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(54) **Method and apparatus for consistent user interface in a multiple application personal communications device**

Verfahren und Vorrichtung zum Verschaffen einer konsequenten Benutzerschnittstelle in einer persönlichen Kommunikationsanlage mit Mehrfachanwendungen

Méthode et appareil pour fournir un interface d'utilisateur cohérent dans un dispositif de télécommunications personnel à applications multiples

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to data processing systems and data communications systems and more particularly relates to providing a consistent user interface for such systems.

RELATED PATENT APPLICATIONS

[0002] This patent application is related to the copending US patent application serial number 279638, entitled "FIELD PROGRAMMING APPARATUS AND METHOD FOR UPDATING PROGRAMS IN A PERSONAL COMMUNICATIONS DEVICE", IBM docket number BC9-94-100, assigned to the IBM Corporation (issued as US patent number 5590373).

[0003] This patent application is also related to the copending US patent application serial number 145917, entitled "PERSONAL COMMUNICATOR HAVING COLLAPSIBLE KEYBOARD FOR EDITING INFORMATION ON SMALL TOUCH SCREEN DISPLAY", IBM docket number BC9-93-077, assigned to the IBM Corporation (published as European publication number EP0651544).

[0004] This patent application is also related to the copending US patent application serial number 146341, entitled "PERSONAL COMMUNICATOR HAVING IMPROVED ZOOM AND PAN FUNCTIONS FOR EDITING INFORMATION ON TOUCH SENSITIVE DISPLAY" COLLAPSIBLE KEYBOARD FOR EDITING INFORMATION ON SMALL TOUCH SCREEN DISPLAY", IBM docket number BC9-93-078, assigned to the IBM Corporation (published as European publication number EP0651543).

[0005] This patent application is also related to the copending U. S. patent application serial number 146342, entitled "PERSONAL COMMUNICATOR HAVING IMPROVED CONTRAST CONTROL FOR A LIQUID CRYSTAL, TOUCH SENSITIVE DISPLAY" IBM docket number BC9-93-079, assigned to the IBM Corporation (issued as US patent number 5422656).

[0006] This patent application is also related to the copending U. S. patent application serial numbers 07/976,127 and 08/459552, entitled " NAVIGATION APPLICATION FOR PERSONAL COMMUNICATOR", assigned to the IBM Corporation, which resulted in US patent 5537608.

BACKGROUND OF THE INVENTION

[0007] It is widely recognized that digital communications technology and data processing technology are converging. One example of this is the development of portable personal computers that include telephone modems, enabling the transmission of digital information over public switched telephone networks (PSTN). Another example is the development of mobile radio telephones that use microprocessors executing stored programs for sampling and digitizing the voice signal, multiplexing the transmission of the digitized voice signal with other such voice signals, and digitally controlling the operations of the cellular telephone device.

[0008] The most recent evidence of the convergence of digital communications technology with digital personal computer technology, is the SIMON (TM) personal communications device described in the above identified patent applications. The SIMON personal communications device has many features within it to enable personal communications. The personal communications device provides a cellular telephone, a facsimile transmission and receiving capability, an electronic mail sending and receiving capability, and an electronic pager, a computer notepad, a computer address book, a computer calendar, and a computer calculator, all within a single compact portable package.

[0009] The SIMON personal communications device includes a central processing unit (CPU) that executes stored programmed instructions stored in electrically programmable read only memories (EPROM). The stored program instruction in the EPROM's include basic input output operating system (BIOS) programs, and application programs to perform the functions of cellular telephony, public switched telephone network (PSTN) telephony, facsimile transmission and reception, electronic mail, pager functions, computer notepad functions, computer address book functions, computer calendar functions, and computer calculator functions. These stored programs are selectively accessed for execution by the CPU.

[0010] The SIMON personal communications device also includes a liquid crystal display having a touch overlay membrane, to enable the user to input keyboard entries or sketches by tactile pressure with a finger or proximity with a stylus. One example of a touch overlay membrane input device is described in US Patent 4,686,332 by Evon Greanias, et al., entitled "Combined Finger Touch and Stylus Detection System for Use on the Viewing Surface of a Visual Display Device", assigned to the IBM Corporation.

[0011] The storage capacity of the RAM can be augmented by employing supplementary memory in the form of a personal computer memory card (PCMCIA) (Trademark of the Personal Computer Memory Card International Association). The personal computer memory card can include extra RAM to supplement the RAM storage in the personal communications device, by plugging the personal computer memory card into a PCMCIA receptacle slot in the personal communications device.

[0012] The LCD screen presents menu images to the user to enable the selection of communications applications such as telephone, facsimile (FAX), or electronic mail (E-mail). For each of these applications, a corresponding keypad and presentation area is displayed.

The user has the option of employing either a public switched telephone network link or a cellular telephone network link for any of these communications applications. However, the functions required to be performed in order to send or receive a cellular telephone network call are different from the functions required for a call over a public switched telephone network.

[0013] All cellular telephones use two-way radio communications controlled by the cellular telephone network. The ambient atmospheric and geographic conditions can affect the strength of the transmitted signal. When transmitting a large amount of data during a FAX or an E-mail session, an acceptable signal strength is required to ensure that data is not lost and to keep the transmission error-free. A signal strength indicator is required on cellular telephones to enable the user to monitor the signal strength and change its location to improve it. Further, a cellular telephone must be registered with the home region it usually employs as the base for its communications. If the cellular telephone is transported outside of its home region, it becomes a roamer, and a different mode of operation called roaming, is carried out. A cellular telephone must provide an indication to the user as to its current mode of operation, either home or roaming. Such concerns are absent from calls using a public switched telephone network. Users prefer consistency in the appearance and use of menus, keys and displays needed to operate a multiple application device such as the SIMON personal communications device. What is needed is a means to provide a consistent user interface for a multiple application personal communications device, that also provides the customized interface features necessary to enable the user to interact with the selected communications medium, either a public switched telephone network or a cellular telephone network.

[0014] EP-A-0552873 discloses a system allowing adapters to be inserted or removed while keeping the system operational, and which can reconfigure the system according to detected insertion or removal of the adapters.

[0015] US patent 5,331,136 discloses a portable hand-held data terminal including a base module, a keyboard, and a display screen. A data and communications module can be selected from a number of different data and communications modules, for use with the base module which may include a radio frequency communications device and may include a coupling for wire-connection telephone communications.

SUMMARY OF THE INVENTION

[0016] The present invention provides an improved user interface for a multiple application personal communications device.

[0017] In a first aspect, the present invention provides a system for providing a user interface in a multiple application personal communications device, wherein the user interface is adaptive to the requirements of a selected communications link and the system comprises: a mobile radio telephone; a data storage means in the device, for storing program instructions; a bus means in the device, coupled to said data storage; a data processor in the device, coupled to said data storage over said bus means, for executing said stored program instructions; a data display screen in the device, coupled to said data processor, for displaying information; a program means stored in the data storage means, having a first portion for managing communications using a public switched telephone network and displaying a first interface image on the display screen; said program means having a second portion, for managing communications using said mobile radio telephone via connection to a mobile radio telephone network and for displaying a second interface image on the display screen; a decoding means coupled to the data processor and to the data storage means, for selectively causing either said first portion or said second portion of said program means to be executed by the data processor; a first option attach connector having a terminal coupled to said public switched telephone network, for selective coupling to said decoding means; a first connector identification means included with said first option attach connector, for identifying said first option attach connector to said decoding means when said first connector is coupled to said decoding means and, in response thereto, said decoding means causing the execution of said first portion of said program means and the display of said first image; said decoding means being adapted to cause said second portion of said program means to be executed and the display of said second image when said first connector is not coupled to said decoding means.

[0018] In a second aspect, the invention provides a method for providing a user interface in a multiple application personal communications device which includes a data storage means and a data processor and which supports both mobile radio telephony and PSTN communications, wherein the user interface is adaptive to the requirements of a selected communications link, the method comprising: in response to identifying that a first option attach connector is coupled to a decoding means of the device, causing the execution of a first portion of a program means corresponding to PSTN communications, to display on a display screen a first interface image characterizing PSTN communications; and, in response to said first option attach connector not being coupled to the decoding means, causing the execution of a second portion of said program means corresponding to mobile radio telephone communications to display on the display means a second interface image characterizing mobile radio telephone communications.

[0019] Systems according to the invention can include an input means, coupled to the data processor, for receiving communications application selection data - the data processor being adapted to send control sig-

nals to the display means in response to said communications application selection data.

[0020] The invention thus preferably provides a user interface for a multiple application personal communications device, that adapts to the unique requirements of the selected communications link. The invention preferably provides an adaptive user interface for a multiple application personal communications device for communication over both public switched telephone networks and cellular telephone networks.

[0021] The invention is used in a personal communications device that includes a memory that stores the operating system programs and the applications programs for execution by a central processing unit (CPU) in the device. In this embodiment of the invention the programs selectively manage the operations of a cellular telephone, a facsimile receiver, a touch overlay input and display, and several desktop functions such as a calendar, notepad, and electronic mail.

[0022] The device according to this embodiment of the invention is capable of performing many types of communications functions that require a variety of communications links. In addition to the radio link provided for cellular telephony, the device is able to connect to a conventional RJ11 telephone jack for public switched telephone service, to an RS232 serial data connector, to diagnostic cables, to external keyboards, and to hands-free microphones and speakers. To consolidate these connection requirements, an option attach connector is provided for the device. The option attach connector includes three programmable indicator bits that indicate to the device, the role the connector is playing when it is connected to the device.

[0023] In accordance with a preferred embodiment of the invention, the option attach connector has a first indicator bit combination that alerts the device that a public switched telephone network connection has been made to it. The presence of the first indicator bit combination is a signal to the device that telephone, FAX, and E-mail communications applications are to be conducted over a PSTN link. The presence of the first indicator bit combination invokes the stored computer program to display images of menus, keypads, and visual presentations on the LCD display that are consistent with a basic display layout for both cellular telephone network and PSTN modes, but that include customized presentation features that are unique to the PSTN mode of communications.

[0024] Further in accordance with a preferred embodiment of the invention, the presence of a second indicator bit combination different from the first indicator bit combination invokes the stored computer program to display corresponding images of menus, keypads, and visual presentations on the LCD display that are consistent with the basic display layout for both cellular telephone network and PSTN modes, but that include customized presentation features that are unique to the cellular telephone network mode of communications.

[0025] The presence of the predetermined indicator bit combinations also invokes the stored computer program to provide appropriate connections between the PSTN link or the cellular telephone network and the telephone, FAX, and modem hardware in the device. In this manner, consistent user interface is provided for a multiple application personal communications device, that adapts to the unique requirements of the selected communications link.

[0026] An embodiment of the invention will now be described in more detail, by way of example, with reference to the accompanying drawings in which:

FIG. 1A is an overall functional block diagram of a personal communications device, connected to a PSTN option attach connector for voice communications over a PSTN, in accordance with the invention.

FIG. 1B is an overall functional block diagram of a personal communications device, in a cellular telephone network mode, for voice communications over a cellular telephone network, in accordance with the invention.

FIG. 1C is an overall functional block diagram of a personal communications device, connected to a PSTN option attach connector for FAX communications over a PSTN, in accordance with the invention.

FIG. 1D is an overall functional block diagram of a personal communications device, in a cellular telephone network mode, for FAX communications over a cellular telephone network, in accordance with the invention.

FIG. 1E is an overall functional block diagram of a personal communications device, connected to an external microphone and speaker cable option attach connector for voice communications over a cellular telephone network, in accordance with the invention.

FIGS. 2A to 2H are a schematic diagrams of several embodiments of the option attach connector.

FIG. 3 is an illustration of the appearance of the menu image 50M displayed on the display/touch overlay 112.

FIGs. 4A to 4D are a flow diagram of a method to provide a consistent user interface in a multiple feature personal communications device, according to an embodiment of the invention;

FIG. 5A is an illustration of the appearance of the image 50A displayed on the display/touch overlay

112, for voice communications over a PSTN.

FIG. 5B is an illustration of the appearance of the image 50B displayed on the display/touch overlay 112, for voice communications over a cellular telephone network.

FIG. 5C is an illustration of the appearance of the image 50C displayed on the display/touch overlay 112, for FAX communications over a PSTN.

FIG. 5D is an illustration of the appearance of the image 50D displayed on the display/touch overlay 112, for FAX communications over a cellular telephone network.

FIG. 5E is an illustration of the appearance of the image 50E displayed on the display/touch overlay 112, for E-MAIL communications over a PSTN.

FIG. 5F is an illustration of the appearance of the image 50F displayed on the display/touch overlay 112, for E-MAIL communications over a cellular telephone network.

FIG. 6 illustrates the layout of the master image 50X produced by the interface program 180.

FIG. 6A illustrates the layout of the PSTN customizing image 50Y produced by the PSTN screen file 182, that when combined with the master image 50X of FIG. 6 by the interface program 180, produces the image 50A of Fig. 1A and Fig. 5A, as it is displayed on the display/touch overlay 112, for voice communications over a PSTN.

FIG. 6B illustrates the layout of the cellular customizing image 50Z produced by the cellular screen file 184, that when combined with the master image 50X of FIG. 6 by the interface program 180, produces the image 50B of Fig. 1B and Fig. 5B, as it is displayed on the display/touch overlay 112, for voice communications over a cellular telephone network.

DISCUSSION OF THE PREFERRED EMBODIMENT

[0027] The personal communication system diagram of FIG. 1A shows the personal communications device 100. The device 100 includes the RAM 102 which is connected by means of the bus 104 to the CPU 106, which executes the stored program instructions in the RAM 102. RAM 102 contains the ink plane buffer 164 used by the touch overlay membrane to store pels of registered contact points by the user's finger of stylus. RAM 102 contains the display buffer for the LCD display 112. Screen images, such as image 50A in Fig. 1A and Fig. 5A, are represented by a bit map stored in the display buffer 162, that displays the bit map as the image 50A, for example on the display 112. The work space 138 in RAM 102 is used by the operating system program 150 and BIOS 134, as well as by application programs running in the device 100.

[0028] Register 136 stores the option value that is decoded by the decoder 122 from the resistor array 220 in the option attach connector 126(0). The interface program 180, stored in RAM 102, reads the option value stored in register 136 and in response, sends control signals to the audio MUX to configure the connections 60A, for example, between the option attach connector 126(0) and the ear piece and microphone 117. This is described in the flow diagram of FIGs. 4A to 4D.

[0029] The interface program 180 also controls the display of images such as 50A on the display 112, in response to reading the option value stored in the register 136. This is described in the flow diagram of FIGs. 4A to 4D. FIG. 6 illustrates the layout of the master image 50X produced by the interface program 180. When the interface program generates the PSTN telephone function image 50A, for example, it accesses the PSTN screen file 182 in RAM 102 which contains the layout of the PSTN customizing image 50Y shown in Fig. 6A. The interface program 180 combines the PSTN customizing image 50Y with the master image 50X of FIG. 6, to produce the composite image 50A of Fig. 1A and Fig. 5A, as it is displayed on the display/touch overlay 112, for voice communications over a PSTN.

[0030] The RAM 102 also stores the cellular screen file 184, that contains the layout of the cellular customizing image 50Z, that when combined with the master image 50X of FIG. 6 by the interface program 180, produces the image 50B of Fig. 1B and Fig. 5B, as it is displayed on the display/touch overlay 112, for voice communications over the cellular telephone network in Fig. 1B. The audio MUX in Fig. 1B selectively configures the connection 60B connecting the ear piece and microphone 117 to the cellular telephone interface 114.

