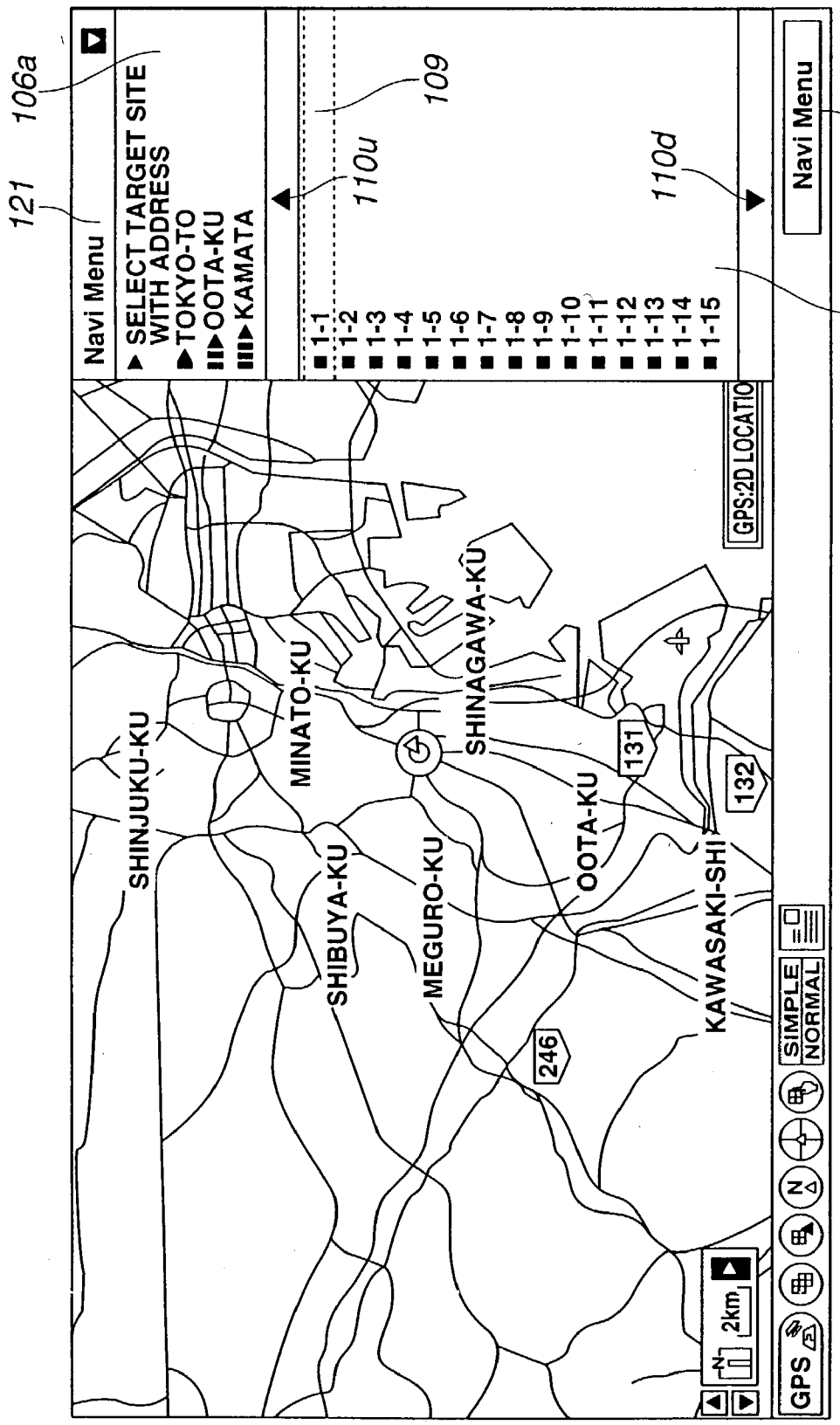

106a
121
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
OOTA-KU
KAMATA
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
1-13
1-14
1-15
110u
109
110d
106b
120
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.23

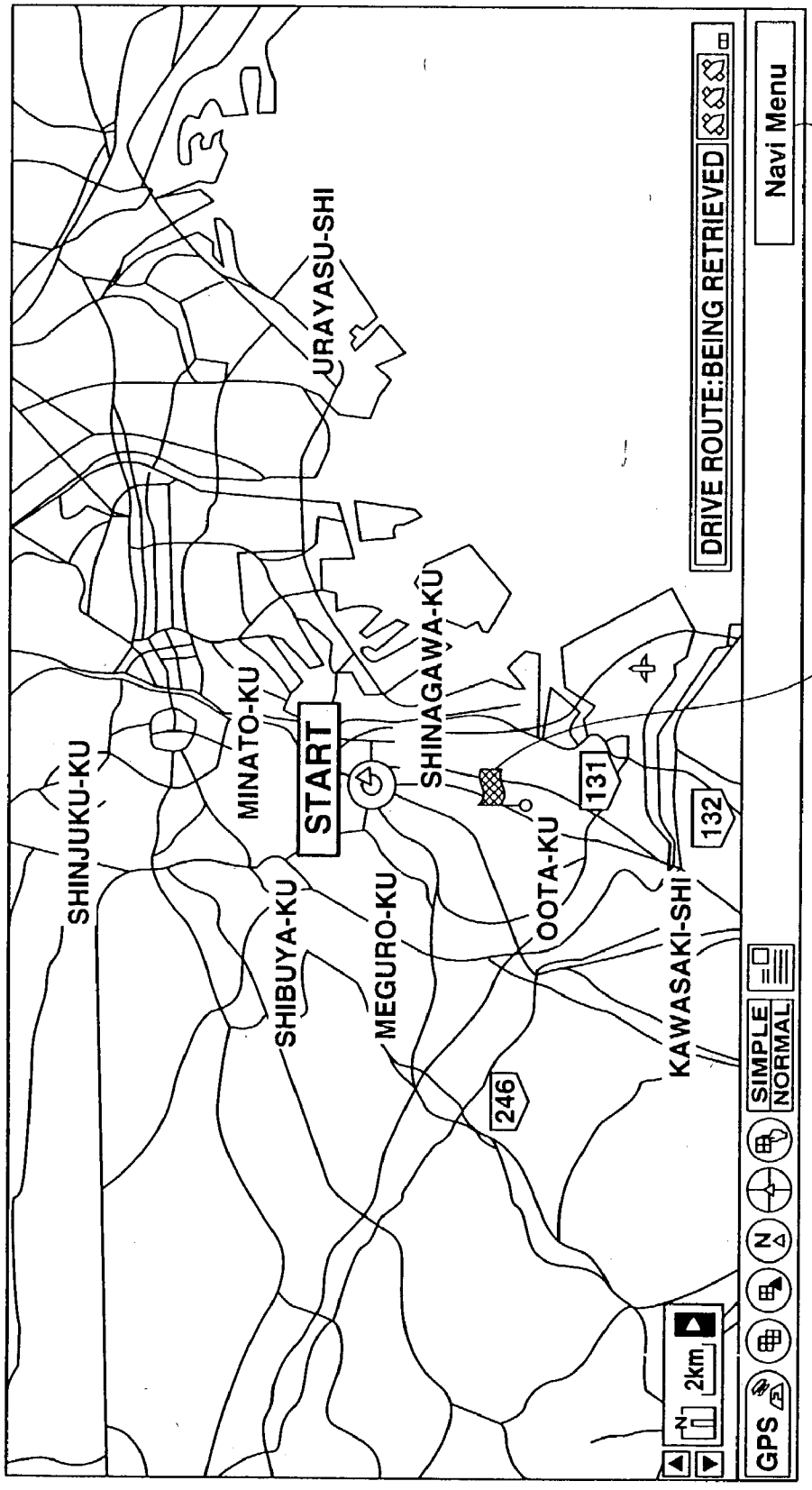

Navi Menu
120
DRIVE ROUTE:BEING RETRIEVED
GF
URAYASU-SHI
SHINAGAWA-KU
MINATO-KU
START
SHINJUKU-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
SIMPLE
NORMAL
GPS
2km

FIG.24

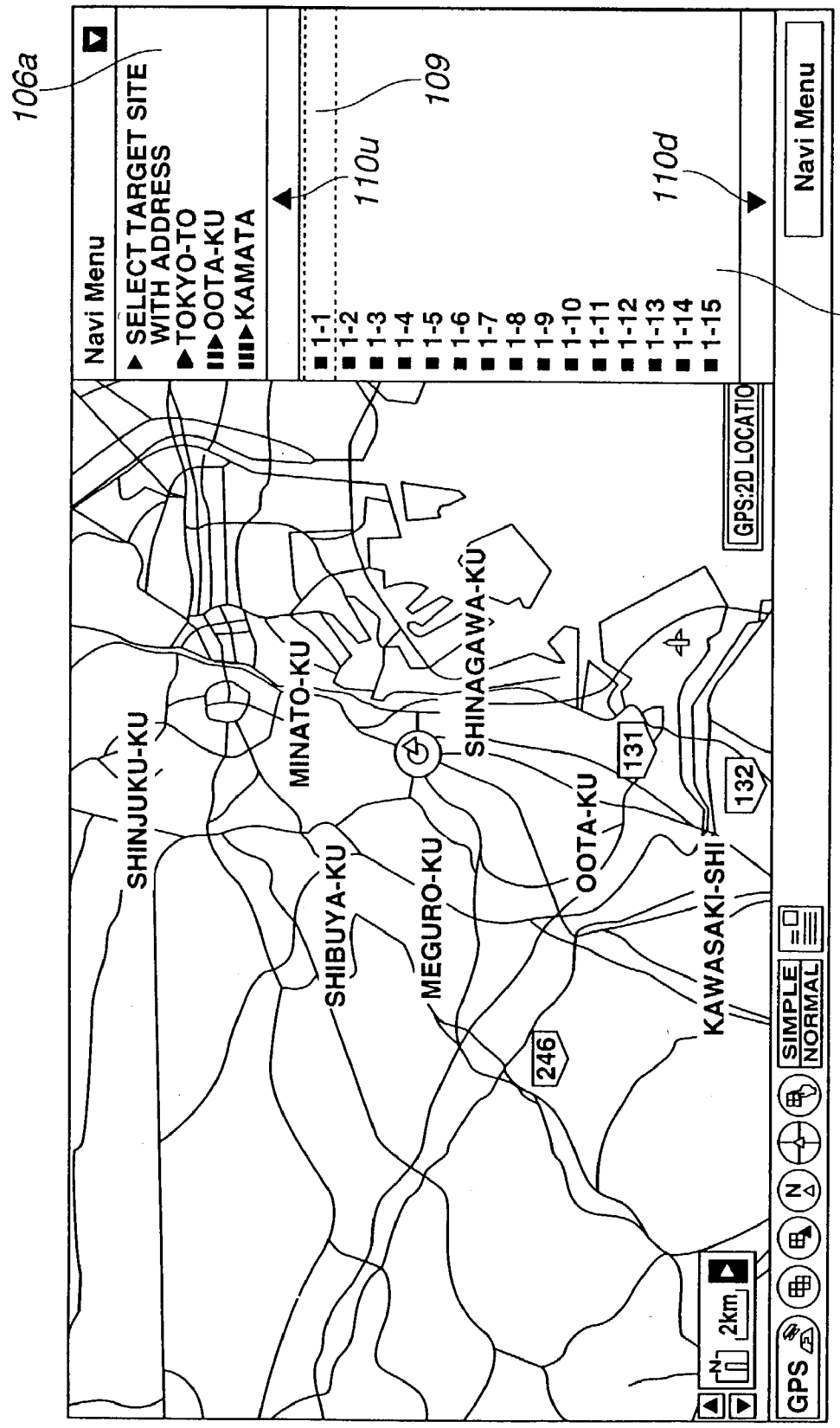

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
OOTA-KU
KAMATA
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
1-13
1-14
1-15
109
110u
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.25

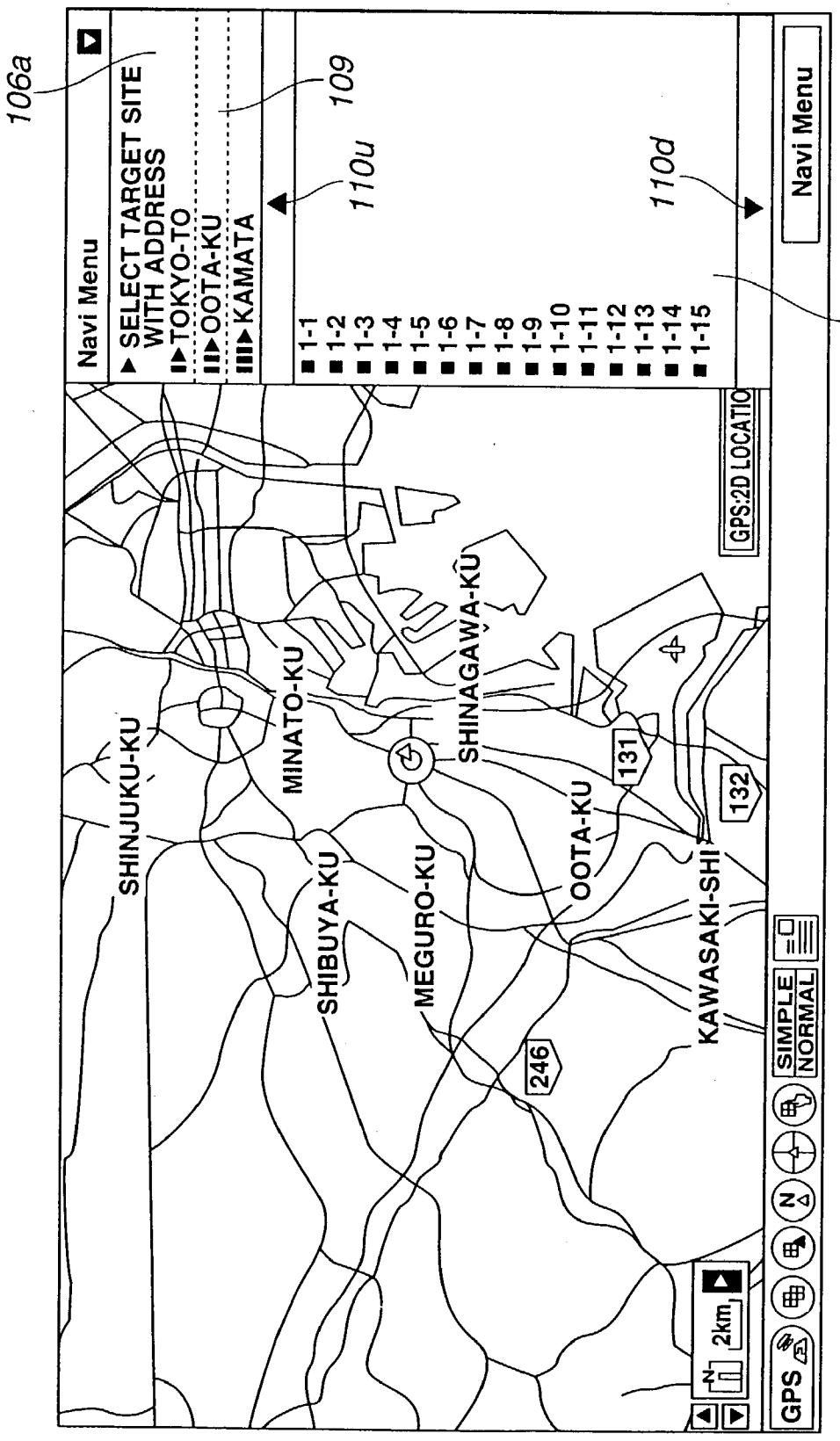

106a
Navi Menu
▲ SELECT TARGET SITE WITH ADDRESS
▮▶TOKYO-TO
▮▮▶OOTA-KU
▮▮▮▶KAMATA
109
110u
110d
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
1-13
1-14
1-15
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.26

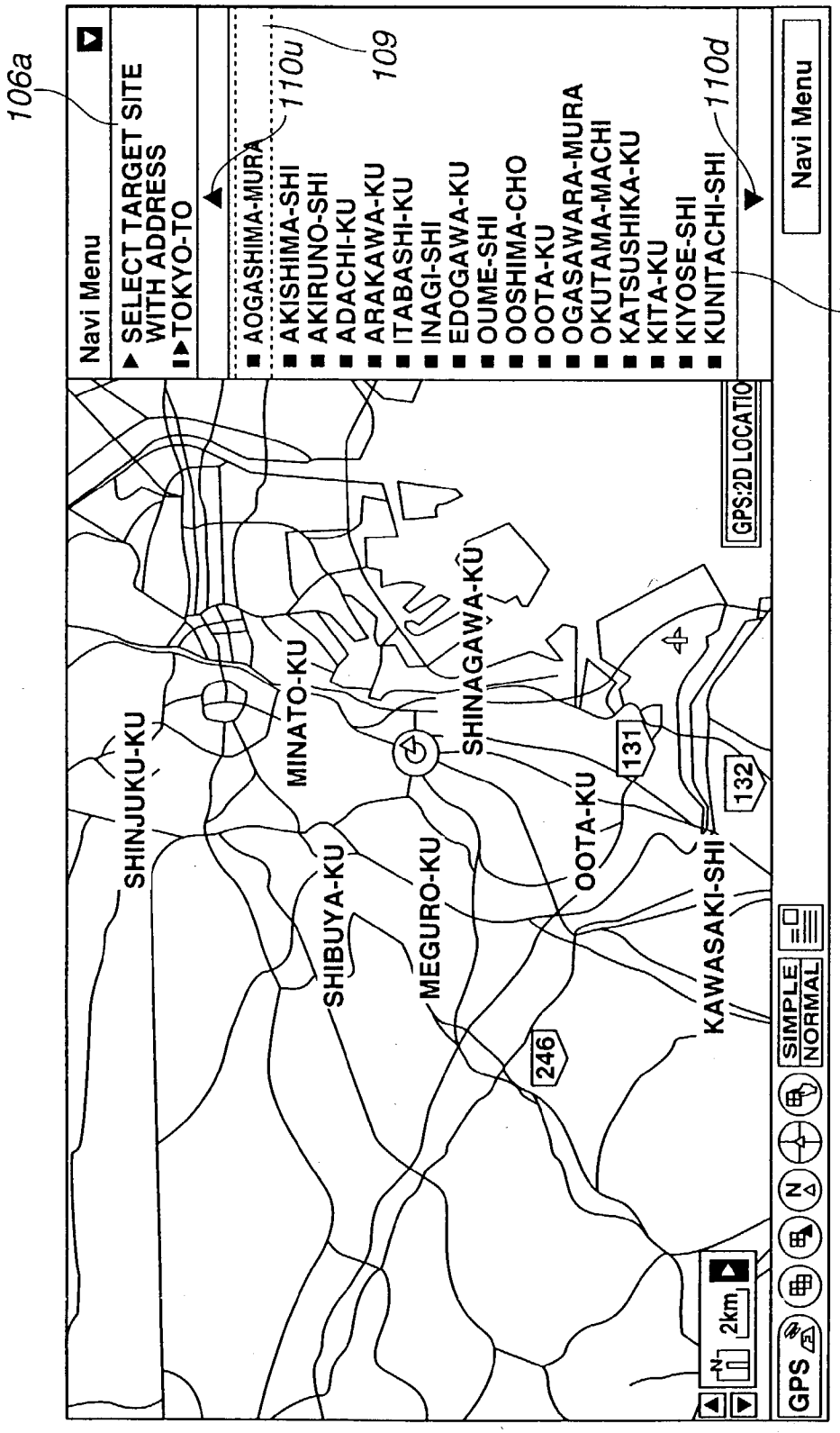

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
AOGASHIMA-MURA
AKISHIMA-SHI
AKIRUNO-SHI
ADACHI-KU
ARAKAWA-KU
ITABASHI-KU
INAGI-SHI
EDOGAWA-KU
OUME-SHI
OOSHIMA-CHO
OOTA-KU
OGASAWARA-MURA
OKUTAMA-MACHI
KATSUSHIKA-KU
KITA-KU
KIYOSE-SHI
KUNITACHI-SHI
110u
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
4
GPS
2km
SIMPLE
NORMAL

