
Instruction Manual

UP27 Program Controller Operation Manual

IM 4P2F5-21E

UP27

Program Controller Operation Manual

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1. INTRODUCTION

This operator's manual explains UP27 operation in terms of what must be known by operators who will work with the instrument in normal operation.

This manual therefore focuses on general handling and front panel key operations (see table below).

To learn all of the functions and specifications of the UP27, read this manual together with the "Initial Setup Manual" (IM 4P2F5-02E).

Please keep these manuals in your convenience location. The following symbolic convention is used in this manual.

Operator's Manual
◎ Handling Instructions
◎ Key Operation
● Setting the operation parameters
• Program pattern
• Fixed setpoint control (local mode)
• PID constants
Etc.
● General operation
• Start/Stop
• Mode transfer
Etc.
◎ Maintenance and Response to Malfunctions

Note: For a more detailed listing of the contents of this manual, see the Table of Contents.

Note that this manual contains no descriptions of the instrument setup parameters or how to set them. See the "Initial Setup Manual" (IM 4P2F5-02E) for information on the setup parameters.

Revision Record

1995. Jan. IM 4P2F5-21E NEW REVISION

■ Documentation Conventions

The symbolic conventions below are used in this manual.

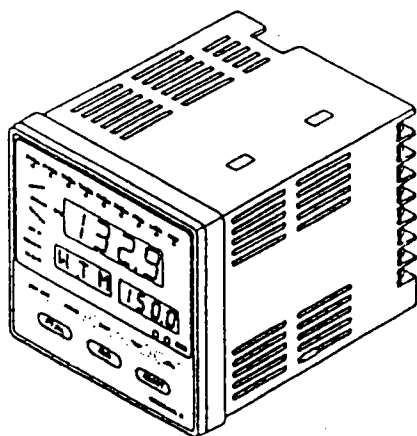
⚠ CAUTION: This marking on the product indicates that the operator must refer to an explanation in the instruction manual in order to avoid damage to the instrument.

2. HANDLING PRECAUTIONS

2.1 Cleaning

Clean the front panel, key switches, and other parts of this instrument only by wiping gently with a dry cloth.

Never use alcohol, mineral spirits (naphtha, etc.) or any other such solvent for cleaning.



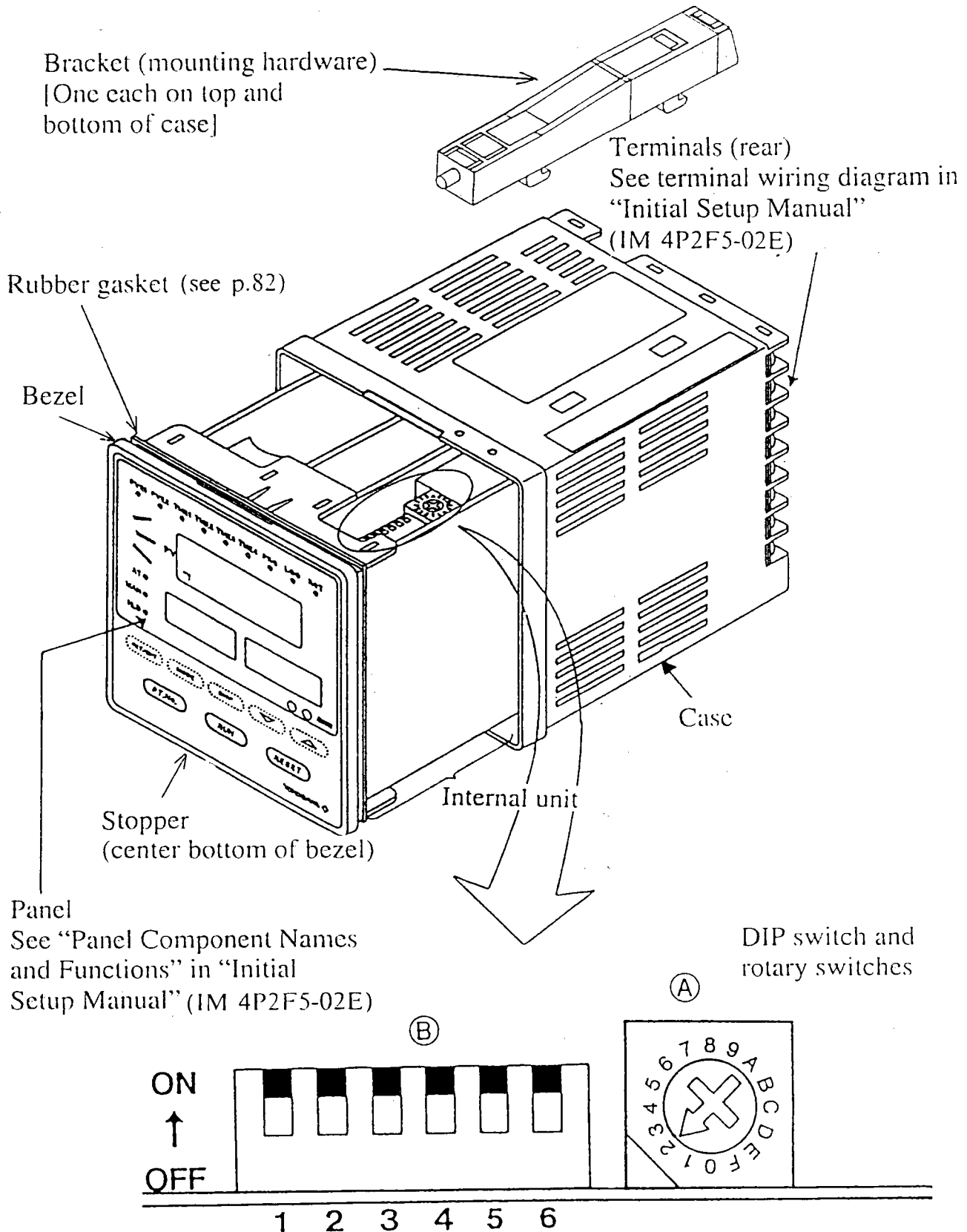
Mineral spirits

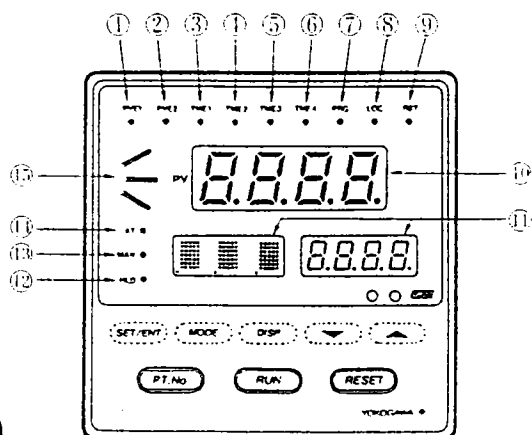


Benzene

2.2 Component Names and Functions

- The UP27 components are as shown in the diagram below.





No.	Indicator or Display	Function
①	PVE 1 (PV event 1 lamp)	Lights when PV event 1 occurs.
②	PVE 2 (PV event 2 lamp)	Lights when PV event 2 occurs.
③	TME 1 (Time event 1 lamp)	Lights when time event 1 occurs.
④	TME 2 (Time event 2 lamp)	Lights when time event 2 occurs.
⑤	TME 3 (Time event 3 lamp)	Lights when time event 3 occurs.
⑥	TME 4 (Time event 4 lamp)	Lights when time event 4 occurs.
⑦	PRG (Program operation mode indicating lamp)	Lights when program is running (OFF when in fixed setpoint control mode (local mode) or in reset state).
⑧	LOC (Local mode indicating lamp)	Lights when UP27 is in fixed setpoint control mode (local mode).
⑨	RST (Reset mode indicating lamp)	Lights when UP27 is in reset state. Program operation stops, and automatic control stops. Note that manual (MAN) mode operation is also disabled when in this state.
⑩	8.8.8.8 (Measured value display)	Displays measured value (PV)
⑪	8.8.8.8 (Setpoint & parameter display)	Displays target setpoint, output, segment No., remaining time in segment, and the various parameters of the UP27.
⑫	HLD (Program hold indicating lamp)	Lights when program operation is in HOLD mode (temporary stop). Control continues while in this mode.
⑬	MAN (Manual mode indicating lamp)	Lights when UP27 is in MAN (manual operation) mode [OFF when UP27 is in AUTO (automatic operation) mode].
⑭	AT (Auto tuning execution indicating lamp)	Flashes while auto tuning is executing.
⑮	≤ — ≥	These indicate the nature of the currently running program segment: ≤ indicates an ascending ramp; — indicates a soak segment; and ≥ indicates a descending ramp.

