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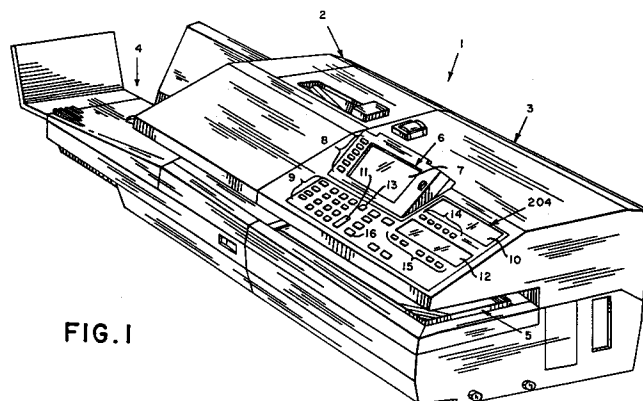
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W-8000 München 81(DE)(54) **Embedded user-interface having multiple language capability.**

(57) A postage meter mailing machine (1) includes an embedded user interface system. The mailing machine includes a programmable microcontroller means having a non-volatile memory for storing data information and executable routine. The microcontroller is in bus communication with a visual display (7) and a plurality of soft keys (8). Stored in the memory are (i) a plurality of system screens for display on the visual display (7), (ii) a data window field and a prompt field and having descriptors for

each of the respective fields (iii) a plurality of text strings in a first language and a plurality of text strings in a second language, (iv) a plurality of graphic display run routines, (v) a plurality of routines for enabling the soft keys (8) and for identifying the respective subsequent screen. The user interface is programmed to enable a select one of the text strings in one of the languages for display on the display.

**FIG. 1**

Background of the Invention

The present invention relates to embedded user interface systems for a microcontrolled machine system having an interactive user interface system, particularly suited for a postage meter mailing machine.

In many machine applications, it is an objective to provide the postage meter mailing machine with an ever increasing number of operator selectable functions presented to the operator through a machine embedded user friendly interface system. The user interface system provides a means for operator control over and interfacing with machine functions. For example, it is considered advantageous to provide a mail processing system, particularly, a postage meter mailing machine, with accounting functionality and report generating functionality. It is further considered advantageous to provide the mailing machine with the ability to interface with external devices or system, such as, funds allocation system and external scales.

Enabling a postage meter mailing machine with expanded functionality has required that the user interface system be expanded in scope to provide to the user with visual instruction as to how to access different machine functions and direct the user as to what information is required from the user in order for the machine controller to properly process a user request. Where such machines intended for multiple nation distribution, it is customary to customize the user interface, for example, with respect to language and currency denomination, to be specific of the particular nation which the mailing machine is intended to be marketed. Further, in order to market or re-market the customized mailing machine in a different national market, it has been necessary to fully replace the user's interface executable software code, most often requiring that the machine is transported to a specially equipped service center.

Summary of the Invention

It is an object of the present invention to present a machine embedded user interface, particularly suited for a postage meter mailing machine, wherein the user interface can be selectively enabled during system set-up for marketing in two or more national markets.

It is a further objective of the present invention to present a machine embedded user interface wherein the user interface may present text strings in a plurality of languages wherein the respective language to be presented with respect to a particular user is enabled automatically upon operator impact of the user identification code.

The user interface is particularly adapted for

mailing machine application. A mailing machine includes as part of the user interface a display, a display input/output (I/O) driver, six soft keys aligned to respective portion of the display and a number of hard keys. The mailing machine is under the control of a microcontroller which includes a host programmable microprocessor in bus communication with suitable memory devices. One of the memory devices is a program memory. The microcomputer is also coupled to the display I/O driver and to I/O drivers for the soft keys and hard keys.

The memory registers of the program memory are mapped into a number of regions, for example, a command region, a text region, a screen region, a dynamic field region, a hard key region and a soft key region. The memory also includes a command file region. The command file contains all the commands for a fully featured mailing machine, inclusive of all option command structures. The execution code routines for the machine functions may be resident in the memory. The text region is comprised of two or more sub-regions. Each region contains the necessary text strings in ASCII form in different languages.