FIG.27

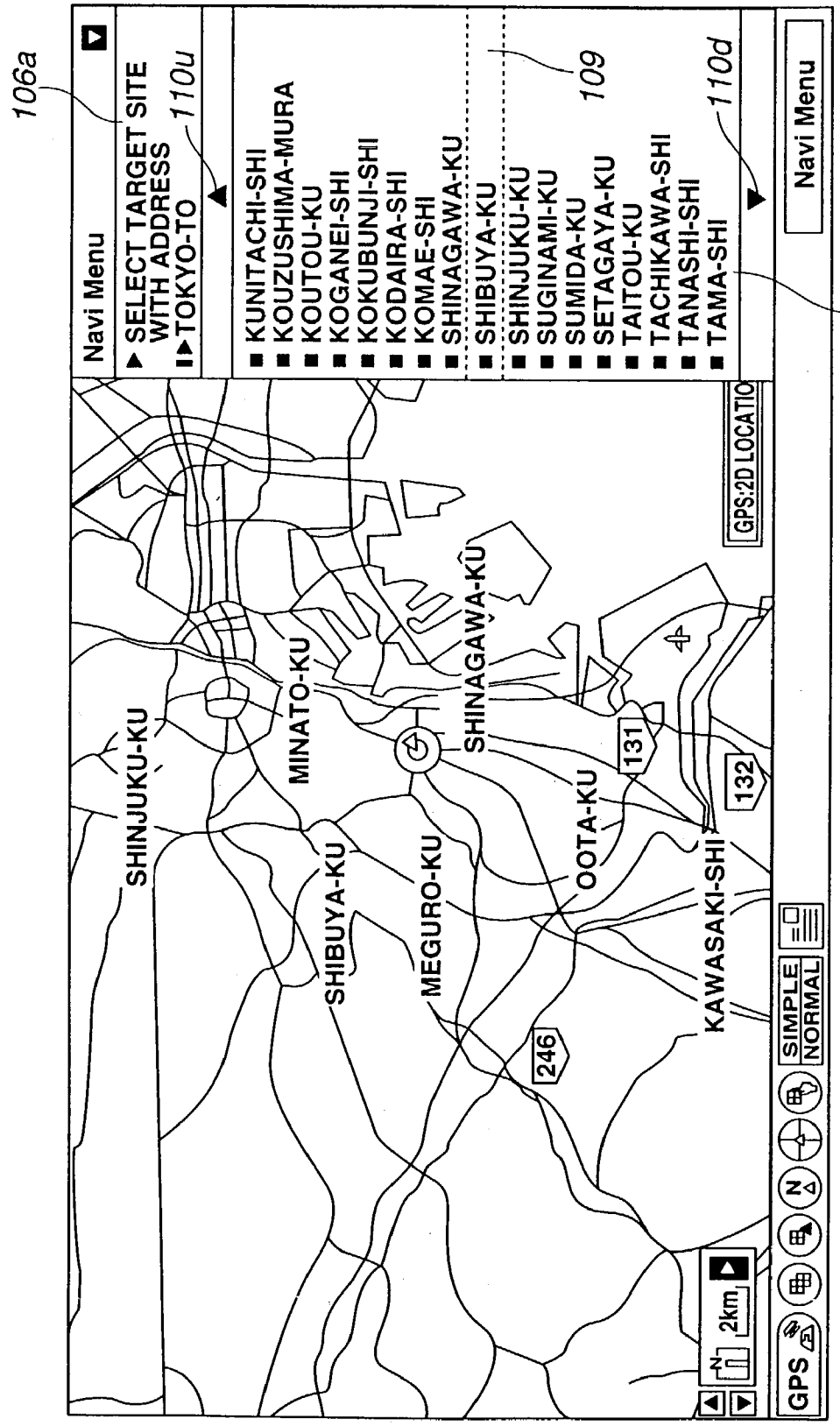

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
110u
KUNITACHI-SHI
KOUZUSHIMA-MURA
KOUTOU-KU
KOGANEI-SHI
KOKUBUNJI-SHI
KODAIRA-SHI
KOMAE-SHI
SHINAGAWA-KU
SHIBUYA-KU
SHINJUKU-KU
SUGINAMI-KU
SUMIDA-KU
SETAGAYA-KU
TAITOU-KU
TACHIKAWA-SHI
TANASHI-SHI
TAMA-SHI
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.28

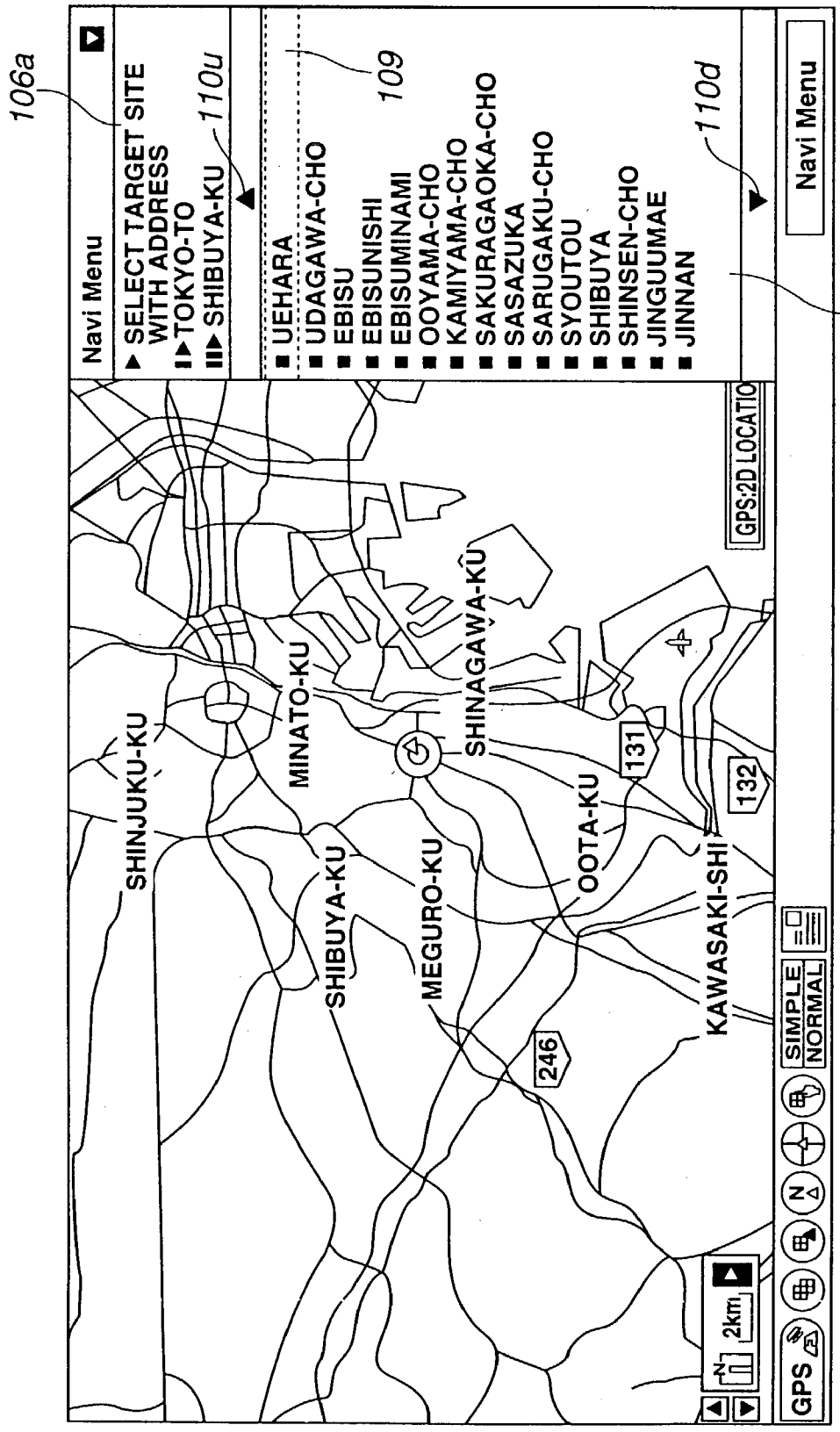

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
SHIBUYA-KU
110u
UEHARA
UDAGAWA-CHO
EBISU
EBISUNISHI
EBISUMINAMI
OOYAMA-CHO
KAMIYAMA-CHO
SAKURAGAOKA-CHO
SASAZUKA
SARUGAKU-CHO
SYOUTOU
SHIBUYA
SHINSEN-CHO
JINGUUMAE
JINNAN
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.29

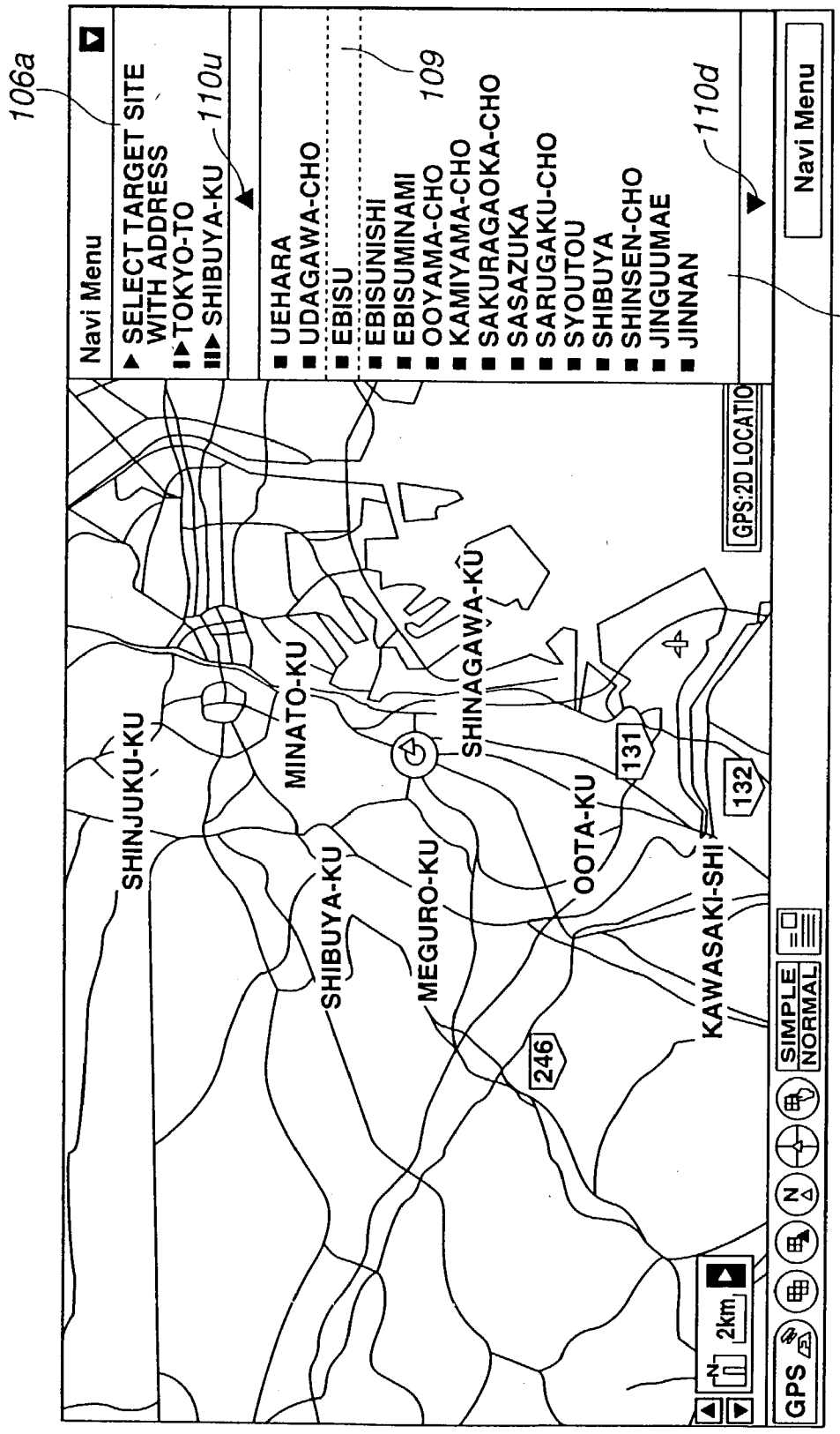

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
SHIBUYA-KU
110u
UEHARA
UDAGAWA-CHO
EBISU
EBISUNISHI
EBISUMINAMI
OOYAMA-CHO
KAMIYAMA-CHO
SAKURAGAOKA-CHO
SASAZUKA
SARUGAKU-CHO
SYOUTOU
SHIBUYA
SHINSEN-CHO
JINGUUMAE
JINNAN
109
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.30

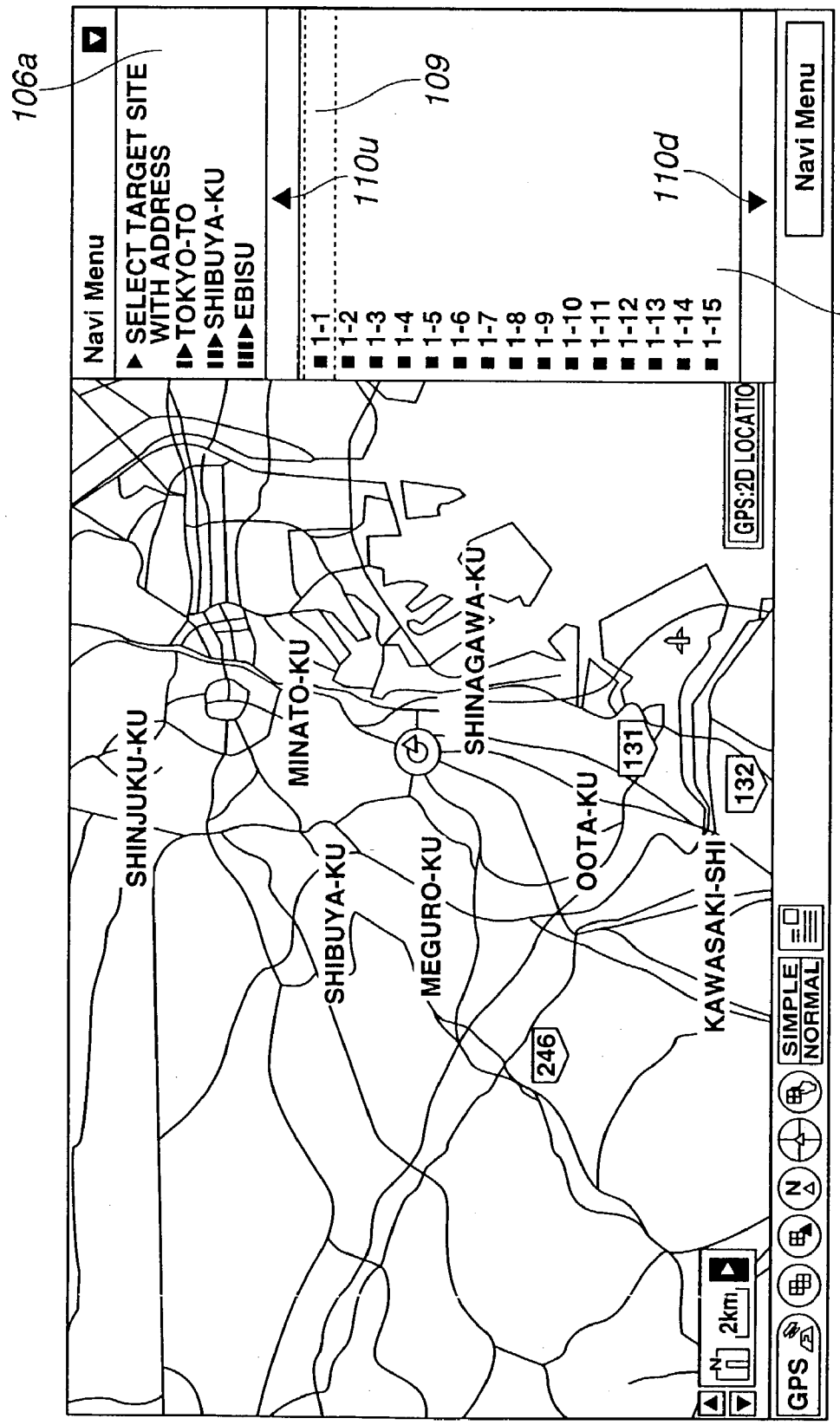

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
TOKYO-TO
SHIBUYA-KU
EBISU
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
1-13
1-14
1-15
109
110u
110d
106b
Navi Menu
GPS:2D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.31

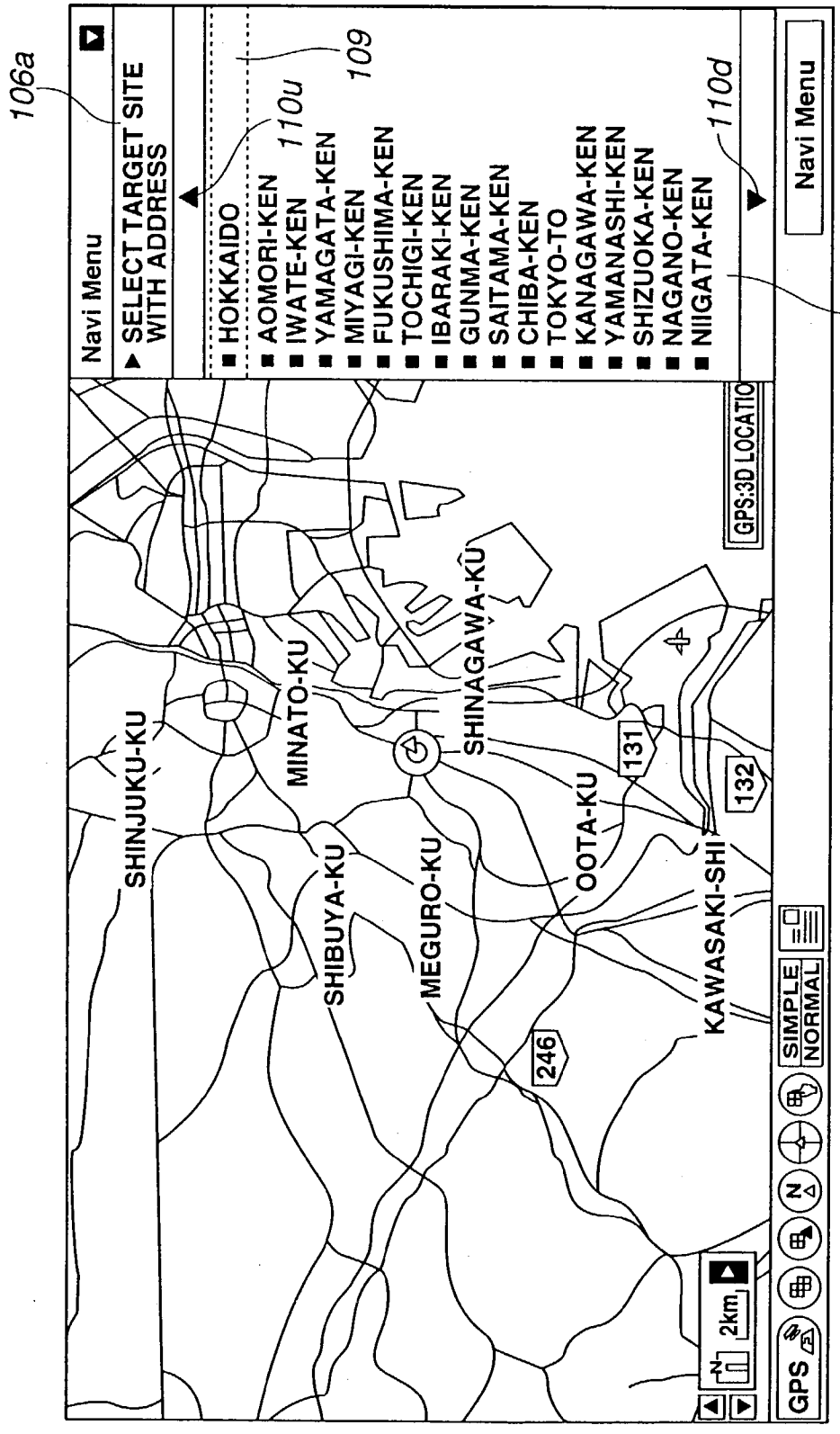

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
HOKKAIDO
AOMORI-KEN
IWATE-KEN
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
110u
109
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.32