Key	Function
PT.No.	<ul style="list-style-type: none"> Selects a program pattern No. with the Operation Display on display.
RUN	<ul style="list-style-type: none"> Starts operation when pressed and held for about two seconds with the Operation Display on display.
RESET	<ul style="list-style-type: none"> Stops operation when pressed and held for about two seconds in program operation mode, local operation mode, or hold mode.
SET/ENT	<ul style="list-style-type: none"> Switches front panel from Operation Display to Operating Parameter Setup Display. Scrolls the display through the setup displays for the various parameters. Enters numeric values.
MODE	<ul style="list-style-type: none"> Transfers UP27 between its modes: hold, advance, auto/manual, local, auto tuning, etc.
DISP	<ul style="list-style-type: none"> Switches UP27 to Operation Display. Returns UP27 from Operating Parameter Setup Display to Operation Display.
≤ — ≥	<p>Used to alter numeric values displayed for target set points and parameters, and also for output when in manual operation mode. The ≤ (down) key decreases the displayed value; the ≥ (up) key increases it. Pressing either key once and releasing it will change the numeric value one digit at a time; pressing and holding the key will speed the rate of change.</p>

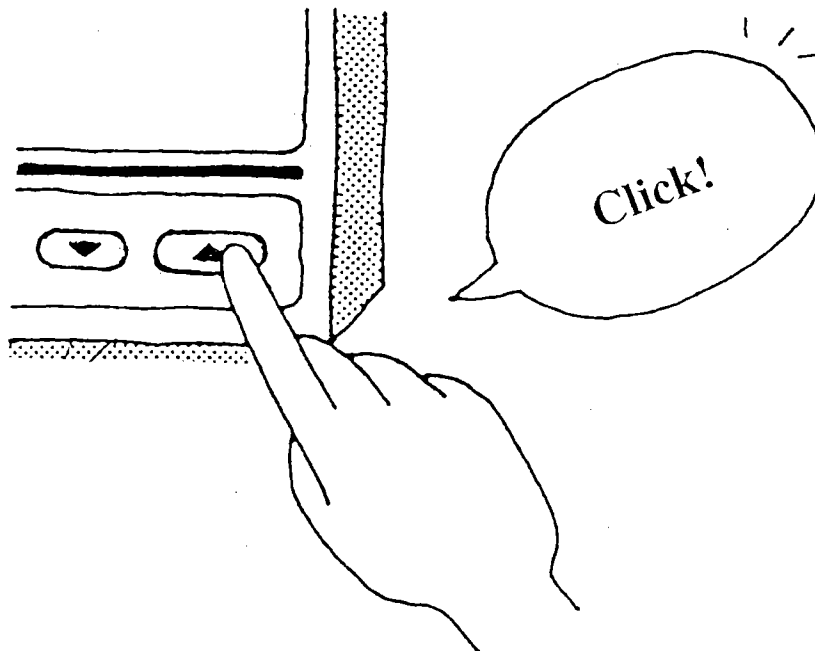
2.3 Cautions for Key Operation

Take the following precautions when operating the keys.

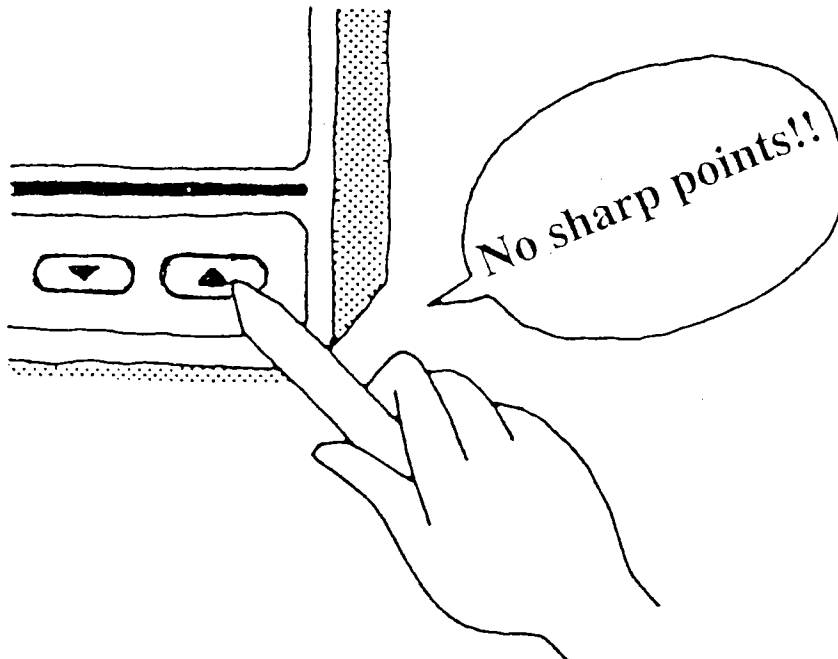


CAUTION

- ① The keys on the UP27 have been built to give a “click” feel when you operate them.
When pressing keys, always press until you feel the “click”.



- ② Never use a sharp point to press keys on the UP27. The point may damage the keypad.

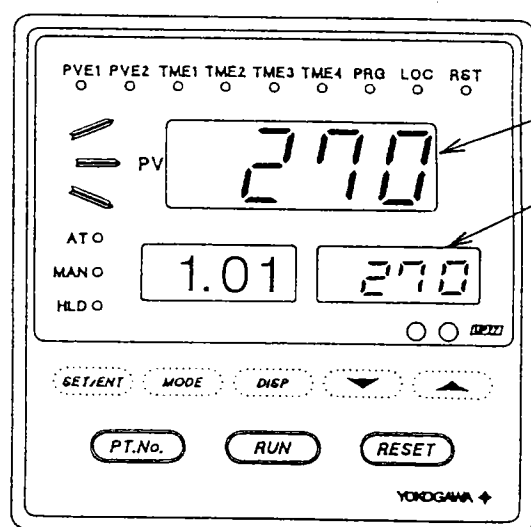


3. KEY OPERATIONS

3.1 Key Operation Principles (Operation Display, Operating Parameter Setup Display)

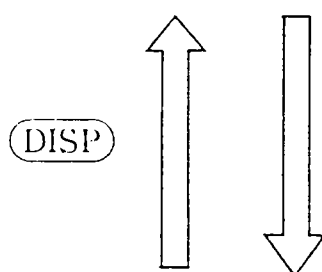
Operation Display

There are three types of Operation Displays, ①, ②, and ③. Note that these displays may differ from those shown here depending on how the setup parameters have been set (see p.8.).



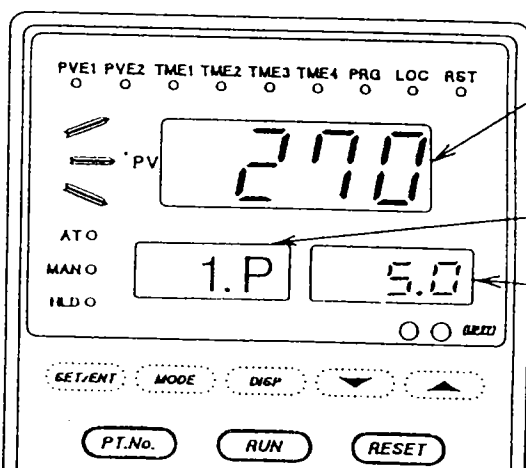
Measured value (PV) (normal display)

- ① Control setpoint value (when in AUTO)
or
- ② Control output (when in MAN)
or
- ③ Remaining segment time, or elapsed wait time



- To switch from either display to the other, press the **(SET/ENT)** key for at least three seconds.

Operating Parameter Setup Display



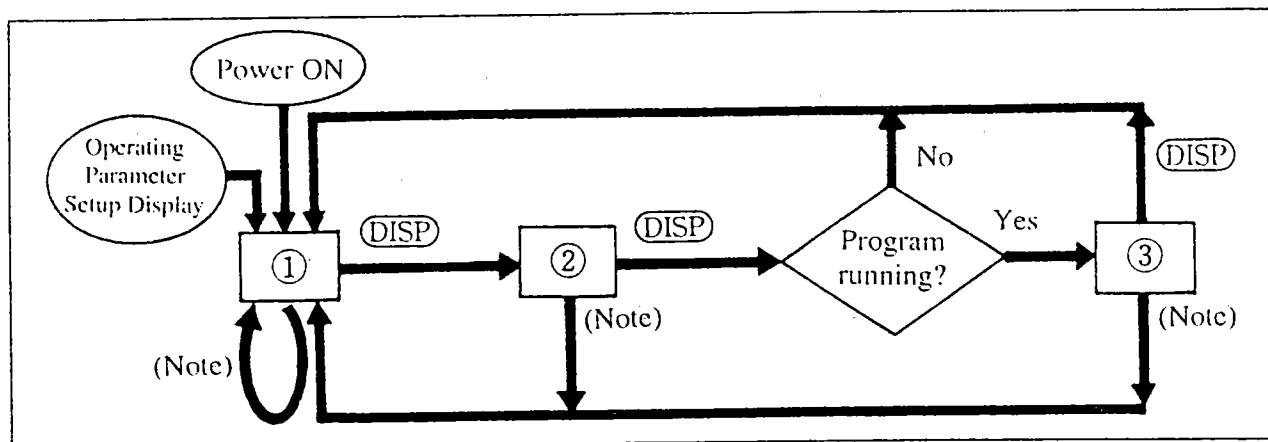
Measured value (PV) (normal display) or pattern segment No., if program pattern setup in progress.