Within the screen region is stored the data structure which represents each screen for the display. As part of that data structure, the screen data defines which hard keys and soft keys are to be enabled with respect to that screen. Each screen is identical in format such that there is a title area, a soft key text area, a dynamic or window area and a hard key text area. Therefore, when a particular screen is retrieved, the text string is retrieved from one of the text sub-region. The particular text-region to be placed in use may be enabled during system set-up. Alternatively, the enabled text sub-region may be determined during operator log-on.

Brief Description of the Drawings

Fig. 1 is a schematic of a microcomputer system for a mail processing system having a user interface system in accordance with the present invention.

Fig. 2 is a schematic of a suitable mailing machine microcontroller system suitable for employing a user interface system in accordance with the present invention.

Fig. 3 is a schematic representation of a memory having specified region in accordance with the present invention.

Fig. 4 is a schematic representation of a display having defined regions in accordance with the present invention.

Fig. 5 is a logic schematic of the user interface screen select in accordance with the present inven-

tion.

Fig. 6 is a schematic representation of a user menu option and data flow in accordance with the present invention.

Detailed Description of the Preferred Embodiment

Referring to Fig. 1, the present invention is particularly suited for a postage meter mailing machine application. For example, a postage meter mailing machine, generally indicated as 1, is comprised of a feeder section 2 and a postage meter mailing machine section 3. In operation, envelopes are placed in a hopper 4 of the feeder section 2, whereupon the envelopes are serially fed through the feeder section to the mailing machine section 3 for imprinting of a postage indicia on feed envelopes by a postage meter print arrangement (not shown) detachably mounted within the mailing machine section 3. In the preferred embodiment, the mailing machine 1 includes a scale 5 for weighing the envelope and communicating with a microprocessor such that proper postage is printed by the printing mechanism of the postage meter on the envelope according to the weight of the envelope.

The mailing machine 1 includes a user interface, generally indicated as 6. The user interface 6 includes a visual display 7 and a plurality of soft keys 8 aligned to a respective portion of the screen 7 and a plurality of hard keys 9, which form a keyboard or keypad, at least one of the keys 9 are designated as an enter key 11 and another designated as a return key 13. Also, one of the hard keys is designated as a start 16. The interface 6 also includes first and second mimic displays 10 and 12, respectively. The mimic interface display also includes function hard keys, generally indicated as 14 which are associated with the mimic display 10 and hard keys 15 which are associated with mimic display 12.

Referring more particularly to Fig. 2, a suitable microcontroller system, generally indicated as 100, is comprised of a core board 102 having located thereon a microprocessor based motor controller 104 in bus 106 communication with a code read only memory (ROM) 107, a motor application specific integrated circuit (ASIC) 108 and a shared non-volatile memory (NVM) controller 112. A microprocessor based host controller 116 is in bus 118 with the NVM controller 112 and connectors 120, 122 and 123, respectively. The motor controller 104 is also in bus 126 communication with a meter board 128, dater board 130 and scale board 132, also referred to as Weight On The Weight (WOW) board 132. Also in communication with the Host controller bus 118, and thereby the host controller 116, are DUAL UART input-output (I/O) module 150

and a Echoplex communication I/O module 152. The NVM controller 112 is in bus 113 communication with a shared non-volatile memory NVM 115.

A microprocessor based sensor controller 119 is in bus 136 communication with the NVM controller 112. An analog-to-digital (A/D) converter 138 is in bus 140 communication with the sensor controller 119. A sensor bus 142 communicates the sensor controller 119 and A/D converter to the harness coupler 144. A flex harness 146 is attached to the harness coupler 144 at one end and to the respective drive motors and sensors (not shown) of the postage meter mailing machine 1. A more detailed description of a particular suitable postage meter mailing machine is described in U.S. Patent No. 4,935,078 entitled HIGH THROUGHPUT MAILING MACHINE TIMING.

A personality module 160 is in communication with the host controller bus 118 through a personality bus 162 through coupler 120. The personality module 160 includes a Expansion NVM 164, a graphics controller 166, a combination keyboard and MIMC I/O port 168. A man machine interface module 170 including a liquid crystal display (LCD) board 172 and a keyboard and MIMIC board 174 which are in respective bus 176 and 178 communication with the graphics controller 166 and I/O board 168 through respective couplers 180 and 182. NVM accounting cartridges 184 and 186 are in communication with the NVM expansion I/O board 164 through coupled bus 188 and 190, respectively.

