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GB 2254449 A GB 2224370 A GB 2212947 A
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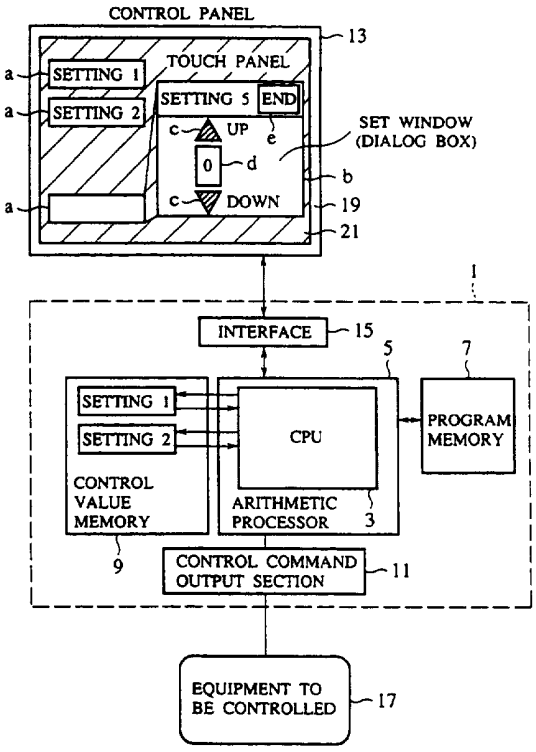
(54) Control parameter setting system

(57) In a process controller setting apparatus comprising a display 19 with an associated touch panel 21, the value of a control parameter according to which the system is operating is stored in a memory and displayed on the display 19. The value of the control parameter is adjusted each time the user adjusts the value of the parameter on the display without the need to confirm the change.

When a control parameter to be adjusted is selected by touching the touch panel in area a, a dialog window b is opened and the associated control parameter is adjusted by pressing area c. Selecting a different parameter a to be adjusted displays its associated dialog window whilst closing the window previously open.