Displays the code identifying the operating parameter

Displays the value set for the operating parameter

Changing Operation Displays

①, ②, and ③ in the figure below show each operation display panel No.

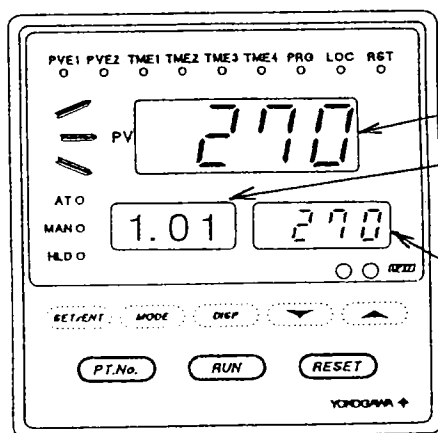


Note: Selecting the modes listed below will return the UP27 to Operation Display ①.

• HOLD • ADVANCE • AUTO/MAN • REM/LOCAL • AT

3.1.1 Operation Display Panel ①

Displays measured value (PV) and control setpoint value (SP)



PV value

Displays program pattern No. and segment No. for program that is running (or program to be run next)

Control setpoint value
(In local mode, fixed set point)

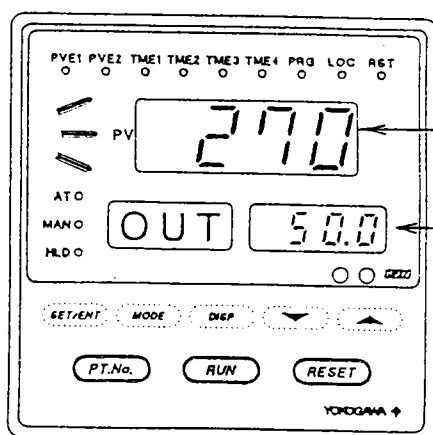
- When in local mode, the UP27 controls with a “local” fixed setpoint (SP), which you can change using the ▼ and ▲ keys. (You must press the **SET/ENT** key to enter whatever value you set. See p. 68.)

Note that in the reset state or during program operation, you cannot change the fixed setpoint (SP) using the ▼ and ▲ keys.

- During temporary program stop (HOLD), you can use the ▼ and ▲ keys to change the control setpoint value if (and only if) in a soak segment. (You do not need to press the **SET/ENT** key to enter the new value.)
- Pressing the **DISP** key on Operation Display ① will switch the UP27 to

3.1.2 Operation Display Panel ②

Displays measured value (PV) and control output.



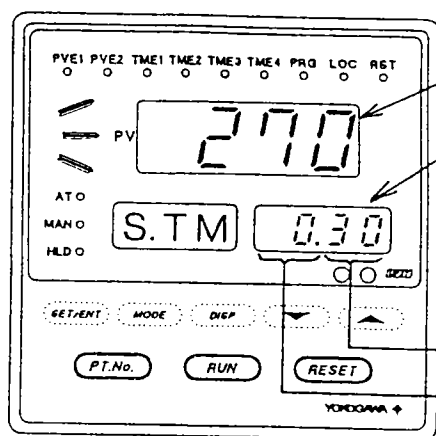
PV value

Control output
(When operating in MAN mode, changes made to the displayed value using the ▼ and ▲ keys go directly to the control output.)

- When operating in MAN (manual) mode from Operation Display ②, you can use the ▼ and ▲ keys to change the control output value. (You do not need to enter the new value with the SET/ENT key.)
- Performing a mode change (MODE key) on Operation Display ② switches the UP27 to Operation Display ①.
- Pressing the DISP key on Operation Display ② will switch the UP27 to Operation Display ③ or Operation Display ①.

3.1.3 Operation Display Panel ③

Displays measured value (PV) and remaining segment time (or wait time)



PV value

Remaining segment time
(Or elapsed wait time, if program has been placed in a wait state by specifying a junction code (JC))

Hours (first two digits),
minutes (last two digits)

or

Minutes (first two digits),
seconds (last two digits)

Minutes

Seconds




Hours

Minutes

- During a temporary program stop (HOLD) on Operation Display Panel ③, you can use the ▼ and ▲ keys to change the remaining segment time if (and only if) in a soak segment.
(You must press the SET/ENT key to enter the new value.)
- You can change the time in the range from 00.00 to 99.59 (for either hours.minutes or minutes.seconds).
- Operation Display Panel ③ is displayed when the UP27 is in a program operation status. Performing a mode change (MODE key) will switch the UP27 to Operation Display Panel ①.

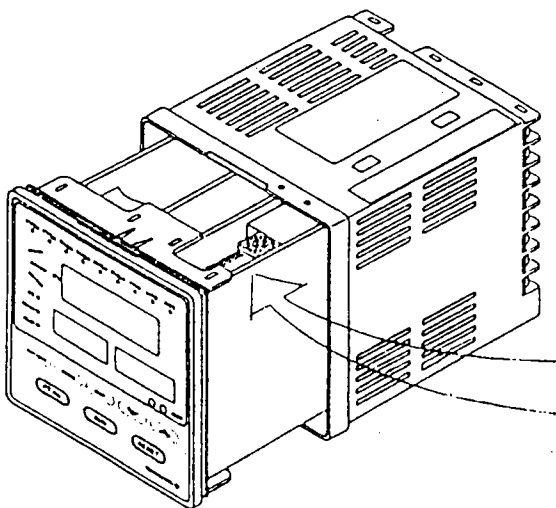
3.2 Key Lock Confirmation

The UP27 is equipped with key lock functions to prevent accidental operation of keys. Therefore in some cases an action will not be executed even though you operate the proper keys for it. If you are unable to perform an operation due to key lock, you should release the key lock before key operation. The UP27 has five types of key lock, as follows.

DAT	 Key lock	Disables all key operations that set or change any parameter.
RUN	 Key lock	Disables the keys that select program patterns, and run and stop programs.
MOD	 Key lock	Disables the key used to select the hold, advance, local, and auto-tuning modes, and to switch between automatic (AUTO) and manual (MAN).
PAR	Operation parameter set/change lock	Disables the keys used to set and change operation parameters.
PID	PID parameter set/change lock	Disables the keys used to set and change the P, I, D, MR, HY, OH, OL, and RP operation parameters.

3.3 How to Release a Key Lock

1




① Turn power OFF and pull out the internal unit.

⚠ CAUTION

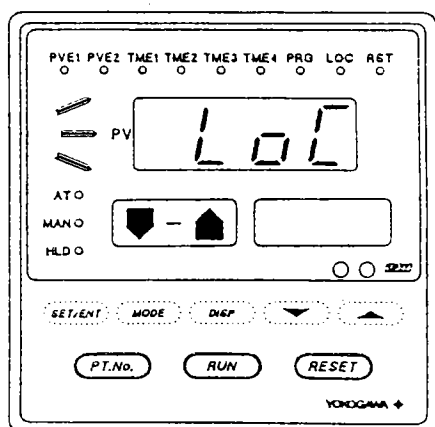
② Set DIP switch No. 4 to OFF.

ON
↑
OFF



1 2 3 4 5 6

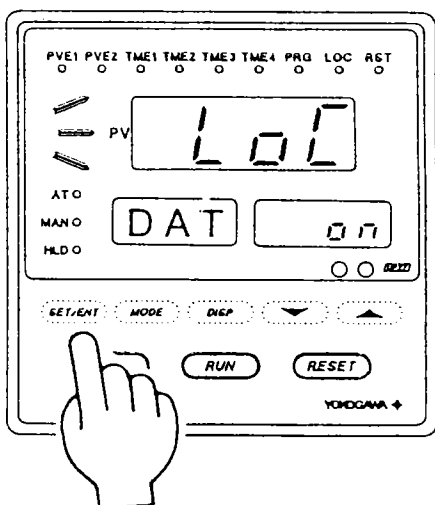
2



- ③ Return the internal unit to the case and turn power ON.

“LOC” will be displayed.