The dual communication module 150 permits bus 192 and 194 coupling thereto of a weighing platform with integrated rating 200, a rating board 202, a service device 204 or such other general purpose device 206 such as a printer. In like manner, an echoplex scale 208 may coupled to the echoplex I/O module 152 by bus 210.

A system bus controller 220 is in bus 222 communication with the host controller bus 118 through the coupler 123. Also a code ROM 221 is in coupled bus 223 communication with the host controller bus 118 through coupler 122. The system bus 224 provides communication of the system bus controller 220 with a I/O expansion module 226 from which may be coupled a parallel printer interface 228, a general purpose interface 230 and a custom parallel interface 223. Other optional devices, such as, a modem 236, an inserter module 238, an OCR module 242, an addresser module 224 and an additional stacker module 240 may be carried by bus 224.

Referring to Figs. 3 and 4, the display 7 is mapped such that each screen defines data window area DW, a soft key menu field MF, a screen title field TF, a prompt/error field PF. The soft keys, individually referred as 8a through 8f, are aligned

to respective portion of the screen menu field MF. Aligning the soft keys to the screen field MF in this manner, allows a machine operator to easily associate the options presented in the menu field MF with the depression of the correspondingly aligned soft key. Operator instructions, request for operator variable data input and operator error messages are presented in the prompt field PF. Within the data window DW, user system information pertinent to the current state of the mailing machine 1 or selected soft functions can be presented to the operator. It is noted that the soft functions refer to data processing functions, such as, funds accounting, and hard functions refer to machine control functions.

Referring to Figs. 3 and 5, the Code ROM Module 221 is partitioned into addressable regions. A first one of the regions is the text region RN-1. The text region RN-1 has stored therein the text strings for display. A second region RN-2 has stored the individual screen descriptor for driving the graphics controller 166. Each screen defines the associated text strings to be displayed with that screen. A region RN-3 is reserved for interactive information, that is, the command structure for display of machine state information.

Referring more particularly to Fig. 5, upon initiation of a screen select processor at 300 which is determined by the function key actuated (i.e., menu option chosen) in previous screen, the memory region corresponding to the language selected is enabled at 302. The identified screen is retrieved from the screen field area at 303. Each identified screen within the screen field area includes screen descriptors. Some of which descriptors define the appropriate text strings and define screen location, define the dynamic field for data window, and also enable the appropriated soft keys. At 303, the corresponding data pursuant to the screen descriptor is retrieved. At 304, the text string is retrieved from the enabled language region. At 305, the first retrieved data item is selected for testing at 306. If the first data item is not a text string, the appropriate graphic information is retrieved from the dynamic field RN-2 at 307. The retrieved graphic display routine is accordingly executed at 308 for display in the data window DW.

Concurrent then with execution of the display routine at 308, a test is performed to determine whether the additional data item has been retrieved at 305. If no further display items have been retrieved, then the routine is finished at 312. If there are additional data items at 309, the routine gets the next data item for testing at 306. If at 306 the data item is a text string, the routine proceeds to 314.

Returning to decision point 306, if a text string has been retrieved as the first item or, as here, is

the next data item to be tested, the specific location for display of the data item and the specific corresponding text identification is retrieved at 314. At 315, the specific test string is retrieved and at 316 the text string is caused to be displayed on the display at the proper screen location. Now at 309, the presence of any additional data item is tested for, if no additional data item, the routine proceeds to 312. If there are additional data item, the routine repeats until all data items have been identified and displayed.

Referring more particularly to Figs. 6A to 6I, to illustrate a preferred form of the user interface system, upon power-up of the interface system, indicated at 11, the screen retrieve routine is executed. First, within the PF screen field, the operator is prompted to input the operator ID number at 12, if enabled. The interface system proceeds to prompt the user at 14 to press the start key for a mail run at 14. However, prior thereto, the operator will be prompted at 13 to input any missing user ID information at 15. Within the message field MF, the operator is now presented with the menu set A1 through A6 which provides the operator with the option to choose by actuation of the respective soft key to change mail classes, change accounts, prepare site setup, service diagnostic, view addition options or quit.