[0031] The RAM 102 also stores the PSTN FAX screen file 182' that is used by the interface program 180 to produce the image 50C in FIG. 5C, which is an illustration of the appearance of the image 50C displayed on the display/touch overlay 112, for FAX communications over a PSTN in Fig. 1C. The audio MUX in Fig. 1C selectively configures the connection 60C connecting the FAX 172/modem 170 to the PSTN cable 200. FIG. 5E is an illustration of the appearance of the image 50E displayed on the display/touch overlay 112, for E-MAIL communications over a PSTN. Its generation by the interface program 180 and the connections by the audio MUX 160 are the same as that for Fig. 1C.

[0032] The option attach connector 126(1) in Fig. 1E, connects the external microphone and speaker cable 201 over line 169 to the audio MUX 160. The resistor array 220 in the connector 126(1) provides a binary value of "001" as the option value stored in the register 136. In response to this option value, the audio MUX in Fig.

1E selectively configures the connection 60E connecting the external microphone and speaker cable 201 to the cellular telephone interface 114. The image 50B is displayed on the display 112, the same as is displayed in Fig. 1B for cellular telephone voice communications.

[0033] The RAM 102 also stores the cellular FAX screen file 184' that is used by the interface program 180 to produce the image 50D in FIG. 5D, which is an illustration of the appearance of the image 50D displayed on the display/touch overlay 112, for FAX communications over a cellular telephone network in Fig. 1D. The audio MUX in Fig. 1D selectively configures the connection 60D connecting the FAX 172/modem 170 to the cellular telephone interface 114. FIG. 5F is an illustration of the appearance of the image 50F displayed on the display/touch overlay 112, for E-MAIL communications over a cellular telephone network. Its generation by the interface program 180 and the connections by the audio MUX 160 are the same as that for Fig. 1D.

[0034] Also connected to the bus 104 in Fig. 1A, is the BIOS EPROM 108 which stores the basic input output operating system (BIOS) program 134 in 128 kbyte electrically programmable read only memory. Also connected to the bus 104 is the application EPROM 110 which stores application programs. Application programs stored in the application EPROM 110 can include the cellular telephone program 140, the public switched telephone network (PSTN) program 141, the facsimile program 142, the electronic mail (E-MAIL) program 143, the pager program 144, the notepad program 145, the address book program 146, the calendar program 147, the calculator program 148, and other applications and I/O driver programs 149. Also included in the application EPROM 110 is the operating system program 150. Also included in the application EPROM 110 is the PCMCIA card and socket services program 152. The programs stored in the BIOS 108 and the application EPROM 110, can be accessed for execution by the CPU 106.

[0035] The audio multiplexer (MUX) 160 in Fig. 1A, is connected to the bus 104, and accepts control signals from the CPU 106 to selectively interconnect lines 174, 175, 176, and 177. Line 174 is connected through the connector receptacle 124 to the RJ11 PSTN cable 200 in Fig. 1A. Line 175 is connected to the ear piece and microphone 117, that are an integral part of the personal communications device 100. Line 176 is connected to the modem 170 and FAX 172. Data and control signals are directly exchanged between the modem 170/FAX 172 and the CPU 106 over line 179. Line 177 is connected to the cellular telephone interface 114, shown with its radio antenna 116. Data and control signals are directly exchanged between the cellular telephone interface 114 and the CPU 106 over line 178. FIG. 1A shows the personal communications device 100, connected to a PSTN option attach connector 126(0) for voice communications over a PSTN cable 200.

[0036] In accordance with the invention, the option attach connector 126(0) has a first indicator bit combination "000" that alerts the device 100 that a public switched telephone network connection 200 has been made to it. The presence of the first indicator bit combination "000" is a signal to the device 100 that telephone, FAX, and E-mail communications applications are to be conducted over the PSTN cable 200. The presence of the first indicator bit combination "000" invokes interface stored computer program 180 to provide appropriate connections in the audio MUX 160, between the PSTN link 200 and the telephone, FAX, and modem hardware in the device. This is described in the flow diagram of FIGs. 4A to 4D. Fig. 1A shows the audio MUX controlled by the CPU 106 to connect line 174 to line 175 by means of connection 60A, connecting the ear piece and microphone 117 to the PSTN cable 200.

[0037] Further in accordance with the invention, the presence of the first indicator bit combination "000" in Fig. 1A also invokes the stored interface computer program 180 to display images 50A of menus, keypads, and visual presentations on the LCD display 112 that are consistent with a basic display layout for master image 50X of Fig. 6 for both cellular telephone network and PSTN modes, but that include customized presentation features of the PSTN customizing image 50Y of Fig. 6A, that are unique to the PSTN mode of communications. FIG. 6 illustrates the layout of the master image 50X produced by the interface program 180. FIG. 6A illustrates the layout of the PSTN customizing image 50Y produced by the PSTN screen file 182, that when combined with the master image 50X of FIG. 6 by the interface program 180, produces the image 50A of Fig. 1A and Fig. 5A, as it is displayed on the display/touch overlay 112, for voice communications over the PSTN cable 200.

[0038] FIG. 1B is an overall functional block diagram of the personal communications device 100, in a cellular telephone network mode, for voice communications over a cellular telephone network, in accordance with the invention. There is no option attach connector in Fig. 1B, and the state of the decoder 122 is the default state with a binary value of "111" for the option value stored in the register 136. In response to this option value, the interface program 180 executes in the CPU 106. The CPU 106 sends control signals to the audio MUX 160 to make the connection 60B between the ear piece and microphone 117 on line 175 and the cellular telephone interface 114 on line 177. This is described in the flow diagram of FIGs. 4A to 4D.

[0039] Also connected to the bus 104 is PCMCIA receptacle slot which is adapted to receive the personal computer memory card 120. The personal computer memory card is a PCMCIA standard card as specified in the publication "PC Card Standard", release 2.0, published by Personal Computer Memory Card International Association, September 1991. The PCMCIA card and socket services program 152 manages the interface between the CPU 106 and the personal computer memory card 120. The PCMCIA card and socket services pro-

gram 152 is described in greater detail in the publication "Socket Services Interface Specification", release 1.0, published by the Personal Computer International Association, September 1991. The personal computer memory card 120, can include extra RAM storage to perform functions such as backup and restore, and to save facsimile images received by the system 100. The personal computer memory card 120 can also include a read only memory (ROM) which has stored in it other pre-stored information such as a metropolitan phone directory. The personal computer memory card 120 can be configured as a reprogramming card for the personal communications device 100. The reprogramming card can contain pre-stored new programs that are to be loaded into the EPROM's 108 and/or 110.

[0040] Also connected to the bus 104 is the liquid crystal display (LCD) and touch overlay 112, and the cellular telephone interface 114 with its antenna 116.

[0041] The device 100 is capable of performing many types of communications functions over a variety of communications links. In addition to the radio link provided by the cellular telephone interface 114 and its antenna 116, the device 100 must be able to connect to a conventional RJ11 telephone jack for public switched telephone service. The device 100 must also be able to connect to a RS232 serial data connector for data communications applications. The device 100 must also be able to connect to diagnostic cables for diagnosing the operation of the device 100. The device 100 must also be able to connected to an external keyboard when desired. The device must also be able to connect to hands-free microphone and speaker to enable the user to speak on the telephone without having to handle the ear piece and microphone 117 units in the device 100. The ear piece and microphone 117 are an integral part of the personal communications device 100.

[0042] To consolidate the connection requirements for the device 100, the option attach connector 126 and its 33 pin receptacle 124 are coupled to the bus 104 through the decoder 122. The option attach connector 126, shown in greater detail in Figures 2A to 2H and in Figure 3, includes three programmable indicator bits that indicate to the device 100, the role that the option attach connector 126 is playing when it is connected through the receptacle 124 to the decoder 122 and the bus 104.

[0043] In accordance with the invention, the option attach connector 126(0) has one indicator bit combination shown in Fig. 1A that alerts the device 100 that the PSTN connector cable 200 is connected to the device 100.

[0044] FIGs. 2A to 2H show the eight different option attach connector configurations when three ID bits ID0, ID1, and ID2 are used to configure the connector 126. The binary value of each ID bit ID0, ID1, or ID2 is established by the presence or absence of resistors 220 (0), 220(1), or 220(2), respectively, each of which serves as a pull down resistor when connected to the circuit 222 of the decoder 122. For example, if there are no resistors 220 present for the three ID values ID0, ID1 and ID2, this corresponds to a default condition of Fig. 2H where no cable is attached to the connector 126(7). This is shown by the dotted out-line for 126(7) shown in FIG. 2H which corresponds to the binary value "111" for ID0, ID1, and ID2. This is applied in FIGs. 1B and 1D.

[0045] When the option attach connection 126 is configured in Fig. 2G to be the reprogramming option connection 126(6), then a single resistor 220(2) corresponds to the ID2 bit. This produces a binary value of ID0, ID1, and ID2 of "110", which signals to the decoder 122 that the reprogramming option connector 126(6) is connected to the receptacle 124 of the decoder 122.

[0046] If the single resistor 220(1) is in the ID1 bit position, as shown in Fig. 2F, then the option attach connector is configured as 126(5) which indicates that a diagnostic cable 205 is attached to the connector.

[0047] If two resistors 220(1) and 220(2) are connected in the option attach connector 126 at the ID1 and ID2 positions, as shown in Fig. 2E, this corresponds to ID0, ID1, and ID2 equalling a binary "100", which indicates that a personality transfer cable 204 is attached to the connector 126(4).

[0048] In FIG. 2D, if a single resistor 220(0) is placed at the ID0 position, then ID0, ID1, and ID2 equalling a binary "011" is created, which corresponds to the connector 126(3), indicating that an external keyboard cable 203 is attached to the connector 126(3).

[0049] If two resistors 220(0) and 220(2) are placed at the ID0 and ID2 positions, as shown in Fig. 2C, then this corresponds to the connector 126(2), which means that an RS232 interface cable 202 is attached to the connector 126(2).

[0050] In FIG. 2B, if two resistors 220(0) and 220(1) are placed at the ID0 and ID1 positions, this corresponds to the connector 126(1) which has ID0, ID1, and ID2 equalling a binary value of "001", which means that an external microphone and an external speaker are attached by cable 201 to the connector 126(1). This is applied in Fig. 1E.

[0051] Finally, if all three resistors 220(0), 220(1), and 220(2) are placed at the ID0, ID1 and ID2 positions, as shown in Fig. 2A, this corresponds to the connector 126 (0), which indicates that a RJ11 cable is attached at 200, for public switched telephone network operations. The cable 200 is attached to the connector 126(0). This is applied in FIGs. 1A and 1C.

[0052] FIG. 3 is an illustration of the appearance of the menu image 50M displayed on the display/touch overlay 112. The menu image 50M presents the user with communication application options such as voice communications, FAX communications, or E-MAIL communications. The user selects one of the communications applications by touching the touch overlay membrane overlying the displayed application option. The selected application identity is then stored in the work space 138 of the RAM 102, to be used by the interface

program 180, as described in the flow diagram of FIGs. 4A to 4D.

[0053] FIGs. 4A to 4D are a flow diagram of the method to provide a consistent user interface in a multiple feature personal communications device.

[0054] FIG. 4A shows method 400 to provide a consistent user interface in a multiple feature personal communications device. The steps are as follows:

[0055] Step 402: display menu image 50M on display screen 112 (FIG. 3).

[0056] Step 404: Load default value "111" into the options register 136 (option attach connector not present 126(7) of FIG. 2H).

[0057] Step 406: Select none or one of seven option attach connectors 126(0) to 126(7) of FIGS. 2A to 2H, and connect it to connector receptacle 124 (FIG. 1A).

[0058] Step 408: Decode the selected option attach connector 126 with decoder 122 (FIG. 1A).

[0059] Step 410: load the option value into the options register 136 of RAM 102 (FIG. 1A).

[0060] Step 420: Select telephone function from menu on display/touch overlay screen 112 (FIG. 3).

[0061] Step 422: Begin interface program 180 to access options register 136 (FIG. 1A), configure audio MUX, 160 and display screen image on display 112.

[0062] Step 424: If option value in options register = "000" (FIG. 1A)(Corresponding to PSTN cable connector 126(0)), Then configure the audio MUX 160 for path 60A to connect ear piece/microphone 117 from line 175 to line 174 and thru option attach connector 126(0) to the RJ11 PSTN cable 200.

[0063] Step 426: access PSTN screen image file 182 and display PSTN phone screen image 50A on display 112 (FIG. 5A).

[0064] FIG. 4B continues the flow diagram of method 400. The steps are as follows:

[0065] Step 428: If option value in options register = "111" (FIG. 1B) (Corresponding to no connector default state 126(7)), Then configure the audio MUX 160 for path 60B to connect ear piece/microphone 117 from line 175 to line 177 to cellular telephone interface 114.

[0066] Step 430: Access cellular screen image file 184 and display cellular phone screen image 50B on display 112 (FIG. 5B). Step 432: If option value in options register = "001" (FIG. 1E) (Corresponding to external microphone and speaker connector 126(1)), Then configure The audio MUX 160 for path 60E to connect external microphone and speaker cable 210 thru connector 126(1) and line 169 to line 177 to cellular telephone interface 114.

[0067] Step 434: access cellular screen image file 184 and display cellular phone screen image 50B on display 112 (FIG. 5B).

[0068] FIG. 4C continues the flow diagram of method 400. The steps are as follows:

[0069] Step 440: Select FAX receive function from menu on display/touch overlay screen 112 (FIG. 3).

[0070] Step 442: Begin interface program 180 to access options register 136 (FIG. 1C), configure audio MUX, 160 and display screen image On display 112

[0071] Step 444: If option value in options register = "000" (FIG. 1C) (Corresponding to PSTN cable connector 126(0)), Then configure The audio MUX 160 for path 60C to connect FAX 172/modem 170 from line 176 to line 174 and thru option attach connector 126(0) to the RJ11 PSTN cable 200.

[0072] Step 446: Access PSTN screen image file 182' and display PSTN FAX screen image 50C on display 112 (FIG. 5c).

[0073] Step 448: If option value in options register = "111" (FIG. 1D) (Corresponding to no connector default state 126(7)), Then configure the audio MUX 160 for path 60D to connect FAX 172/modem 170 from line 176 to line 177 to cellular telephone interface 114.

[0074] Step 450: Access cellular FAX screen image file 184' and display cellular FAX screen image 50D on display 112 (FIG. 5D).

FIG. 4D continues with the flow diagram of method 400. The steps are as follows:

[0075] Step 460: Select E-MAIL receive function from menu on display/touch overlay screen 112 (FIG. 3).

[0076] Step 462: Begin interface program 180 to access options register 136 (FIG. 1C), configure audio MUX, 160 and display screen image On display 112.

[0077] Step 464: If option value in options register = "000" (FIG. 1C) (Corresponding to PSTN cable connector 126(0)), Then configure the audio MUX 160 for path 60C to connect modem 170 from line 176 to line 174 and thru option attach connector 126(0) to the RJ11 PSTN cable 200 .

[0078] Step 466: Access PSTN screen image file and display PSTN E-MAIL screen image 50E on display 112 (FIG. 5E).

[0079] Step 468: If option value in options register = "111" (FIG. 1D) (Corresponding to no connector default state 126(7)), Then configure the audio MUX 160 for path 60D to connect modem 170 from line 176 to line 177 to cellular telephone interface 114.