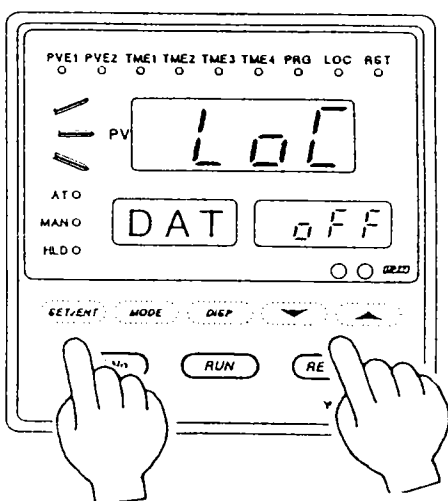
3



- ④ Press the (SET/ENT) key to call up type code for the key lock to be cancelled.

If “ON” is displayed, that means that the lock is engaged for that type.

4



- ⑤ Press the (▼) or (▲) key to display “OFF” and use the (SET/ENT) key to enter the setting; the lock is now released.

After releasing a key lock, return DIP switch No. 4 to ON (see [1] above).

5. OPERATION PARAMETER SETTING

This section explains how to set the operating parameters. When you set these parameters, refer to the “Operating Parameter Summary Table” (p.86) at the back of this manual.

— Notes on Setting Operation Parameter —

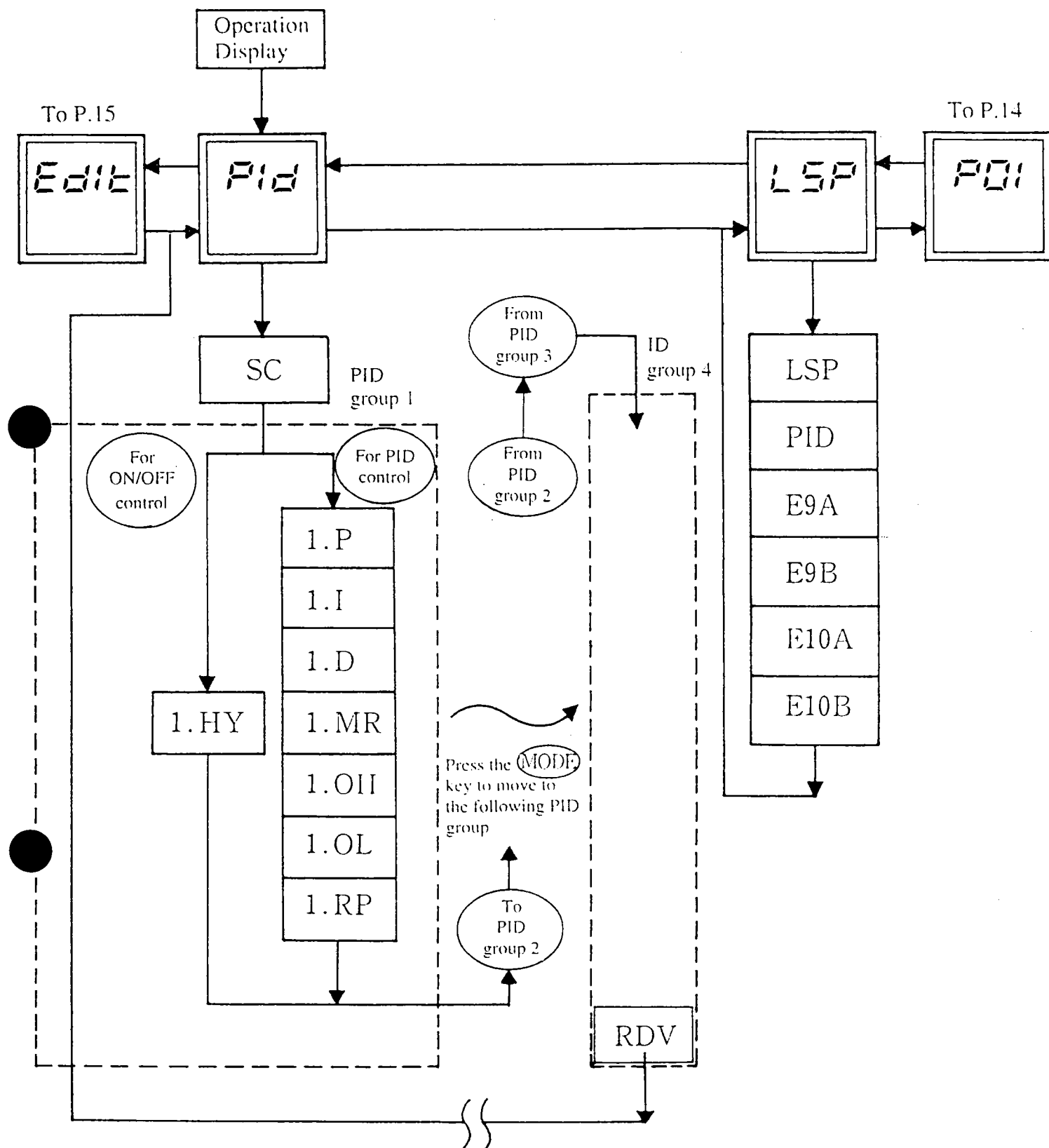
Note 1 As described in Section 3.1, “Key Operation Principles”, to call up the Operation Parameter Setup Display you must press the **(SET/ENT)** key for at least three seconds with the Operation Display on display.

Note 2 The Operation Parameter Setup Display consists of multiple menu displays. You will use the **(▼)** and **(▲)** keys to call up the menu display for the parameter that you wish to set (or change) (see diagrams on following pages).

Note 3

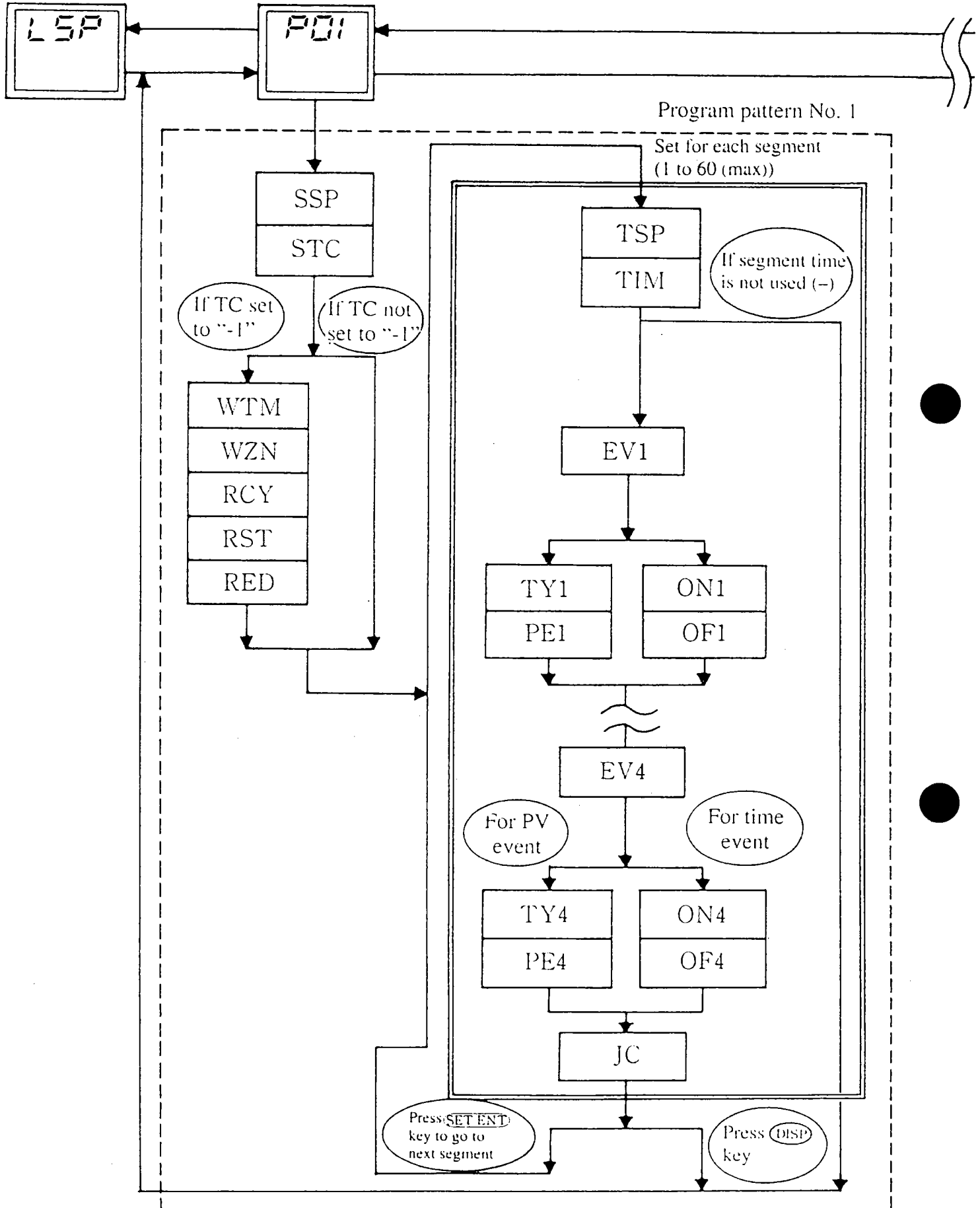
- After you finish setting an operating parameter, you can return to the Operation Display Panel ① by pressing the **(DISP)** key, if you do not wish to set any other parameters.
- If you wish to continue on and set another operating parameter, press the **(SET/ENT)** key step by step until the setup display for the required parameter is displayed.
- Pressing **(DISP)** during the process of setting a parameter will return you to the menu display to which that parameter belongs.
- Before setting a parameter, you should refer to the setup procedure (p.16 to p.60) for that parameter.