If the operator should choose to change the mail class by depressing soft key 8a, the operator is then prompted at 17 within the prompt field PF to pick a class or enter a speed code and to press enter when done. The operator is also presented in the menu field with the options S1 through S2 which present a variety of available classes. If the operator were to wish additional classes to choose from, he simply presses the soft key 8e aligned to option S5 and additional options are presented to the operator. It should be appreciated that the user interface can proceed in this manner to accommodate as many classes as are desired. As noted and hereafter understood, an operator may choose any of the presented menu choices by depressing the aligned soft key.

Pursuant to a selection of option S6, the operator may choose to view the appropriate fees at 21 in the data window DW associated with the classes displayed in the data window. The operator is then prompted at 22 in the prompt field PF to hit the resume, option S6, to resume the selections at the A1 through A6 menu selection point.

Along with the option to change classes in menu field MF, the operator is given the choice to change accounts at A2 upon which further operation will apply. The operator is presented with a prompt at 25 to enter the account number. Once the new account number is entered at 26, the machine returns to node N1 and the operator is

prompted to press the start to run the mail at 14. A diagnostic services option is present at A4 where, should that option be chosen, the user interface will then enter into a service diagnostics display routine which is presented to the user in the similar format as hereafter discussed. Should the operator enter a quit mode A6, the user interface then returns to a request for an operator ID at 12.

The operator may choose at this point to view more options at A5 following which selection the operator is then prompted to make a selection or press start to run at 30 and the operator is presented with a second set of options A7 through A12. The A7 option reinstates option A1 through A6 to the MF. Option A8 allows the operator to display the meter register and other meter information. If selected, the meter information is displayed in the data window DW and the operator is prompted to hit enter or go back to the previous presented options A1 through A6 at 32. The operator may choose to view reports at A9, should the operator make that selection, the operator is then presented with a list of reports in the data window DW and is prompted at 40 to select the report by hard key entry. The operator is then presented with a choice of three report types B1 through B3 to choose from. The available options now being account summary at B1, last transaction at B2, and a site setup and operating reports at B3.

Claims

1. An embedded user interface system for an apparatus,

said apparatus having a programmable microcontroller means for performing hard and soft system apparatus functions and having memory means for storing data information and executable routines, said microcontroller being in bus communication with a visual display means for displaying information under control of said microcontroller and a plurality of soft keys, wherein said embedded user interface system comprises:

- said memory means having stored therein
- (a) a plurality of system screens for display on said visual display, each of said screens having a menu field of N columns and M rows, a data window field, and a prompt field, and having descriptors for each of said respective fields,
 - (b) a plurality of text strings in a first language and a plurality of text strings in a second language,
 - (c) a plurality of graphic display run routines,
 - (d) means for enabling said soft keys and for identifying said respective subsequent

screen in response to activation of said respective soft keys; and,

said user interface having means to enable a selected one of said text strings in one of said languages being programmed to identify a first screen and having a screen select routine to

- (a) get the identified screen from said screen region of said memory for display on said display means,
- (b) get the text strings identified by said screen descriptor of said identified screen from said text region and display said text string in respective areas of said menu field of said screen, and enable said respective soft keys,
- (c) display dynamic information in the data window field of said displayed screen and execute a graphic display run routine,
- (d) await activation of one of said soft keys, and
- (e) execute a command file.

2. An embedded user interface system as claimed in claim 1 wherein each of said soft keys is aligned to a respective portion of said screen menu field and said respective text string is aligned opposite said enabled soft key.

3. An embedded user interface system as claimed in claim 1 or 2 wherein said memory means comprises;

- (a) a screen region having stored therein said plurality of system screens,
- (b) a text region having stored therein a first language subregion and a second language subregion each region having said plurality of text strings in the respective languages,
- (c) a dynamic field region having stored therein said graphic display run routines, and
- (d) a soft key field having said routine for enabling said soft keys and for identifying said respective subsequent screen.

4. A method of providing an apparatus with a user selectable apparatus system function, said apparatus having a programmable microcontroller in bus communication with a program memory, a visual display means for visual display of information and a plurality of soft keys comprising the steps of:

- storing in said program memory
- (i) a plurality of system screens for display on said visual display, each of said screens having a menu field of N columns and M rows, a data window field and a prompt

field, and having descriptors for each of said respective fields,

(ii) a plurality of text strings,

(iii) a plurality of graphic display run routines,

(iv) means for enabling said soft keys and for identifying a respective subsequent screen; and,

programming said microcontroller to identify a first screen and to perform a screen routine to

(a) get the identified screen from said screen region of said memory for display on said display,

(b) get the text strings identified by said screen descriptor of said identified screen from said text region and display said text strings in respective areas of said menu field of said screen, and enable said respective soft keys,

(c) display dynamic information in the data window field of said screen and execute a graphic display run routine,

(d) await activation of one of said soft keys and repeat for next screen till end, and

(e) execute a command file upon actuation of a selected one of said keys.