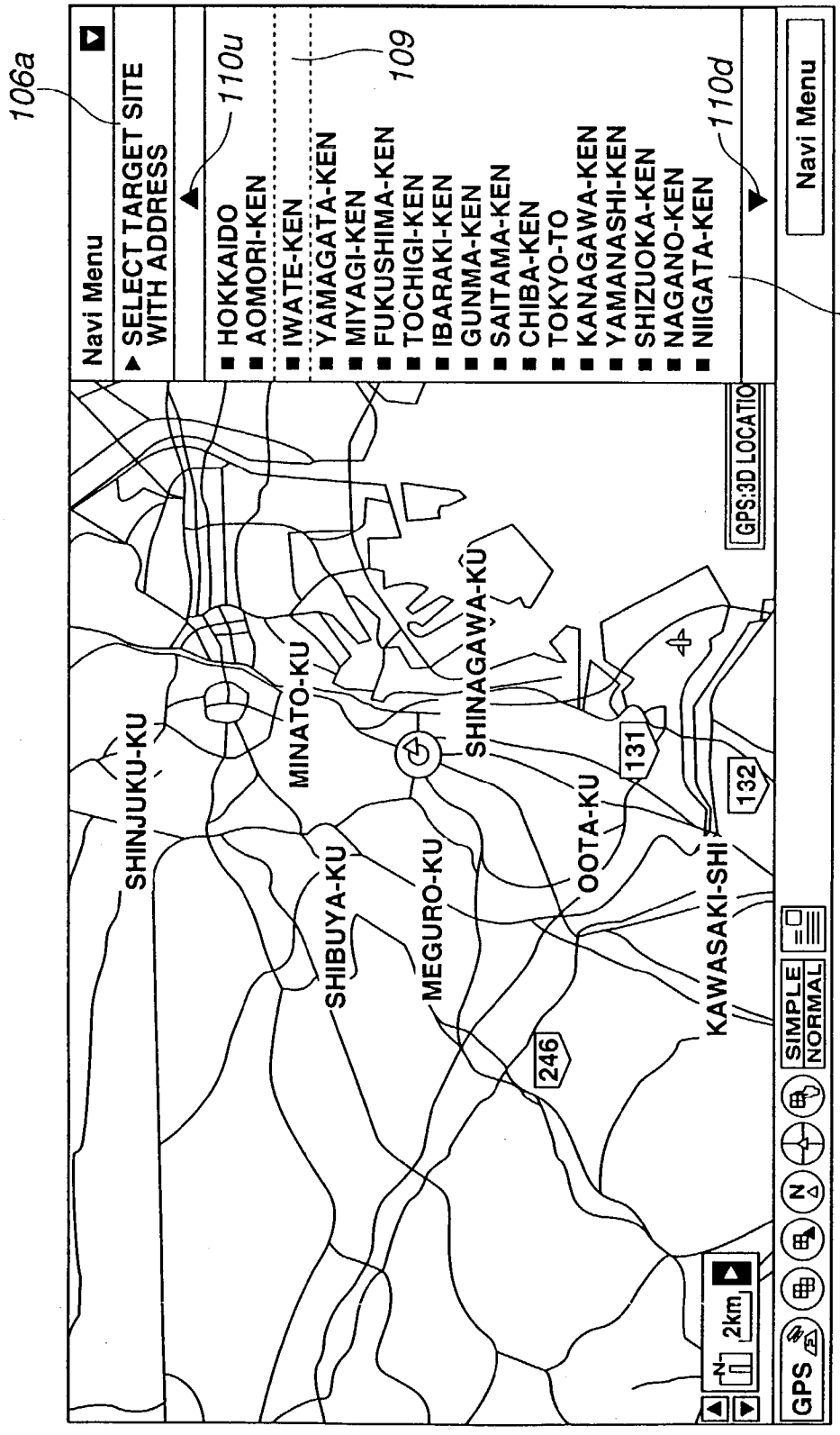

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HOKKAIDO
AOMORI-KEN
IWATE-KEN
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
109
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.33

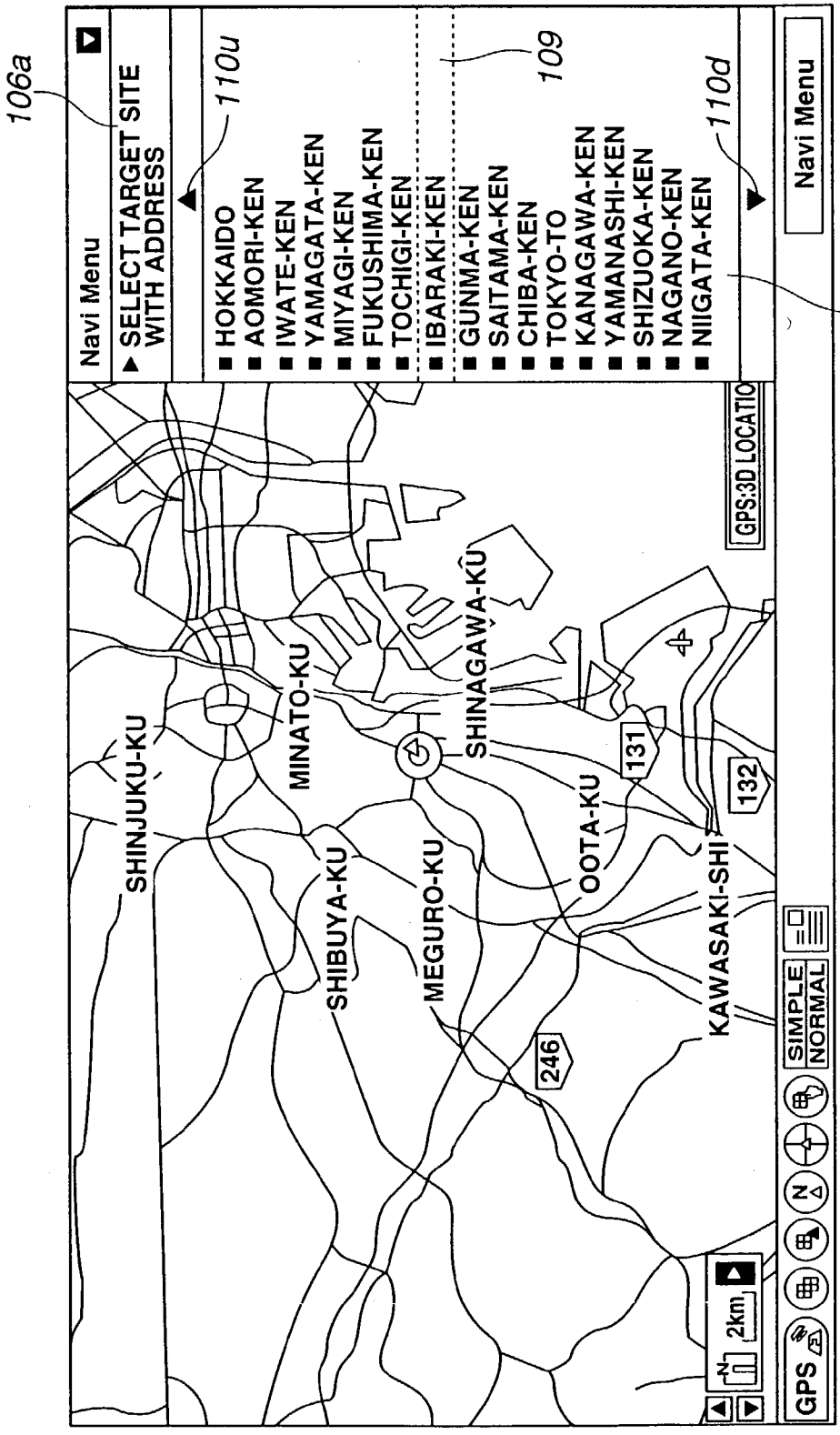

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HOKKAIDO
AOMORI-KEN
IWATE-KEN
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
109
110d
106b
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS:3D LOCATIO
Navi Menu
GPS
2km
SIMPLE
NORMAL

FIG.34

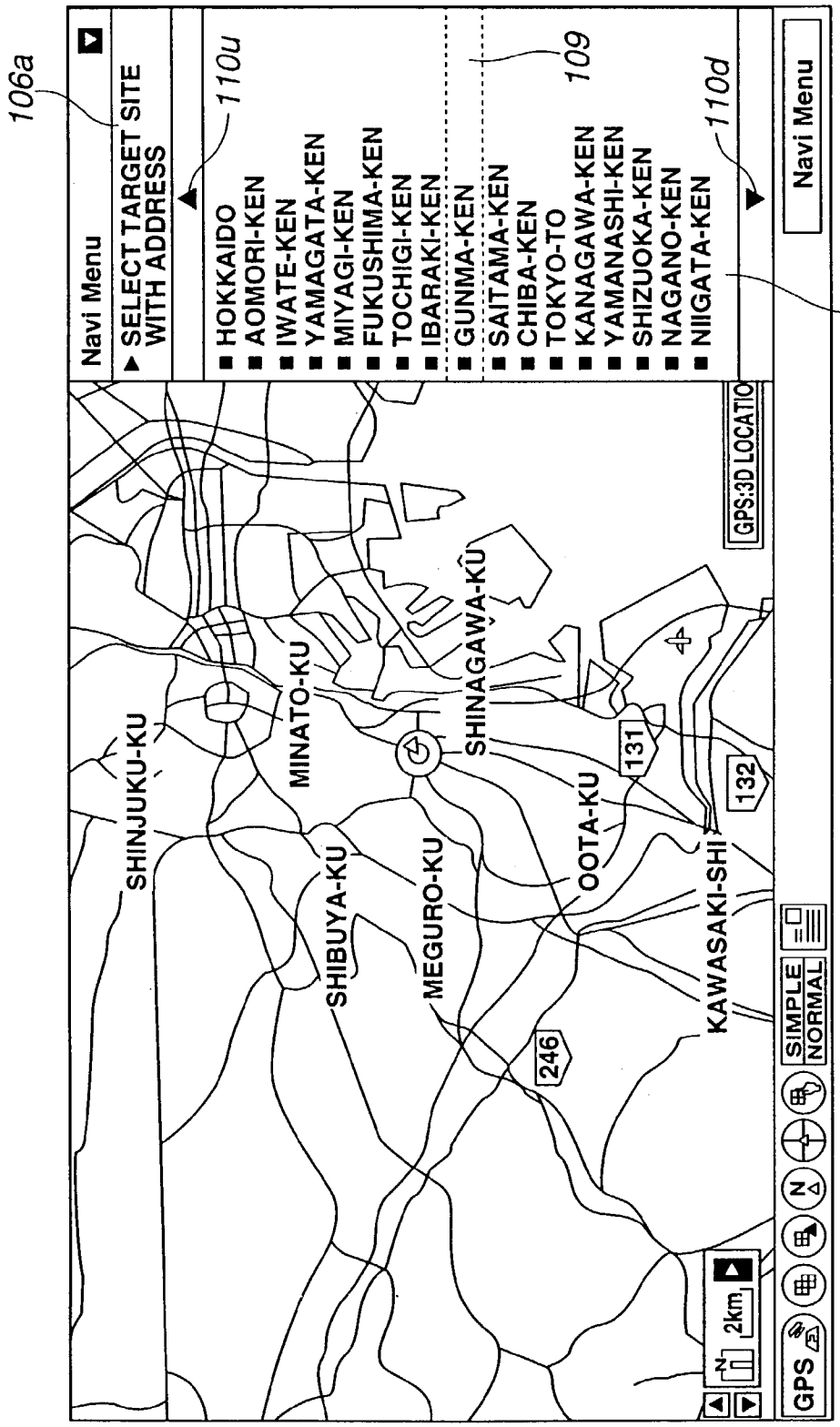

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HOKKAIDO
AOMORI-KEN
IWATE-KEN
YAMAGATA-KEN
MIYAGI-KEN
FUKUSHIMA-KEN
TOCHIGI-KEN
IBARAKI-KEN
GUNMA-KEN
SAITAMA-KEN
CHIBA-KEN
TOKYO-TO
KANAGAWA-KEN
YAMANASHI-KEN
SHIZUOKA-KEN
NAGANO-KEN
NIIGATA-KEN
109
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.35

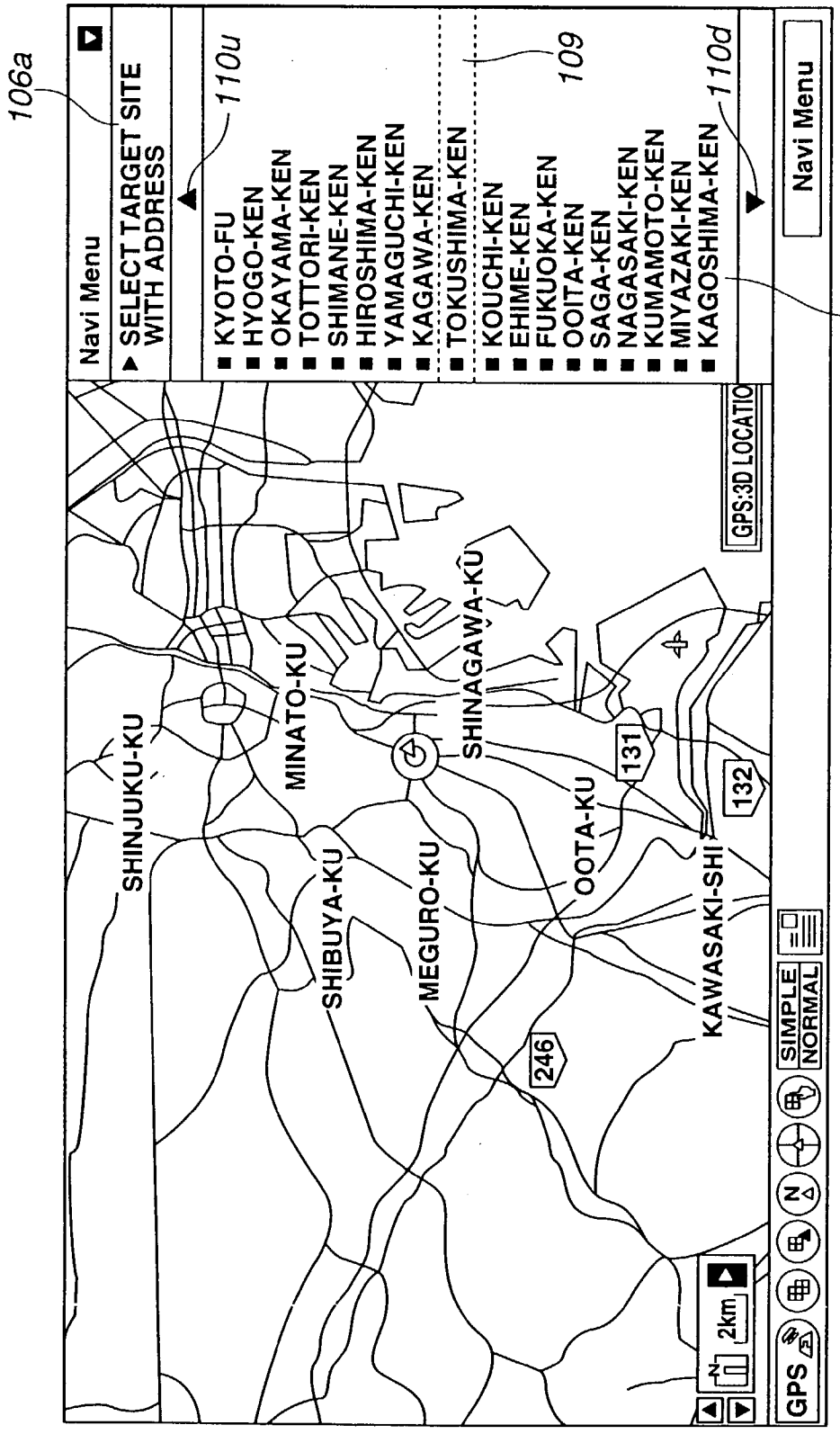

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
KYOTO-FU
HYOGO-KEN
OKAYAMA-KEN
TOTTORI-KEN
SHIMANE-KEN
HIROSHIMA-KEN
YAMAGUCHI-KEN
KAGAWA-KEN
TOKUSHIMA-KEN
KOUCHI-KEN
EHIME-KEN
FUKUOKA-KEN
OOITA-KEN
SAGA-KEN
NAGASAKI-KEN
KUMAMOTO-KEN
MIYAZAKI-KEN
KAGOSHIMA-KEN
109
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
GPS
2km
SIMPLE
NORMAL

FIG.36

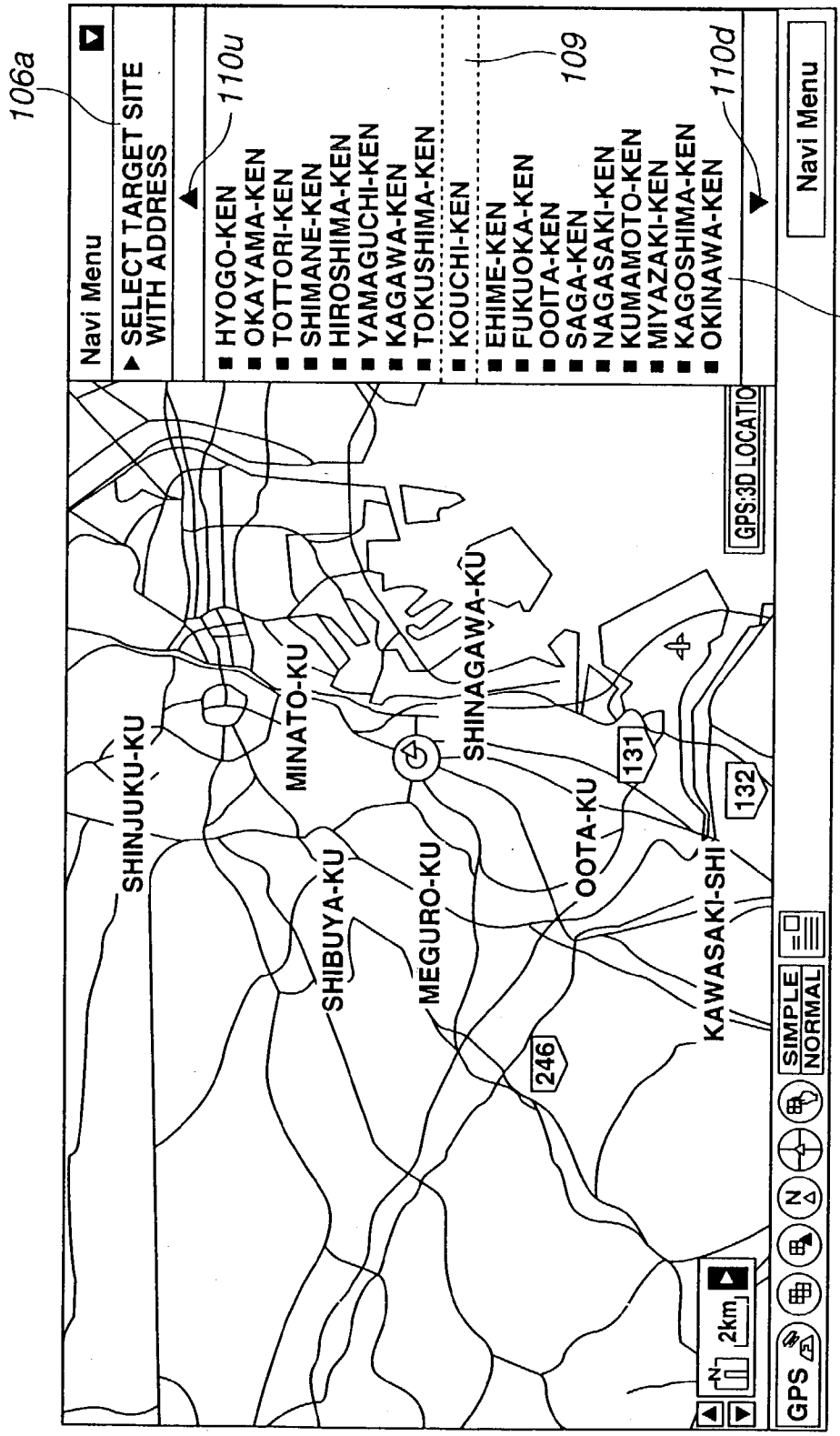

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HYOGO-KEN
OKAYAMA-KEN
TOTTORI-KEN
SHIMANE-KEN
HIROSHIMA-KEN
YAMAGUCHI-KEN
KAGAWA-KEN
TOKUSHIMA-KEN
KOUCHI-KEN
EHIME-KEN
FUKUOKA-KEN
OOITA-KEN
SAGA-KEN
NAGASAKI-KEN
KUMAMOTO-KEN
MIYAZAKI-KEN
KAGOSHIMA-KEN
OKINAWA-KEN
109
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.37