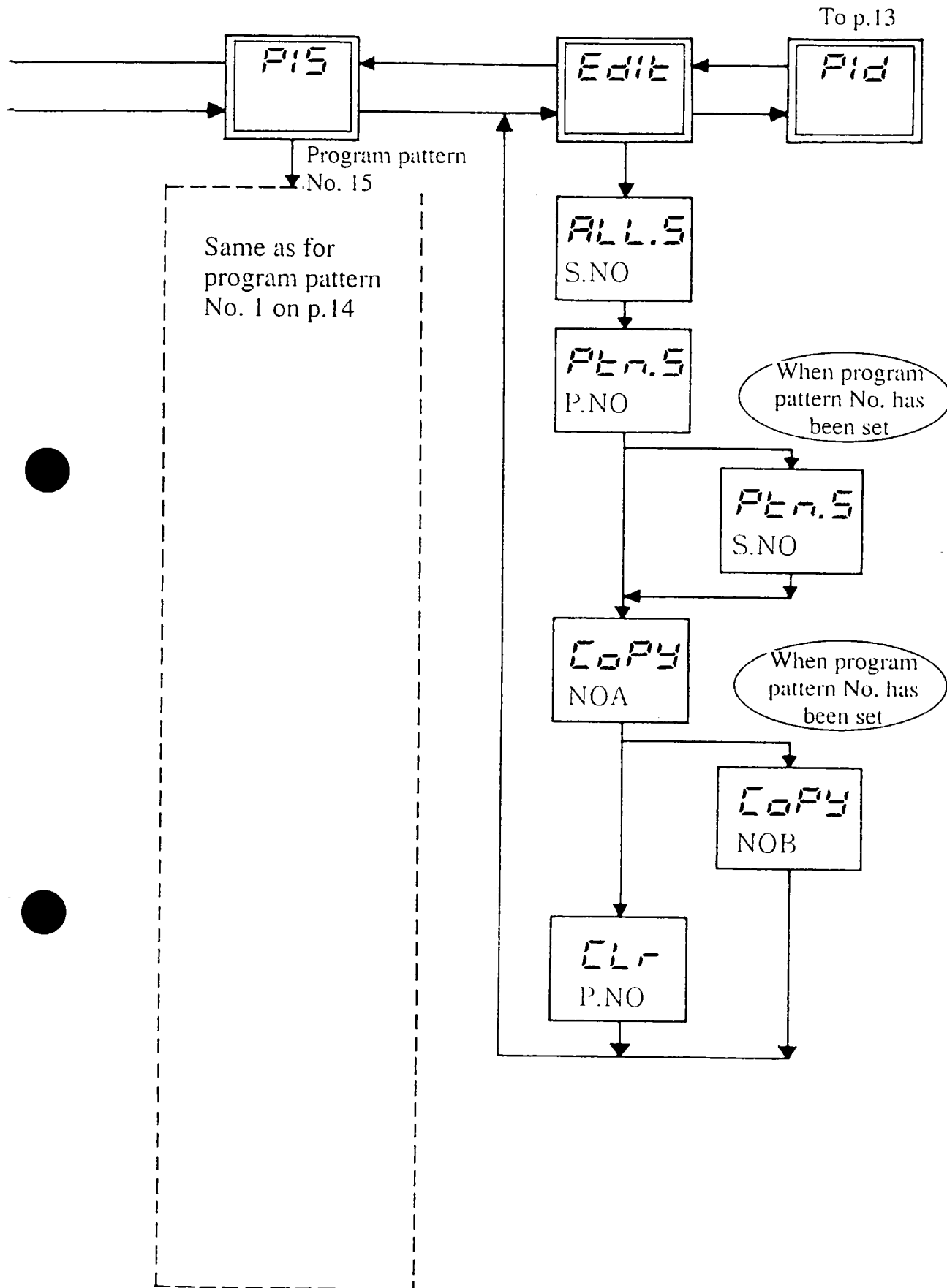
Note 4 For descriptions of the functions of the various parameters, see the “Initial Setup Manual” (IM 4P2F5-02E).



Note: “1.RP” belongs to PID group 1; “2.RP” belongs to PID group 2, and “RDV” belongs to PID group 4.

To P.13



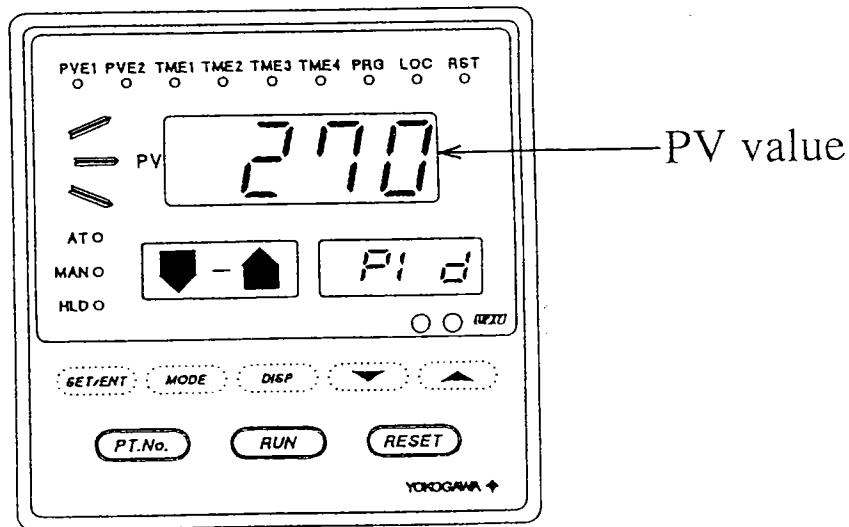


4.1 Control Parameter Setup Menu Display

Calling up this menu display will enable you to set the individual parameters: SC, P, I, D, MR, HY, OH, OL, RP, and RDV.

How to Call Up the Control Parameter Setup Menu Display

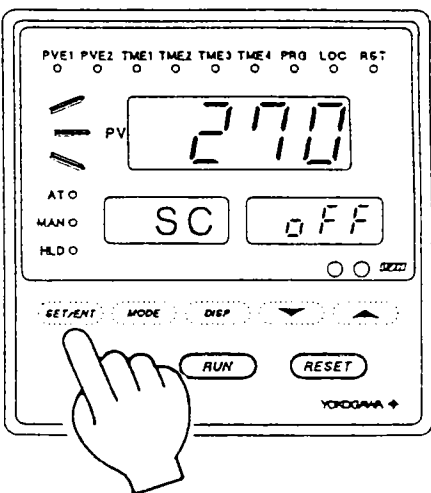
- ① With the Operation Display on display, press the **SET/ENT** key for at least three seconds.
- ② The UP27 will switch to the Control Parameter Setup Menu Display shown below.



4.1.1 Procedures for “Super” Function ON/OFF

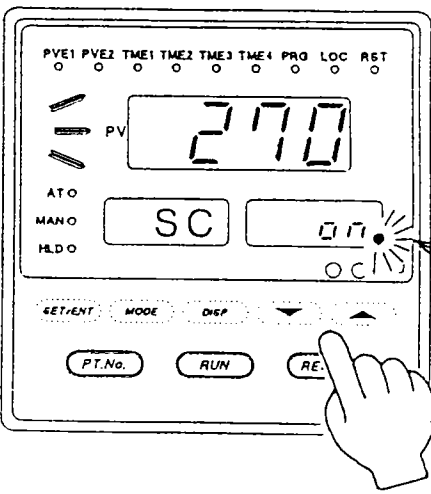
- Note:
- “Super” function can not be selected in ON/OFF control.
 - “SUPER” function is effective for PID control only. Not effective for P, PI, and PD control.

1



- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **SET/ENT** key again (for less than three seconds). (Check that **SC** is displayed.)

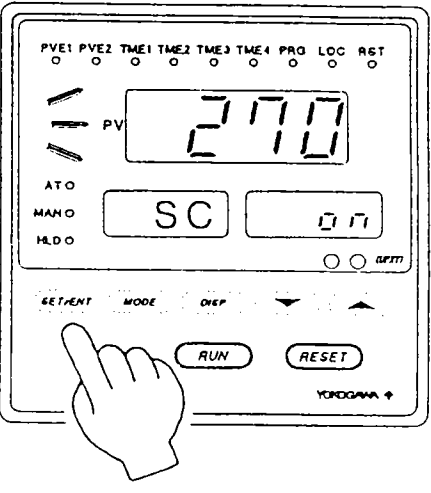
2



Use the **▼** and **▲** keys to display “ON” or “OFF”. (To use “SUPER,” display “ON”.)