5. A method as claimed in claim 4 further comprising the steps of storing in said memory a plurality of regions

(a) a screen region having stored therein said plurality of system screens,

(b) a text region having stored therein said plurality of text strings,

(c) a dynamic field having said graphic display run routines, and

(d) a soft key field having said routine for enabling said soft keys and for identifying said respective subsequent screen.

6. An embedded user interface system for an mailing machine,

said mailing machine having a programmable microcontroller means for performing hard and soft system apparatus functions and having memory means for storing data information and executable routines, said microcontroller being in bus communication with a visual display means for displaying information under control of said microcontroller and a plurality of soft keys, wherein said embedded user interface system comprises:

said memory means having stored therein:

(a) a plurality of system screens for display on said visual display means each of said screens having a menu field of N columns and M rows, a data window field, and a

prompt field, and having descriptors for each of said respective fields,

(b) a plurality of text strings in a first language and a plurality of text strings in a second language,

(c) a plurality of graphic display run routines, and

(d) means for enabling said soft keys and for identifying said respective subsequent screen in response to activation of said soft keys; and,

said user interface having means to enable a select one of said text strings in one of said languages, being programmed to identify a first screen and having a screen select routine to

(a) get the screen identified from said screen region of said memory for display on said display means,

(b) get the text strings identified by said screen descriptor of said identified screen from said text region and display said text strings in respective areas of said menu field of said screen, and enable said respective soft keys,

(c) display dynamic information in the data window field of said screen and execute a graphic display run routine,

(d) await activation of one of said soft keys and report for next screen till end, and

(e) execute a command file.

7. An embedded user interface system as claimed in claim 6 wherein each of said soft keys is aligned to a respective portion of said screen menu field, said respective text string being aligned opposite said enabled soft key.

8. An embedded user interface system as claimed in claim 6 or 7 wherein said memory means comprises;

(a) a screen region having stored therein said plurality of system screens,

(b) a text region having stored therein a first language subregion and a second language subregion each region having said plurality of text strings in the respective languages,

(c) a dynamic field region having stored therein said graphic display run routines, and

(d) a soft key field having said routine for enabling said soft keys and for identifying said respective subsequent screen.

9. A method of providing a mailing machine with a user selectable mailing machine system function, said mailing machine having programmable microcontroller in bus communica-

tion with a program memory, a visual display means for visual display of information and a plurality of soft key, comprising the steps of:

storing in said program memory:

- (i) a plurality of system screens for display on said visual display, each of said screens having a menu field of N columns and M rows, a data window field and a prompt field, and having descriptors for each of said fields, 5 10
- (ii) a plurality of text strings,
- (iii) a plurality of graphic display run routines, and
- (iv) means for enabling said soft keys and for identifying said respective subsequent screen; and, 15

programming said microcontroller to identify a first screen and having a screen routine to:

- (a) get the identified screen from said screen region of said memory for display on said display means, 20
- (b) get the text strings identified by said screen descriptor of said identified screen from said text region and display said text string in respective areas of said menu field of said screen, and enable said respective soft keys, 25
- (c) display dynamic information in the data window field of said screen and execute graphic display run routine, 30
- (d) await activation of one of said soft keys and repeat for next screen till end, and
- (e) execute a command file upon actuation of a selected one of said keys. 35

10. A method as claimed in claim 9 further comprising the step of storing in said memory means a plurality of regions including:

- (a) a screen region having stored therein said plurality of system screens, 40
- (b) a text region having stored therein said plurality of text strings,
- (c) a dynamic field having said graphic display run routines, and 45
- (d) a soft key field having said routine for enabling said soft keys and for identifying said respective subsequent screen.

11. A user interface system for microcomputer controlled apparatus having a memory, a plurality of keys and a display, the system comprising: 50

text strings in first and second languages stored in said memory; and 55

means responsive to actuation of a selected

key to enable display of text strings in a selected one of said languages.