FIG.3



GB 2 302 419 A

FIG.1

PRIOR ART

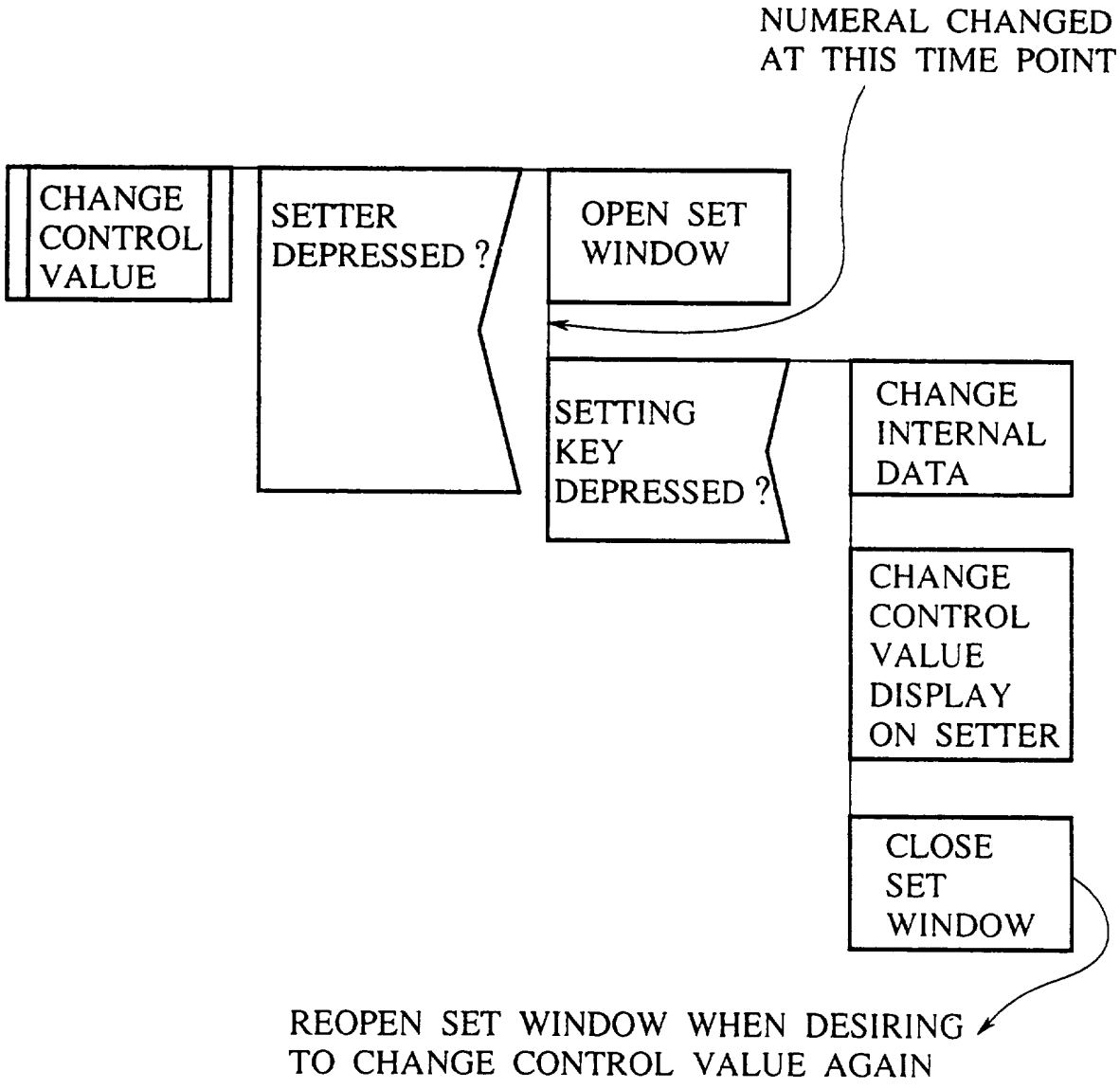


FIG.2
PRIOR ART

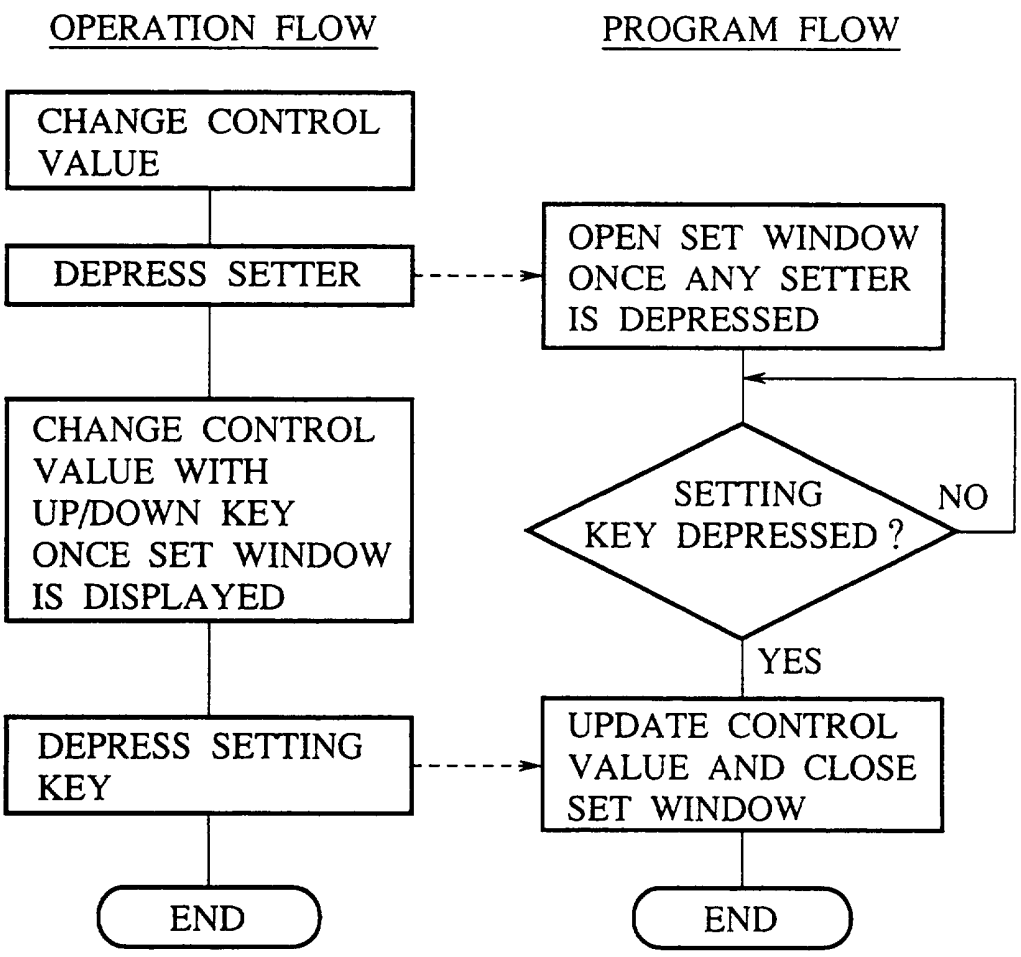


FIG.3

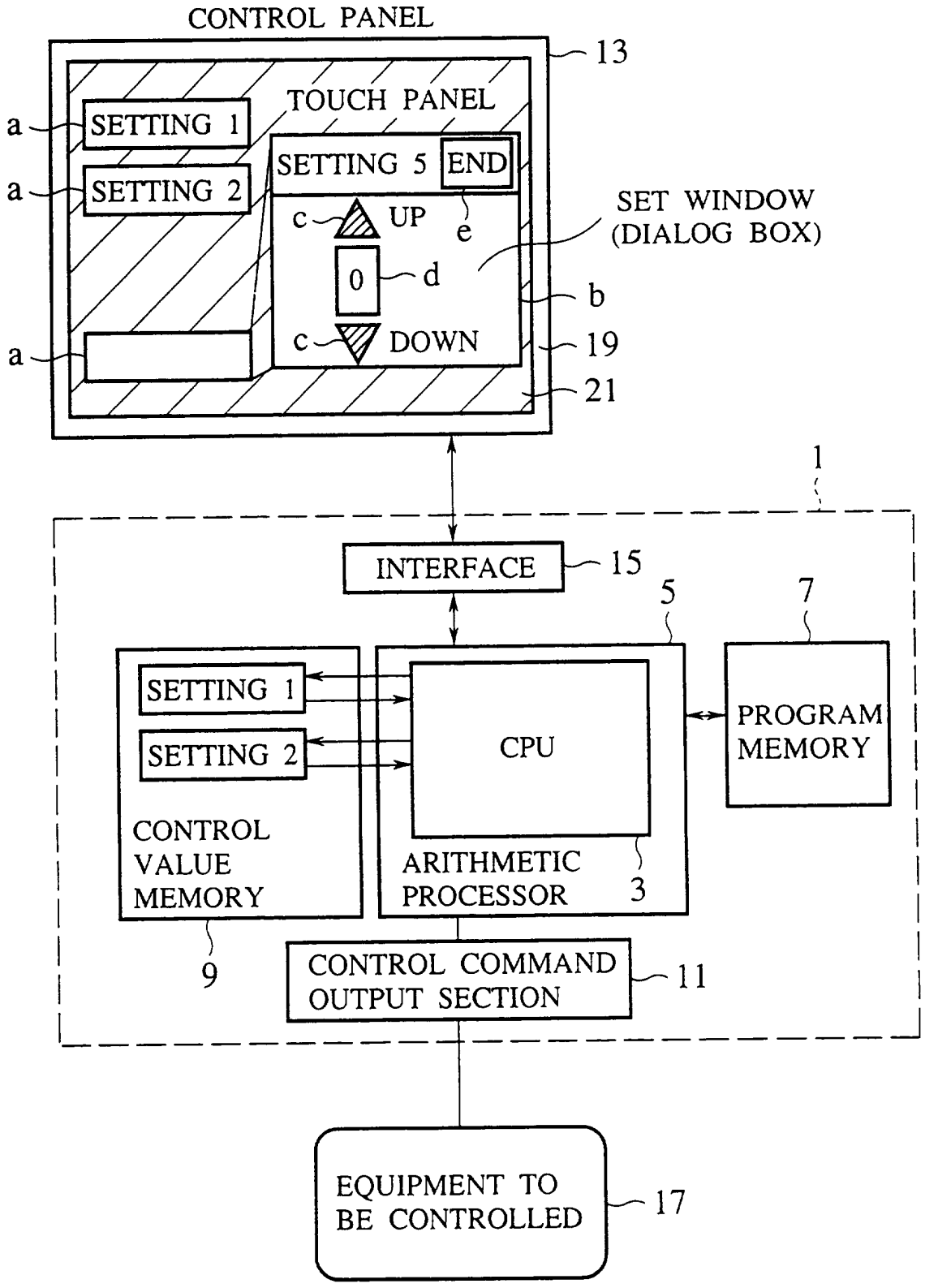

CONTROL PANEL
13
TOUCH PANEL
a
SETTING 1
a
SETTING 2
SETTING 5
END
c
UP
e
SET WINDOW
(DIALOG BOX)
0
d
b
a
c
DOWN
19
21
1
INTERFACE
15
5
7
SETTING 1
SETTING 2
CPU
PROGRAM
MEMORY
CONTROL
VALUE
MEMORY
ARITHMETIC
PROCESSOR
3
9
CONTROL COMMAND
OUTPUT SECTION
11
EQUIPMENT TO
BE CONTROLLED
17