[0080] Step 470: Access cellular E-MAIL screen image file & display cellular E-MAIL screen image 50F on display 112 (FIG. 5F).

[0081] The method then returns to the main program. The method 400 is carried out primarily through the execution of program instructions stored in the RAM 102 and executed by the CPU 106.

Claims

1. A system for providing a user interface in a multiple application personal communications device (100), wherein the user interface is adaptive to the requirements of a selected communications link and the system comprises:

   a mobile radio telephone (116);

a data storage means (102) in the device, for storing program instructions;

a bus means (104) in the device, coupled to said data storage;

a data processor (106) in the device, coupled to said data storage over said bus means, for executing said stored program instructions;

a data display screen (112) in the device, coupled to said data processor, for displaying information;

a program means (180) stored in the data storage means, having a first portion for managing communications using a public switched telephone network and displaying a first interface image (50A) on the display screen;

said program means (180) having a second portion, for managing communications using said mobile radio telephone via connection to a mobile radio telephone network and for displaying a second interface image (50B) on the display screen;

a decoding means (122) coupled to the data processor and to the data storage means, for selectively causing either said first portion or said second portion of said program means to be executed by the data processor;

a first option attach connector (126) having a terminal coupled to said public switched telephone network (200), for selective coupling to said decoding means;

a first connector identification means (220) included with said first option attach connector, for identifying said first option attach connector to said decoding means when said first connector is coupled to said decoding means and, in response thereto, said decoding means causing the execution of said first portion of said program means and the display of said first image;

said decoding means being adapted to cause said second portion of said program means to be executed and the display of said second image when said first connector is not coupled to said decoding means.

2. A system according to claim 1, wherein

said first portion of said program means is adapted to display a FAX application image (50C) for communication with a public switched telephone network as said first interface image on the display screen, in response to said first connector identification means included with said first option attach connector identifying said first option attach connector to said decoding means when said first connector is coupled to said decoding means.

3. A system according to claim 1, wherein

said first portion of said program means is adapted to display an E-MAIL application image (50E) for communication with a public switched telephone network as said first interface image on the display screen, in response to said first connector identification means included with said first option attach connector identifying said first option attach connector to said decoding means when said first connector is coupled to said decoding means.

4. A system according to any one of claims 1 to 3, including an option connector receptacle (124) coupled to said decoding means, and wherein coupling said first option attach connector to said decoding means comprises connecting said first option attach connector to said receptacle.

5. A system according to any one of claims 1 to 4, including an input means, coupled to said data processor, for receiving communications application selection data, and wherein said system is adapted to send control signals to said display means in response to said communications application selection data, to display an interface image corresponding to a selected communications application.

6. A system according to claim 5, wherein said communications application selection data is a voice communications selection.

7. A system according to claim 5, wherein said communications application selection data is a FAX communications selection.

8. A system according to claim 5, wherein said communications application selection data is an E-MAIL communications selection.

9. A method for providing a user interface in a multiple application personal communications device (100) which includes a data storage means (102) and a data processor (106) and which supports both mobile radio telephony and PSTN communications, wherein the user interface is adaptive to the requirements of a selected communications link, the method comprising:

in response to identifying (408,410) that a first option attach connector is coupled to a decoding means of the device, causing the execution (422,424, 426) of a first portion of a program

means corresponding to PSTN communications, to display (426) on a display screen a first interface image (50A) characterizing PSTN communications;

in response to said first option attach connector not being coupled to the decoding means, causing the execution (422, 428, 430) of a second portion of said program means corresponding to mobile radio telephone communications to display (430) on the display means a second interface image (50B) characterizing mobile radio telephone communications.

10. A method according to claim 9, wherein said respective first or second portion of said program means is executed in response to communications application selection data, to display an interface image corresponding to a selected communications application.

11. A method according to claim 10, wherein said communications application selection data is a voice communications selection.

12. A method according to claim 10, wherein said communications application selection data is a FAX communications selection.

13. A method according to claim 10, wherein said communications application selection data is an E-MAIL communications selection.

14. A method according to any one of claims 10 to 13, which further comprises:

forming said first image from a master image (50X) and a PSTN communications characterizing image; and

forming said second image from a master image and a cellular telephone communications characterizing image.

Patentansprüche

1. System zur Bereitstellung einer Benutzerschnittstelle in einer persönlichen Kommunikationseinheit (100) für mehrere Anwendungen, wobei die Benutzerschnittstelle auf die Erfordernisse einer ausgewählten Kommunikationsverbindung ausgelegt werden kann und das System Folgendes umfasst:

ein Mobilfunktelefon (116);

ein Datenspeichermittel (102) in der Einheit, um Programmbefehle zu speichern;

ein Busmittel (104) in der Einheit, das mit dem Datenspeicher verbunden ist;

einen Datenprozessor (106) in der Einheit, der über das Busmittel mit dem Datenspeicher verbunden ist, um die gespeicherten Programmbefehle auszuführen;

einen Datenbildschirm (112) in der Einheit, der mit dem Datenprozessor verbunden ist, um Informationen anzuzeigen;

ein Programmmittel (180), das in dem Datenspeichermittel gespeichert ist und einen ersten Teil hat, um Übertragungen unter Verwendung eines öffentlichen Telefonwählnetzes zu verwalten und um ein erstes Schnittstellenbild (50A) auf dem Bildschirm anzuzeigen;

wobei das Programmmittel (180) einen zweiten Teil hat, um Übertragungen unter Verwendung des Mobilfunktelefons über die Verbindung mit einem Mobilfunktelefonnetzwerk zu verwalten und um ein zweites Schnittstellenbild (50B) auf dem Bildschirm anzuzeigen;
ein Decodiermittel (122), das mit dem Datenprozessor und dem Datenspeichermittel verbunden ist, um selektiv zu veranlassen, dass entweder der erste Teil oder der zweite Teil des Programmmittels von dem Datenprozessor ausgeführt wird;
einen ersten Option-Anschlussstecker (126), der einen mit dem öffentlichen Telefonwählnetz (200) verbundenen Anschlusskopf hat, um selektiv eine Verbindung mit dem Decodiermittel herzustellen;
ein erstes Steckererkennungsmittel (220), das zu dem ersten Option-Anschlussstecker gehört, um den ersten Option-Anschlussstecker gegenüber dem Decodiermittel auszuweisen, wenn der erste Stecker mit dem Decodiermittel verbunden wird und das Decodiermittel als Antwort darauf die Ausführung des ersten Teils des Programmmittels und die Anzeige des ersten Bildes veranlasst;
wobei das Decodiermittel so ausgelegt ist, dass es die Ausführung des zweiten Teils des Programmmittels und die Anzeige des zweiten Bildes veranlasst, wenn der erste Stecker nicht mit dem Decodiermittel verbunden wird.

2. System nach Anspruch 1, wobei
der erste Teil des Programmmittels so ausgelegt ist, dass er als Antwort darauf, dass das erste Steckererkennungsmittel, das zu dem ersten Option-Anschlussstecker gehört, den ersten Option-Anschlussstecker gegenüber dem Decodiermittel ausweist, wenn der erste Stecker mit dem Decodiermittel verbunden wird, ein FAX-Anwendungsbild (50C) zur Übertragung über ein öffentliches Telefonwählnetz als das erste Schnittstellenbild auf dem Bild-

schirm anzeigt.

3. System nach Anspruch 1, wobei der erste Teil des Programmmittels so ausgelegt ist, dass er als Antwort darauf, dass das erste Stekkererkennungsmittel, das zu dem ersten Option-Anschlussstecker gehört, den ersten Option-Anschlussstecker gegenüber dem Decodiermittel ausweist, wenn der erste Stecker mit dem Decodiermittel verbunden wird, ein E-MAIL-Anwendungsbild (50E) zur Übertragung über ein öffentliches Telefonwählnetz als das erste Schnittstellenbild auf dem Bildschirm anzeigt.

4. System nach einem der Ansprüche 1 bis 3, das eine Option-Steckerbuchse (124) enthält, die mit dem Decodiermittel verbunden wird, und wobei die Verbindung des ersten Option-Anschlussstteckers mit dem Decodiermittel das Einstecken des ersten Option-Anschlussteckers in die Buchse umfasst.

5. System nach einem der Ansprüche 1 bis 4, das ein Eingabemittel enthält, das mit dem Datenprozessor verbunden ist, um Kommunikationsanwendung-Auswahldaten zu empfangen, und wobei das System so ausgelegt ist, dass es als Antwort auf die Kommunikationsanwendung-Auswahldaten Steuersignale an das Anzeigemittel sendet, um ein Schnittstellenbild anzuzeigen, das einer ausgewählten Kommunikationsanwendung entspricht.

6. System nach Anspruch 5, wobei die Kommunikationsanwendung-Auswahldaten eine Sprach-Kommunikationsauswahl sind.

7. System nach Anspruch 5, wobei die Kommunikationsanwendung-Auswahldaten eine FAX-Kommunikationsauswahl sind.

8. System nach Anspruch 5, wobei die Kommunikationsanwendung-Auswahldaten eine E-MAIL-Kommunikationsauswahl sind.

9. Verfahren zur Bereitstellung einer Benutzerschnittstelle in einer persönlichen Kommunikationseinheit (100) für mehrere Anwendungen, die ein Datenspeichermittel (102) und einen Datenprozessor (106) enthält und sowohl Mobilfunktelefonie als auch Übertragungen über das öffentliche Telefonwählnetz (PSTN-Übertragungen) unterstützt, wobei die Benutzerschnittstelle auf die Erfordernisse einer ausgewählten Kommunikationsverbindung ausgelegt werden kann, wobei das Verfahren Folgendes umfasst:

als Antwort auf die Feststellung (408, 410), dass ein erster Option-Anschlussstecker mit einem Decodiermittel der Einheit verbunden ist, Veranlassen der Ausführung (422, 424, 426) eines ersten Teils eines Programmmittels, der PSTN-Übertragungen entspricht, um auf einem Bildschirm ein erstes Schnittstellenbild (50A) anzuzeigen (426), das PSTN-Übertragungen kennzeichnet;

als Antwort darauf, dass der erste Option-Anschlussstecker nicht mit dem Decodiermittel verbunden ist, Veranlassen der Ausführung (422, 428, 430) eines zweiten Teils des Programmmittels, der Mobilfunktelefon-Übertragungen entspricht, um auf dem Anzeigemittel ein zweites Schnittstellenbild (50B) anzuzeigen (430), das Mobilfunktelefon-Übertragungen kennzeichnet.

10. Verfahren nach Anspruch 9, wobei der jeweils erste oder zweite Teil des Programmmittels als Antwort auf Kommunikationsanwendung-Auswahldaten ausgeführt wird, um ein Schnittstellenbild anzuzeigen, das einer ausgewählten Kommunikationsanwendung entspricht.

11. Verfahren nach Anspruch 10, wobei die Kommunikationsanwendung-Auswahldaten eine Sprach-Kommunikationsauswahl sind.

12. System nach Anspruch 10, wobei die Kommunikationsanwendung-Auswahldaten eine FAX-Kommunikationsauswahl sind.

13. System nach Anspruch 10, wobei die Kommunikationsanwendung-Auswahldaten eine E-MAIL-Kommunikationsauswahl sind.

14. Verfahren nach einem der Ansprüche 10 bis 13, das des Weiteren Folgendes umfasst:

Bilden des ersten Bildes aus einem Hauptbild (50X) und einem eine PSTN-Übertragung kennzeichnenden Bild; und

Bilden des zweiten Bildes aus einem Hauptbild und einem eine Mobilfunkkommunikation kennzeichnenden Bild.

Revendications

1. Un système pour fournir une interface utilisateur dans un dispositif de communications personnelles (100) à applications multiples, dans lequel l'interface utilisateur est adaptative envers les exigences d'une liaison de communication sélectionnée, et le système comprend :

un téléphone radio mobile (116);

des moyens de stockage de données (102) installés dans le dispositif, pour stocker des instructions de programmation;
des moyens de bus (104) prévus dans le dispositif, couplés audit stockage de données;
un processeur de données (106) prévu dans le dispositif, couplé audit stockage de données sur lesdits moyens de bus, pour exécution desdites instructions de programmation stockées;
un écran d'affichage de données (102) placé dans le dispositif, couplé audit processeur de données, pour afficher de l'information;
des moyens de programme (180) stockés dans les moyens de stockage de données, ayant une première partie, pour gérer les communications par utilisation d'un réseau téléphonique à commutation publique et pour afficher une première image d'interface (50A) sur l'écran d'affichage;
lesdits moyens de programme (180) ayant une deuxième partie, pour gérer les communications en utilisant ledit téléphone radio mobile via une connexion à un réseau téléphonique radio mobile et pour afficher une deuxième image d'interface (50B) sur l'écran d'affichage;
des moyens de décodage (122) couplés au processeur de données et aux moyens de stockage de données, pour provoquer sélectivement l'exécution soit de ladite première partie, soit de ladite deuxième partie desdits moyens de programme par le processeur de données;
un premier connecteur d'attachement d'option (126) ayant une borne couplée audit réseau téléphonique commuté publique (200) pour coupler sélectivement auxdits moyens de décodage;
des premiers moyens d'identification de connecteur (220) inclus dans ledit premier moyen connecteur d'attachement d'option, pour identifier ledit premier connecteur d'attachement, sur lesdits moyens de décodage lorsque ledit premier connecteur est couplé auxdits moyens de décodage et, en réponse à cela, provoquer l'exécution, par lesdits moyens de décodage, de ladite première partie desdits moyens de programme et l'affichage de ladite première image;
lesdits moyens de décodage étant adaptés pour provoquer l'exécution de ladite deuxième partie desdits moyens de programme et l'affichage de ladite deuxième image, lorsque ledit premier connecteur n'est pas couplé auxdits moyens de décodage.

2. Un système selon la revendication 1, dans lequel :

ladite première partie desdits moyens de programme est adaptée pour afficher une image d'application FAX (50C) pour communications avec un réseau téléphonique commuté publique, à titre dedite première image d'interface sur l'écran d'affichage, en réponse au fait que lesdits moyens d'identification de premier connecteur, inclus dans ledit premier connecteur d'attachement d'option, identifient ledit premier connecteur d'attachement d'option sur lesdits moyens de décodage lorsque ledit premier connecteur est couplé auxdits moyens de décodage.

3. Un système selon la revendication 1, dans lequel :

ladite première partie desdits moyens de programme est adaptée pour afficher une image d'application E-MAIL (50E) pour communications avec un réseau téléphonique commuté publique à titre dedite première image d'interface sur l'écran d'affichage, en réponse au fait que lesdits premiers moyens d'identification de connecteur, inclus avec ledit premier connecteur d'attachement d'option, identifient ledit premier connecteur d'attachement d'option placé sur lesdits moyens de décodage, lorsque ledit premier connecteur est couplé auxdits moyens de décodage.

4. Un système selon l'une quelconque des revendications 1 à 3, comprenant un réceptacle de connecteur d'option (124) couplé auxdits moyens de décodage, et dans lequel le couplage dudit premier connecteur d'attachement d'option sur lesdits moyens de décodage comprend la connexion dudit premier connecteur d'attachement d'option audit réceptacle.

5. Un système selon l'une quelconque des revendications 1 à 4, incluant des moyens d'entrée, couplés audit processeur de données, pour recevoir des données de sélection d'application de communication, et dans lequel ledit système est adapté pour envoyer des signaux de commande auxdits moyens d'affichage en réponse auxdites données de sélection d'application de communication, afin d'afficher une image d'interface qui corresponde à une application de communication sélectionnées.