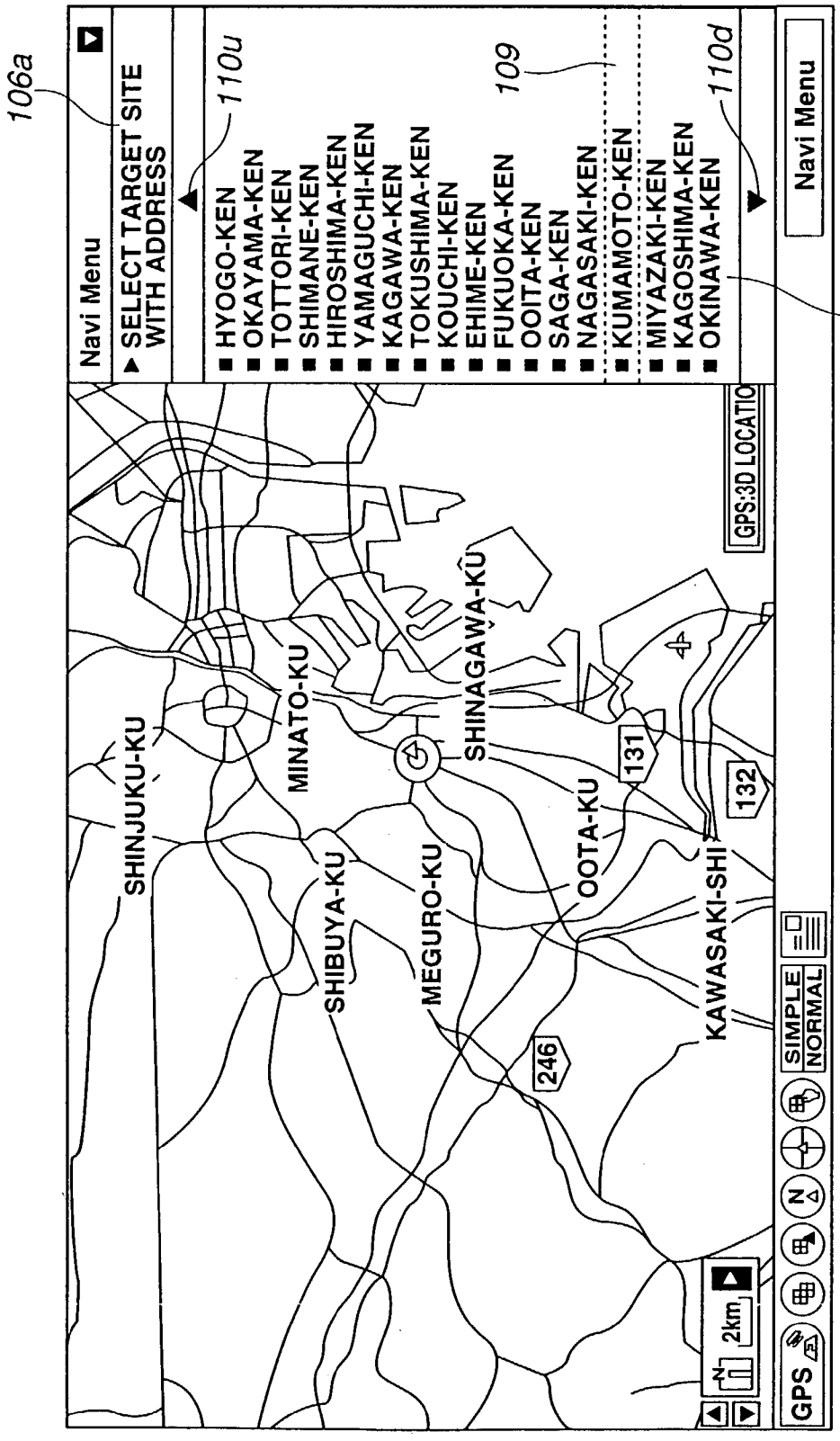

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HYOGO-KEN
OKAYAMA-KEN
TOTTORI-KEN
SHIMANE-KEN
HIROSHIMA-KEN
YAMAGUCHI-KEN
KAGAWA-KEN
TOKUSHIMA-KEN
KOUCHI-KEN
EHIME-KEN
FUKUOKA-KEN
OOITA-KEN
SAGA-KEN
NAGASAKI-KEN
109
KUMAMOTO-KEN
MIYAZAKI-KEN
KAGOSHIMA-KEN
OKINAWA-KEN
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
SIMPLE
NORMAL

FIG.38

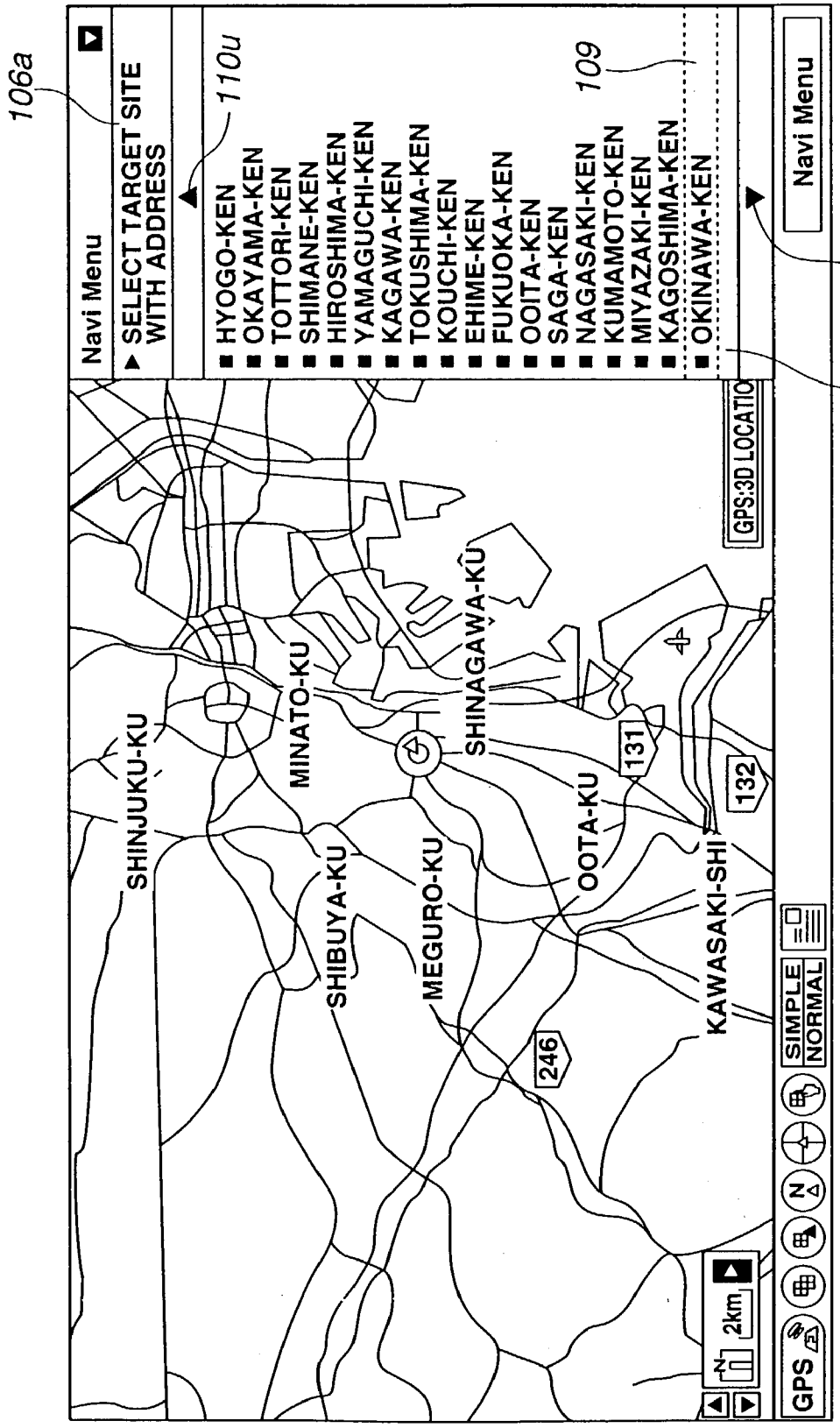

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HYOGO-KEN
OKAYAMA-KEN
TOTTORI-KEN
SHIMANE-KEN
HIROSHIMA-KEN
YAMAGUCHI-KEN
KAGAWA-KEN
TOKUSHIMA-KEN
KOUCHI-KEN
EHIME-KEN
FUKUOKA-KEN
OOITA-KEN
SAGA-KEN
NAGASAKI-KEN
KUMAMOTO-KEN
MIYAZAKI-KEN
KAGOSHIMA-KEN
OKINAWA-KEN
109
GPS:3D LOCATIO
106b
110d
Navi Menu
SHINJUKU-KU
MINATO-KU
SHINAGAWA-KU
SHIBUYA-KU
MEGURO-KU
OOTA-KU
KAWASAKI-SHI
131
132
246
GPS
2km
N
SIMPLE
NORMAL

FIG.39

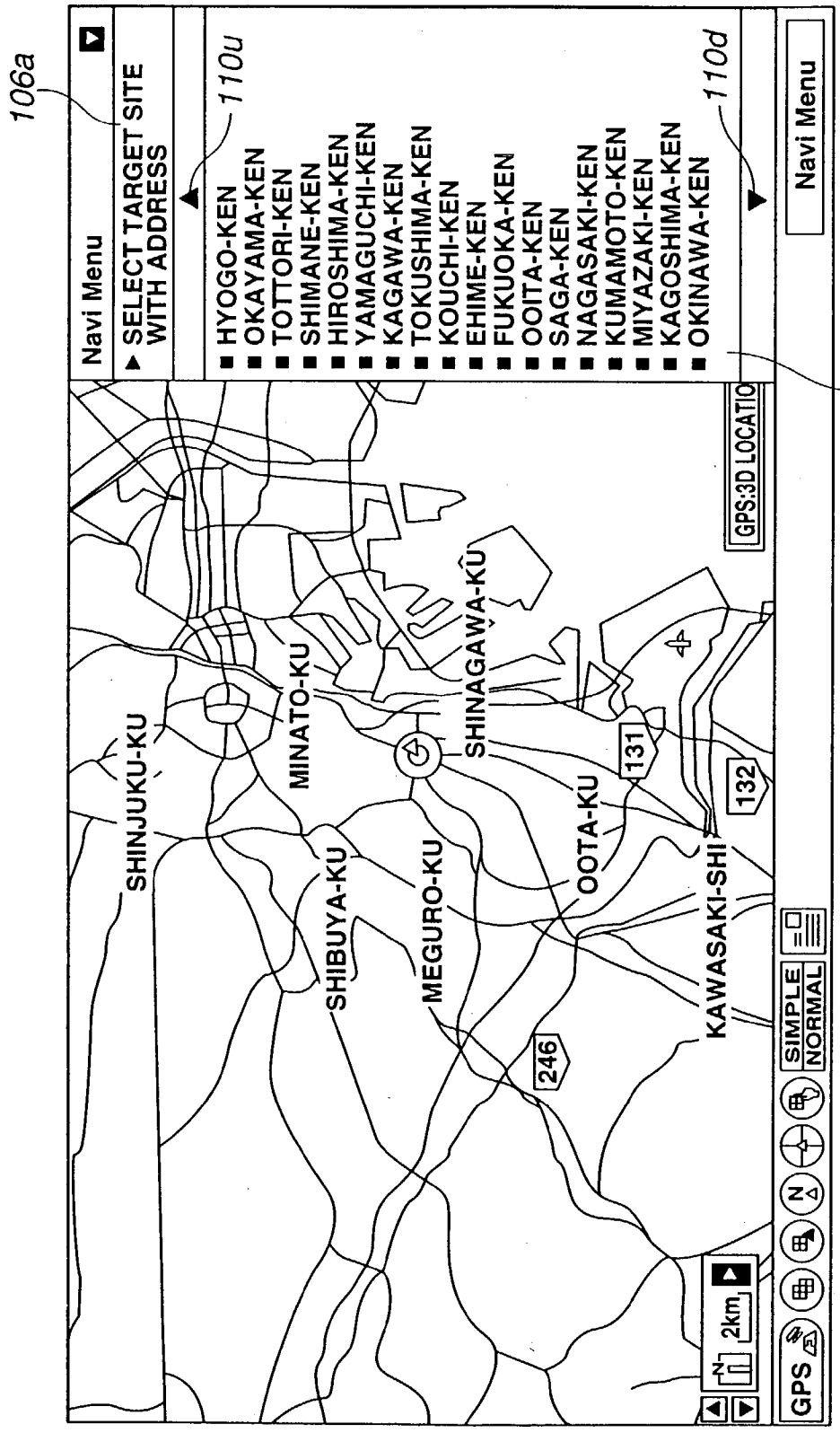

106a
Navi Menu
SELECT TARGET SITE WITH ADDRESS
110u
HYOGO-KEN
OKAYAMA-KEN
TOTTORI-KEN
SHIMANE-KEN
HIROSHIMA-KEN
YAMAGUCHI-KEN
KAGAWA-KEN
TOKUSHIMA-KEN
KOUCHI-KEN
EHIME-KEN
FUKUOKA-KEN
OOITA-KEN
SAGA-KEN
NAGASAKI-KEN
KUMAMOTO-KEN
MIYAZAKI-KEN
KAGOSHIMA-KEN
OKINAWA-KEN
110d
106b
Navi Menu
GPS:3D LOCATIO
SHINJUKU-KU
MINATO-KU
SHIBUYA-KU
MEGURO-KU
SHINAGAWA-KU
OOTA-KU
KAWASAKI-SHI
246
131
132
4
GPS
2km
SIMPLE
NORMAL

FIG.40

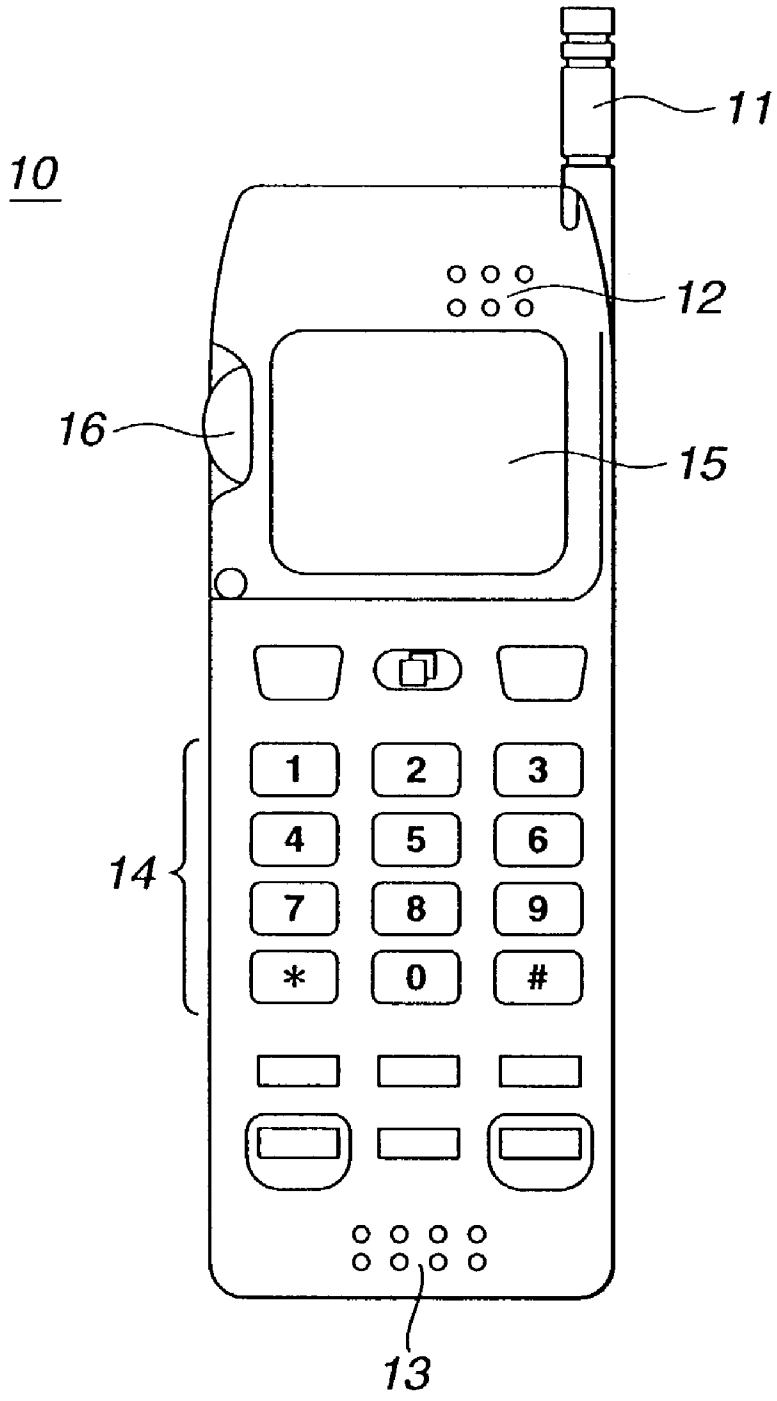


FIG.41

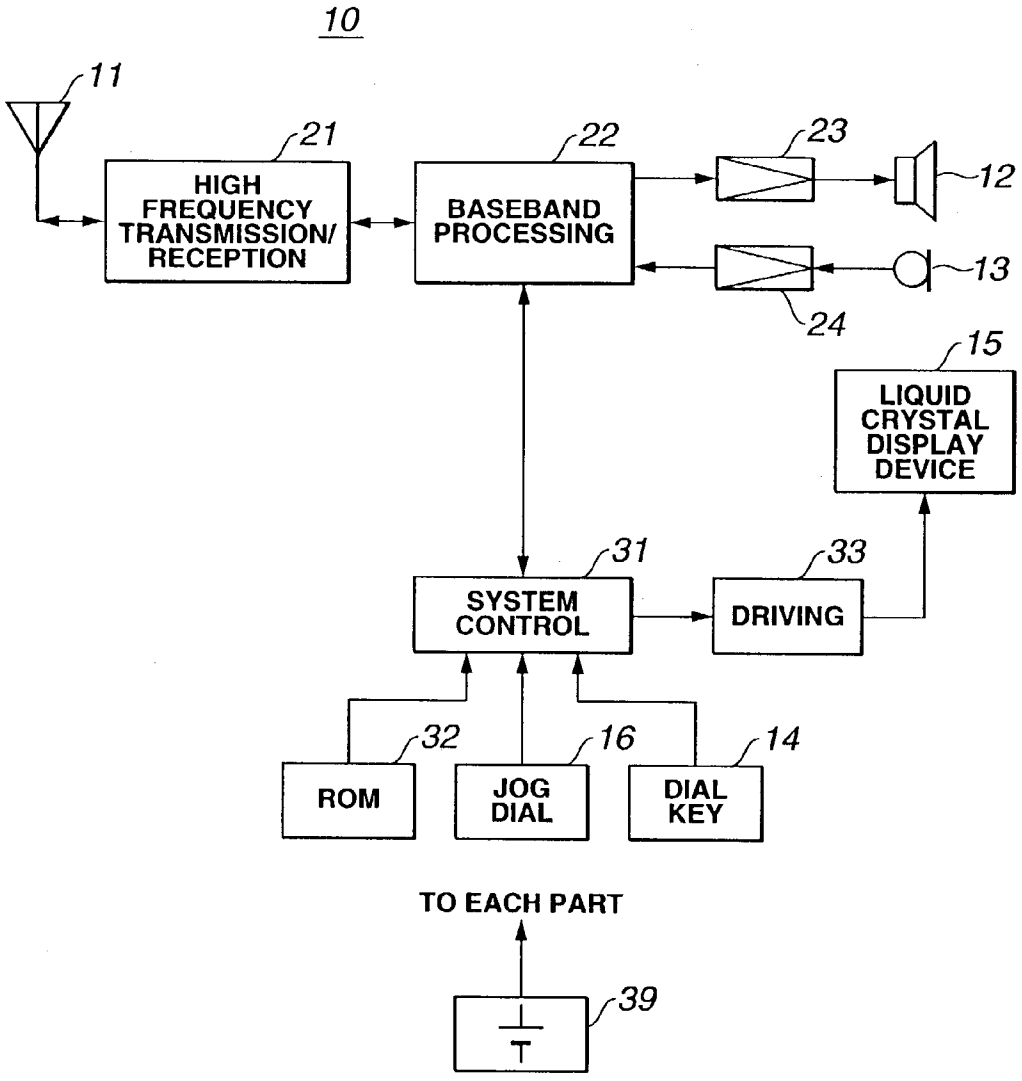

10
11
21
HIGH FREQUENCY TRANSMISSION/ RECEPTION
22
BASEBAND PROCESSING
23
12
13
24
15
LIQUID CRYSTAL DISPLAY DEVICE
31
SYSTEM CONTROL
33
DRIVING
32
ROM
16
JOG DIAL
14
DIAL KEY
TO EACH PART
39