FIG.4

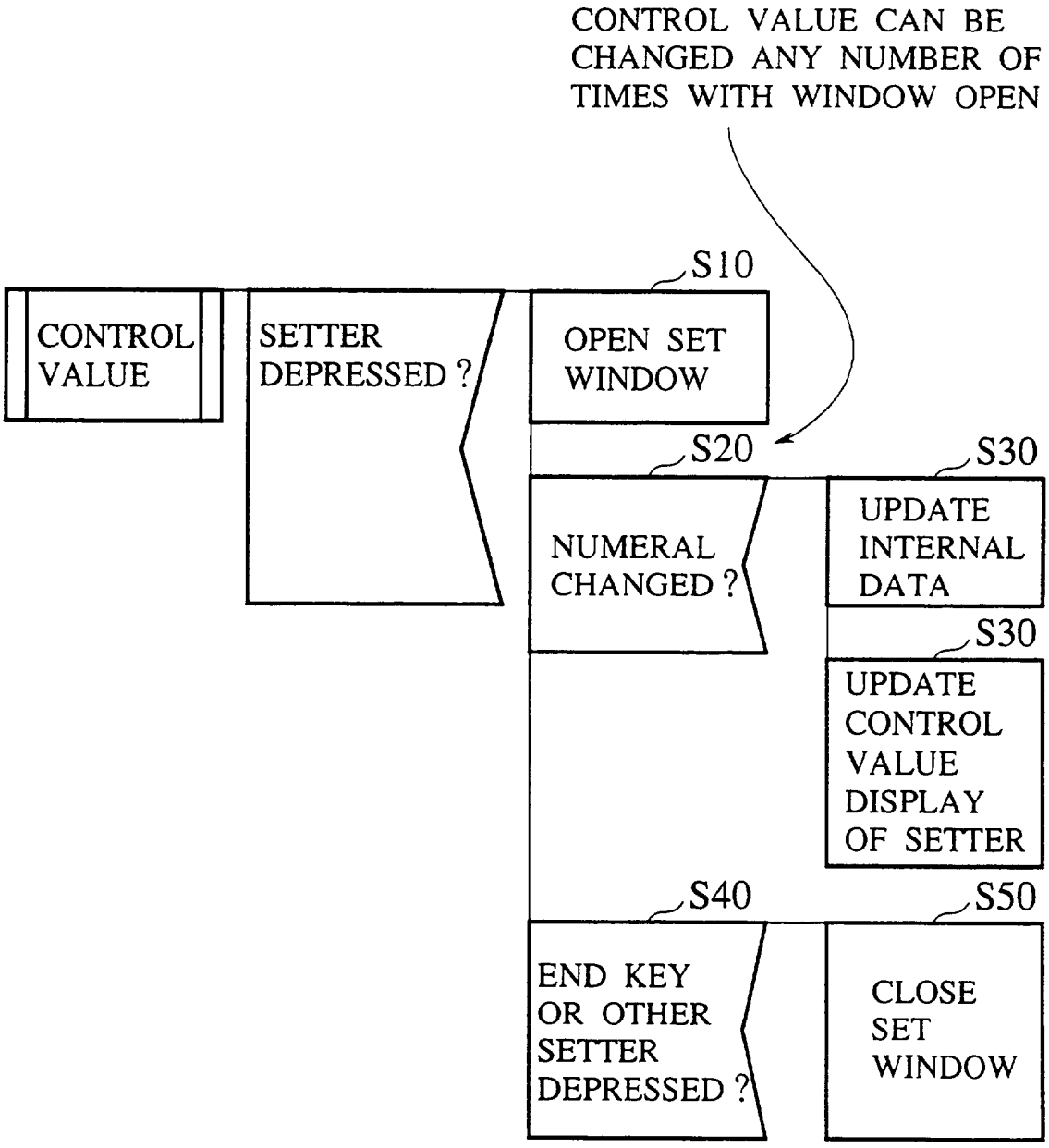
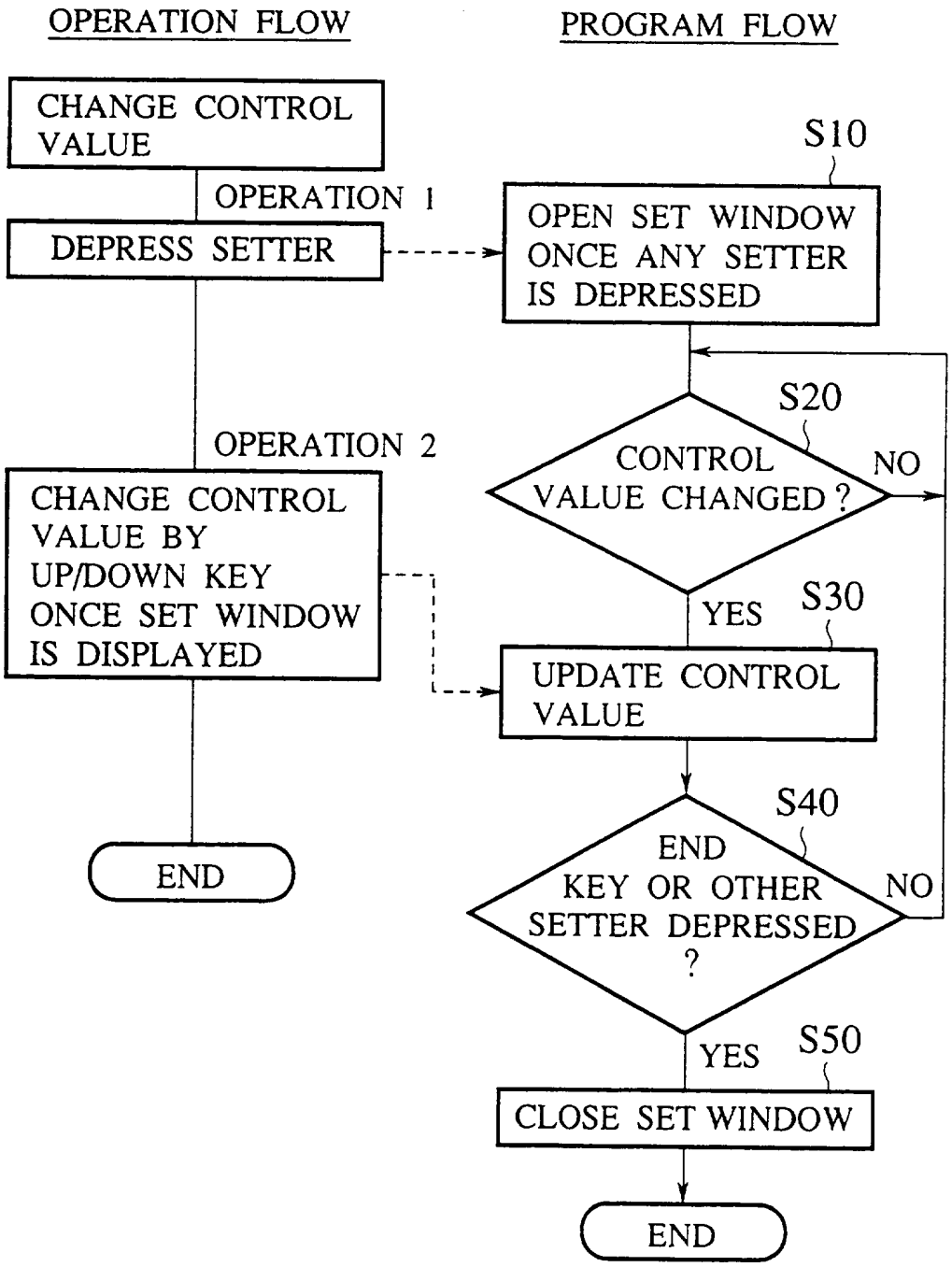