6. Un système selon la revendication 5, dans lequel lesdites données de sélection d'application de communication sont une sélection de communication vocale.

7. Un système selon la revendication 5, dans lequel lesdites données de sélection d'application de communication sont une sélection de communication de type FAX.

8. Un système selon la revendication 5, dans lequel

lesdites données de sélection d'application de communication sont une sélection de communication de type E-MAIL.

9. Un procédé pour fourniture d'une interface utilisateur dans un dispositif de communications personnelles à applications multiples (100), comprenant des moyens de stockage de données (102) et un processeur de données (106), et qui supporte à la fois des communications de téléphonie radio mobile et PSTN (Réseau Publique Téléphonique Commuté), dans lequel l'interface utilisateur est adaptative envers les exigences d'une liaison de communication sélectionnée, le procédé comprenant :

en réponse à l'identification (408, 410) du fait qu'un premier collecteur d'attachement d'option est couplé à des moyens de décodage du dispositif, provoquer l'exécution (422, 424, 426) d'une première partie de moyens de programme correspondant à des communications PSTN, pour affichage (426), sur un écran d'affichage, d'une première image d'interface (50A) qui caractérise des communications PSTN;
en réponse au fait que ledit premier connecteur d'attachement d'option n'est pas couplé aux moyens de décodage, provoquer l'exécution (422, 428, 430) d'une deuxième partie dudit moyen de programme correspondant à des communications de téléphonie radio mobile, pour affichage (430), sur les moyens d'affichage, d'une deuxième image d'interface (50B) caractérisant des communications de téléphonie radio mobile.

10. Un procédé selon la revendication 9, dans lequel ladite première ou deuxième partie respective desdits moyens de programme est exécutée en réponse à des données de sélection d'application de communication, pour affichage d'une image d'interface correspondant à une application de communication sélectionnée.

11. Un procédé selon la revendication 10, dans lequel lesdites données de sélection d'application de communication sont une sélection de communication vocale.

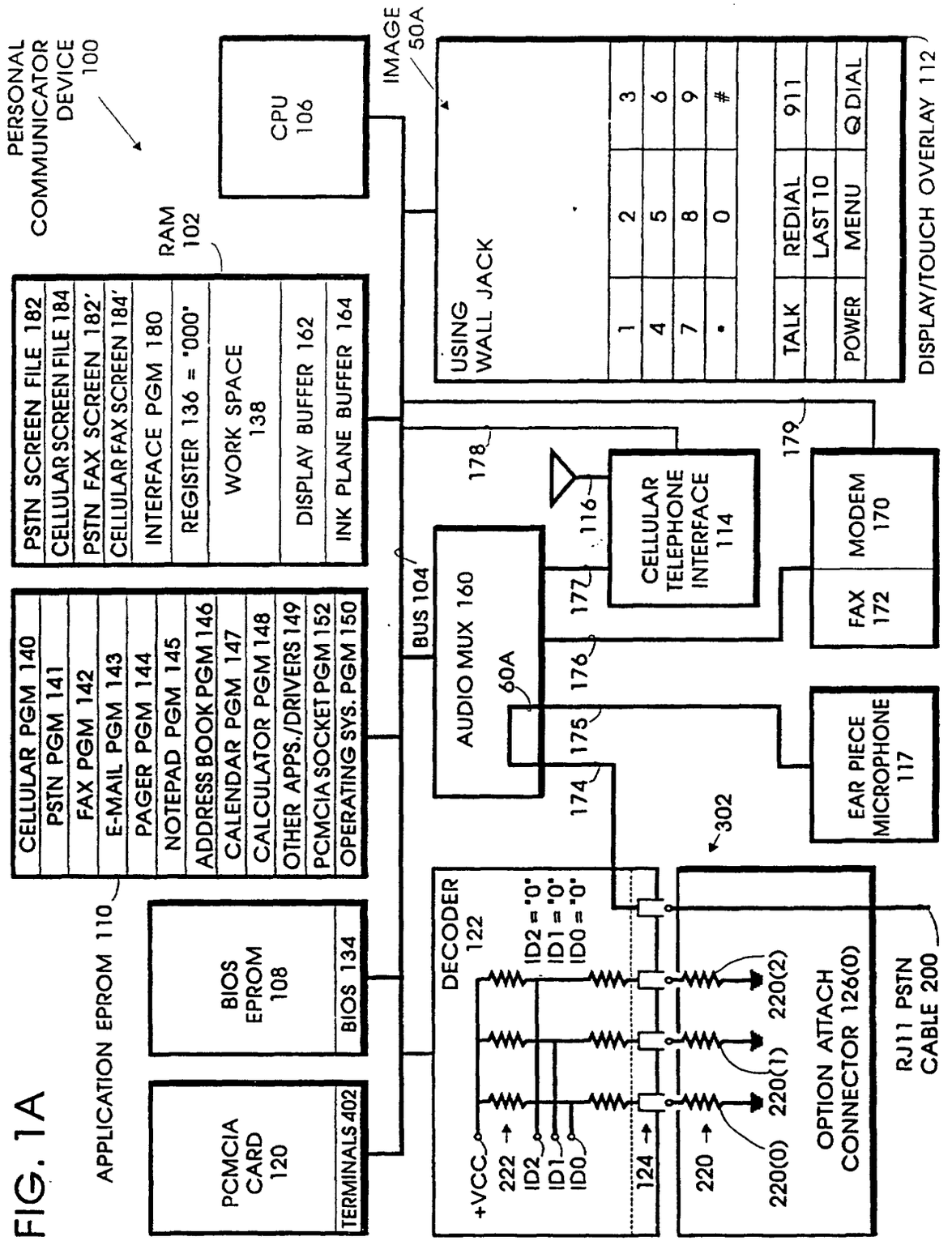
12. Un procédé selon la revendication 10, dans lequel lesdites données de sélection d'application de communication sont une sélection de communication de type FAX.

13. Un procédé selon la revendication 10, dans lequel lesdites données de sélection d'application de communication sont une sélection de communication de type E-MAIL.

14. Un procédé selon l'une quelconque des revendications 10 à 13, comprenant en outre :

la formation de ladite première image à partir d'une image maître (50X) et d'une image caractérisant les communications PSTN; et
la formation de ladite deuxième image à partir d'une image maître et d'une image caractérisant des communications en téléphonie cellulaire.

FIG. 1A


PERSONAL COMMUNICATOR DEVICE 100
CPU 106
IMAGE 50A
RAM 102
PSTN SCREEN FILE 182
CELLULAR SCREEN FILE 184
PSTN FAX SCREEN 182'
CELLULAR FAX SCREEN 184'
INTERFACE PGM 180
REGISTER 136 = "000"
WORK SPACE 138
DISPLAY BUFFER 162
INK PLANE BUFFER 164
USING WALL JACK
1 2 3
4 5 6
7 8 9
* 0 #
TALK REDIAL 911
LAST 10
POWER MENU Q DIAL
DISPLAY/TOUCH OVERLAY 112
CELLULAR PGM 140
PSTN PGM 141
FAX PGM 142
E-MAIL PGM 143
PAGER PGM 144
NOTEPAD PGM 145
ADDRESS BOOK PGM 146
CALENDAR PGM 147
CALCULATOR PGM 148
OTHER APPS./DRIVERS 149
PCMCIA SOCKET PGM 152
OPERATING SYS. PGM 150
APPLICATION EPROM 110
BUS 104
178
179
AUDIO MUX 160
60A
116
CELLULAR TELEPHONE INTERFACE 114
177
176
175
174
MODEM 170
FAX 172
EAR PIECE MICROPHONE 117
302
BIOS EPROM 108
BIOS 134
PCMCIA CARD 120
TERMINALS 402
DECODER 122
ID2 = "0"
ID1 = "0"
ID0 = "0"
+VCC
222
ID2
ID1
ID0
124
220
220(0)
220(1)
220(2)
OPTION ATTACH CONNECTOR 126(0)
RJ11 PSTN CABLE 200

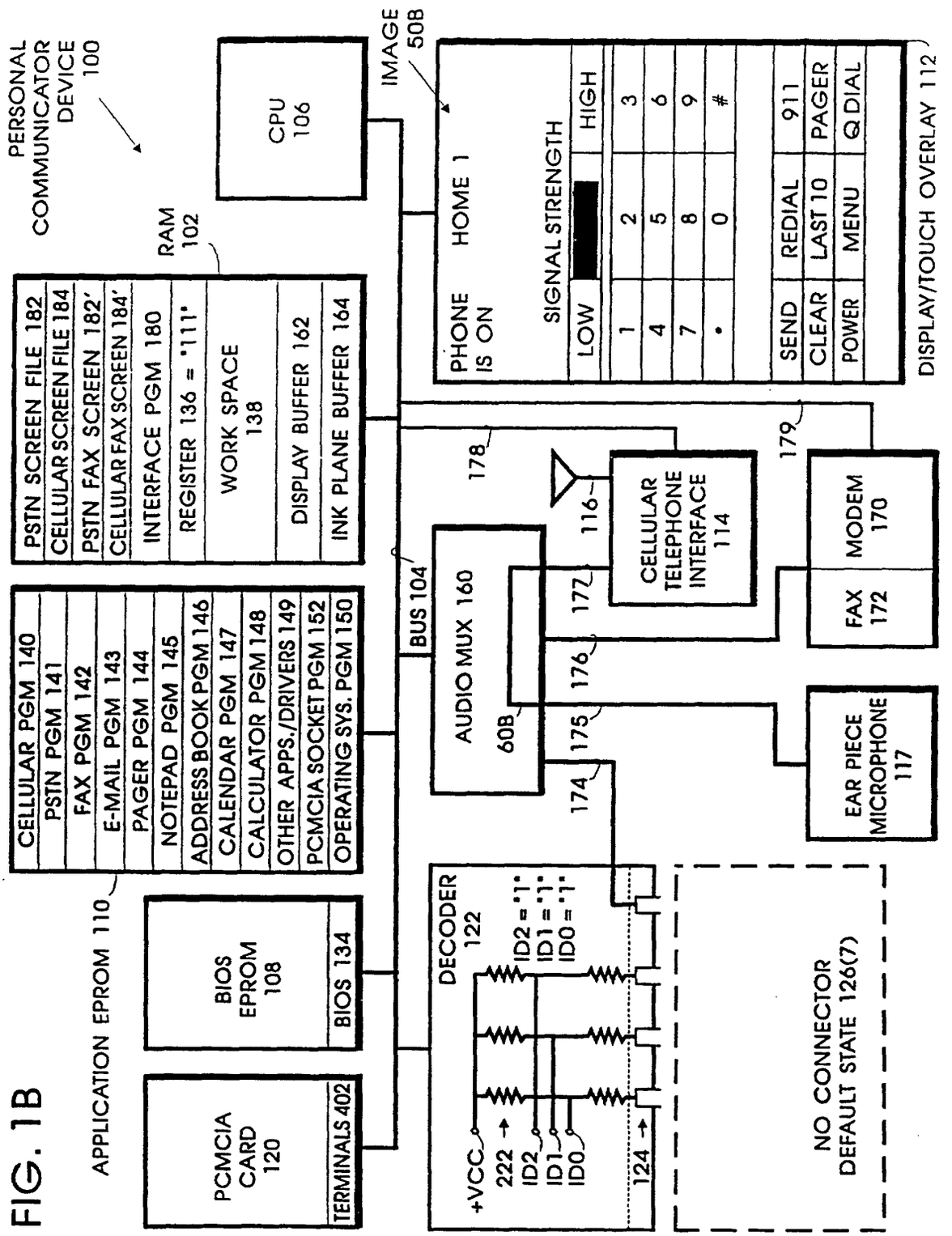

PERSONAL COMMUNICATOR DEVICE 100
CPU 106
RAM 102
IMAGE 50B
PSTN SCREEN FILE 182
CELLULAR SCREEN FILE 184
PSTN FAX SCREEN 182'
CELLULAR FAX SCREEN 184'
INTERFACE PGM 180
REGISTER 136 = "111"
WORK SPACE 138
DISPLAY BUFFER 162
INK PLANE BUFFER 164
PHONE IS ON
HOME 1
SIGNAL STRENGTH
LOW
HIGH
1 2 3
4 5 6
7 8 9
* 0 #
SEND REDIAL 911
CLEAR LAST 10 PAGER
POWER MENU Q DIAL
DISPLAY/TOUCH OVERLAY 112
CELLULAR PGM 140
PSTN PGM 141
FAX PGM 142
E-MAIL PGM 143
PAGER PGM 144
NOTEPAD PGM 145
ADDRESS BOOK PGM 146
CALENDAR PGM 147
CALCULATOR PGM 148
OTHER APPS./DRIVERS 149
PCMCIA SOCKET PGM 152
OPERATING SYS. PGM 150
APPLICATION EPROM 110
BUS 104
178
179
AUDIO MUX 160
60B
116
CELLULAR TELEPHONE INTERFACE 114
MODEM 170
FAX 172
172
176
175
174
EAR PIECE MICROPHONE 117
BIOS EPROM 108
BIOS 134
PCMCIA CARD 120
TERMINALS 402
DECODER 122
+VCC
222
ID2
ID1
ID0
ID2 = "1"
ID1 = "1"
ID0 = "1"
124
NO CONNECTOR
DEFAULT STATE 126(7)