12. A mailing machine having a user interface system according to any of claims 1 to 3, 6 to 8 and 11 or operable according to any of claims 4,5,9 and 10.

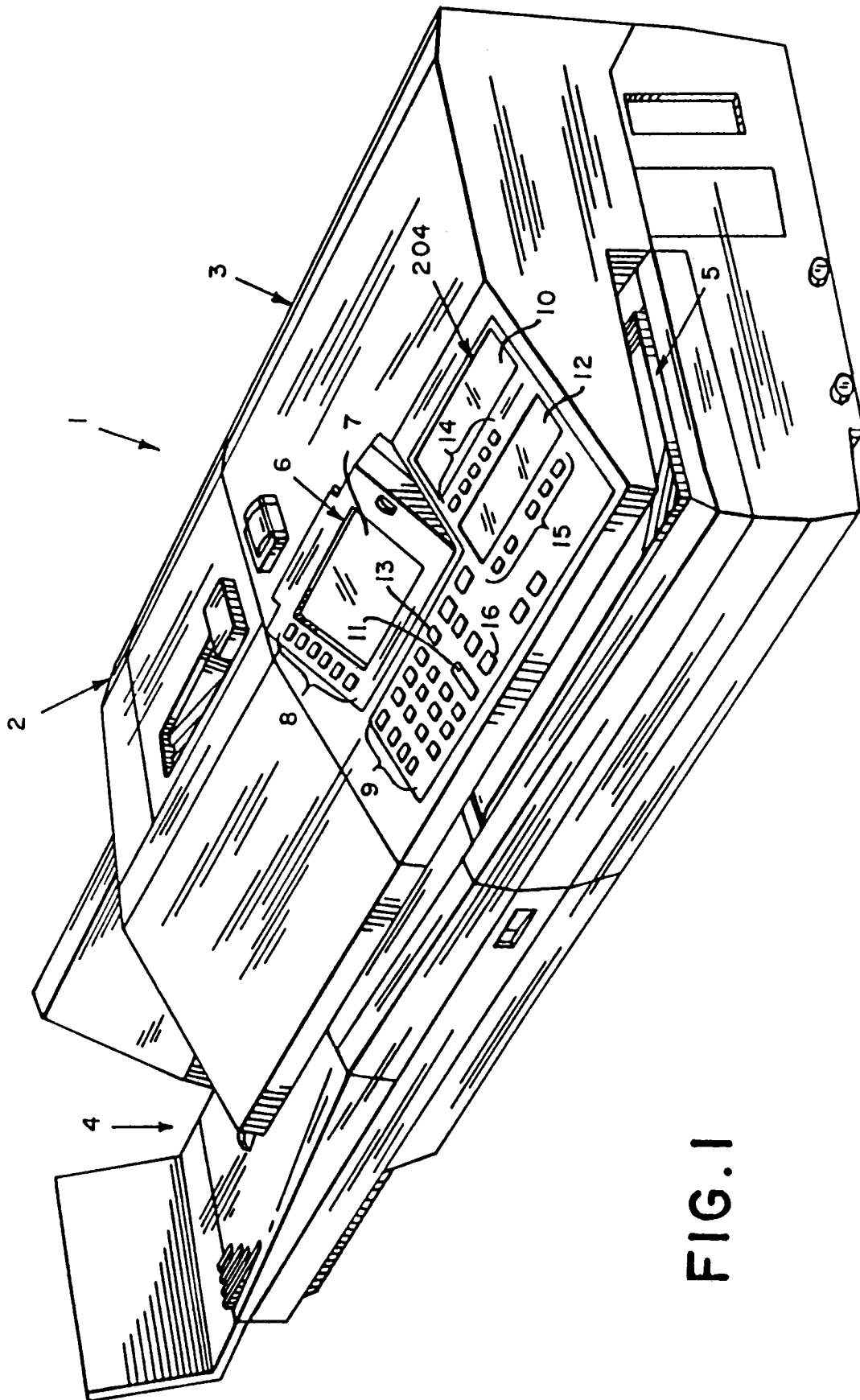


FIG. 1

FIG. 2

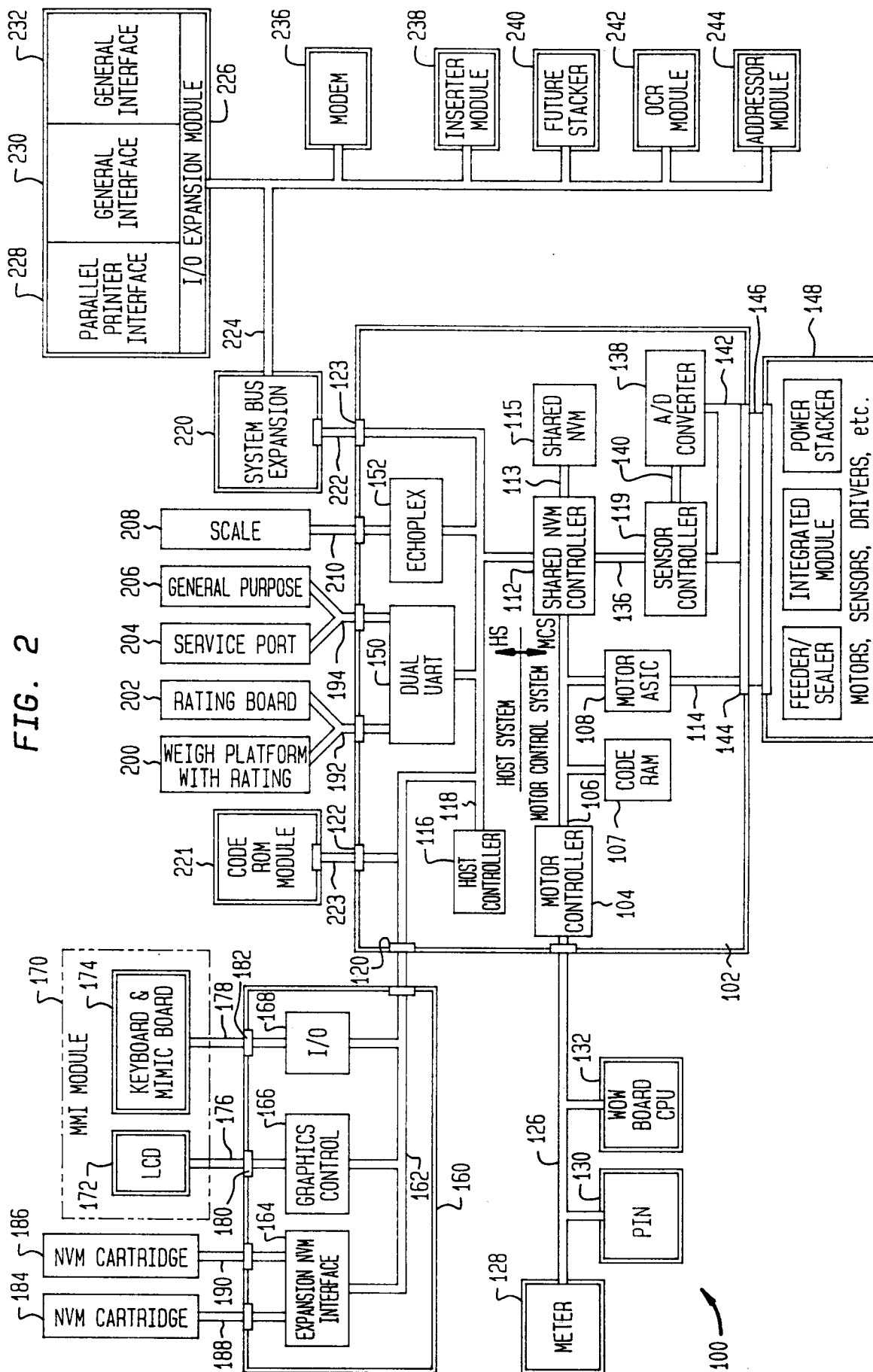


FIG. 3

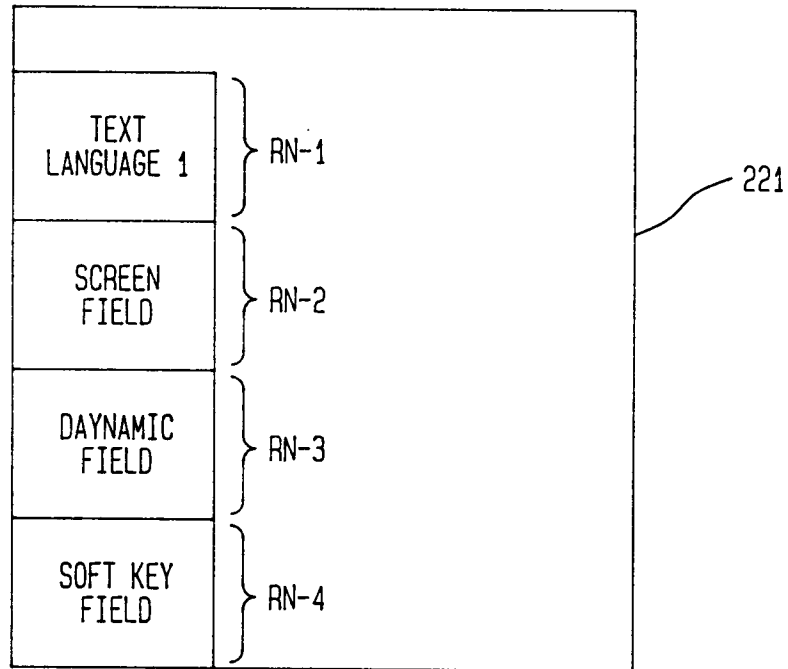