CONTROL VALUE CAN BE CHANGED ANY NUMBER OF TIMES WITH WINDOW OPEN
CONTROL VALUE
SETTER DEPRESSED ?
S10
OPEN SET WINDOW
S20
NUMERAL CHANGED ?
S30
UPDATE INTERNAL DATA
S30
UPDATE CONTROL VALUE DISPLAY OF SETTER
S40
END KEY OR OTHER SETTER DEPRESSED ?
S50
CLOSE SET WINDOW

FIG.5


OPERATION FLOW
PROGRAM FLOW
CHANGE CONTROL VALUE
OPERATION 1
DEPRESS SETTER
S10
OPEN SET WINDOW ONCE ANY SETTER IS DEPRESSED
S20
CONTROL VALUE CHANGED ?
NO
YES
OPERATION 2
CHANGE CONTROL VALUE BY UP/DOWN KEY ONCE SET WINDOW IS DISPLAYED
S30
UPDATE CONTROL VALUE
S40
END KEY OR OTHER SETTER DEPRESSED ?
NO
YES
S50
CLOSE SET WINDOW
END
END

CONTROL VALUE-SETTING APPARATUS FOR PROCESS CONTROLLER

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an apparatus for setting a control value of a processor controller, and more particularly though not exclusively, to a control value-setting apparatus of touch panel type for a process controller which outputs a control command on the basis of a control value written in a control value memory.

Description of the Related Art

A process controller used with an injection molding machine or the like comprises a control value memory for storing a control value (control target value) rewritably, and outputs a control command on the basis of the control value rewritably stored in the control value memory.

Such a process controller comprises a control value-setting apparatus of touch panel type for writing a control value in a control value memory. A control value-setting apparatus of touch panel type includes an image display section of a liquid crystal panel or the like, a touch panel applied on the image display section, and a control section for fetching an input signal from the touch panel, displaying on the image display section and rewriting the control value in the control value memory.