FIG. 1B

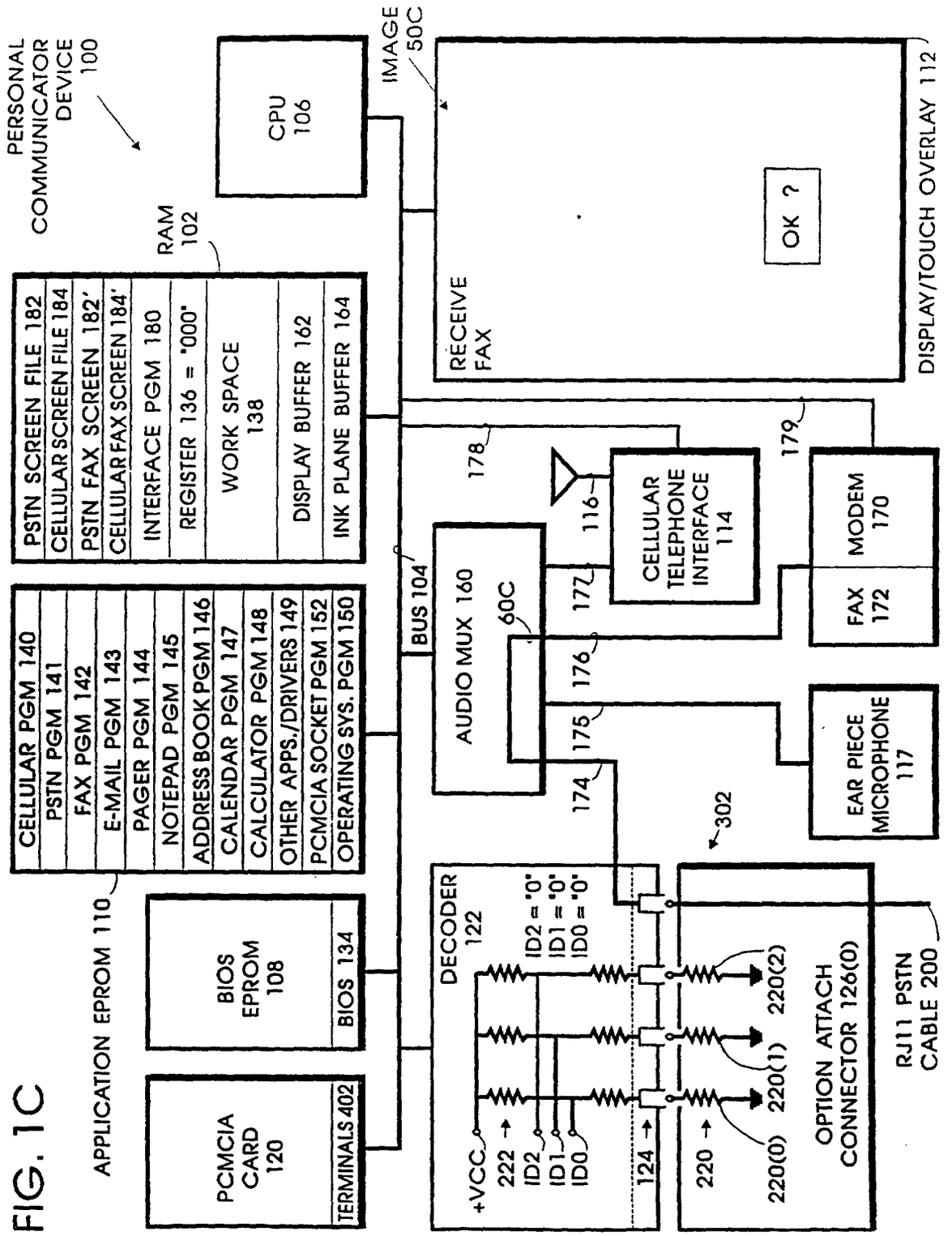

PERSONAL COMMUNICATOR DEVICE 100
IMAGE 50C
CPU 106
RAM 102
PSTN SCREEN FILE 182
CELLULAR SCREEN FILE 184
PSTN FAX SCREEN 182'
CELLULAR FAX SCREEN 184'
INTERFACE PGM 180
REGISTER 136 = "000"
WORK SPACE 138
DISPLAY BUFFER 162
INK PLANE BUFFER 164
RECEIVE FAX
OK ?
DISPLAY/TOUCH OVERLAY 112
CELLULAR PGM 140
PSTN PGM 141
FAX PGM 142
E-MAIL PGM 143
PAGER PGM 144
NOTEPAD PGM 145
ADDRESS BOOK PGM 146
CALENDAR PGM 147
CALCULATOR PGM 148
OTHER APPS./DRIVERS 149
PCMCIA SOCKET PGM 152
OPERATING SYS. PGM 150
APPLICATION EPROM 110
BUS 104
178
179
AUDIO MUX 160
60C
116
CELLULAR TELEPHONE INTERFACE 114
MODEM 170
FAX 172
177
176
175
174
EAR PIECE MICROPHONE 117
302
BIOS EPROM 108
BIOS 134
PCMCIA CARD 120
TERMINALS 402
DECODER 122
ID2 = '0'
ID1 = '0'
ID0 = '0'
+VCC
222
ID2
ID1
ID0
124
220
220(0)
220(1)
220(2)
OPTION ATTACH CONNECTOR 126(0)
RJ11 PSTN CABLE 200

FIG. 1C

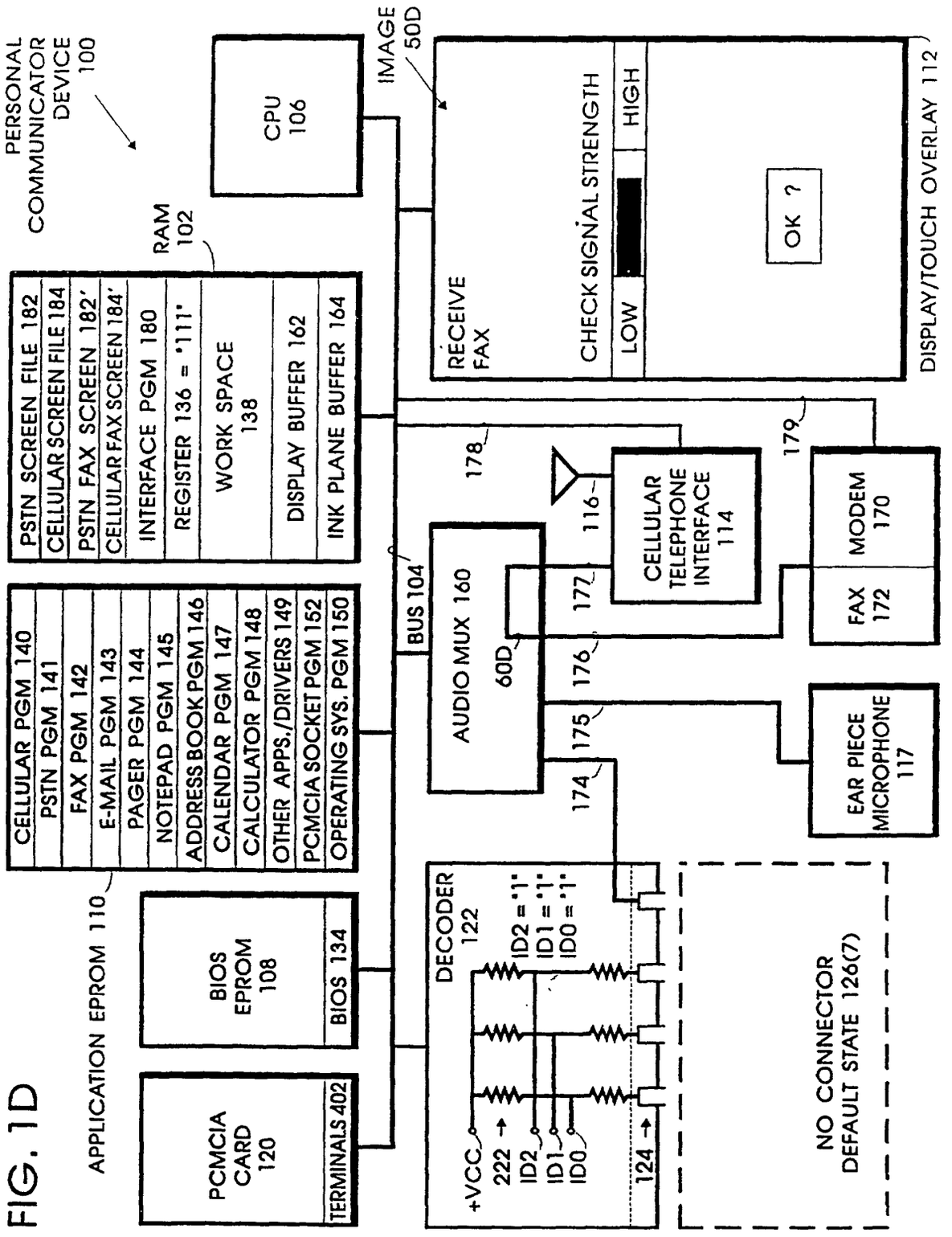

PERSONAL COMMUNICATOR DEVICE 100
CPU 106
IMAGE 50D
RAM 102
PSTN SCREEN FILE 182
CELLULAR SCREEN FILE 184
PSTN FAX SCREEN 182'
CELLULAR FAX SCREEN 184'
INTERFACE PGM 180
REGISTER 136 = "111"
WORK SPACE 138
DISPLAY BUFFER 162
INK PLANE BUFFER 164
RECEIVE FAX
CHECK SIGNAL STRENGTH
LOW
HIGH
OK ?
DISPLAY/TOUCH OVERLAY 112
CELLULAR PGM 140
PSTN PGM 141
FAX PGM 142
E-MAIL PGM 143
PAGER PGM 144
NOTEPAD PGM 145
ADDRESS BOOK PGM 146
CALENDAR PGM 147
CALCULATOR PGM 148
OTHER APPS./DRIVERS 149
PCMCIA SOCKET PGM 152
OPERATING SYS. PGM 150
APPLICATION EPROM 110
BUS 104
178
179
AUDIO MUX 160
60D
116
CELLULAR TELEPHONE INTERFACE 114
177
176
175
174
MODEM 170
FAX 172
EAR PIECE MICROPHONE 117
BIOS EPROM 108
BIOS 134
PCMCIA CARD 120
TERMINALS 402
DECODER 122
ID2 = "1"
ID1 = "1"
ID0 = "1"
+VCC
222
ID2
ID1
ID0
124
NO CONNECTOR
DEFAULT STATE 126(7)

FIG. 1D

FIG. 1E

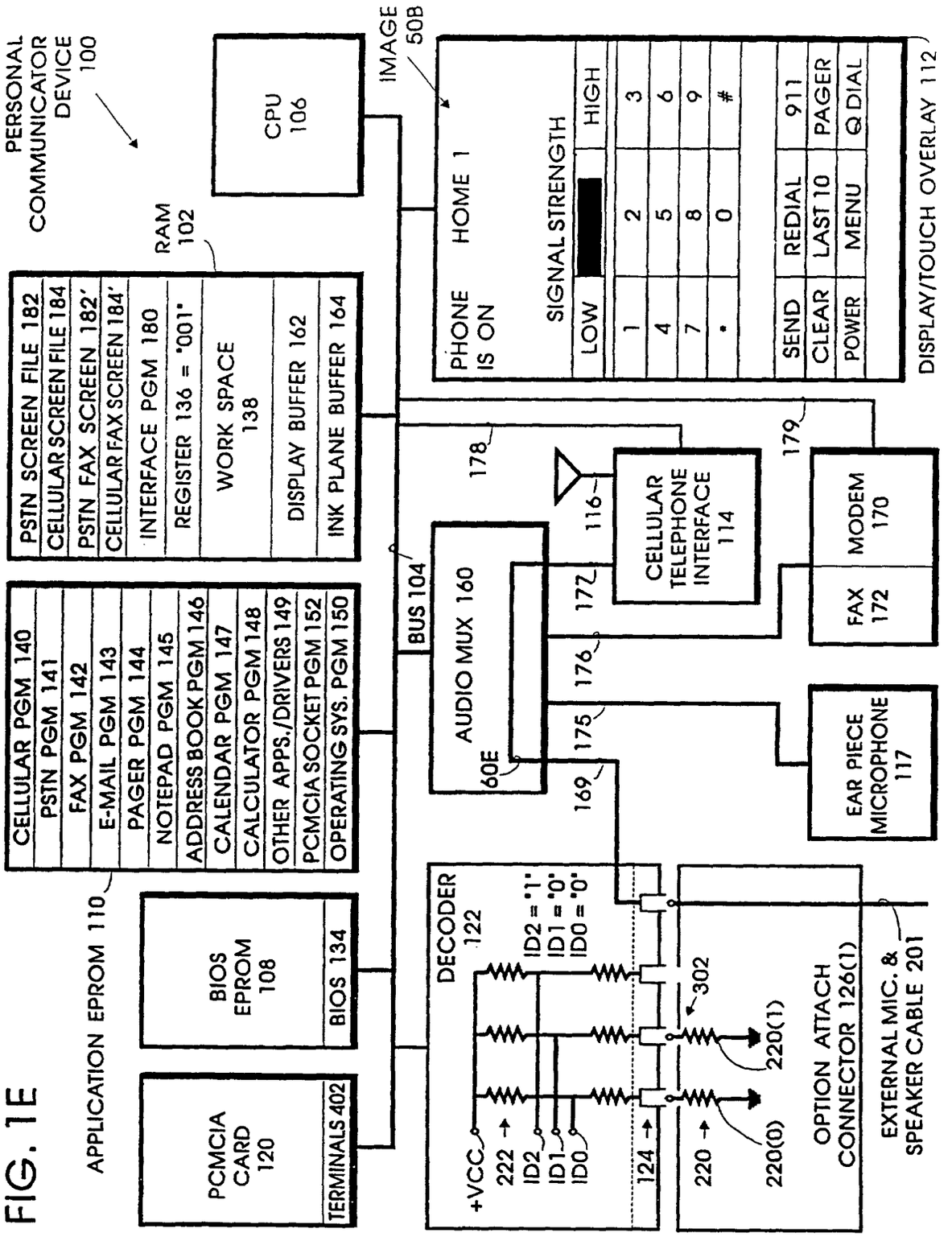

PERSONAL COMMUNICATOR DEVICE 100
CPU 106
IMAGE 50B
RAM 102
PSTN SCREEN FILE 182
CELLULAR SCREEN FILE 184
PSTN FAX SCREEN 182'
CELLULAR FAX SCREEN 184'
INTERFACE PGM 180
REGISTER 136 = '001'
WORK SPACE 138
DISPLAY BUFFER 162
INK PLANE BUFFER 164
PHONE IS ON
HOME 1
SIGNAL STRENGTH
LOW
HIGH
1
2
3
4
5
6
7
8
9
*
0
#
SEND
REDIAL
911
CLEAR
LAST 10
PAGER
POWER
MENU
Q DIAL
DISPLAY/TOUCH OVERLAY 112
CELLULAR PGM 140
PSTN PGM 141
FAX PGM 142
E-MAIL PGM 143
PAGER PGM 144
NOTEPAD PGM 145
ADDRESS BOOK PGM 146
CALENDAR PGM 147
CALCULATOR PGM 148
OTHER APPS./DRIVERS 149
PCMCIA SOCKET PGM 152
OPERATING SYS. PGM 150
APPLICATION EPROM 110
BUS 104
178
179
116
CELLULAR TELEPHONE INTERFACE 114
MODEM 170
FAX 172
AUDIO MUX 160
60E
177
176
175
169
EAR PIECE MICROPHONE 117
BIOS EPROM 108
BIOS 134
PCMCIA CARD 120
TERMINALS 402
DECODER 122
ID2 = '1'
ID1 = '0'
ID0 = '0'
+VCC
222
ID2
ID1
ID0
124
302
220
220(0)
220(1)
OPTION ATTACH CONNECTOR 126(1)
EXTERNAL MIC. & SPEAKER CABLE 201

FIG. 2A

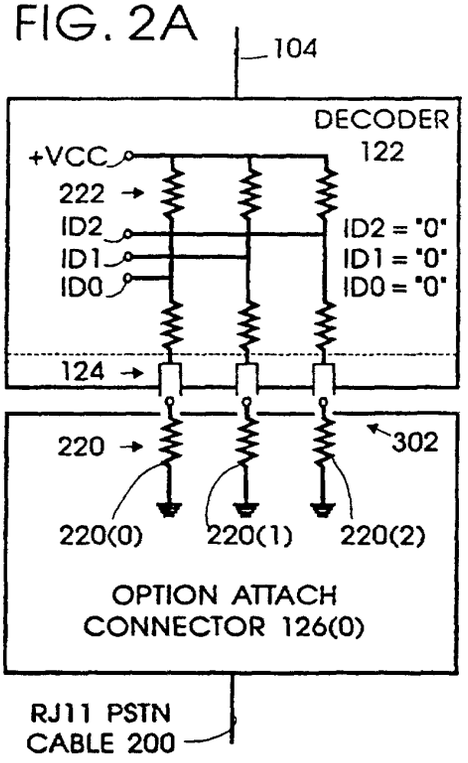
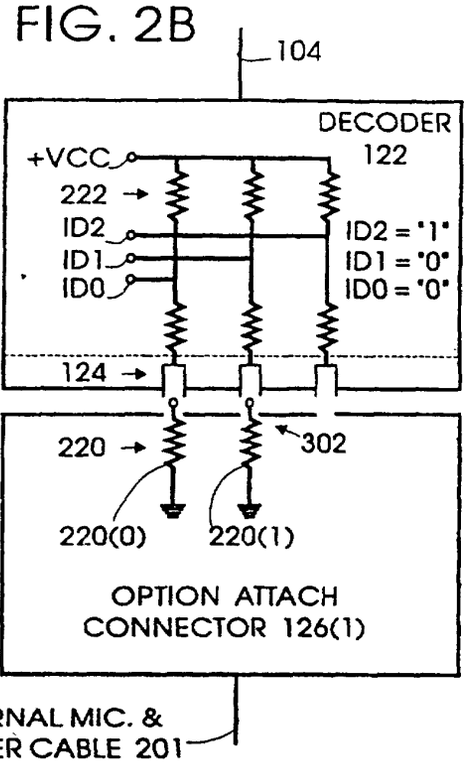