[The period will be flashing (See note at page bottom).]

3



Press the **SET/ENT** key again. This completes the setting. (Note) [The period will turn OFF.]

Note: See also [Note 3] in the “Notes on Setting Operation Parameters” (p.12).

Note: The flashing period shows that you are about to change the value; it will

4.2 Setting the PID Group Parameters

There are four PID groups, numbered 1 through 4, each having the following parameters:

proportional band (P), integral time (I), derivative time (D), manual reset (MR), ON/OFF control hysteresis (HY), output high and low limit values (OH, OL)

In addition, reference point (RP), and reference deviation (RDV) parameters are provided in PID groups 1, 2, and 4 as follows:

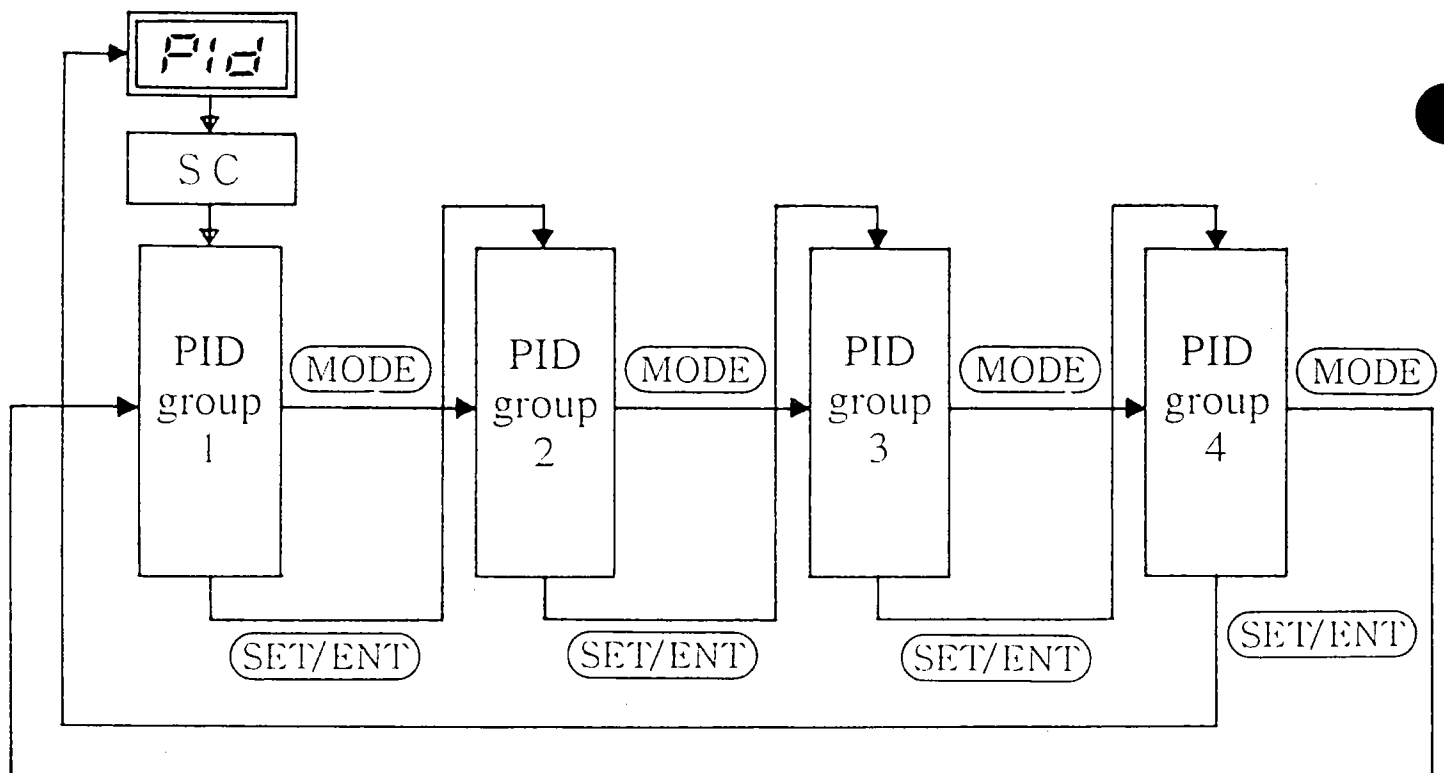
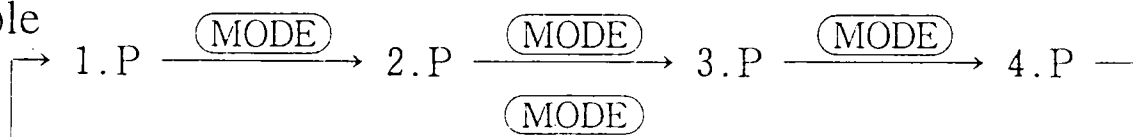
PID group 1 also has a reference point 1 ("1.RP") parameter

PID group 2 also has a reference point 2 ("2.RP") parameter

PID group 4 also has a reference deviation ("RDV") parameter
(PID group 3 has no "RP" and "RDV" parameter.)

To move between PID groups, use the **SET/ENT** or **MODE** key.

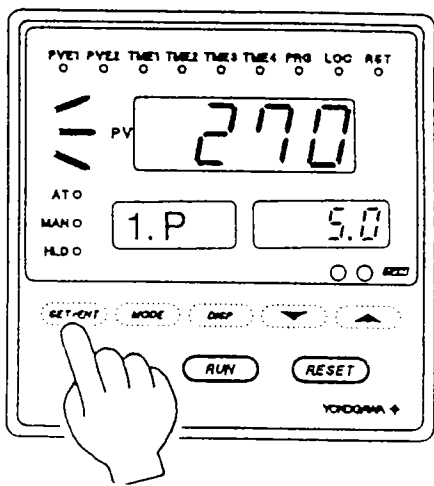
Example



① Setting the proportional band (P)

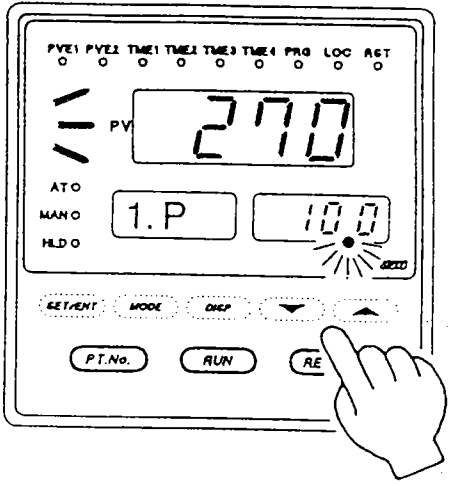
Note: The proportional band setup display will not be displayed if the UP27 is set up for ON/OFF control.

1



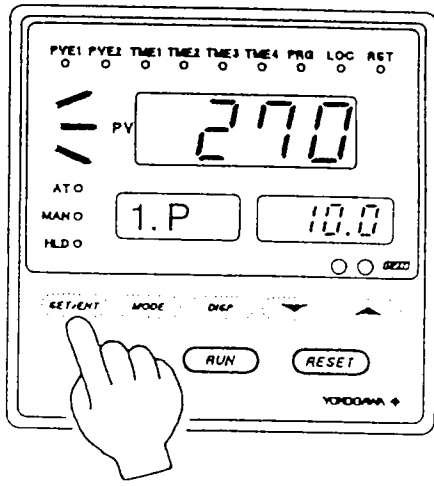
- With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **(SET/ENT)** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)
 For PID group 2: **2.P**
 For PID group 3: **3.P**
 For PID group 4: **4.P**

2



Use the **(▼)** and **(▲)** keys to set the proportional band to the required value.
 [The decimal point will be flashing. (Note 2)]

3



Press the **(SET/ENT)** key again. This completes the setting. (Note)
 [The decimal point will stop flashing and remain ON.]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note 1: Pressing the **(MODE)** key will select other PID groups in order as follows:

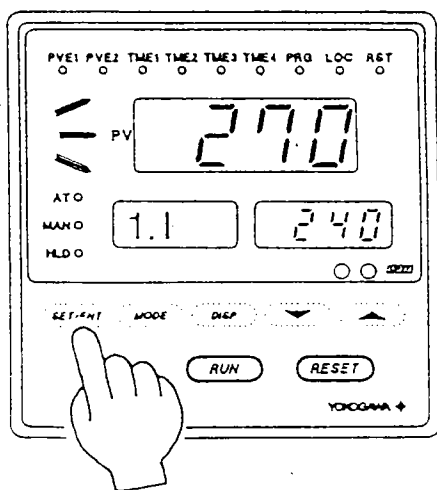
→ 1.P → 2.P → 3.P → 4.P → 1.P →

Note 2: The decimal point will stop flashing if the proportional band is set to 10.0.