In a conventional control value-setting apparatus of touch panel type, a plurality of items to be set are displayed for each control value on the image display section. As shown in the PAD (SDL) diagram of

Fig. 1 and the flowchart of Fig 2, upon operation of the touch panel (hereinafter referred to as the "setter") in the display area of selected one of the items to be set on display, a dialog box (hereinafter referred to as the "set window") for setting the control value of the particular item to be set is displayed on the image display section, i.e., a window is opened. The touch panel in the display area of an up/down key in the set window is operated to update the display of the control value. The operation of the touch panel (hereinafter referred simply as the "setting key") in the display area of the setting key (end key) in the set window, on the other hand, rewrites and updates the control value (interval data) of the control value memory, thereby terminating the display of the set window, i.e., closing the window.

For setting process data (control value) in an injection molding machine, it is common practice to sequentially change the control value during a stable automatic operation cycle while watching the conditions of the mold actually produced. This also applies to a high-cycle operation running at the rate of several seconds per cycle. In view of this, it is desirable to change a control value rapidly with a simple operation without proceeding through a complicated sequence.

In the above-mentioned control value-setting apparatus of touch panel type, the control value in the control value memory is not updated unless the setting key is operated after changing the control value. The key operation, therefore, is complicated, thereby requiring an accordingly longer time for operation and control processing.

The set window is closed when the setting key is operated. In the case of changing the same control

value for each cycle, therefore, the set window is required to be opened each time by the same operation procedure, which complicates the key operation and requires correspondingly longer time for operation and control processing.

Further, when the set window for a given item to be set is open, the set window for another item to be set cannot be opened unless the first set window is closed by the operation of the setting key. This also requires a complicated key operation and correspondingly longer time for operation and control processing.

For the reasons described above, the control value cannot be changed with high operability and efficiency in the case of the conventional control value-setting apparatus of touch panel type.

SUMMARY OF THE INVENTION

An aim of the present invention, which has been developed in view of the above-mentioned problems, is to provide a control value-setting apparatus for a process controller capable of changing a control value with high operability and efficiency.

According to one aspect of the present invention, there is provided an apparatus for setting a control variable of a process controller, the apparatus comprising a memory for storing the control variable, means for displaying the value of the variable, and means for inputting information to change the value of the variable, wherein the controller is arranged to update the value of the displayed variable each time information to change the value of the variable is received via the inputting means, and to store the new value of the variable in the memory each time the

display means is updated.

According to a further more particular aspect of the present invention there is provided, a process controller including a control value memory for storing a control value rewritably and outputting a control command on the basis of the control value written in the control value memory, a control value-setting apparatus comprising an image display section, a touch panel attached on the image display section, and a control section for fetching an input signal from the touch panel, displaying an image urging a user to operate on the image display section and rewriting the control value in the control value memory, wherein the control section operates in such a manner that a plurality of items to be set are displayed for each control value on the image display section, and the touch panel, in the display area of selected one of the items to be set on display is operated thereby to display a dialog box for setting the control value of the particular item to be set, whereas the touch panel in the display area of an up/down key in the dialog box is operated thereby to update the display of the control value while at the same time rewriting the control value in the control value memory.

In a control value-setting apparatus for a process controller embodying the present invention, a plurality of items to be set are displayed on the image display section for each control value, and the touch panel in the display area of selected one of the items to be set on display is operated thereby to display a dialog box for setting the control value of the particular item to be set, while the touch panel in the display area of the up/down key in the dialog box is operated thereby to update the display of the

control value and rewrite the control value in the control value memory. The control value thus can be changed without operating a setting key.

Even after changing a control value, the display of a dialog box for setting the control value is sustained, i.e., the set window is kept open, and thus the control value can be changed again.

The control section may be operated to update the displaying of the control value and to rewrite the control value in the control value memory in such manner that the displaying of a dialog box being displayed on the display at that time is terminated in a state of the dialog box for setting the control value of the item being displayed, by operating the touch panel in the displaying area for setting new item then the touch panel of the up/down key in the displaying area of the new dialog box being operated.

In the control value-setting apparatus for a process controller embodying the present invention, upon operation of the touch panel in the display area of a new item to be set when the dialog box for setting a control value for an item to be set is displayed on the image display section, the display of the dialog box on display is terminated and the new dialog box for setting the control value of the new item to be set is displayed on the image display section. On the other hand, the touch panel of the up/down key in the display area of the new dialog box is operated thereby to update the display of the control value and rewrite the control value in the control value memory. As a result, it becomes possible to change another control value without performing the operation to close the dialog box already open for setting the control value.

According to another aspect of the present

invention, there is provided a method of setting a control variable for a process controller, said method comprising storing a process control variable in a memory of a process controller, displaying the value of the variable, inputting information to change the value of the variable, updating the value of the displayed variable each time information to change the value of the variable is input into the process controller and storing the new value of the variable in the memory each time the displayed variable is updated.