FIG. 2B



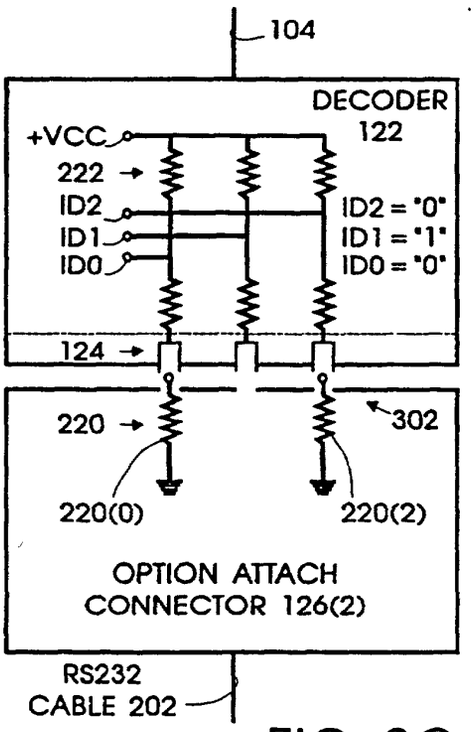


FIG. 2C

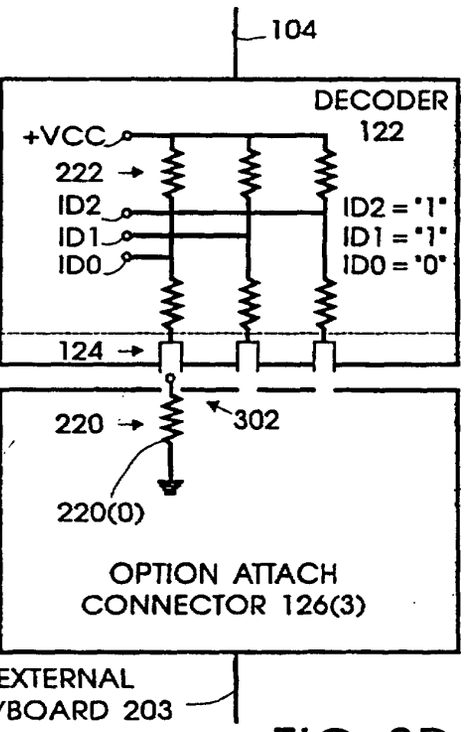


FIG. 2D

FIG. 2E

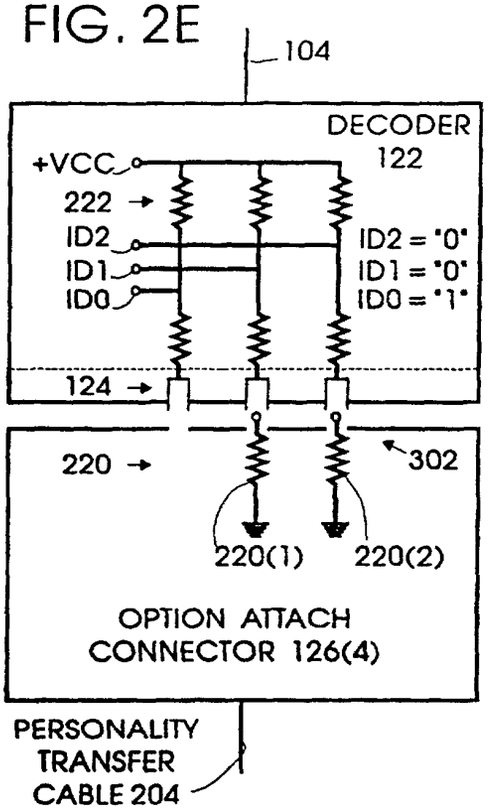
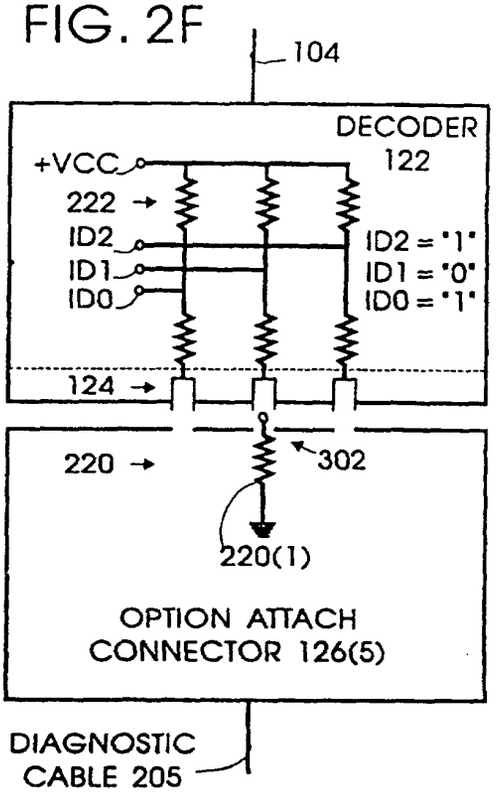


FIG. 2F



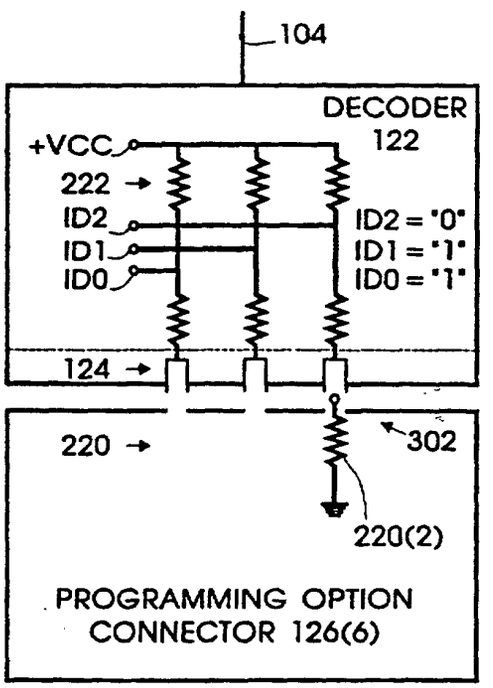


FIG. 2G

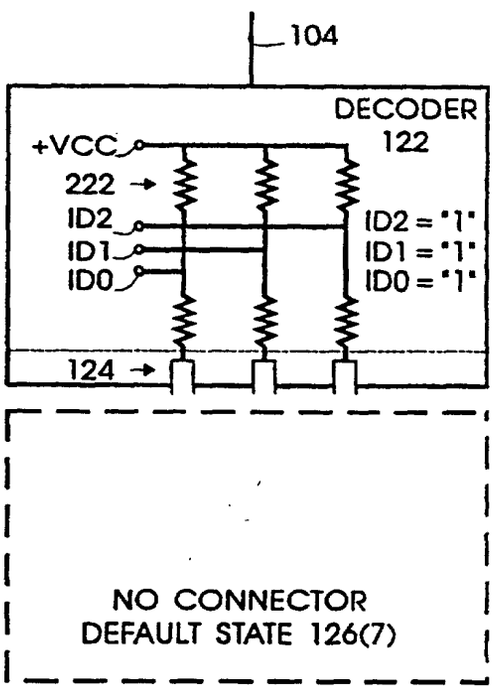


FIG. 2H

FIG. 3

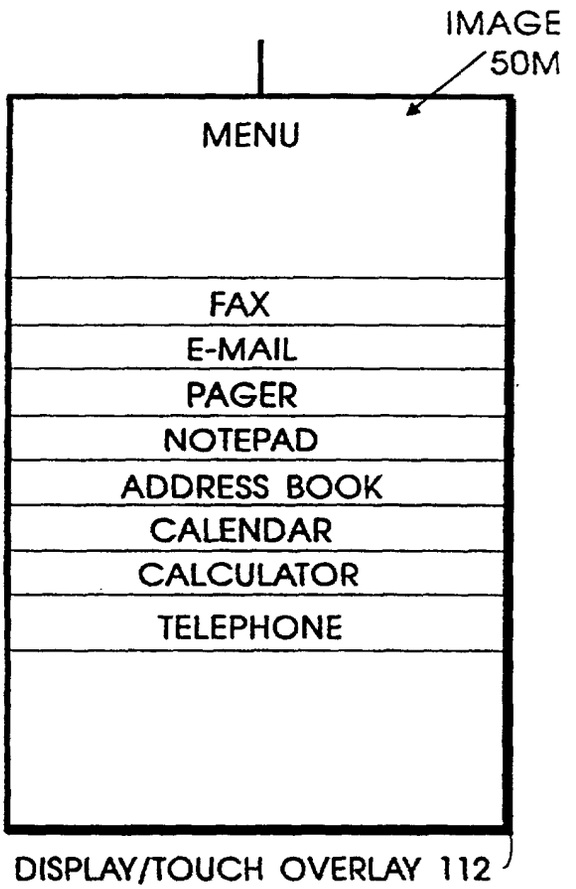


IMAGE
50M
MENU
FAX
E-MAIL
PAGER
NOTEPAD
ADDRESS BOOK
CALENDAR
CALCULATOR
TELEPHONE
DISPLAY/TOUCH OVERLAY 112

FIG. 4A

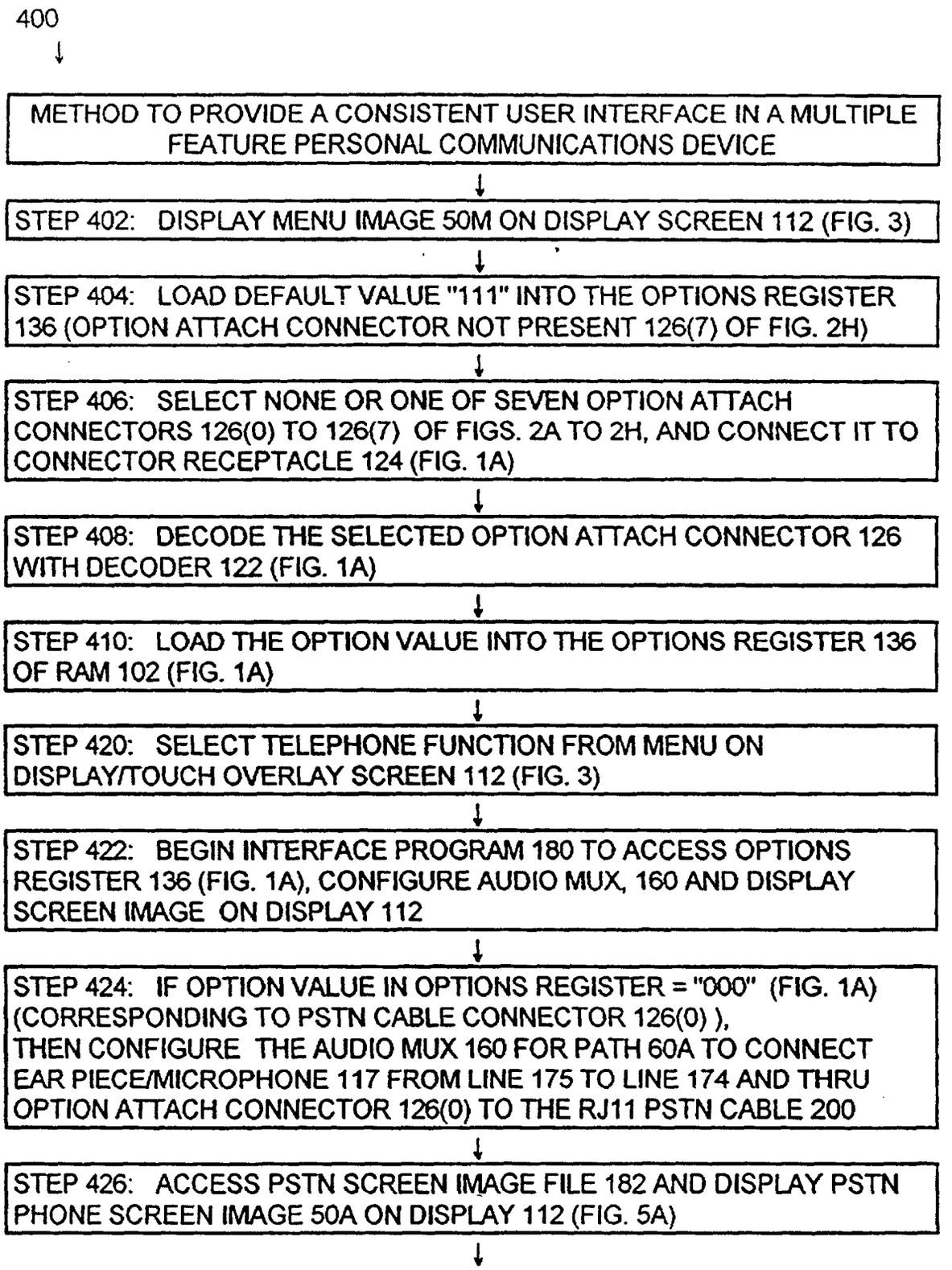

400
METHOD TO PROVIDE A CONSISTENT USER INTERFACE IN A MULTIPLE FEATURE PERSONAL COMMUNICATIONS DEVICE
STEP 402: DISPLAY MENU IMAGE 50M ON DISPLAY SCREEN 112 (FIG. 3)
STEP 404: LOAD DEFAULT VALUE "111" INTO THE OPTIONS REGISTER 136 (OPTION ATTACH CONNECTOR NOT PRESENT 126(7) OF FIG. 2H)
STEP 406: SELECT NONE OR ONE OF SEVEN OPTION ATTACH CONNECTORS 126(0) TO 126(7) OF FIGS. 2A TO 2H, AND CONNECT IT TO CONNECTOR RECEPTACLE 124 (FIG. 1A)
STEP 408: DECODE THE SELECTED OPTION ATTACH CONNECTOR 126 WITH DECODER 122 (FIG. 1A)
STEP 410: LOAD THE OPTION VALUE INTO THE OPTIONS REGISTER 136 OF RAM 102 (FIG. 1A)
STEP 420: SELECT TELEPHONE FUNCTION FROM MENU ON DISPLAY/TOUCH OVERLAY SCREEN 112 (FIG. 3)
STEP 422: BEGIN INTERFACE PROGRAM 180 TO ACCESS OPTIONS REGISTER 136 (FIG. 1A), CONFIGURE AUDIO MUX, 160 AND DISPLAY SCREEN IMAGE ON DISPLAY 112
STEP 424: IF OPTION VALUE IN OPTIONS REGISTER = "000" (FIG. 1A) (CORRESPONDING TO PSTN CABLE CONNECTOR 126(0)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60A TO CONNECT EAR PIECE/MICROPHONE 117 FROM LINE 175 TO LINE 174 AND THRU OPTION ATTACH CONNECTOR 126(0) TO THE RJ11 PSTN CABLE 200
STEP 426: ACCESS PSTN SCREEN IMAGE FILE 182 AND DISPLAY PSTN PHONE SCREEN IMAGE 50A ON DISPLAY 112 (FIG. 5A)