FIG. 4

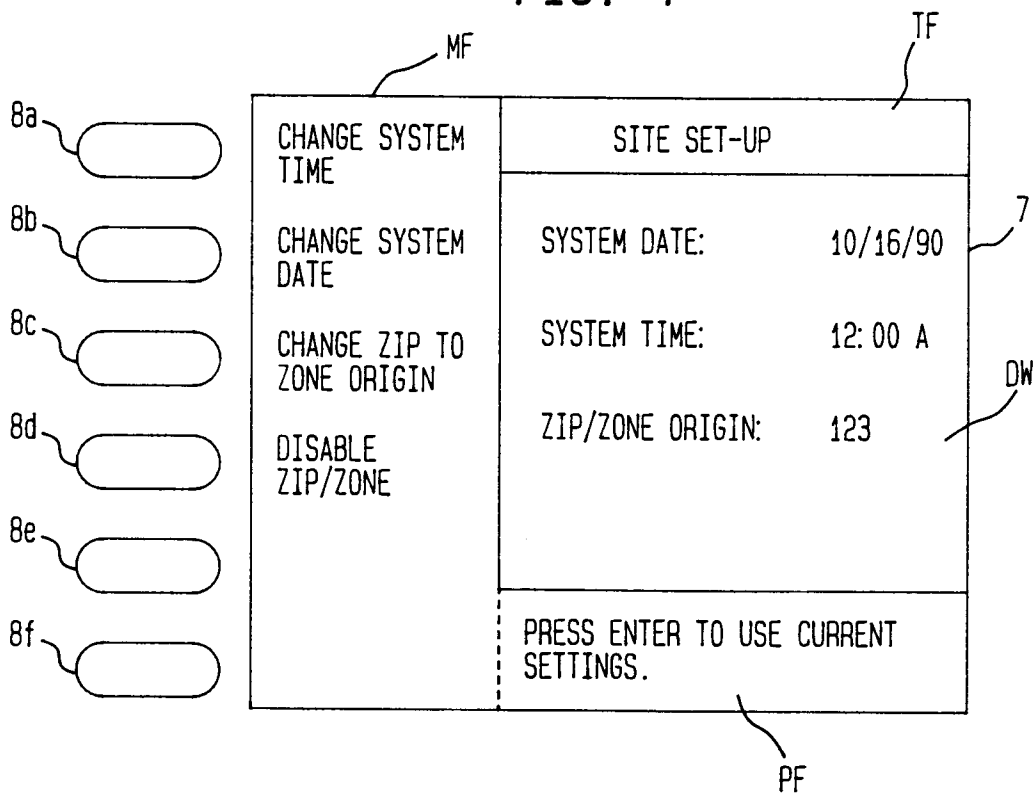


FIG. 5

(MULTIPLE-LANGUAGE CAPABILITY FOR A SYSTEM WITH "SOFT" DISPLAY
"SCREEN PAINTER" ALGORITHM)