FIG.42

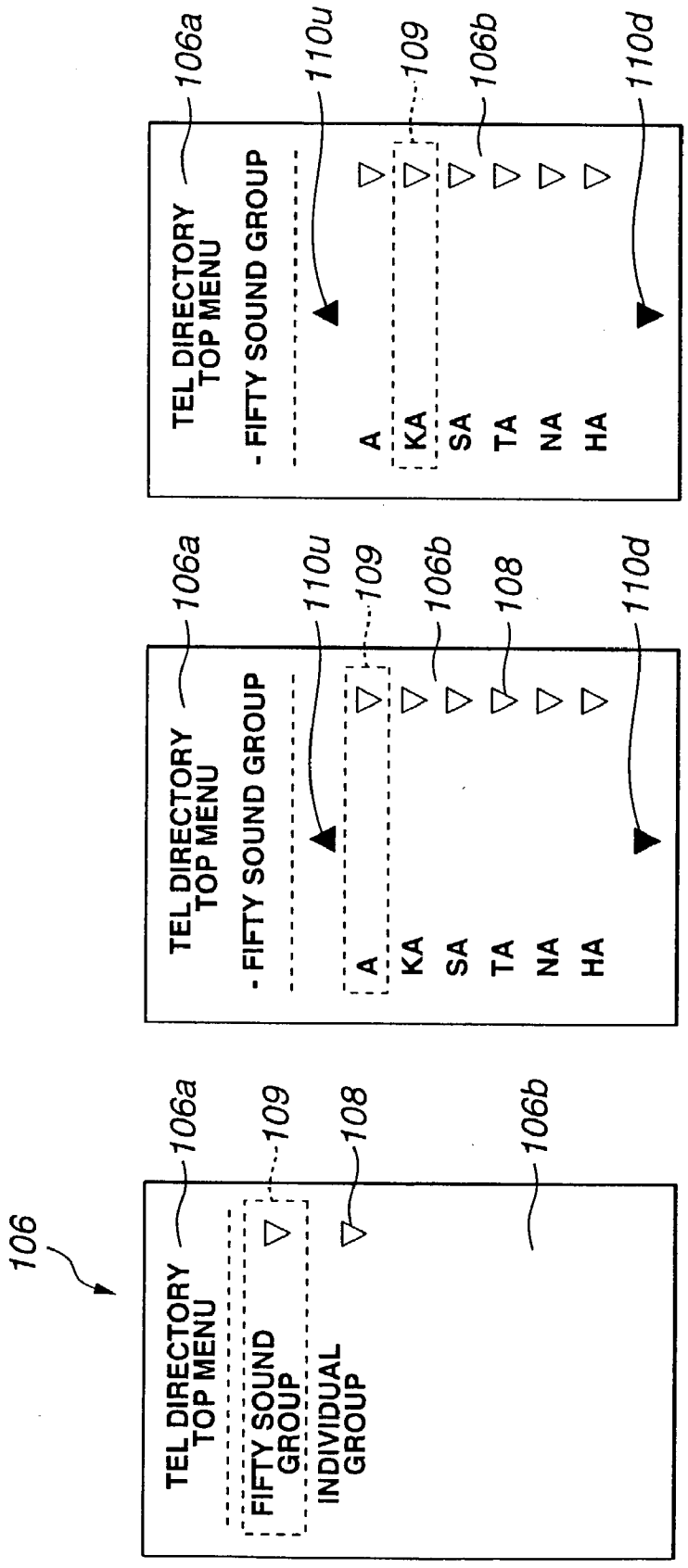


FIG.43A

FIG.43B

FIG.43C

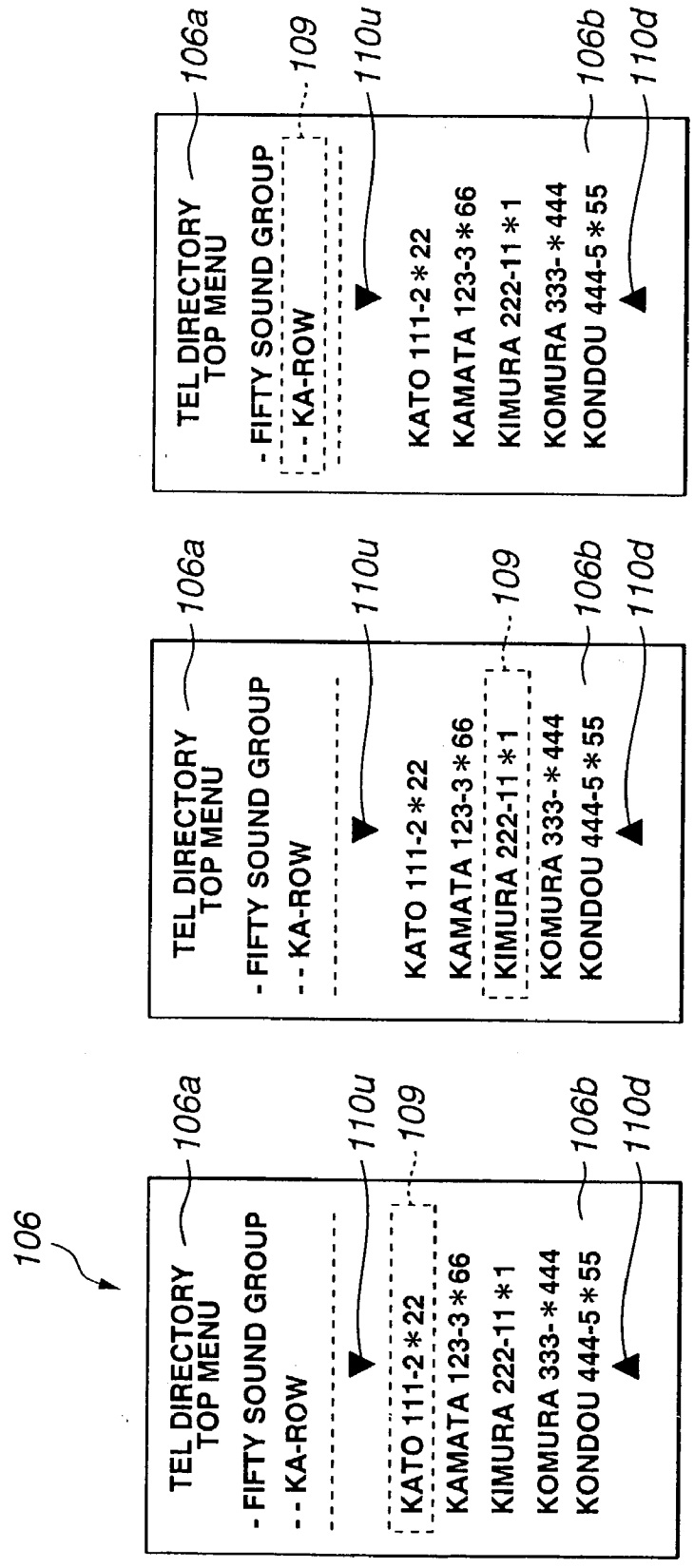


FIG.44A

FIG.44B

FIG.44C

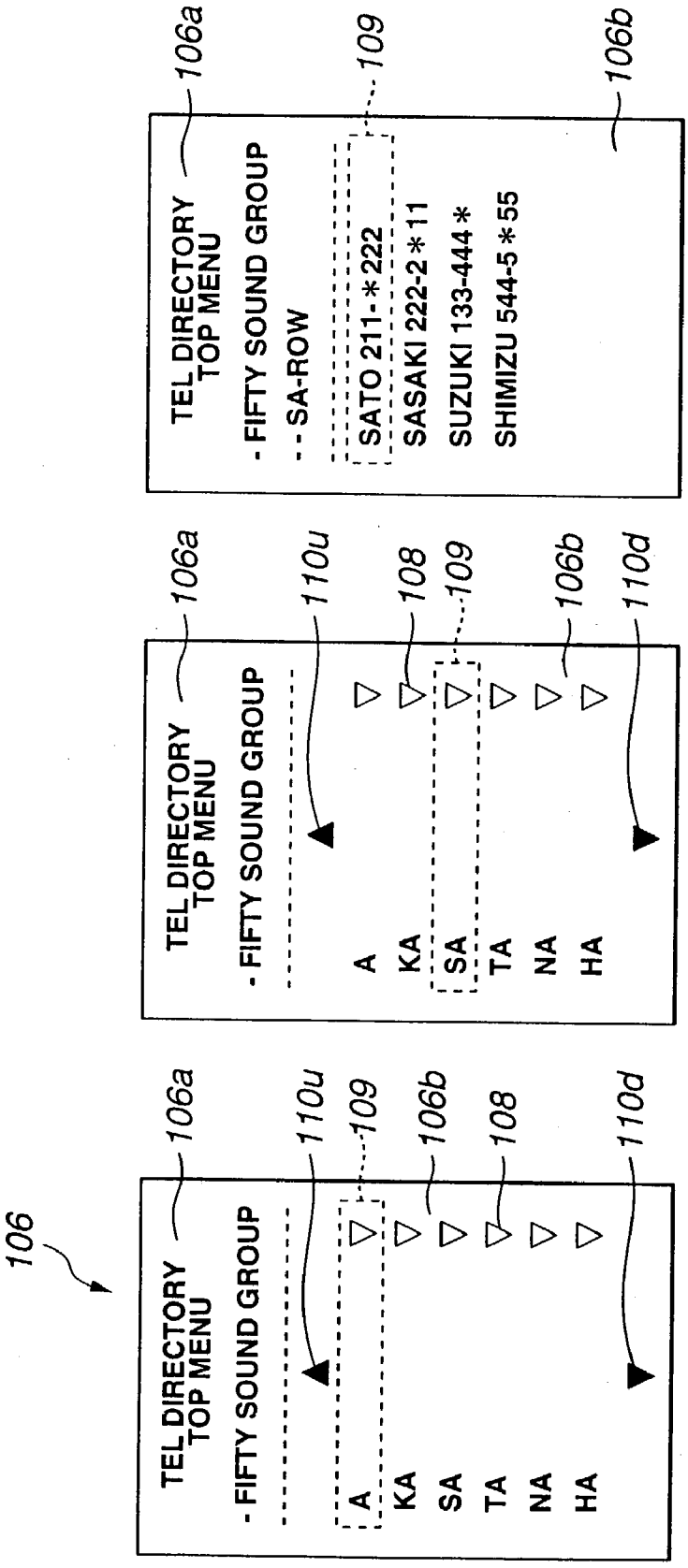


FIG.45A

FIG.45B

FIG.45C

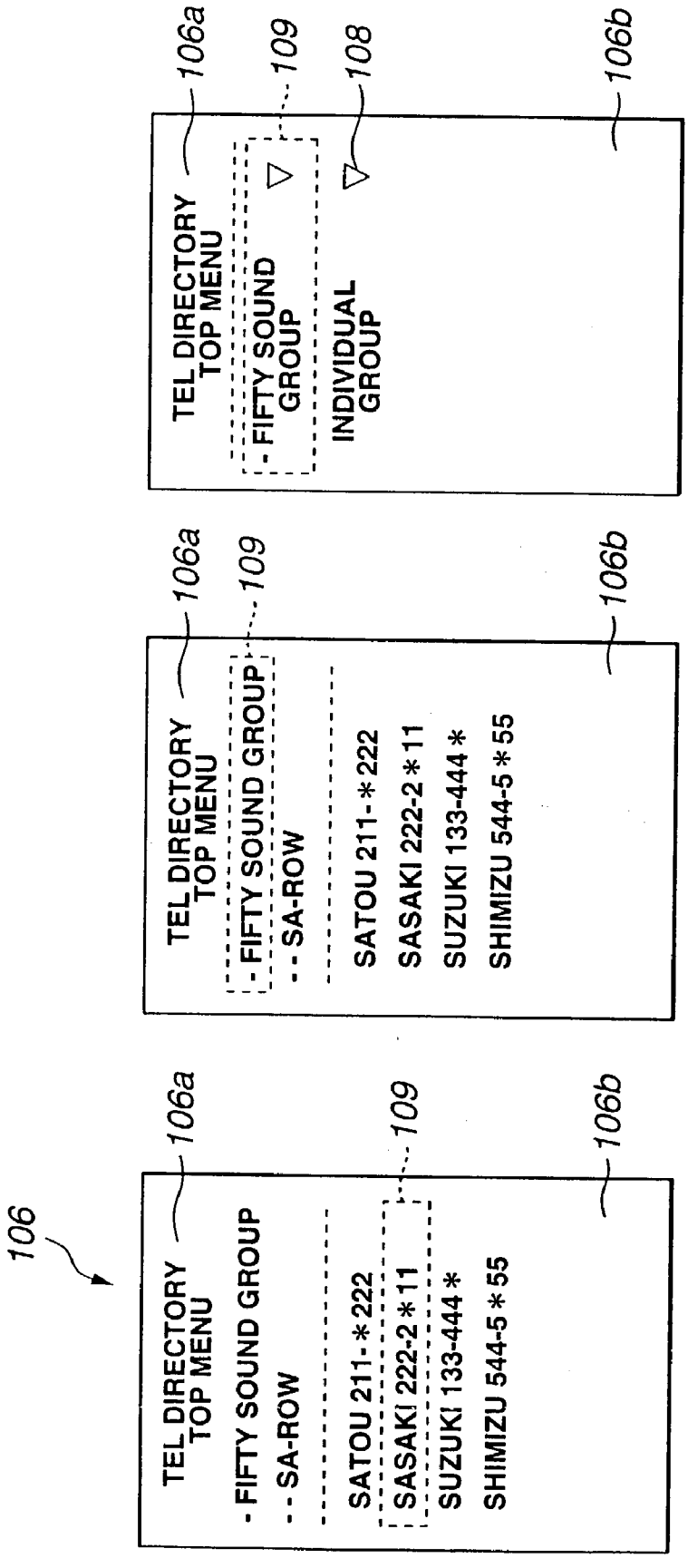


FIG.46A

FIG.46B

FIG.46C

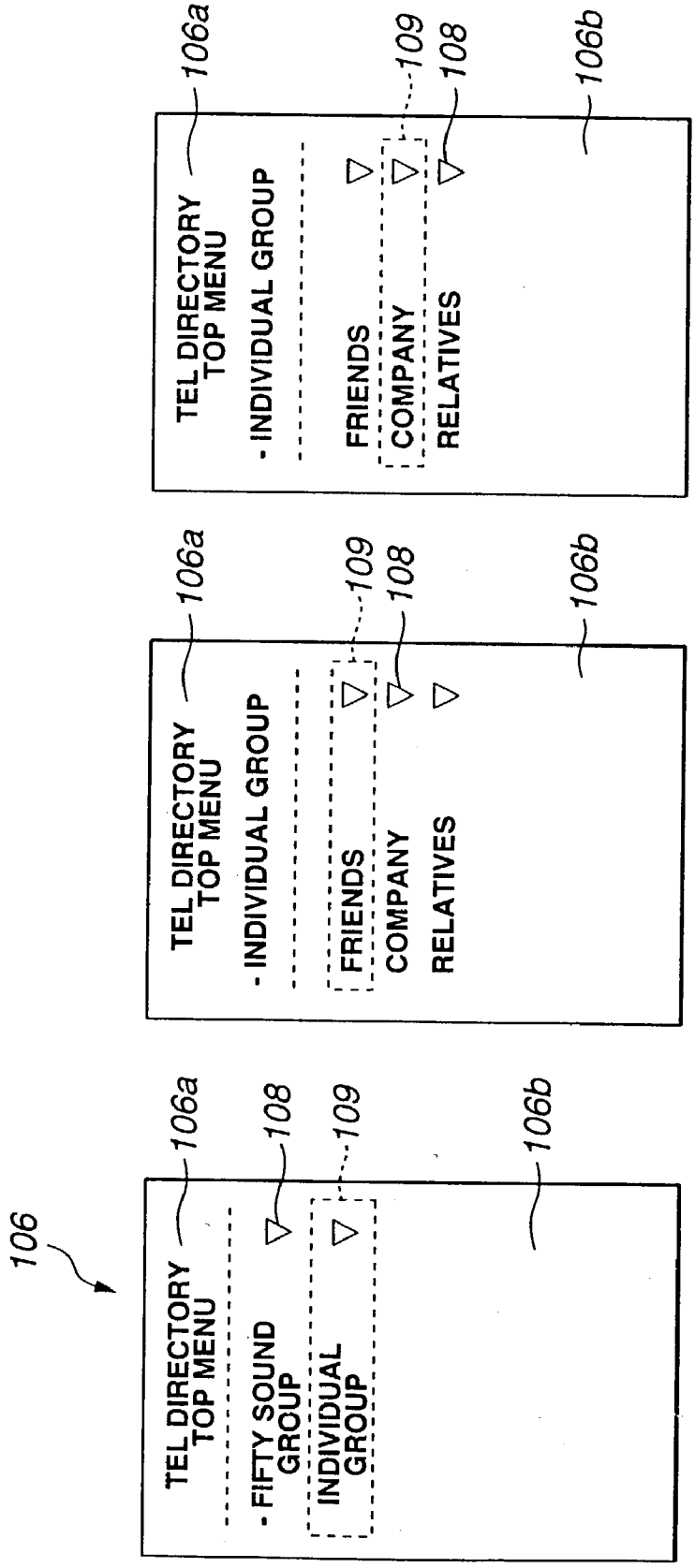


FIG.47A

FIG.47B

FIG.47C

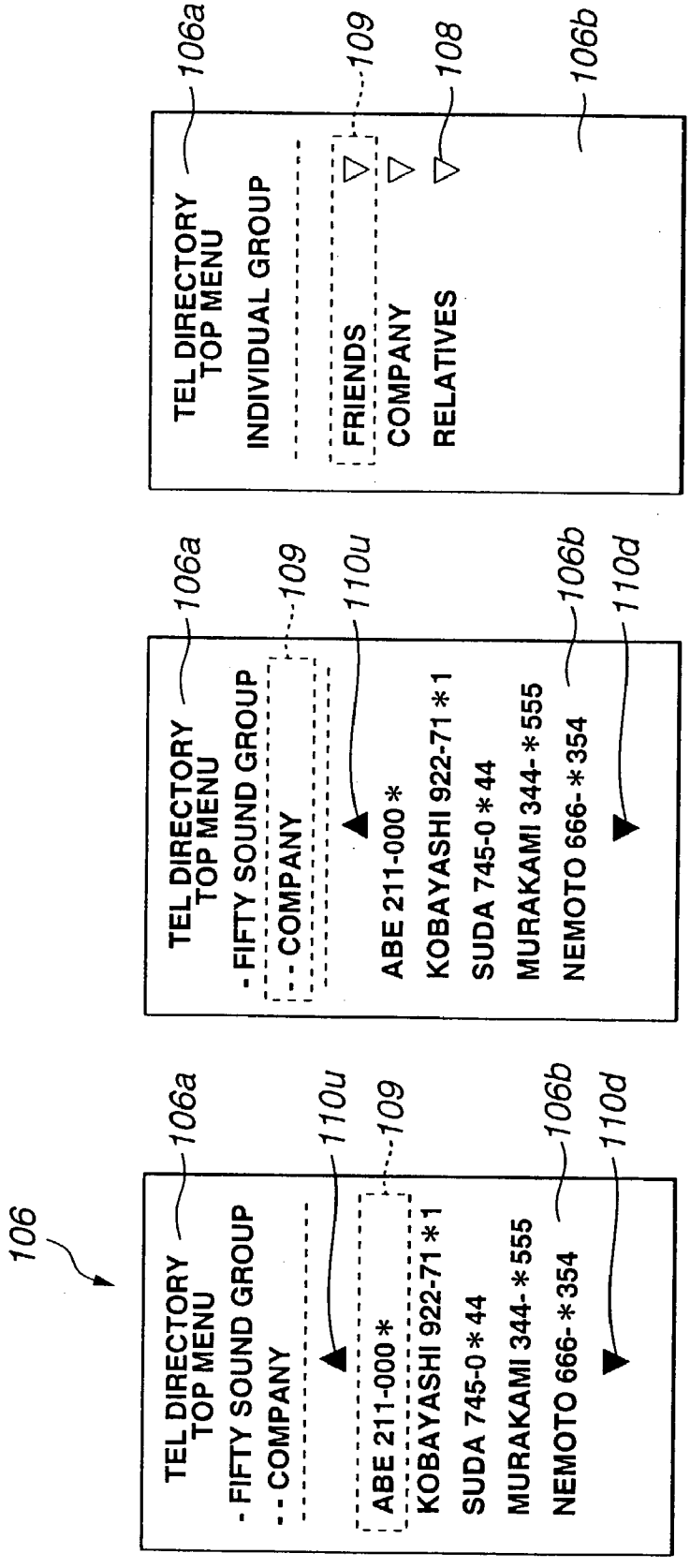


FIG.48A

FIG.48B

FIG.48C

INFORMATION PROCESSING DEVICE AND METHOD, AND INFORMATION PROCESSING PROGRAM

TECHNICAL FIELD

[0001] This invention relates to an information processing method and apparatus for carrying out preset processing, based on an information processing program, and to the information processing program.

BACKGROUND ART

[0002] Among small-sized portable information processing apparatuses, such as a portable telephone set or a personal digital assistant, there are those provided with jog dials, as uniaxially controlled user interface devices, for improving one-hand tractability or simplifying the operating sequence.