FIG. 4B

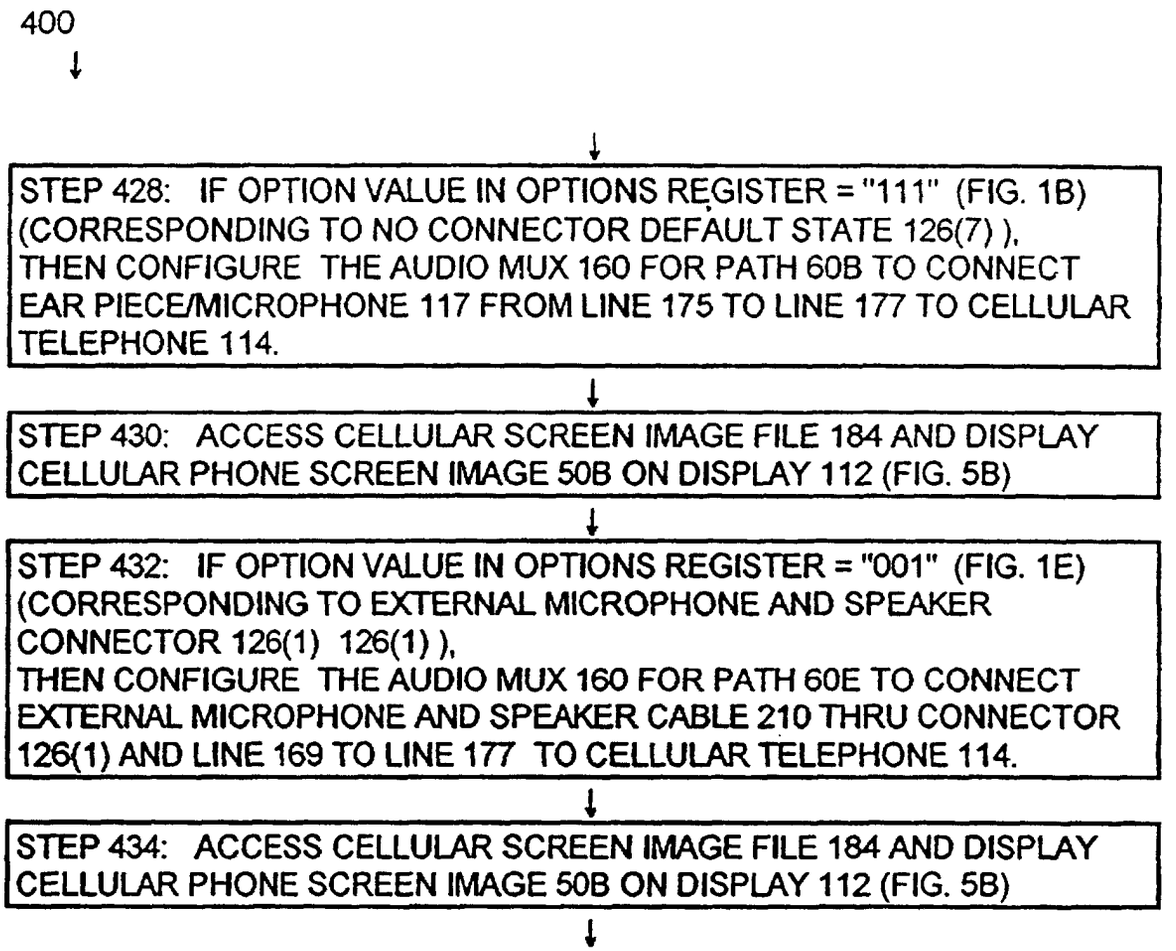

400
STEP 428: IF OPTION VALUE IN OPTIONS REGISTER = "111" (FIG. 1B) (CORRESPONDING TO NO CONNECTOR DEFAULT STATE 126(7)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60B TO CONNECT EAR PIECE/MICROPHONE 117 FROM LINE 175 TO LINE 177 TO CELLULAR TELEPHONE 114.
STEP 430: ACCESS CELLULAR SCREEN IMAGE FILE 184 AND DISPLAY CELLULAR PHONE SCREEN IMAGE 50B ON DISPLAY 112 (FIG. 5B)
STEP 432: IF OPTION VALUE IN OPTIONS REGISTER = "001" (FIG. 1E) (CORRESPONDING TO EXTERNAL MICROPHONE AND SPEAKER CONNECTOR 126(1) 126(1)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60E TO CONNECT EXTERNAL MICROPHONE AND SPEAKER CABLE 210 THRU CONNECTOR 126(1) AND LINE 169 TO LINE 177 TO CELLULAR TELEPHONE 114.
STEP 434: ACCESS CELLULAR SCREEN IMAGE FILE 184 AND DISPLAY CELLULAR PHONE SCREEN IMAGE 50B ON DISPLAY 112 (FIG. 5B)

FIG. 4C

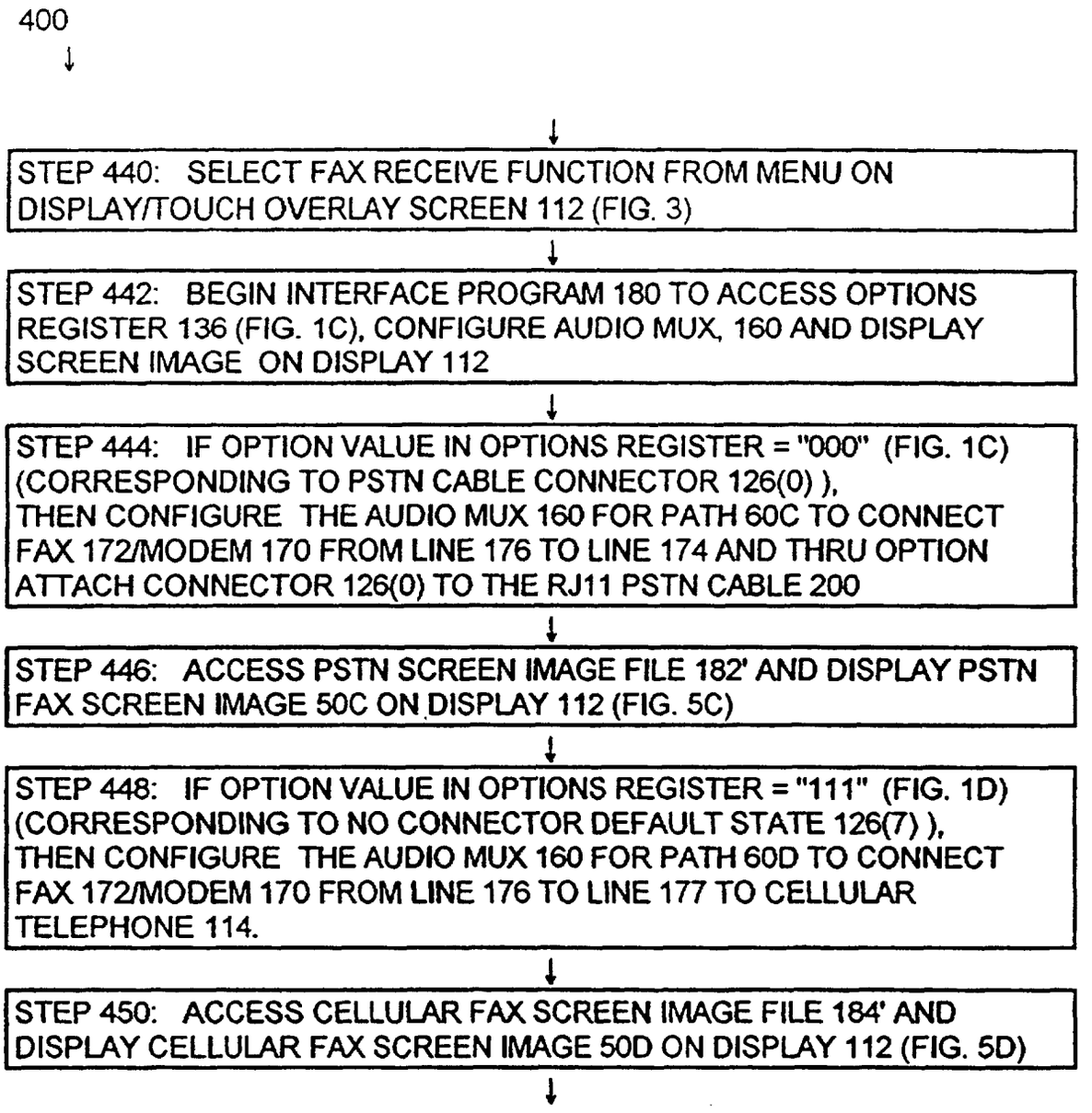

400
STEP 440: SELECT FAX RECEIVE FUNCTION FROM MENU ON DISPLAY/TOUCH OVERLAY SCREEN 112 (FIG. 3)
STEP 442: BEGIN INTERFACE PROGRAM 180 TO ACCESS OPTIONS REGISTER 136 (FIG. 1C), CONFIGURE AUDIO MUX, 160 AND DISPLAY SCREEN IMAGE ON DISPLAY 112
STEP 444: IF OPTION VALUE IN OPTIONS REGISTER = "000" (FIG. 1C) (CORRESPONDING TO PSTN CABLE CONNECTOR 126(0)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60C TO CONNECT FAX 172/MODEM 170 FROM LINE 176 TO LINE 174 AND THRU OPTION ATTACH CONNECTOR 126(0) TO THE RJ11 PSTN CABLE 200
STEP 446: ACCESS PSTN SCREEN IMAGE FILE 182' AND DISPLAY PSTN FAX SCREEN IMAGE 50C ON DISPLAY 112 (FIG. 5C)
STEP 448: IF OPTION VALUE IN OPTIONS REGISTER = "111" (FIG. 1D) (CORRESPONDING TO NO CONNECTOR DEFAULT STATE 126(7)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60D TO CONNECT FAX 172/MODEM 170 FROM LINE 176 TO LINE 177 TO CELLULAR TELEPHONE 114.
STEP 450: ACCESS CELLULAR FAX SCREEN IMAGE FILE 184' AND DISPLAY CELLULAR FAX SCREEN IMAGE 50D ON DISPLAY 112 (FIG. 5D)

FIG. 4D

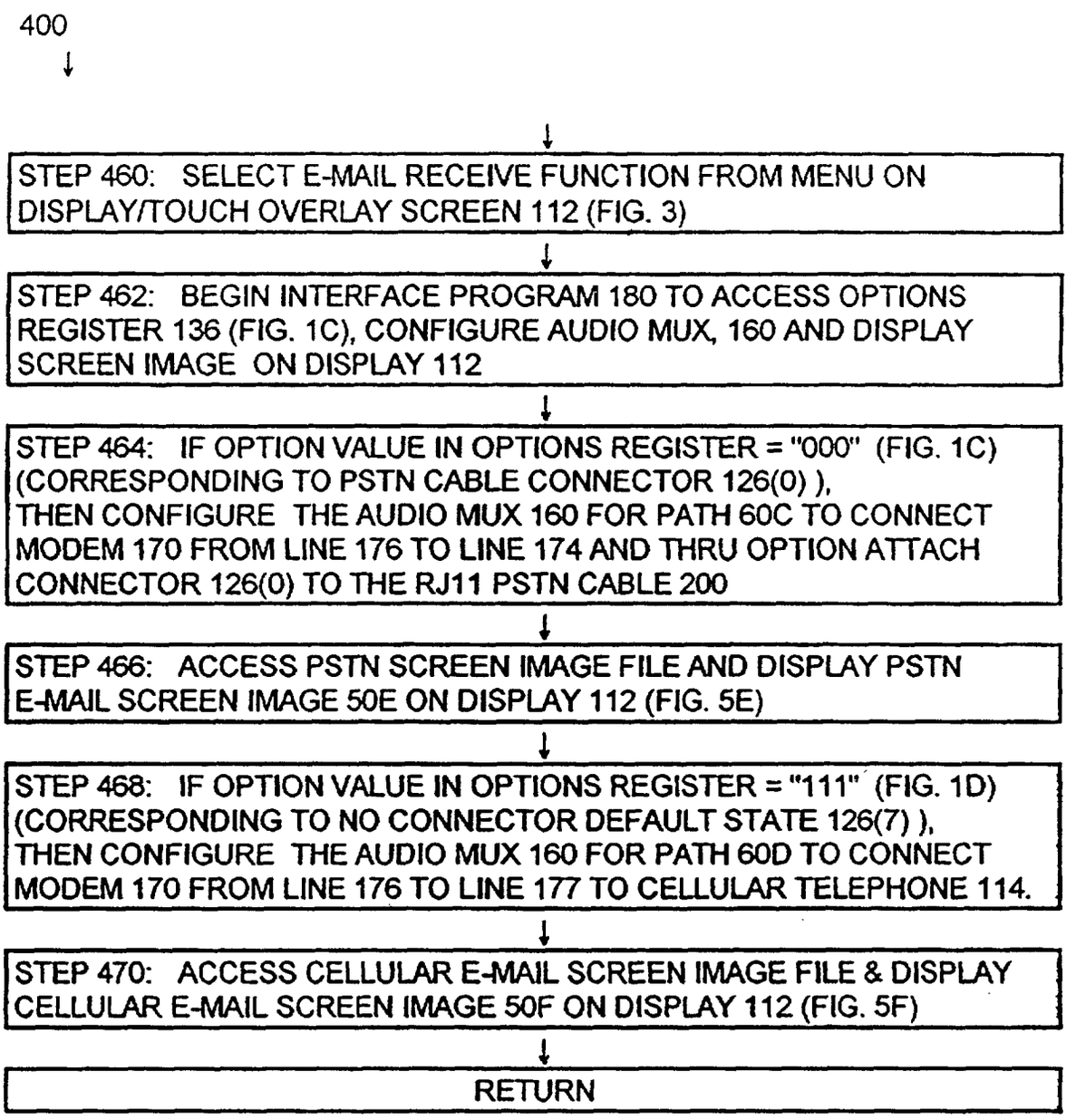

400
STEP 460: SELECT E-MAIL RECEIVE FUNCTION FROM MENU ON DISPLAY/TOUCH OVERLAY SCREEN 112 (FIG. 3)
STEP 462: BEGIN INTERFACE PROGRAM 180 TO ACCESS OPTIONS REGISTER 136 (FIG. 1C), CONFIGURE AUDIO MUX, 160 AND DISPLAY SCREEN IMAGE ON DISPLAY 112
STEP 464: IF OPTION VALUE IN OPTIONS REGISTER = "000" (FIG. 1C) (CORRESPONDING TO PSTN CABLE CONNECTOR 126(0)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60C TO CONNECT MODEM 170 FROM LINE 176 TO LINE 174 AND THRU OPTION ATTACH CONNECTOR 126(0) TO THE RJ11 PSTN CABLE 200
STEP 466: ACCESS PSTN SCREEN IMAGE FILE AND DISPLAY PSTN E-MAIL SCREEN IMAGE 50E ON DISPLAY 112 (FIG. 5E)
STEP 468: IF OPTION VALUE IN OPTIONS REGISTER = "111" (FIG. 1D) (CORRESPONDING TO NO CONNECTOR DEFAULT STATE 126(7)), THEN CONFIGURE THE AUDIO MUX 160 FOR PATH 60D TO CONNECT MODEM 170 FROM LINE 176 TO LINE 177 TO CELLULAR TELEPHONE 114.
STEP 470: ACCESS CELLULAR E-MAIL SCREEN IMAGE FILE & DISPLAY CELLULAR E-MAIL SCREEN IMAGE 50F ON DISPLAY 112 (FIG. 5F)
RETURN