The method may include storing, displaying and changing a plurality of process variables. In this case, the method may further comprise providing a setting window for each control variable through which a user can change the value of the variable, automatically deactivating or closing a present setting window and opening a new setting window for a new variable when a new variable is selected.

The above and further features are set forth with particularity in the appended claims and together with the advantages thereof will become clearer from consideration of the following description of an exemplary embodiment of the present invention when considered with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Fig. 1 is a PAD diagram showing the operation of a conventional control value-setting apparatus for a process controller;

Fig. 2 is a flowchart showing the operation flow and the program flow of a conventional control value-

setting apparatus for a process controller;

Fig. 3 is a diagram showing the configuration of a control value-setting apparatus for a process controller according to an embodiment of the invention;

Fig. 4 is a PAD diagram showing the operation of a control value-setting apparatus for a process controller according to an embodiment of the invention; and

Fig. 5 is a flowchart showing the operation flow and a program for a control value-setting apparatus for a process controller according to an embodiment of the invention.

DETAILED DESCRIPTION OF AN EMBODIMENT

An embodiment of the invention is described hereinafter with reference to Figures 3 to 5 of the accompanying drawings.

Fig. 3 shows a control value-setting apparatus for a process controller according to an embodiment of the present invention. A process controller body 1 includes an arithmetic processor 5 having a CPU 3 as a control section, a program memory 7 for storing a system program, a control value (set value table) memory 9 for storing a control value in rewritable fashion, a control command output section 11, and an interface 15 of a control panel 13. A control command is applied to an equipment to be controlled, for example, an injection molding machine from the control command output section 11 on the basis of the control value written in the control value memory 9.

The control panel 13 includes an image display section 19 configured of a liquid crystal or a CRT, and a touch panel 21 attached on the image display

section 19. In response to a display command from the arithmetic processor 5, a predetermined display is effected on the image display section 19 and an operation signal derived from the touch panel 21 is applied to the arithmetic processor 5.

The arithmetic processor 5 has the CPU 3 thereof execute the system program, applies a control command from the control command output section 11 to the equipment to be controlled, for example, an injection molding machine on the basis of the control value stored in the control value memory 9, and performs display on the image display section 19 while at the same rewriting the control value in the control value memory 9.

The arithmetic processor 5, as shown in Fig. 3, is such that a plurality of items to be set **a** are displayed for each control value on the image display section 13, and the touch panel 21 in the display area of selected one of the items to be set on display is operated thereby to display on the image display section the dialog box **b** for setting the control value of the particular item to be set, while the touch panel 21 in the display area of the up/down key **c** in the dialog box is operated thereby to update the display **d** of the control value and rewrite the control value in the control value memory 9.

The arithmetic processor 5, as shown in Fig. 1, is such that upon operation of the touch panel 21 in the display area of a new item to be set **a** when the dialog box **b** for setting the control value of an item to be set is on display on the image display section, the display of the dialog box **b** on display is terminated and the dialog box for setting the control value of the new item to be set is displayed on the image display section, while upon operation of the

touch panel of the up/down key **c** in the display area of the same dialog box, the display of the control value is updated and the control value in the control value memory 9 is rewritten.

Now, explanation will be made about the operating procedure and the operation of a control value-setting apparatus for the process controller configured as described above with reference to the PAD diagram of Fig. 4 and the flowchart of Fig. 5.

First, the touch panel 21 in the display area of a given item to be set is operated, i.e., a setter **a** is depressed when the items to be set for the respective control values are on display (operation 1), the dialog box, i.e., the set window **b** opens (step S10), thus entering a state waiting for a change in the control value (step S20).

Under this condition, the up/down key **c** is operated thereby to update the display **d** of the control value and rewrite the control value in the control value memory 9. As a result, the control value is completely changed, and the arithmetic processor 5 applies a control command to the equipment to be controlled 17 from the control command output section 11 on the basis of the control value newly written in the control value memory 9.

The set window **b** continues to be open, and it is checked whether the end key **e** or other setter **a** is depressed or not (step S40). If the end key **e** or other setter **a** is found to be depressed, the set window **b** is closed (step S50). In the case where neither the end key **e** or other setter **a** is depressed, in contrast, the process returns to the mode of waiting for a change in the control value (step S20). Consequently, the state is maintained in which the control value can be changed again.

Upon depression of other setter **a** with the set window **b** open, the set window **b** of the setter **a** is opened, and the control value is updated in the same manner as described above. The state thus can be immediately obtained in which other control value can be changed without any operation for closing the control value-setting dialog box already open.

The foregoing operation permits the control value to be changed with high operability and efficiency.

Although the present invention has been described and explained in detail above with reference to a particular embodiment, it is to be appreciated that the invention is not limited to such an embodiment, and it will be apparent to those skilled in the art that the invention is applicable in various forms of embodiments without departing from the scope of the invention as determined by the appended claims.