[0003] For example, an operating menu for an equipment employing the jog dial, such as a portable telephone set, enables extremely simple menu operations, such as decision making operation, brought about by rotation and thrusting of the jog dial.

[0004] On the other hand, in an operating system (OS) for a personal computer (PC) or a personal digital assistant (PDA), typified by Windows95 (registered trademark) or Window98 (registered trademark) manufactured by Microsoft Company, USA, there is a menu interface traced by a random hierarchical structure termed 'menu'. There is also an interface which is not the menu and which is comprised of tree and list views, in a transverse layout, as a basic interface of a file system. The 'Explorer Window' of the Windows manufactured by Microsoft Inc., USA, is of this type of the interface. By these means, it is possible to specify the current position in a tree structure or to directly revert to an optional hierarchical layer.

[0005] Meanwhile, if, in the above-mentioned operating menu, provided with the jog dial, the menu itself has a hierarchical structure, it is not possible to represent a particular position of the tree structure, such that a user finds it difficult to locate the position in the menu in the course of control. Additionally, when tracing back through hierarchical layers, it is only possible to return to the top menu or to the directly previous hierarchical layer, meaning only insufficient operating flexibility that can be offered to the user.

[0006] Moreover, in the above-mentioned operating system (OS), there are a menu interface traced by a random hierarchical structure termed 'menu' and an interface comprised of a horizontal array of tree or list view. These interfaces, however, may not be said to be optimum as an interface for a vertically elongated casing for a hand-held portable telephone set, or as an interface for a portable equipment that is in need of a vertically elongated display panel, since these interfaces necessarily use a display of a certain transverse width due to their structural constraints.

DISCLOSURE OF THE INVENTION

[0007] It is therefore an object of the present invention to provide an information processing method and apparatus and an information processing program, having an operating menu system of a hierarchical structure employing a user interface device, in which it is possible to represent the current hysteresis layer.

[0008] It is another object of the present invention to provide an information processing method and apparatus and information processing program, in which the hysteresis hierarch itself becomes a part of a menu and focus may be shifted to revert to a particular past hierarchical layer.

[0009] It is yet another object of the present invention to provide a an information processing method and apparatus and information processing program, in which plural menu items may be cyclically shown in the current menu or the letter string of the focused menu may be scrolled on the display unit to enable suppression of the transverse width of the menu itself.

[0010] For accomplishing these objects, the present invention provides an information processing apparatus including operating means, display means for displaying an item as an object of selection which employs the operating means, and for hierarchically displaying the hysteresis information relevant to display of the item and control means for controlling the display and selection of the item in the display means and hierarchical display and selection of the hysteresis information.

[0011] This information processing apparatus operates responsive to selection employing the operating means to display the hysteresis information, in distinction from the item, by tracing from the past until the present, on the display means, under control by the control means.

[0012] This enables the current hierarchical layer to be represented in an operating menu system of a hierarchical structure for a user interface device which is uni-axially controlled using e.g., a jog dial.

[0013] Moreover, the hierarchical layer itself becomes a part of the menu in the meaning that reversion to a specified past layer becomes possible by moving the focus to and deciding on the layer.

[0014] Moreover, the transverse width of the menu itself may be prevented from increasing by e.g., the scrolling of the letter string of the focused menu. Consequently, the present invention may be applied with advantage not only to PC application software but to a product that is in need of a vertically elongated casing or display panel, such as a portable telephone device.

[0015] The present invention also provides an information processing method including an item and hysteresis displaying step of displaying an item as an object of selection employing an operating unit in a display unit and of hierarchically displaying the hysteresis information relevant to the display of the item in the display unit, and a control step of controlling the display and selection of the item and the hierarchical display and selection of the hysteresis information by the item and hysteresis displaying step.

[0016] The present invention also provides an information processing program executed by an information processing apparatus and which includes an item and hysteresis displaying step of displaying an item as an object of selection employing an operating unit in a display unit and of hierarchically displaying the hysteresis information relevant to the display of the item in the display unit, and a control step of controlling the display and selection of the item and the hierarchical display and selection of the hysteresis information by the item and hysteresis displaying step.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] **FIG. 1** is a block diagram showing an information processing apparatus of a first embodiment of the present invention.

[0018] **FIG. 2** illustrates a jog dial.

[0019] **FIG. 3** is a transition diagram of a menu system under which the information processing apparatus operates.

[0020] **FIG. 4** is a first view for illustrating menu display on a display unit of the information processing apparatus.

[0021] **FIG. 5** is a first transition diagram in a specified instance of the menu display.

[0022] **FIG. 6** is a second transition diagram in a specified instance of the menu display.

[0023] **FIG. 7** is a second view for illustrating menu display on a display unit of the information processing apparatus.

[0024] **FIG. 8** is a third transition diagram in a specified instance of the menu display.

[0025] **FIG. 9** is a perspective view showing a notebook computer of a second embodiment of the present invention.

[0026] **FIG. 10** is an enlarged view showing the jog dial mounted on the notebook computer of **FIG. 9** and its vicinity.

[0027] **FIG. 11** shows an electrical structure of the notebook computer of **FIG. 9**.

[0028] **FIG. 12** shows a first exemplary display on an LCD in the notebook computer of **FIG. 9**.

[0029] **FIG. 13** shows a second exemplary display on an LCD in the notebook computer.

[0030] **FIG. 14** shows a third exemplary display on an LCD in the notebook compute.

[0031] **FIG. 15** shows a fourth exemplary display on an LCD in the notebook computer.

[0032] **FIG. 16** shows a fifth exemplary display on an LCD in the notebook computer.

[0033] **FIG. 17** shows a sixth exemplary display on an LCD in the notebook computer.

[0034] **FIG. 18** shows a seventh exemplary display on an LCD in the notebook computer.

[0035] **FIG. 19** shows an eighth exemplary display on an LCD in the notebook computer.

[0036] **FIG. 20** shows a ninth exemplary display on an LCD in the notebook computer.

[0037] **FIG. 21** shows a tenth exemplary display on an LCD in the notebook computer.

[0038] **FIG. 22** shows an eleventh exemplary display on an LCD in the notebook computer.

[0039] **FIG. 23** shows a twelfth exemplary display on an LCD in the notebook computer.

[0040] **FIG. 24** shows a thirteenth exemplary display on an LCD in the notebook computer.

[0041] **FIG. 25** shows a fourteenth exemplary display on an LCD in the notebook computer.

[0042] **FIG. 26** shows a fifteenth exemplary display on an LCD in the notebook computer.

[0043] **FIG. 27** shows a sixteenth exemplary display on an LCD in the notebook computer.

[0044] **FIG. 28** shows a seventeenth exemplary display on an LCD in the notebook computer.

[0045] **FIG. 29** shows a nineteenth exemplary display on an LCD in the notebook computer.

[0046] **FIG. 30** shows a twentieth exemplary display on an LCD in the notebook computer.

[0047] **FIG. 31** shows a twenty-first exemplary display on an LCD in the notebook computer.

[0048] **FIG. 32** shows a twenty-second exemplary display on an LCD in the notebook computer.

[0049] **FIG. 33** shows a twenty-third exemplary display on an LCD in the notebook computer.

[0050] **FIG. 34** shows a twenty-fourth exemplary display on an LCD in the notebook computer.

[0051] **FIG. 35** shows a twenty-fifth exemplary display on an LCD in the notebook computer.

[0052] **FIG. 36** shows a twenty-sixth exemplary display on an LCD in the notebook computer.

[0053] **FIG. 37** shows a twenty-seventh exemplary display on an LCD in the notebook computer.

[0054] **FIG. 38** shows a twenty-eighth exemplary display on an LCD in the notebook computer.

[0055] **FIG. 39** shows a twenty-ninth exemplary display on an LCD in the notebook computer.

[0056] **FIG. 40** shows a thirtieth exemplary display on an LCD in the notebook computer.

[0057] **FIG. 41** is a perspective view showing a portable telephone set of a third embodiment of the present invention.

[0058] **FIG. 42** shows an electrical structure of the portable telephone set.

[0059] **FIGS. 43A** to **43C** show a first display instance in the display unit of the portable telephone set.

[0060] **FIGS. 44A** to **44C** show a second display instance in the display unit of the portable telephone set.

[0061] **FIGS. 45A** to **45C** show a third display instance in the display unit of the portable telephone set.

[0062] **FIGS. 46A** to **46C** show a fourth display instance in the display unit of the portable telephone set.

[0063] **FIGS. 47A** to **47C** show a fifth display instance in the display unit of the portable telephone set.

[0064] **FIGS. 48A** to **48C** show a sixth display instance in the display unit of the portable telephone set.

BEST MODE FOR CARRYING OUT THE INVENTION

[0065] Referring to the drawings, certain preferred embodiments of the present invention will be explained in detail.

[0066] A first embodiment is now explained by referring to FIGS. **1** to **8**. The first embodiment, shown in **FIG. 1**, is directed to an information processing device **100**, which is adapted for executing a menu display program stored in a ROM **101**, and which operates as a menu system. The information processing device **100** includes an operating unit **102**, accepting the user's operation, a display unit **103** for demonstrating the image information in a preset display area, and a controller **104** for demonstrating the hysteresis information and the items of the current menu hierarchy in separation from each other in a display area on the display unit **103**. The controller **104** is connected to a ROM **101**, operating unit **102** and to the display unit **103** over a bus **105**.

[0067] The menu display program represents a specified example of the information processing method of the present invention. The information processing method of the present invention demonstrates items of selection using the operating unit **102** in the display unit **103**, while hierarchically demonstrating the hysteresis information pertinent to the display of the above items in the display unit **103** and controlling the hierarchical display and selection of the hysteresis information.

[0068] For the operating unit **102**, a jog dial, operating as a uniaxial control user interface device, is used. When rotated or thrust, the jog dial shifts a cursor on the display unit **103** and decides on items through which the cursor is moved. Referring to **FIG. 2**, the jog dial includes a rotary encoder **12** and a push switch **13**, mounted on a contact mounting substrate **11**. When rotated, the rotary encoder **12** shifts the cursor to selectively highlight the menu items. The rotary encoder **12** is adapted for being slid within a preset range in the horizontal direction along a movement guide rail **14**. The push switch **13** is fixed and detects the thrusting of the rotary encoder **12** in a direction indicated by arrow H1 to issue a 'decision' command. The push switch **13** has an actuating button **30** facing the rotary encoder **12**, which is a peripherally actuated type disc-shaped operating knob **27**.

[0069] The display unit **103** is a liquid crystal device (LCD) and is used as an area for demonstrating the entire menu. However, due to size reduction of the overall device, limitations are imposed on the size of the display unit **103**, as indicated in **FIG. 4***ff*.

[0070] The controller **104** causes the hysteresis information of the operating menu from the past to the present, as later explained, to be displayed vertically in a display area on the display **103** in separation from the items of the current menu hierarchy, responsive to the actuation on the operating unit **102**.

[0071] **FIG. 3** shows the structure of a menu system when the information processing device **100** operates as it executes the above-mentioned menu display program. The top menu 'Top Menu' transfers to, for example, three menus, that is a [menu A 'Menu A'], a [menu B "Menu B"] and a [menu C "Menu C"]. The [menu A "menu A"] transfers to a [menu A-1 "Menu A-1"], a [menu A-2 "Menu A-2"] and to a [menu A-3 "Menu A-3"]. The [menu A-1 "Menu A-1"] transfers to a [menu A-1-1 "Menu A-1-1"], a [menu A-1-2 "Menu A-1-2"], a [menu A-1-3 "Menu A-1-3"], a [menu A-1-4 "Menu A-1-4"], a [menu A-1-5 "Menu A-1-5"], and to a [menu A-1-6 "Menu A-1-1-6"]. Of these, the [menu A-1-1 "Menu A-1-1"] further transfers to a a [menu A-1-1-1 "Menu A-1-1-1"] and to a [menu A-1-1-2 "Menu A-1-1-2"], while the [menu A-1-4 "Menu A-1-4"] further transfers to a [menu A-1-4-1 "Menu A-1-4-1"] and to a [menu A-1-4-2 "Menu A-1-4-2"].

[0072] The [menu B "menu B"] transfers to a [menu B-1 "Menu B-1"] and to a [menu B-2 "Menu B-2"], whilst the [menu C "menu C"] transfers to a [menu C-1 "Menu C-1"] and to a [menu C-2 "Menu C-2"].

[0073] **FIG. 4** shows a display instance in an entire menu display area **106** on the display unit **103** of the information processing device **100** operating as the menu system shown in **FIG. 3**.

[0074] This entire menu display area **106** is divided into a hysteresis hierarchical menu area **106***a* and a current menu area **106***b*.

[0075] The hysteresis hierarchical menu area **106***a* is such an area in which the hysteresis information from the hysteresis from the past operations up to the current hierarchy is displayed, responsive to the actuation on the operating unit **102**, and in which the user's selective operation is carried out with the use of the operating unit **102**. As the hierarchy increases, the row is enhanced, from e.g., the [top menu "Top Menu"], [. . . menu A-1 " . . . Menu A-1"], with the current layer [menu A-1 "Menu A-1"] being demonstrated in the lowermost layer. It is noted that indents or marks **107** denote that the structure specified is a hierarchical structure. On movement and selection by the operating unit **102**, reversion may be made directly to the hierarchy, as will be explained subsequently.

[0076] A current menu area **106***b* denotes an item of the current menu hierarchy. If a menu has a lower order item or items, the menu has a folder mark **108**.

[0077] Responsive to actuation on the operating unit **102**, a cursor **109** demonstrated in the entire menu display area **106** is seamlessly moved through the hysteresis hierarchical menu area **106***a* and the current menu area **106***b*, as will be explained subsequently. The cursor is also moved continuously across the uppermost menu in the hysteresis hierarchical menu area **106***a* and the lowermost menu in the current menu area **106***b*.

[0078] The cursor **109** is moved responsive to rotational operation of the jog dial, which is the operating unit **102** (input device). As the cursor **109** is moved, the menu selected by the 'decision' command associated with the thrusting of the jog dial is executed by the controller **104**. The menu item, focused on movement of the cursor **109**, enlarges the letter font. If the appellation of the menu item is long, it is demonstrated as it is scrolled on selection.

[0079] Referring to **FIGS. 5 and 6**, specified instances of the aforementioned seamless cursor movement, selection and display of the menu of the lower hierarchy and direct reversion up to the selected hierarchy, in case of employing a jog dial, indicated here as the jog dial **102**, are hereinafter explained.

[0080] First, a specified instance of the seamless cursor movement is explained. The cursor **109** is initially focused in the [top menu 'Top Menu"] demonstrated in the hysteresis hierarchical menu area **106***a* of the entire menu display area, indicated No. 1 (step **1**) in **FIG. 5**. It is noted that the entire menu display area is hereinafter referred to as No. # depending on the changing states. If, as the cursor **109** is focused

in this manner on the [top menu 'Top Menu"], the jog dial is thrust to make 'decision', this menu display is in the non-displaying state.

[0081] In the No. 1 current menu area **106***b*, four menus, namely [menu A "Menu A"], [menu B "Menu B"], [menu C "Menu C"], [menu D "Menu D"] are demonstrated with respective folder marks **108**. If the jog dial **102** is turned downwards (step **2**), the cursor **109** is moved to the [menu A "Menu A"] of the No. 4 current menu area **106***b*. If, at step **S3**, the jog dial **102** is turned downwards, the cursor **109** is moved to the [menu B "Menu B"] of the No. 7 current menu area **106***b* shown in **FIG. 6**. If the jog dial **102** is turned downwards at steps **S4** and **S5**, the cursor **109** is moved to the [menu C "Menu C"] and to the [menu D "Menu D"] of the No. 8 and No. 9 current menu areas **106***b*, respectively. If the jog dial **106** is further turned downwards at step **S6**, the cursor **109** is moved to the [top menu "Top Menu"] in the No. 1 hysteresis hierarchical menu area **106***a* shown in **FIG. 5**. The cursor **109** lying on the [menu A-1 "Menu A-1"] of the four menus, namely the [menu A-1 "Menu A-1"], [menu A-2 "Menu A-2"], [menu A-3 "Menu A-3"] and [menu A-4 "Menu A-4"], displayed in the current menu area **106***b* as shown at No. 5, is moved to the [. . . menu A " . . . Menu A"] in the No. 2 hysteresis hierarchical menu area **106***a*, by turning the jog dial **102** upwards (step **S31**). On the other hand, the cursor **109** lying on the [menu A-1-1 "Menu A-1-1"] of the four menus, namely the [menu A-1-1 "Menu A-1-1"], [menu A-1-2 "Menu A-1-238], [menu A-1-3 "Menu A-1-3"] and [menu A-1-4 "Menu A-1-4"], displayed in the menu area **106***b* as shown at No. 6, is moved to the [. . . menu A-1 " . . . Menu A-1"] in the No. 3 hysteresis hierarchical menu area **106***a* by turning the jog dial **102** upwards (step **S32**).

[0082] A specified instance of selection and display of the menu of the lower hierarchy responsive to the actuation of the jog dial **102** is now explained. If, with the entire menu display area in the No. 4 state, the [menu A "Menu A"] of the current menu area **106***b* is decided on responsive to rotation and thrusting of the jog dial **102** (step **S11**), the hysteresis information [. . . menu A " . . . Menu A"] testifying to the selection of the [menu A "Menu A"] is displayed in the hysteresis hierarchical menu area **106***a*, as shown at No. 5. In the current menu area **106***b*, the four menus, namely the [menu A-1 "Menu A-1"], [menu A-2 "Menu A-2"], [menu A-3 "Menu A-3"] and the [menu A-4 "Menu A-4"] of the lower hierarchical layers are displayed with respective folder marks **108**. If, in this state of No. 5, the [menu A-1 "Menu A-1"] of the current menu area **106***b* is decided on responsive to rotation and thrusting of the jog dial **102** (step **S12**), the hysteresis information testifying to selection of the [menu A-1 "Menu A-1"] is demonstrated, as shown at No. 6, in the hysteresis hierarchical menu area **106***a* as [. . . menu A-1 " . . . Menu A-1"] newly entered below [menu A-1 "Menu A-1"]. In the current menu area **106***b*, the [menu A-1-1 "Menu A-1-1"], [menu A-1-2 "Menu A-1-2"], [menu A-1-3 "Menu A-1-3"] and [menu A-1-4 "Menu A-1-4"], as lower hierarchical layers of the [menu A-1 "Menu A-1"], are displayed. For the [menu A-1-1 "Menu A-1-1"] and the [menu A-1-4 "Menu A-1-4"], there are attached folder marks **108** indicating that there are further lower hierarchical layers. If, in this state of No. 6, the [menu A-1-1 "Menu A-1-1"] of the current menu area **106***b* is decided on responsive to rotation and thrusting of the jog dial **102** (step **S13**), the hysteresis information testifying to selection of the [menu A-1-1 "Menu A-1-1"] is demonstrated, in the hysteresis hierarchical menu area **106***a*, as [. . . [menu A-1-1 " . . . Menu A-1-1"] newly entered below [. . . menu A-1 " . . . Menu A-1"], as shown at No. 10 of **FIG. 6**. In the current menu area **106***b*, the [menu A-1-1-1 "Menu A-1-1-1"] and [menu A-1-1-2 "Menu A-1-1-2"], as lower hierarchical layers of the [menu A-1-1 "Menu A-1-1"], are displayed.

[0083] A specified instance of direct reversion to the selected hierarchical layer is now explained. In No. 2, the [. . . menu A-1 " . . . Menu A-1"] is displayed below [top menu "Top Menu"] of the hysteresis hierarchical menu area **106***a*, as the hysteresis information testifying to the selection of the [menu A "Menu A"]. In the current menu area **106***b*, the [menu A-1 "Menu A-1"], [menu A-2 "Menu A-2"], [menu A-3 "Menu A-3"] and the [menu A-4 "Menu A-4"] as lower hierarchical layers are displayed with folder marks **108**. If, from this state (No. 2), the [. . . menu A " . . . Menu A"] displayed in the hysteresis hierarchical menu area **106***a* is decided on by the rotation and thrusting of the jog dial **102** (step **S21**), the entire menu display area displays the current menu area **106***b* including [menu A "Menu A"], as at No. 4. In No. 3, [. . . menu A-1 " . . . Menu A-1"], is displayed below [. . . menu A "Menu A"] of the hysteresis hierarchical menu area **106***a*, as the hysteresis information testifying to the selection of the [menu A-1 "Menu A-1"]. In the current menu area **106***b*, the [menu A-1-1 "Menu A-1-1"], [menu A-1-2 "Menu A-1-2"], [menu A-1-3 "Menu A-1-3"] and [menu A-1-4 "Menu A-1-4"], as lower hierarchical layers, are displayed. If, from this state (No. 3), the [. . . menu A-1 " . . . Menu A-1"] displayed in the hysteresis hierarchical menu area **106***a* is decided on by the rotation and thrusting of the jog dial **102** (step **S22**), the entire menu display area displays the current menu area **106***b* including [menu A-1 "Menu A-1"], as at No. 5.