FIG. 5A

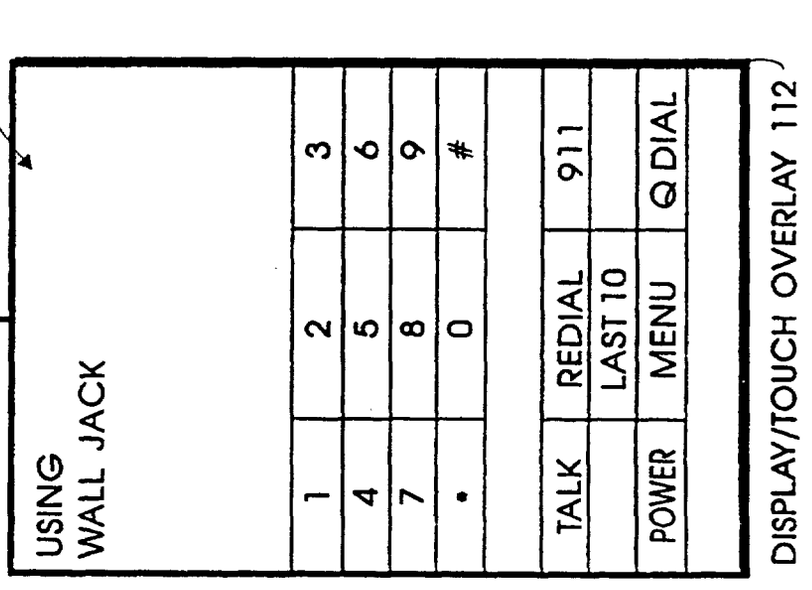


IMAGE 50A
USING WALL JACK
1
2
3
4
5
6
7
8
9
*
0
#
TALK
REDIAL
911
LAST 10
POWER
MENU
Q DIAL
DISPLAY/TOUCH OVERLAY 112

FIG. 5B

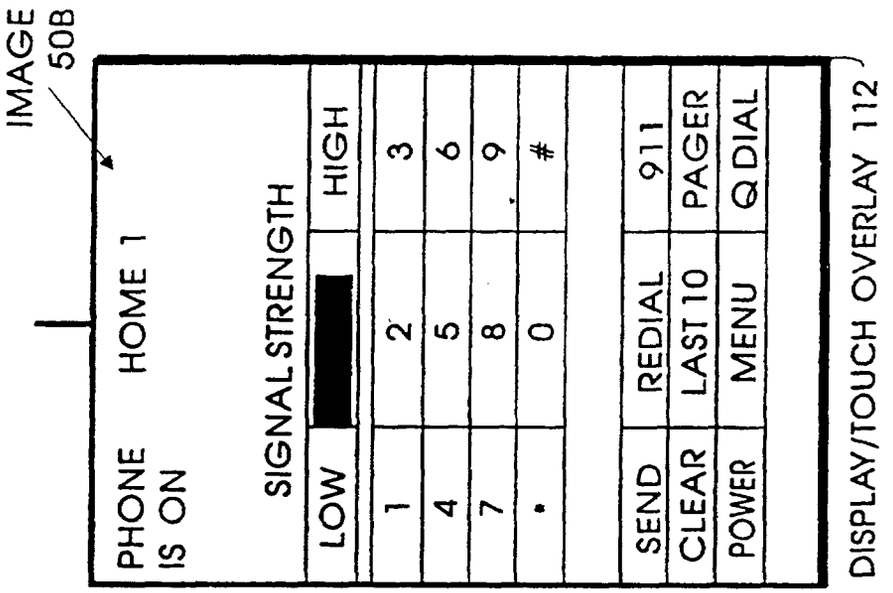


IMAGE 50B
PHONE IS ON
HOME 1
SIGNAL STRENGTH
LOW
HIGH
1
2
3
4
5
6
7
8
9
*
0
#
SEND
REDIAL
911
CLEAR
LAST 10
PAGER
POWER
MENU
Q DIAL
DISPLAY/TOUCH OVERLAY 112

FIG. 5C

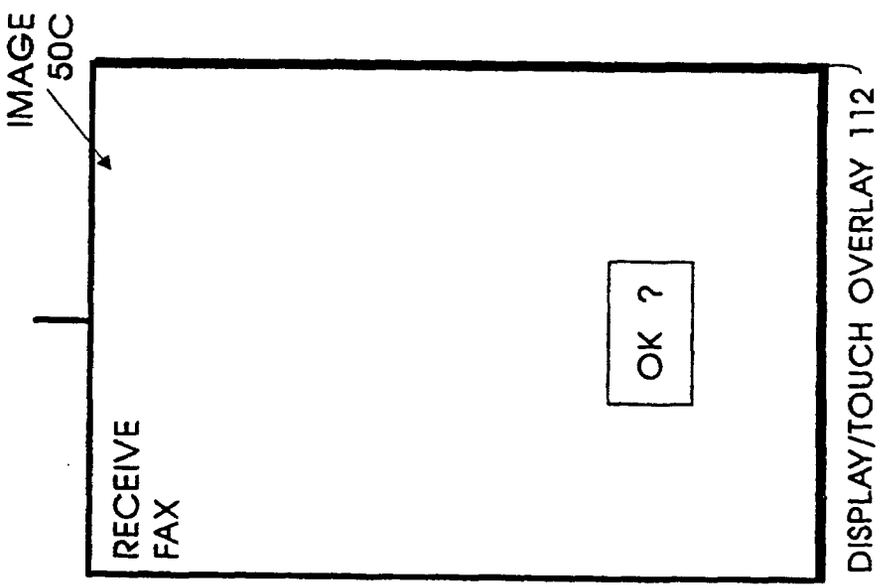


IMAGE
50C
RECEIVE
FAX
OK ?
DISPLAY/TOUCH OVERLAY 112

FIG. 5D

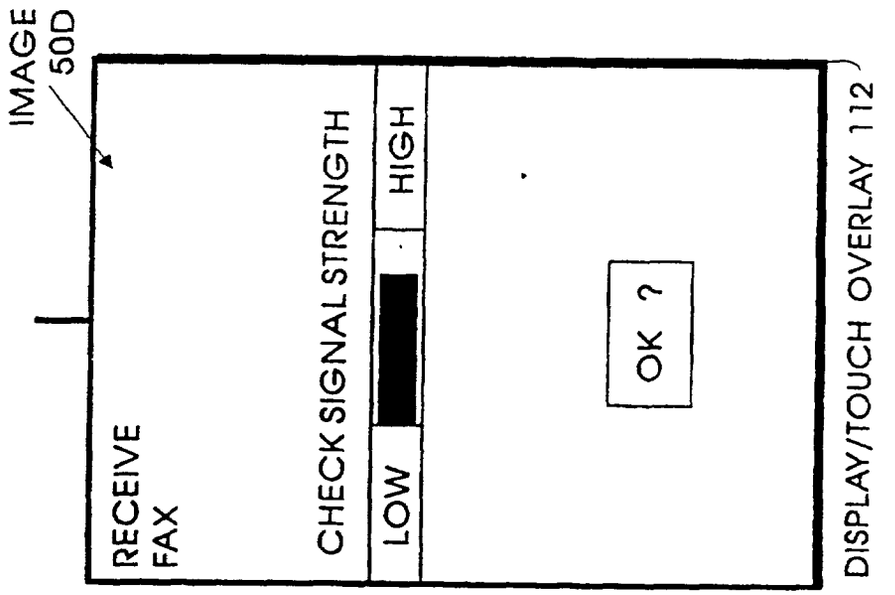


IMAGE
50D
RECEIVE
FAX
CHECK SIGNAL STRENGTH
LOW
HIGH
OK ?
DISPLAY/TOUCH OVERLAY 112

FIG. 5E

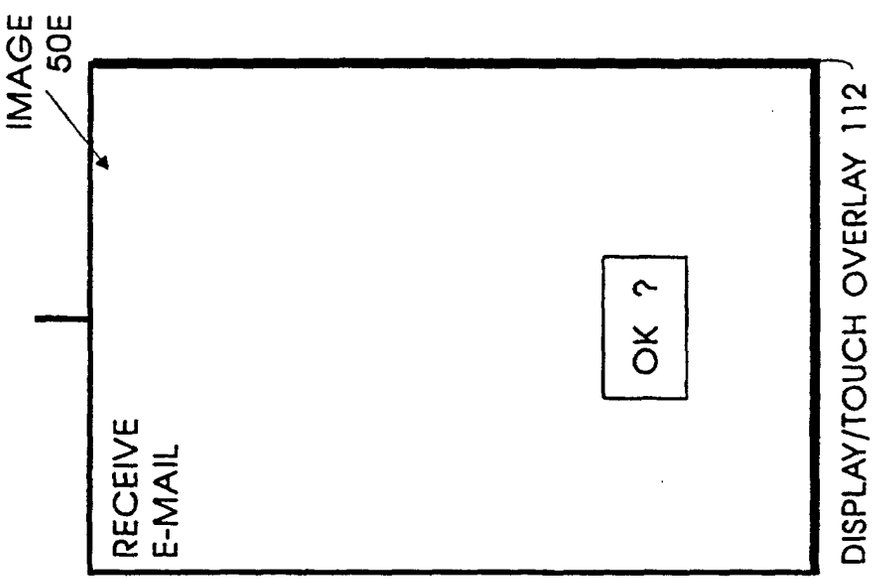


IMAGE
50E
RECEIVE
E-MAIL
OK ?
DISPLAY/TOUCH OVERLAY 112

FIG. 5F

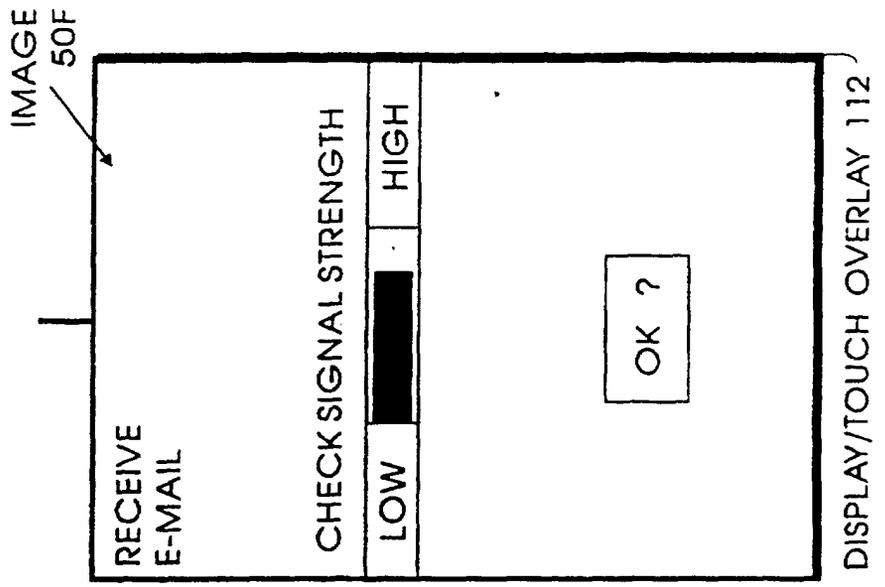


IMAGE
50F
RECEIVE
E-MAIL
CHECK SIGNAL STRENGTH
LOW
HIGH
OK ?
DISPLAY/TOUCH OVERLAY 112

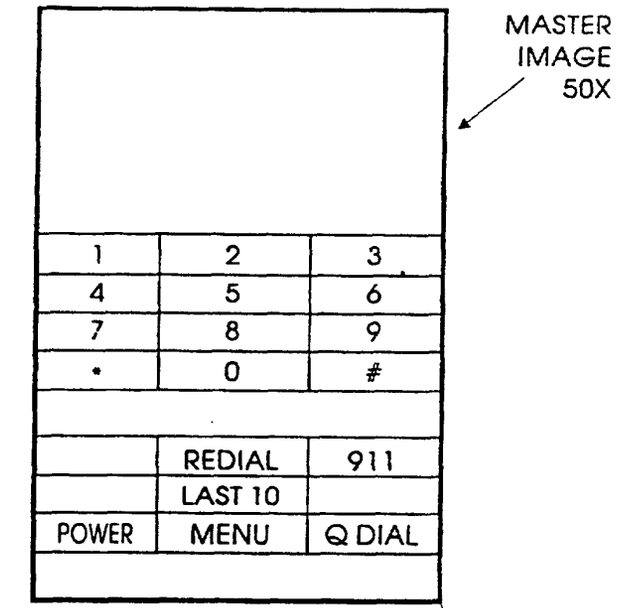


FIG. 6

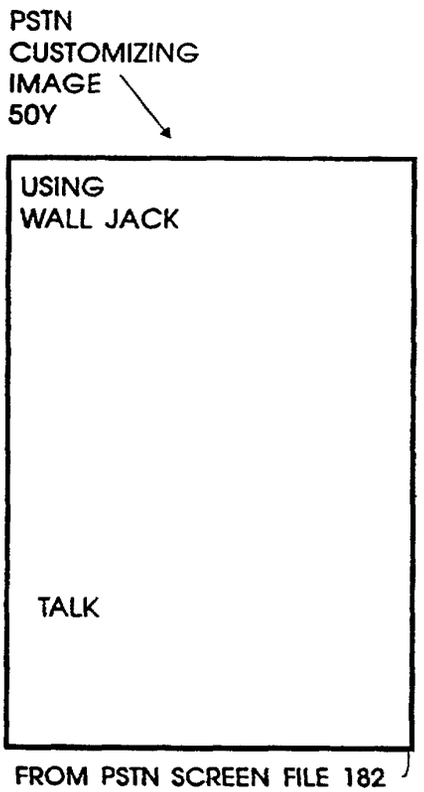


FIG. 6A

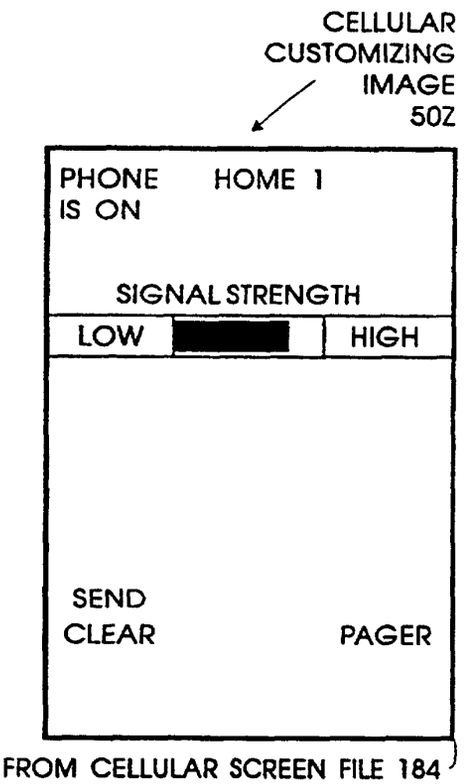


FIG. 6B