It will thus be understood from the foregoing description that in an embodiment of the present invention, there is provided a control value-setting apparatus for a process controller, in which a plurality of items to be set are displayed for each control value on the image display section, and the touch panel in the display area for selected one of the items to be set on display is operated thereby to display the dialog box for setting the control value of the particular item to be set on the image display section, while the touch panel in the display area of the up/down key in the particular dialog box is operated thereby to update the display of the control value and execute the rewrite operation of the control value in the control value memory. In this way, the control value can be changed completely without operation of the set (end) key, and the control value thus can be changed with high operability and high

efficiency.

Since the display of the dialog box for setting the control value is sustained, i. e., the set window is kept open, even after the control value is changed, the operation is not required for reopening the set window, and the control value can be changed again immediately.

In the control value-setting apparatus of the embodiment, as described above, when the touch panel in the display area of a new item to be set is operated with a dialog box for an item to be set being on display, the display of the dialog box on display is terminated, and the dialog box for setting the control value of the new item to be set is displayed on the image display section, while when the touch panel of the up/down key in the display area of the same dialog box is operated, the display of the control value is updated and the control value in the control value memory is rewritten. In this way, the state is achieved in which another control value can be changed without operation of closing the dialog box, thus making it possible to change various control values with high operability and efficiency.

CLAIMS:

1. In a process controller including a control value memory for storing a control value rewritably and outputting a control command on the basis of the control value written in the control value memory, an apparatus for setting a control value comprising:

an image display section;

a touch panel attached on said image display section; and,

a control section for fetching an input signal from said touch panel, displaying an image urging a user to operate on the image display section and rewriting the control value in the control value memory;

wherein said control section displays a plurality of items to be set for each control value on the image display section, the touch panel being operated in the display area of selected one of the items to be set on display thereby to display a dialog box for setting the control value of the particular item to be set on the image display section, the touch panel being operated in the display area of the up/down key in the same dialog box thereby to update the display of the control value while at the same time rewriting the control value in the control value memory.

2. A control value-setting apparatus for a process controller according to claim 1, wherein said control section is operated to update the displaying of the control value and to rewrite the control value in the control value memory in such manner that the displaying of a dialog box being displayed on the display at that time is terminated in a state of the

dialog box for setting the control value of the item being displayed, by operating the touch panel in the displaying area for setting new item then the touch panel of the up/down key in the displaying area of the new dialog box being operated.

3. An apparatus for setting a control variable of a process controller, the apparatus comprising a memory for storing the control variable, means for displaying the value of the variable, and means for inputting information to change the value of the variable, wherein the controller is arranged to update the value of the displayed variable each time information to change the value of the variable is received via the inputting means, and to store the new value of the variable in the memory each time the display means is updated.

4. An apparatus according to claim 3, wherein the memory, the display means and the inputting means are each arranged to handle a plurality of control variables.

5. An apparatus according to claim 4, wherein said display means and said inputting means are arranged to provide a setting window for each control variable through which a user can change the value of the variable, and the apparatus is arranged to automatically deactivate or close a present setting window and to open a new setting window for a new variable when the new variable is selected.

6. A method of setting a control variable for a process controller, said method comprising storing a process control variable in a memory of a process

controller, displaying the value of the variable, inputting information to change the value of the variable, updating the value of the displayed variable each time information to change the value of the variable is input into the process controller and storing the new value of the variable in the memory each time the displayed variable is updated.

7. A method according to claim 6, wherein a plurality of control variables are stored, displayed and changed.

8. A method according to claim 7, further comprising, providing a setting window for each control variable through which a user can change the value of the variable, automatically deactivating or closing a present setting window and opening a new setting window for a new variable when a new variable is selected.

9. A process controller including an apparatus as claimed in any of claims 1 to 5.

10. An apparatus, controller or method substantially as described herein with reference to Figures 3 to 5 of the accompanying drawings.

The Patent Office

15

Application No: GB 9612456.5
Claims searched: 1-10

Examiner: Mr Andrew Bartlett
Date of search: 12 September 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G3N (NG1A3, NG1A5, NG1A9, NG1AX)

Int Cl (Ed.6): B29C 45/76; G05B 19/02, 19/08, 19/10 & 19/409

Other: ONLINE:- WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage			Relevant to claims
X;Y	GB2254449 A	(Combustion Eng)	See p17 line 29 - p19 line 31	3,4,6 & 7; 1,2,5 & 8
Y	GB2224370 A	(Toshiba)	See p9 line 18 - p10 line 11	1,2,5 & 8
X	GB2212947 A	(Smith Meters)	See p5 lines 19-31	3,4,6 & 7
X	EP0451298 A	(Fanuc)	See p8 line 3 et seq.	3,4,6 & 7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.