[0084] **FIG. 7** shows another display instance in the entire menu display area **106** on the display unit **103** of the information processing device **100**. In this other display instance, a list up button **110***u* and a list down button **110***d* are indicated in the current menu area **106***b*. The list up button **110***u* and the list down button **110***d* are displayed for indicating the presence of hidden menu items only when the menu has a fixed vertical width and the menu items are not accommodated in the display simultaneously. In the case of **FIG. 7**, it is indicated that there exist other menus than the [menu A-1-1 "Menu A-1-1"], [menu A-1-2 "Menu A-1-2"], [menu A-1-3 "Menu A-1-3"] and the [menu A-1-4 "Menu A-1-4"], for example, [menu A-1-5 "Menu A-1-5"] and the [menu A-1-6 "Menu A-1-6"].

[0085] If commands for uninterrupted vertical movement are issued from the jog dial **102** in the current menu area **106***b* where there are displayed the list up button **110***u*/list down button **110***d*, a focus **10***d* by scroll **109** is moved up to a mid point of the current menu area **106***b* and, if the mid point is surpassed, the list begins and continues to scroll, as later explained.

[0086] Also, the list up button **110***u*/list down button **110***d* is emphatically displayed if a command is issued for vertical movement with the jog dial **102**, by way of feedback to the user's actuation. This emphatic representation is particularly effective when the list itself is scrolled.

[0087] Referring to **FIG. 8, a** specified instance for menu display responsive to the command from the jog dial **102** in an area defined by the list up button **110***u* and the list down button **110***d* is explained.

[0088] First, in the current menu area **106***b* of No. 11, the [menu A-1-1 "Menu A-1-1"], [menu A-1-2 "Menu A-1-2"], [menu A-1-3 "Menu A-1-3"] and the [menu A-1-4 "Menu A-1-4"] are displayed between the list up button **110***u* and the list down button **110***d*. These are lower hierarchical layer menus with respect to the [menu A-1 "Menu A-1"] lying in the hysteresis hierarchical menu area **106***a*. There are also other lower hierarchical layer menus of the [menu A-1 "Menu A-1"], such as [menu A-1-5 "Menu A-1-5"] or the [menu A-1-6 "Menu A-1-6"]. In No. 11, the cursor **109** is focused to the [menu A-1-1 "Menu A-1-1"]. If the jog dial **102** is turned downwards (step **S41**), the cursor **109** is moved to the [menu A-1-2 "Menu A-1-2"] lying below the [menu A-1-1 "Menu A-1-1"], as indicated in the current menu area **106***b* of No. 12. If the jog dial **102** is further turned downwards (step **S42**), the cursor **109** is moved to the [menu A-1-3 "Menu A-1-3"] lying below the [menu A-1-2 "Menu A-1-2"], as indicated at No. 13.

[0089] If the jog dial **102** is further turned downwards (step **S43**), the cursor **109** is not moved and the [menu A-1-4 "Menu A-1-4"] lying below the [menu A-1-3 "Menu A-1-3"] is moved to the position of the cursor **109**, as indicated at No. 14. At this time, the [menu A-1-1 "Menu A-1-1"] between the list up button **110***u* and the list down button **110***d* vanishes and the [menu A-1-5 "Menu A-1-5"] is displayed anew. If the jog dial **102** is further turned downwards (step **S44**), the [menu A-1-5 "Menu A-1-5"] lying below the [menu A-1-4 "Menu A-1-4"] is moved to a position of the cursor **109**, as indicated at No. 15. At this time, the [menu A-1-3 "Menu A-1-3"] to the [menu A-1-6 "Menu A-1-6"] are displayed between the list up button **110***u* and the list down button **110***d*. If the jog dial **102** is further turned downwards (step **S45**), the cursor **109** is moved to the [menu A-1-6 "Menu A-1-6"] lying below the [menu A-1-5 "Menu A-1-5"], as indicated at No. 16. The [menu A-1-6 "Menu A-1-6"] lies at the trailing end of the lower hierarchical layer menu of the [menu A-1 "Menu A-1"] lying in turn between the list up button **110***u* and the list down button **110***d*. If the jog dial **102** is further turned downwards (step **S46**), the cursor **109** exits the current menu area **106***b* to shift to the [top menu "Top Menu"] displayed in the hysteresis hierarchical menu area **106***a*, as indicated at No. 17. If the jog dial **102** is further turned downwards at steps **S47** and **S48**, the cursor **109** is moved to the [. . . menu A "Menu A"], [. . . menu A-1 "Menu A-1"] displayed in the hysteresis hierarchical menu area **106***a*, as indicated at No. 18 and No. 19, respectively. If the jog dial **102** is turned downwards at step **S49**, the cursor **109** is shifted to the [menu A-1-1 "Menu A-1-1"] of the current menu area **106***b*, as indicated at No. 11.

[0090] Thus, in the information processing device **100** shown in **FIG. 1**, in which the current hysteresis hierarchical layer in the menu is represented by hierarchically representing the menus selected responsive to the rotating and thrusting movements of the jog dial **102**, it becomes possible to assist the user in comprehending the menu structure and to promote ease in learning the operating sequence. Additionally, such a function may be provided which allows to return to a specified past layer, thus enhancing the operating flexibility that can be offered to the user.

[0091] A second embodiment, directed to a notebook personal computer, the appearance of which is shown in **FIG. 9**, is now explained. This notebook personal computer **1** is basically made up by a main body unit **2** and a display unit **3** that may be opened or closed with respect to the main body unit **2**. The main body unit **2** of the notebook personal computer has, on its upper surface, a keyboard **5**, acted on when inputting various letters or symbols, a touch pad **6**, as a pointing device, acted on in shifting the mouse cursor, and a power supply switch **8**.

[0092] On the front surface of the display unit **3**, there is provided an LCD (Liquid Crystal Display) **7** for displaying an image. On a right upper side of the display unit **3**, there are provided a power supply lamp PL, a battery lamp BL, a message lamp ML and other lamps, such as LEDs, as necessary.

[0093] Between keys A and B (right hand side keys) on the main body unit **2**, there is mounted a jog dial **4**. This jog dial **4** is mounted on the same level as that of the keys A and B, as shown in **FIG. 10**. The jog dial **4** executes preset processing operations, in association with the rotational and translational movements indicated by arrows a and b, respectively as shown in **FIG. 10**,

[0094] This jog dial **4** may, of course, be mounted on the left hand side of the main body unit **2**. The jog dial may also be arranged at a mid portion on the front surface of the main body unit to permit manipulation of the jog dial with the thumb finger as the touch pad **6** is manipulated with the index finger. The jog dial may also be provided on the left or right side edge of the touch pad **6** carrying the LCD **7**. The jog dial may also be arranged longitudinally along the left or right sides of the touch pad **6**. The jog dial may also be arranged transversely along the upper or lower edge of the touch pad **6**, or longitudinally between the right and left buttons of the touch pad **6**. The jog dial may also be arranged longitudinally between G and H keys of the keyboard **5**. The jog dial may also be arranged at an optional angle in such a direction as to permit facilitated manipulation with representing fingers without limitations to the longitudinal or transverse mounting direction. The jog dial may also be arranged at such a position as to permit manipulation with a thumb finger on the lateral side of the mouse as a pointing device.

[0095] An illustrative electrical structure of the notebook personal computer **1** is explained with reference to **FIG. 11**. The CPU (Central Processing Unit) **51** is formed by e.g., a Pentium (trademark) processor manufactured by Intel Company and is connected to a host bus **52**. To the host bus **52** is also connected a Northbridge **53** which also is connected to a PCI bus **56**. The Northbridge **53** is formed by e.g., 400BX manufactured by Intel Company and is configured for controlling the CPU **51** or a main memory **54**. Meanwhile, the Northbridge **53** and a Southbridge **58**, as later explained, constitute a so-called chip set.

[0096] The Northbridge **53** is also connected to a main memory **54** and a cache memory **55**. The cache memory **55** is adapted for caching data used by the CPU **51**. The CPU **51** also has a primary cache memory enclosed therein, although such cache memory is not shown.

[0097] The main memory **54** is made up by, for example, a DRAM (dynamic Read Only memory), and is adapted for storing a program executed by the CPU **51** or data required for operation of the CPU **51**. Specifically, at a time point of end of booting, an E-mail program **54**A, an autopilot program **54**B, a jog dial status monitoring program **54**C, a jog dial driver **54**D, an operating program (OS) **54**E and other application programs **54**F**1** to **54**F*n* are transferred to and stored in the main memory **54**.

[0098] It should be noted that this notebook personal computer **1** fetches a map viewer software program **54**F**1** from the HDD **67** for execution. The information processing method of the present invention is applied in particular to this program as an application program **54**F**1** adapted for coping with the jog dial. Among specified examples of the map viewer software program, there is the Navin' You (trademark) as a map displaying tool for demonstrating the current position based on GPS. As for details of this Naving'You, reference is had to an Internet home page with the URL of http://vaio.sony.co.jp/software/NavinYou/top.html. In sum, this Navin'You is such a software which allows to manipulate a map with a realistic visual sense and a perspective feeling, by representing the intersections or indications approaching towards the user in keeping with car movement, as if the user is looking from above, to add to the conventional planar map display. The height of flight can be adjusted freely by a preset operation, and high speed scrolling is possible by simply advancing the pointer in a desired bearing. So, the user's operation in car driving may be likened to manipulation of an aircraft.

[0099] In this map view program, the map is displayed on the LCD **7** as shown in **FIGS. 12***ff*. It is necessary to prevent the map displaying area from being hidden to more than a necessary extent, without enlarging the display area, despite the fact that a menu display area is demonstrated in hierarchical layers. An operational instance for this case will be explained subsequently ind detail.

[0100] The E-mail program **54**A is a program for receiving/sending a communication message over a communication network, such as telephone network **76**, through a modem **75**, as later explained. The E-mail program **54**A has an oncoming mail acquisition function, as a specified function. This oncoming mail acquisition function checks to see whether or not a mail addressed to the user, if any, is left in a mail box **79** of a mail server **78** formed in the provider **77**, and acquires such mail.

[0101] The autopilot program **54**B sequentially boots a plural number of preset processing operations or programs in a preset order for executing the processing operations.

[0102] The OS (basic program software) **54**E, typified by Windows 95 (trademark), Window 98 (trademark) of Microsoft Company or MAC OS of Apple Computer Company (trademark), controls the rudimentary operations of a computer.

[0103] The jog dial status monitoring program **54**C receives a notice from the above respective applications as to whether or not the jog dial can be accommodated while operating for indicating what can be done on actuating the jog dial **4** if the jog dial can be accommodated. Usually, the jog dial status monitoring program **54**C is awaiting an event of the jog dial **4**, and has a list for receiving the notice from an application. The jog dial driver **54**D executes various functions responsive to actuation of the jog dial **4**.

[0104] A video controller **57** is also connected to the PCI bus **56** and is adapted for controlling the display of the LCD **7** on the display unit **3** based on the data supplied over the PCI bus **56**.

[0105] A sound controller **64**, connected to the PCI bus **56**, captures an input from the microphone **66**, or sends speech signals to the loudspeaker **65**. The modem **75** is also connected to the PCI bus **56**. The modem **75** may be connected to a communication network **80**, such as Internet, or to a mail server **78**, over a public telephone network **76** of an Internet service provider **77**.

[0106] The Southbridge **58**, also connected to the PCI bus **56**, is formed by, for example, P11X4E of Intel Company to control variegated I/O (input/output) devices. That is, the Southbridge **58** is constituted by an IDE (Integrated Drive Electronics) controller/configuration register **59**, a timer circuit **60** and by an IDE interface **61**, to control the devices connected to the IDE bus **62** or those connected over e.g., an ISA/EIO (Industry Standard Architecture/ Extended Input Output) bus **63** and an embedded controller **68**.

[0107] The IDE controller/ configuration register **59** is made up by two IDE controllers, that is by a so-called primary IDE controller and a secondary IDE controller, not shown, and by a configuration register, also not shown.

[0108] The primary IDE controller is connected over IDE bus **62** to a connector, not shown, and an HDD **67** is connected to the connector. To the secondary IDE controller, a connector of a bay device, which is a so-called IDE device, exemplified by a CD-ROM drive, not shown, a second HDD or FDD, also not shown, is adapted for being connected electrically when such pay device is mounted in position.

[0109] In the HDD **67**, there are stored, in addition to an E-mail program **67**A, an autopilot program **67**B, a jog dial state monitor program **67**C, a jog dial driver **67**D and an OS (basic program software) **67**E, an application program **67**F**1**, which is the aforementioned map viewer software program, and a plural number of application softwares **67**F*n*. These programs **67**A to **67**E and **67**F**1** to **67**F*n* in the HDD **67** are sequentially transmitted to and stored in the RAM **54** during the boot-up process.

[0110] To the ISA/EIO bus **63**, there is additionally connected an embedded controller **68**, comprised of a microcomputer and which is used as an I/O controller. That is, the embedded controller **68** is comprised of an interconnection of an I/O interface **69**, a ROM **70**, a RAM **71** and CPU **72**.

[0111] In the ROM **70**, an LED control program **70**A, a touchpad input monitor program **70**B, a key input monitor program **70**C, a wake-up program **70**D and a jog dial state monitor program **70**E are pre-stored.

[0112] The LED control program **70**A is a program for controlling the on/off of a power supply battery lamp PL, a battery lamp BL, a message lamp ML, as necessary, and other LED lamps. The touchpad input monitor program **70**B is a program for monitoring the inputting from the touch pad **6** by the user. The key input monitor program **70**C is a program for monitoring the inputting from the keyboard **5** or from other key switches. The wake-up program **70**D is a program for checking whether or not the time is the preset

time, based on the current time data supplied from a timer circuit **60** in the Southbridge **58**, and for booting up the preset processing or program at the pre-set time by way of supervising respective chip power supply units.

[**0113**] The jog dial state monitor program **70**E is a program for perpetually monitoring whether or not the rotary encoder **12** of the jog dial **4** has been rotated or pressed.

[**0114**] The ROM **70** also has recorded therein BIOS**70**F. The BIOS (Basic Input/Output System) is a software program controlling the data exchange (inputting/outputting) between the OS or the application software and peripheral equipment, such as display, keyboard or HDD.

[**0115**] The RAM **71** includes respective registers, such as LED control, touchpad input status, key input status and time setting registers, and I/O registers for monitoring the jog dial state, as registers **71**A to **71**F. For example, the register **71**A, that is an LED control register **71**A, controls the turning on of the message lamp ML, indicating the instantaneous boot-up state of the E-mail, as later explained, when the jog dial **4** is pressed. In the key input status register **71**C, an operating key flag is stored when the jog dial **4** is thrust by way of performing a one-touch operation. The setting time register **71**D is able to set an optional time point.

[**0116**] To the embedded controller **68**, the jog dial **4**, touchpad **6** and the keyboard **5** are connected via a connector, not shown, such that signals associated with respective operations on the jog dial **4**, touchpad **6** and the keyboard **5** may be output over an ISA/EIO bus **63**. To the embedded controller **68**, there are connected the power supply battery lamp PL, battery lamp BL, message lamp ML and other LED lamps.

[**0117**] To the embedded controller **68**, there is further connected a power supply control circuit **73**. The power supply control circuit **73** is connected to an enclosed battery **74** or to an AC power supply to supply the power as necessary to the respective blocks, while performing control for charging the enclosed battery **74** or to secondary batteries of the peripheral devices. The embedded controller **68** also monitors the power supply switch **8** actuated when turning the power supply on or off.

[**0118**] The embedded controller **68** is able at all times to run the programs **70**A to **70**E, by an internal power supply even when the power supply **8** is off. That is, these programs are running at all times even if no windows are opened on the LCD **7** of the display unit **3**. That is, even when the power supply **8** is off and the OS **54**E is not booted in the CPU **51**, the embedded controller **68** runs the jog dial state monitor program **70**E at all times. In particular, if the notebook personal computer **1** is not provided with a dedicated key, the notebook personal computer **1** may be endowed with a programmable power key (PPK) function, although details are not shown, such that, even in the power saving state, or in power supply down state, the user's favorite software or script file may be booted on the user simply pressing the jog dial **4**.

[**0119**] A few operating instances are hereinafter explained for the case of reading out the map view software program stored in the HDD **67** into the RAM **54** by the notebook personal computer **1** for execution on the map viewer software program **54**F**1**. As these operating instances, display of a navigation menu (Navi menu [Navi Menu]), erasure of the navigation menu, destination setting by the navigation menu, change in the destination setting by the navigation menu and the scrolling processing by the navigation menu, are hereinafter explained with reference to **FIGS. 12 and 13**, **FIGS. 14 and 15**, FIGS. **16** to **24**, FIGS. **25** to **31** and to FIGS. **32** to **40**, respectively. The area which demonstrates the navigation menu, or the navigation menu display area **106**, is equivalent to the aforementioned entire menu display area **106**. This navigation menu display area **106** is classified into the hysteresis hierarchical menu area **106***a* and the current menu area **106***b*.

[**0120**] First, the display and erasure of the navigation menu are explained. If, from the map displaying state shown in **FIG. 12**, the cursor is moved with the touch pad **6** onto the [navi menu "Navi Menu"] represented on the right lower end, the click button is pressed. Alternatively, after the cursor is moved with a mouse, the right button is clicked. This demonstrates a navigation menu shown in **FIG. 13**. The navigation menu may also be adapted to be displayed in association with the rotation in the upward or downward rotation, the operation of pressing the jog dial **4** or with the operation of pressing the [upward arrow button] on the keyboard. The display of the navigation menu, that is the [navi menu "Navi Menu"]**121**, is displayed in the hysteresis hierarchical menu area **106***a*.

[**0121**] If the navigation menu is not to be displayed, the cursor is moved with the touch pad **6** onto the [navi menu "Navi Menu"]**121** displayed in the hysteresis hierarchical menu area **106***a*, beginning from the map displaying state shown in **FIG. 14**, after which the click button is pressed. Alternatively, the right button is clicked after cursor movement with the touch pad **6**. This erases the navigation menu as shown in **FIG. 15**. The [ENTER] key and the [SPACE] key on the keyboard may also be pressed after setting the cursor on [navi menu "Navi Menu"] on the [navi menu "Navi Menu"]**121** to erase the navigation menu.

[**0122**] The destination setting by the navigation menu is now explained. From the state in which the [navi menu "Navi Menu"]**121** (navigation menu) is demonstrated in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 16**, the jog dial **4** is rotated to shift the cursor to [address selection by an address] in the current menu area **106***b*. The jog dial **4** is then pushed in for decision. Then, [select the destination with address] is displayed in the hysteresis hierarchical menu area **106***a* of the entire menu display area **106** as the hysteresis information, as shown in **FIG. 17**. Then, in an area in the current menu area **106***b*, sandwiched between the list up button **110***u* and the list down button **110***d*, [Hokkaido] up to [Niigata-ken] is displayed. Ahead of the names of the to-do-fu-ken (administrative partition of Japan) are entered folder marks **108** for indicating that these names are provided with lower hierarchical layers. In the initial state, the cursor **109** is focused on [Hokkaido].

[**0123**] If, responsive to actuation of the jog dial **4**, the cursor **109** is to be moved to [Tokyo-to] displayed in the current menu area **106***b*, as shown in **FIG. 18**, the cursor **109** is moved to a mid portion in the current menu area **106***b*. On surpassing this mid portion, the list begins and continues to scroll until [Tokyo-to] is positioned at the mid portion. At this time, [Tokyo-to] is scrolled by four rows towards above in the area between the list up button **110***u* and the list down button **110***d* such that [Hokkaido]. [Aomori-ken], [Akita-

ken] and [Iwate-ken] disappear from the list up side button **110***u*, while [Toyama-ken], [Gifu-ken], [Ishikawa-ken] and [Fukui-ken] are presented on the list button **110***d*.

[**0124**] If the cursor **109** is focused on [Tokyo-to] and the jog dial **4** is thrust to decide on the selection, [Tokyo-to] is demonstrated as the hysteresis information below [select destination based on address] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 19**. At this time, [Aogashima-mura] to [Kunitachi-shi] are displayed as lower hierarchical layer information for [Tokyo-to] in the current menu area **106***b*. In the initial state, the cursor **109** is focused on [Aogashima-mura].

[**0125**] If it is attempted to move the cursor **109** to [Ohta-ku], as shown in **FIG. 20**, the cursor **109** is shifted to a mid portion of the current menu area **106***b*. If this is surpassed, the list begins and continues to scroll, such that [Ohta-ku] is positioned at the mid portion. Since the [Ohta-ku] is scrolled two rows towards the upper side, between the list up button **110***u* and the list down button **110***d*, [Aogashima-mura] and [Shoujima-shi] disappear on the side of the list up button **110***u*, while [Kozushima-mura] and [Koto-ku] appear on the side of the list down button **110***d*.