② Setting the integral time (I)

Note: The integral time setup display will not be displayed if the UP27 is set up for ON/OFF control.

1



- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

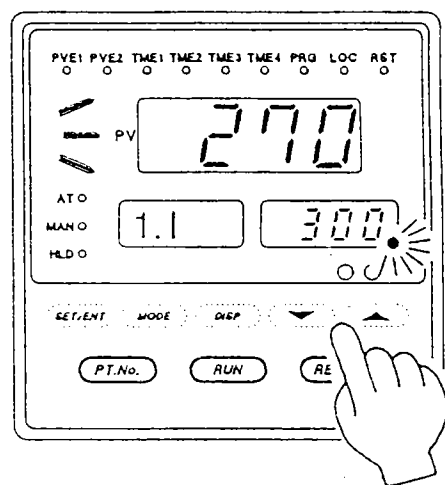
- Press the **SET/ENT** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)

For PID group 2: **2.I**

For PID group 3: **3.I**

For PID group 4: **4.I**

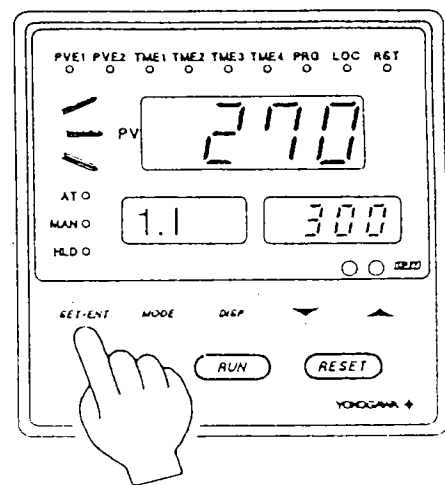
2



Use the **▼** and **▲** keys to set the integral time to the required value.

[The decimal point will be flashing. (Note 2)]

3



Press the **SET/ENT** key again. This completes the setting. (Note) [The decimal point will turn OFF.]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

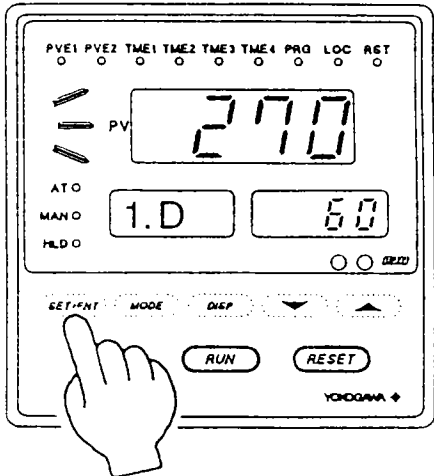
Note 1: Pressing the **MODE** key will select other PID groups in order as follows:

→ 1.I → 2.I → 3.I → 4.I → 1.I →

③ Setting the derivative time (D)

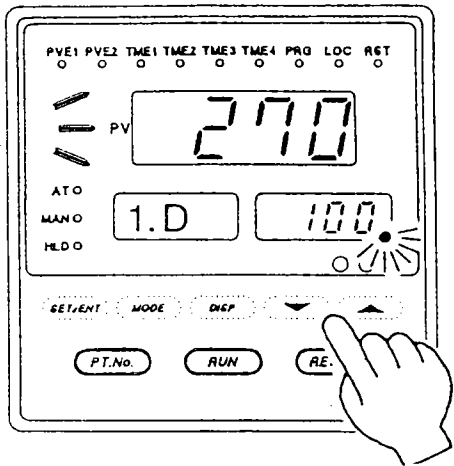
Note: The derivative time setup display will not be displayed if the UP27 is set up for ON/OFF control.

1



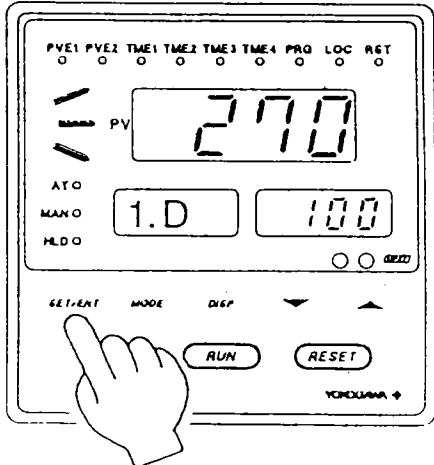
- With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **(SET/ENT)** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)
 For PID group 2: **2.D**
 For PID group 3: **3.D**
 For PID group 4: **4.D**

2



Use the **(DOWN)** and **(UP)** keys to set the derivative time to the required value.
 [The decimal point will be flashing. (Note 2)]

3



Press the **(SET/ENT)** key again. This completes the setting. (Note)
 [The decimal point will turn OFF.]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note 1: Pressing the **(MODE)** key will select other PID groups in order as follows:

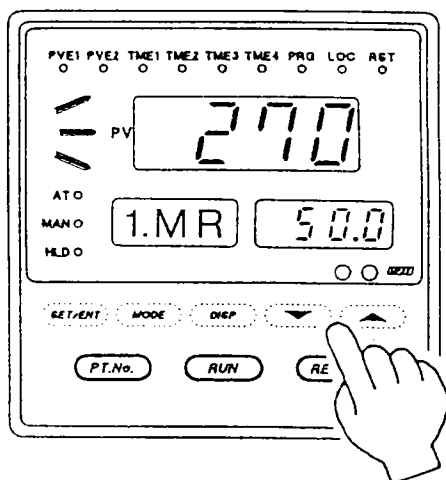
→ 1.D → 2.D → 3.D → 4.D → 1.D

Note 2: The decimal point will be flashing if the derivative time is being set.

④ Setting the manual reset (MR)

Note: The manual reset value is effective only when the integral time (I) parameter is set to OFF.

1



- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

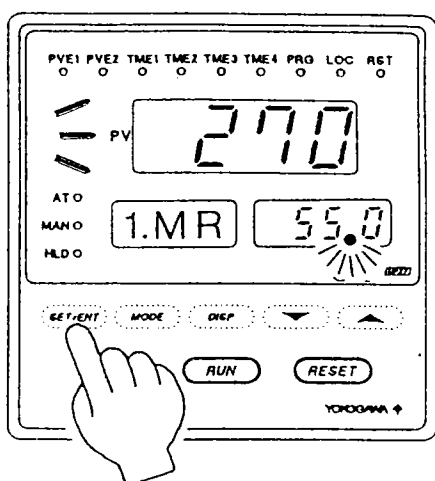
- Press the **SET/ENT** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)

For PID group 2: **2.MR**

For PID group 3: **3.MR**

For PID group 4: **4.MR**

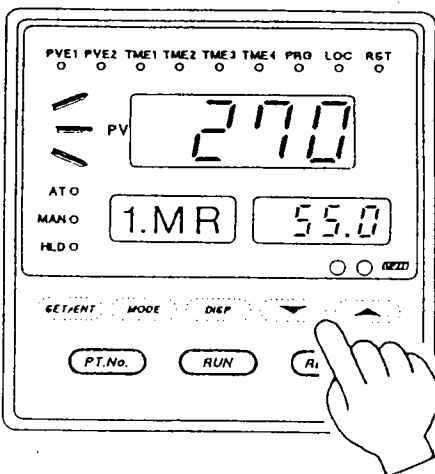
2



Use the **▼** and **▲** keys to set the manual reset to the required value.

[The decimal point will be flashing. (Note 2)]

3



Press the **SET/ENT** key again. This completes the setting. (Note) [The decimal point will stop flashing and remain ON.]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

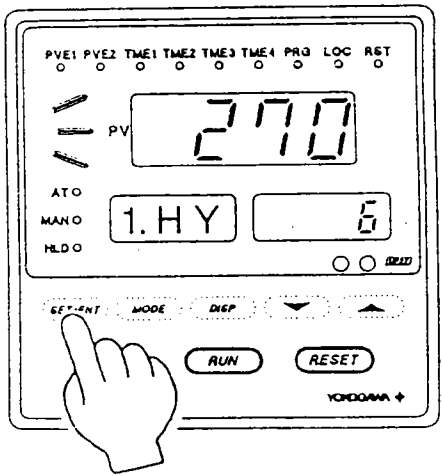
Note 1: Pressing the **MODE** key will select other PID groups in order as follows:

→ 1.MR → 2.MR → 3.MR → 4.MR → 1.MR →

⑤ Setting the ON/OFF control hysteresis (HY)

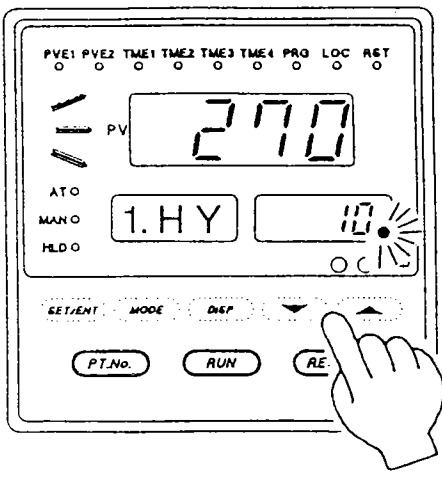
Note: The ON/OFF control hysteresis setup display will be displayed only if the UP27 is set up for ON/OFF control.