[**0126**] If the cursor **109** is focused on [Ohta-ku] and the jog dial **4** is thrust to decide on the selection, [Tokyo-to] is demonstrated as the hysteresis information below [Tokyo-to] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 21**. At this time, [Ikegami] to [Kitamine-cho] are displayed as lower hierarchical layer information for [Ohta-ku] in the current menu area **106***b*. In the initial state, the cursor **109** is focused on [Ikegami].

[**0127**] If it is attempted to move the cursor **109** to [Kamata], as shown in **FIG. 22**, the cursor **109** is shifted to a mid portion of the current menu area **106***b*. If this is surpassed, the list begins and continues to scroll, such that [Kamata] is positioned at the mid portion. Since [Kamata] is scrolled two rows towards the upper side, between the list up button **110***u* and the list down button **110***d*, [Ikegami] and [Ishikawa-cho] disappear on the side of the list up button **110***u*, while [Kugahara] and [Keihin-jima] appear on the side of the list down button **110***d*.

[**0128**] If the cursor **109** is focused on [Kamata] and the jog dial **4** is thrust to decide on the selection, [Kamata] is demonstrated as the hysteresis information below [Ohta-ku] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 23**. At this time, the address information [1-1] to [1-15] are displayed as lower hierarchical layer information for [Kamata] in the current menu area **106***b*. In the initial state, the cursor **109** is focused on [1-1].

[**0129**] If the address selection is decided on in **FIG. 23** by the operation of the jog dial **4**, the current position is displayed on the map with start (START) and the destination [Tokyo-to Ohta-ku Kamata #-#] is displayed with a goal flash mark GF, as shown in **FIG. 24**. It is noted that one of the address information [1-1] to [1-15] is inserted for the address information #-#.

[**0130**] The change of the destination setting by the navigation menu is hereinafter explained. It should be noted that the destination setting is to be changed from the state shown in **FIG. 25**. In **FIG. 25**, the hysteresis information having the hierarchy of [select destination based on address], [Tokyo-to], [Ohta-ku] and [Kamata] is displayed in the hysteresis hierarchical menu area **106***a*, while the address information [1-1] to [1-15] for [Kamata] is displayed in the current menu area **106***b*. For changing the setting of [ku] of the destination, [Ohta-ku] displayed in the hysteresis hierarchical menu area **106***a* is selected responsive to actuation of the jog dial **4**, as shown in **FIG. 26**. In the current menu area **106***b*, [ku] including [Ohta-ku], and also including mura (village) and shi (city) in this case, are displayed from [Aogashima-mura] to [Kunitachi-shi] in the current menu area **106***b*, as shown in **FIG. 27**.

[**0131**] If it is attempted to move the cursor **109** to [Shibuya-ku], as shown in **FIG. 28**, the cursor **109** is shifted to a mid portion of the current menu area **106***b*. If this is surpassed, the list begins and continues to scroll, such that [Shibuya-ku] is positioned at the mid portion. Since [Shibuya-ku], not displayed in the state of **FIG. 27**, is scrolled 16 rows towards the upper side, between the list up button **110***u* and the list down button **110***d*, [Aogashima-mura] to [Kiyose-shi] disappear on the side of the list up button **110***u*, while [Kozushima-mura] to [Tama-shi] appear on the side of the list down button **110***d*.

[**0132**] If the cursor **109** is focused on [Shibuya-ku] and the jog dial **4** is thrust to decide on the selection, [Shibuya-ku] is demonstrated as the hysteresis information below [Tokyo-to] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 29**. At this time, [Uehara] to [Zin-nan] are displayed as lower hierarchical layer information for [Shibuya-ku] in the current menu area **106***b*. In the initial state, the cursor **109** is focused on [Uehara].

[**0133**] If the cursor **109** is moved to [Ebisu], using the jog dial **4**, as shown in **FIG. 30**, to decide on the selection, as shown in **FIG. 30**, the hierarchical hysteresis information [Ebisu] is demonstrated below [Shibuya-ku] in the hysteresis hierarchical menu area **106***a*, while the address information [1-1] to [1-15] is displayed in the current menu area **106***b*, as shown in **FIG. 31**. If the address selection is decided on by the operation on the jog dial **4**, the current position on the map is displayed with start (START) and the destination [Tokyo-to Shibuya-ku Ebisu #-#] is displayed with a goal flash mark.

[**0134**] The scrolling processing by the navigation menu is hereinafter explained. In the following explanation, representation of the to-do-fu-ken names in the current menu area **106***b*, associated with the menu of [select destination based on address] as indicated in the hysteresis hierarchical menu area **106***a* of **FIG. 32** is taken as an example. In the initial state, the cursor **109** is focused on the [Hokkaido]. As the jog dial **4** is rotated towards below, the cursor **109** is moved to [Iwate-ken] half-way, as shown in **FIG. 33**. As the jog dial **4** is further rotated towards below, the cursor **109** is moved to [Ibaraki-ken] at a mid portion of the current menu area **106***b*, as shown in **FIG. 34**. If the focus of the cursor **109** surpasses the mid portion of the current menu area **106***b*, the list of the to-do-fu-ken names scrolls, without the cursor itself being moved, as shown in FIGS. **35** to **37**. When the state of **FIG. 37** is reached, that is when [Kochi-ken] is at a mid position as indicated by the cursor **109**, all names of to-do-fu-ken are displayed in the current menu area **106***b*, with [Okinawa-ken] at the trailing end, between the list up button **110***u* and the list down button **110***d*, so that there is no hidden name of to-do-fu-ken. The scrolling of the list then ceases. If rotation of the jog dial **4** is continued further,

the cursor **109** is moved from [Kumamoto-ken] to [Okinawa-ken], as shown in FIGS. **38** to **39**, until finally the cursor disappears from the current menu area **106***b* to point to [navi menu "Navi-Menu"]**21** on the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 40**.

[**0135**] The list up button **110***u* and the list down button **110***d* are displayed with emphasis in case of a command for vertical movement on the jog dial **4**, by way of feedback to the user's actuation. This emphatic representation is particularly useful when the list itself performs scrolling, as explained previously.

[**0136**] Thus, in the notebook personal computer **1**, shown in **FIG. 9**, the hierarchical menu representation, associated with rotation and pressing of the jog dial **4**, can be applied to the map viewer software program, so that it is possible to represent the current hierarchical hysteresis layer in the menu pertinent to the map viewer software program. By representing the hierarchical hysteresis, it becomes possible with advantage to assist the user in comprehending the menu structure pertinent to the map viewer software program as well as to promote the ease in learning the operating procedure. It is moreover possible to furnish the function of direct reversion to the particular past hierarchical layer to realize more flexible user interface.

[**0137**] A third embodiment of the present invention is hereinafter explained. This third embodiment is directed to a portable telephone set **10** shown in **FIG. 41**. This portable telephone set **10** has a casing on the upper surface of which is provided an antenna for transmission **11** and on upper and lower portions of the front surface of which are provided a telephone receiver **12** and a telephone transmitter **13**. Between the telephone receiver **12** and the telephone transmitter **13**, there are provided a dial key **14** and a display **15** formed by a liquid crystal display device.

[**0138**] The portable telephone set **10**, shown in **FIG. 41**, is provided with a jog dial **16** having a circular-shaped knob that is both rotatable and movable radially. This jog dial **16** may be rotated to cause cursor movement, while it may also be pushed in the radial direction to operate as a non-lock decision key. The jog dial **16** is used for performing variable functions customarily provided on a portable telephone set. For example, the jog dial **16** may be operated to switch to a display screen of registered telephone numbers or to select the number displayed. This is the so-called telephone directory function of sequentially displaying the registered telephone numbers on a display **15** to select and transmit desired telephone number.

[**0139**] Among the methods of displaying and selecting the telephone numbers, registered on operation of the jog dial **16**, there are the following methods:

[**0140**] A first method is applied to a case in which telephone numbers are registered in terms of columns of the 50-syllabary table of the Japanese hiragana or katakana letters. As a first stage, respective columns of [a], [ka], [sa], [ta], [na], . . . are demonstrated on a display screen, with scrolling, and the desired column group is selected by pressing the jog dial. As a second stage, the registered telephone numbers, included in the so selected column group, are displayed with scrolling on the display screen by jog dial rotating operation to select the desired telephone number by the pressing operation on the jog dial.

[**0141**] A second method is applied to a case in which telephone numbers are registered in groups each made up by plural persons. As a first step, the respective groups are demonstrated with scrolling on a display screen by a jog dial rotating operation. As a second step, the registered telephone numbers in the sequence of the 50-syllabary table, included in the so selected group, are displayed with scrolling on the display screen by a jog dial rotating operation to select the desired telephone number by the pressing operation on the jog dial.

[**0142**] In both the first and second methods, the portable telephone set **10** shown in **FIG. 41**, may be operated using the jog dial **16** and the display **15**. Moreover, with this portable telephone set **10**, the menu display area for selection and display of the telephone numbers can be demonstrated on the display **15**, without enlarging the area, even although the menu display area for telephone number selection and display is of the hierarchical display type. This operation will be explained in detail subsequently.

[**0143**] **FIG. 42** shows an electrical structure of the portable telephone set **10**. In **FIG. 42**, the parts or components similar to those of **FIG. 41** are denoted by the same reference numerals and the corresponding description is partially omitted for clarity.

[**0144**] In **FIG. 42**, the antenna **11** and a high frequency transmission/reception circuit **21** of the portable telephone set **10** are interconnected to send or receive the high frequency transmission signal or the high frequency reception signal. Moreover, the high frequency transmission/reception circuit **21** and a baseband processing circuit **22** are interconnected to send or receive transmission and reception signals.

[**0145**] The baseband processing circuit **22** is connected through speech amplification circuits **23**, **24** to the telephone receiver **12** and to the telephone transmitter **13**, respectively, to send or receive speech signals, while being connected to a system control circuit (CPU) **31** to send or receive control signals.

[**0146**] To the system control circuit **31** are connected an operating unit including a dial key **14** and a jog dial **16** and a ROM **32** having stored therein variegated programs including a text input routine. To the system control circuit **31** is also connected a liquid crystal display device (LCD) **15** over a driving circuit **33**. The power necessary for operating various components is supplied from a battery **39**.

[**0147**] In the ROM **32**, there is stored a telephone directory program which depends on the method of displaying and selecting the telephone number registered by the operation of the jog dial **16**. In particular and, this telephone directory program has a menu by a first method for displaying and selection of the telephone number according to the 50-syllabary table and a menu by a second method for displaying and selection of the telephone number according to the groups of individuals. It is noted that the menu display area for selection and display of the telephone number may be displayed in the display device **15**, without enlarging the area, even although the menu display area for telephone number selection and display is of the hierarchical display type.

[**0148**] The above telephone directory program, stored in the ROM **32**, is executed by the system controller **31**. The

operation when the system controller **31** of the portable telephone set **10** executes the telephone directory program and specified instances on the display **15** are hereinafter explained with reference to FIGS. **43** to **48**.

[**0149**] If the execution of the telephone directory program is commanded by the dial key **14**, another operating key or by a preset operating key of the jog dial **16**, the system controller **31** executes the above program to display the entire menu display area **106**, shown in **FIG. 43**A, on the display **15**. The entire menu display area **106** is divided into the hysteresis hierarchical menu area **106***a* and the current menu area **106***b*, as mentioned above. The [telephone directory top menu] is displayed in the hysteresis hierarchical menu area **106***a*, whilst the [50-syllabary group] menu by the first method and the [individual group] by the second method are displayed with respective folder marks **108** in the current menu area **106***b*. In the initial state, the cursor **109** is focused on the [50-syllabary group] menu.

[**0150**] If, in the focused state of the cursor **109**, shown in **FIG. 43**A, the jog dial **16** is pressed to decide on the selection, the hierarchical hysteresis information [50-syllabary group] is displayed below the [telephone directory top menu] in the hysteresis hierarchical menu area **106***a*, whilst [a], [ka], [sa], [ta], [na] and [ha] columns are displayed, along with folder marks **108**, in the list up button **110***u* and the list down button **110***d* in the current menu area **106***b*, as shown in **FIG. 43B**. In the initial state, the cursor **109** is focused on the [a] column.

[**0151**] If the cursor **109** is moved to the [ka] column, with the operation of rotating the jog dial **16** in the downward direction, as shown in **FIG. 43**C, and the jog dial **16** is pressed to decide on the selection, the hierarchical hysteresis information [ka] is displayed below the [50-syllabary group] in the hysteresis hierarchical menu area **106***a*, such that respective registered appellations of the [ka] column and the telephone numbers are displayed between the list up button **110***u* and the list down button **110***d* of the current menu area **106***b*, as shown in **FIG. 44A**. In the initial state, the cursor **109** is focused on the uppermost name [Kato].

[**0152**] If the cursor **109** is moved to the name [Kimura] by rotational operation of the jog dial **16**, and the jog dial **16** is pressed to decide on the selection, as shown in **FIG. 44**B, transmission to [Kimura] occurs automatically.

[**0153**] If the callee is to be changed, the cursor **109** is moved to and decided on the [-ka] displayed in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 44C**. Then, the [a], [ka], [sa], [ta], [na] and [ha] columns, thus including the [ka] column, are displayed, along with folder marks **108**, between the list up button **110***u* and the list down button **110***d*, as shown in **FIG. 45A**. In the initial state, the cursor **109** is focused on the [a] column.

[**0154**] If the cursor **109** is moved to and decided on the column [sa] displayed in the current menu area **106***b*, as shown in **FIG. 45**B, the hierarchical hysteresis information indicating the selection of the [-sa] column is displayed below the [50-syllabary group] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 45C**. In the current menu area **106***b*, the registered names and telephone numbers of the column [sa] are displayed. In the initial state, the cursor **109** is focused on the uppermost name [Sato].

[**0155**] If the cursor **109** is moved to the name [Sasaki] by rotational movement of the jog dial **16**, and the selection is decided on by the thrusting operation of the jog dial **16**, as shown in **FIG. 46**A, transmission to [Sasaki] occurs automatically.

[**0156**] A specified instance of changing the display and selection of the telephone number of the individual group, as from the state shown in **FIG. 46**A, in accordance with the above-mentioned second method, is now explained. If the cursor **109** is moved to and decided on the [-50-syllabary group] demonstrated in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 46**B, not only the [50-syllabary group] but also the [individual group] is demonstrated along with the folder marks **108**, as shown in **FIG. 46C**. In the initial state, the cursor **109** is focused on the [50-syllabary group].

[**0157**] If the cursor **109** is moved to and decided on the [individual group] by the rotating and thrusting movement of the jog dial **16**, as shown in **FIG. 47**A, the hierarchical hysteresis information indicating the selection of the [-individual group] is displayed below the [telephone directory top group] indicating the selection of the [-individual group], as shown in **FIG. 47B**. In the initial state, the cursor **109** is focused on the [friend] in the uppermost row in the current menu area **106***b*.

[**0158**] If the cursor **109** is moved to the [Company] responsive to the rotating actuation of the jog dial **16**, and the selection is decided on responsive to the thrusting operation of the jog dial **16**, the hierarchical hysteresis information indicating the selection of [. . . Company] is demonstrated below the [-individual group] in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 48A**. At this time, the names and telephone numbers of registered entities of the [Company] are displayed between the list up button **110***u* and the list down button **110***d* in the current display area **106***b*. In the initial state, the cursor **109** is focused on the name [Abe] at the upper end. If the selection is decided on in this state, by the pressing on the jog dial **16**, transmission to [Abe] occurs automatically.

[**0159**] If the callee is to be changed, the cursor **109** is moved to and decided on the [. . . Company] displayed in the hysteresis hierarchical menu area **106***a*, as shown in **FIG. 48B**. Then, [friends], [companies] and [relatives] are indicated, along with the folder marks **108**, in the current menu area **106***b*, as shown in **FIG. 48C**. In the initial state, the cursor **109** is focused on the [friends] of the uppermost row in the current menu area **106***b*.

[**0160**] Thus, in the portable telephone set **10**, shown in **FIG. 41**, the hierarchical menu display which is responsive to the rotation and thrusting of the jog dial **16** may be applied to the telephone directory program, and hence it becomes possible to express the current hierarchical hysteresis layer in the menu pertinent to the telephone directory program. The display of the hierarchical hysteresis has a merit that it becomes possible with advantage to assist the user in comprehending the menu structure pertinent to the map viewer software program as well as to promote the ease in learning the operating procedure. It is moreover possible to furnish the function of direct reversion to the particular past hierarchical layer to implement more flexible user interface.

[**0161**] Although the user interface device in each of the above-described first to third embodiments is the uniaxially controlled jog dial, the present invention is not limited to use

of the jog dial such that other suitable operating keys, such as cross-shaped keys, may also be used.

[0162] Although a map viewer program or a telephone directory program, for example, has been given as the applicable software program, these are merely illustrative such that any other suitable software programs may be used provided that the information is displayed and selected in a hierarchical menu representation. In particular, such a software program having certain limitations as to menu display and selection may suitably be used.

[0163] For example, the present invention may suitably be applied to an image shaping or image capturing program in which menu display and selection may be hierarchically performed within the menu display of a fixed size without affecting the image display area.

[0164] Industrial Applicability

[0165] According to the present invention, the current hierarchical hysteresis layer can be represented in an operating menu system having a hierarchical structure. On the other hand, reversion to a particular past hierarchical layer becomes possible by moving the focus to and deciding on the hierarchical hysteresis layer itself which becomes part of the menu. The transverse width of the menu itself can be suppressed by a focused menu letter string scrolling on the display section.

1. An information processing apparatus comprising:

operating means;

display means for displaying an item as an object of selection which employs said operating means, and for hierarchically displaying the hysteresis information relevant to display of said item; and

control means for controlling the display and selection of said item in said display means and the hierarchical display and selection of said hysteresis information.

2. The information processing apparatus according to claim 1 wherein said control means displays the hysteresis information on said display means as it traces from the past to the present, responsive to selection employing said operating means, in association with and in distinction from said item.

3. The information processing apparatus according to claim 2 wherein said control means hierarchically displays the hysteresis information in a preset area in said display means in distinction from said item.

4. The information processing apparatus according to claim 3 wherein said control means causes said hysteresis information and said item in a vertical direction in preset areas in said display means.

5. The information processing apparatus according to claim 3 wherein said display means includes, in said preset area, a hierarchical hysteresis display area for displaying the hysteresis information and for allowing to select the hysteresis information using said operating means, and a current display area for displaying said current item and for allowing to select said item using said operating means.

6. The information processing apparatus according to claim 5 wherein said control means hierarchically displays said hysteresis information in said hierarchical hysteresis display area responsive to the selection employing said operating means.

7. The information processing apparatus according to claim 5 wherein when the hysteresis information displayed in said hierarchical hysteresis display area is selected using said operating means, said control means causes an item corresponding to the selected hysteresis information to be displayed in said current display area.

8. The information processing apparatus according to claim 5 wherein said control means causes seamless movement of an indicating mark, displayed on said display means in association with the operation on said operating means, between said hierarchical hysteresis display area and the current display area.

9. The information processing apparatus according to claim 8 wherein said control means causes continuous movement of said indicating mark, displayed on said display means responsive to the operation on said operating means, between the uppermost layer information of said hysteresis information in said hierarchical hysteresis display area and the lowermost layer item in said current display area.

10. The information processing apparatus according to claim 5 wherein, if there is a lower hysteresis layer for the current item displayed in said current display area, a mark indicating such effect is exhibited.

11. The information processing apparatus according to claim 5 wherein, if there are items in said current display area that cannot be displayed at a time, upper and lower marks indicating that effect are exhibited, and said items are cyclically exhibited between the upper and lower marks.

12. The information processing apparatus according to claim 11 wherein said items are scrolled between said upper and lower marks.

13. The information processing apparatus according to claim 11 wherein, when a cursor is focused on an item in said current display area responsive to actuation on said operating means, the cursor is moved up to a mid portion between said upper and lower marks and, when the mid portion is surpassed, said item is scrolled.

14. An information processing method comprising:

an item/hysteresis displaying step of displaying an item as an object of selection employing an operating unit in a display unit and of hierarchically displaying the hysteresis information relevant to the display of said item in said display unit; and

a control step of controlling the display and selection of said item and the hierarchical display and selection of said hysteresis information by said item/hysteresis displaying step.

15. An information processing program including an item/hysteresis displaying step of displaying an item as an object of selection employing an operating unit in a display unit and of hierarchically displaying the hysteresis information relevant to the display of said item in said display unit, and a control step of controlling the display and selection of said item and hierarchical display and selection of said hysteresis information by said item/hysteresis displaying step, said program being executed by an information processing apparatus.

* * * * *