1



- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **SET/ENT** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)
 For PID group 2: **2.HY**
 For PID group 3: **3.HY**
 For PID group 4: **4.HY**

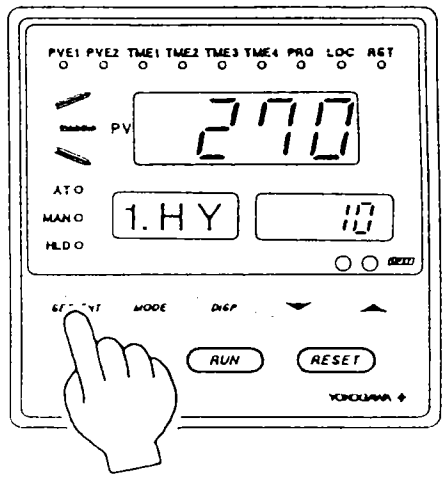
2



Use the and keys to set the hysteresis to the required value.

[The decimal point will be flashing. (Note 2)]

3



Press the **SET/ENT** key again. This completes the setting. (Note)
 [The decimal point will stop flashing and remain ON (or OFF if the value is an integer).]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

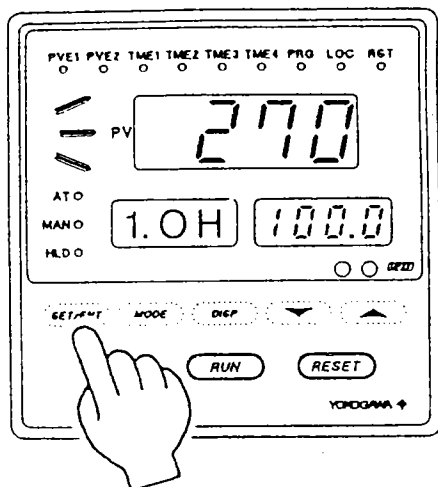
Note 1: Pressing the **MODE** key will select other PID groups in order as follows:

→ 1.HY → 2.HY → 3.HY → 4.HY → 1.HY →

⑥ Setting the output high limit (OH)

Note: The output high limit setup display will not be displayed if the UP27 is set up for ON/OFF control.

1



- With the Operation Display on display, press the (SET/ENT) key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

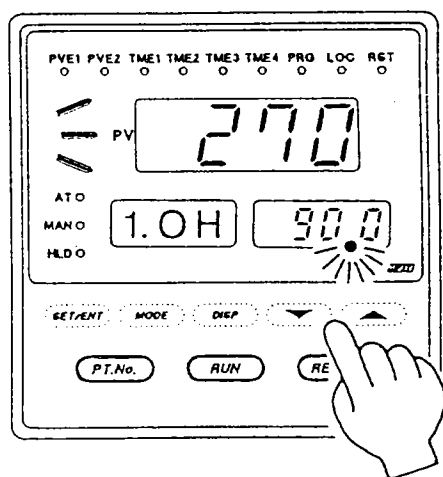
- Press the (SET/ENT) key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)

For PID group 2: 2.OH

For PID group 3: 3.OH

For PID group 4: 4.OH

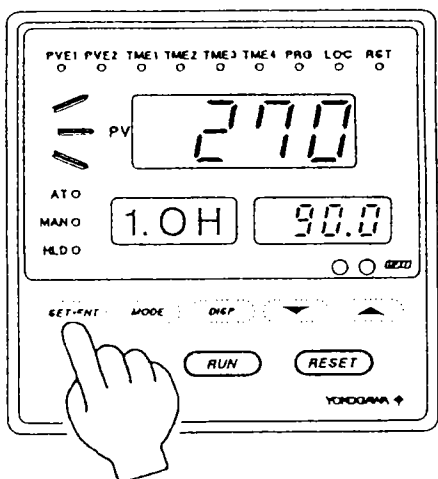
2



Use the (▼) and (▲) keys to set the output high limit to the required value.

[The decimal point will be flashing. (Note 2)]

3



Press the (SET/ENT) key again. This completes the setting. (Note) [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also [Note 3] in the "Notes on Setting Operation Parameters" (p.12).

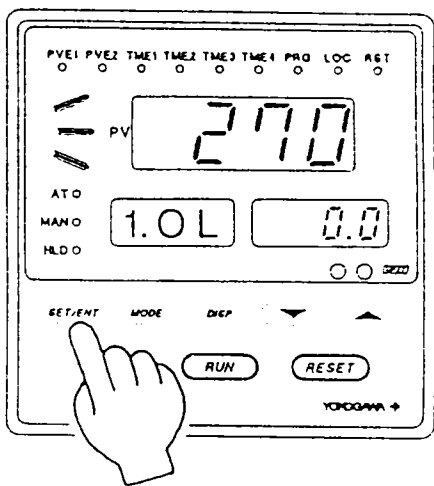
Note 1: Pressing the (MODE) key will select other PID groups in order as follows:

→ 1.OH → 2.OH → 3.OH → 4.OH → 1.OH →

⑦ Setting the output low limit (OL)

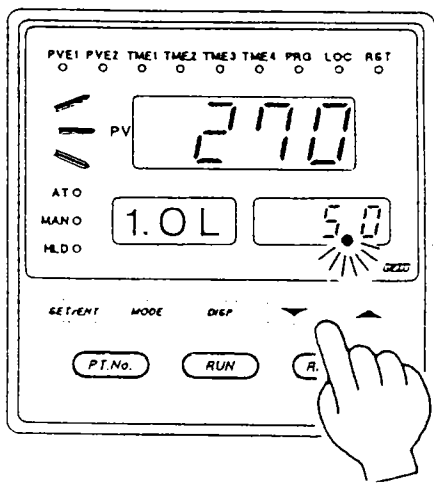
Note: The output low limit setup display will not be displayed if the UP27 is set up for ON/OFF control.

1



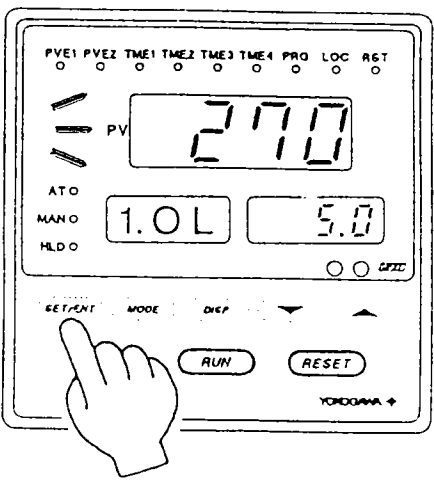
- With the Operation Display on display, press the (SET/ENT) key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the (SET/ENT) key several times (less than three seconds each time) until the display shown at left appears (for PID group 1). (Note 1)
 For PID group 2: 2.OL
 For PID group 3: 3.OL
 For PID group 4: 4.OL

2



Use the and keys to set the output low limit to the required value.
 [The decimal point will be flashing. (Note 2)]

3



Press the (SET/ENT) key again. This completes the setting. (Note)
 [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also Note 3 in the "Notes on Setting Operation Parameters" (p.12).

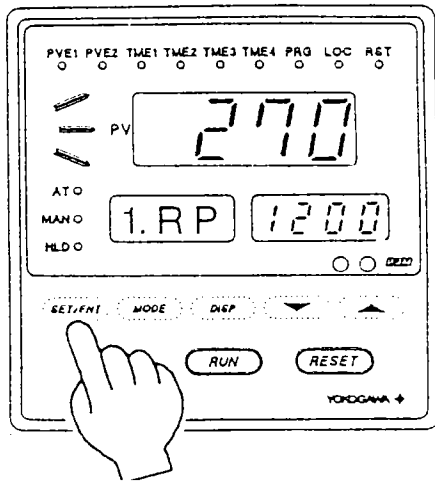
Note 1: Pressing the (MODE) key will select other PID groups in order as follows:

→ 1.OL → 2.OL → 3.OL → 4.OL → 1.OL →

Note 2: The decimal point will stop flashing and become ON (OFF) if the value is an integer (integer).

⑧ Setting the reference point (RP)

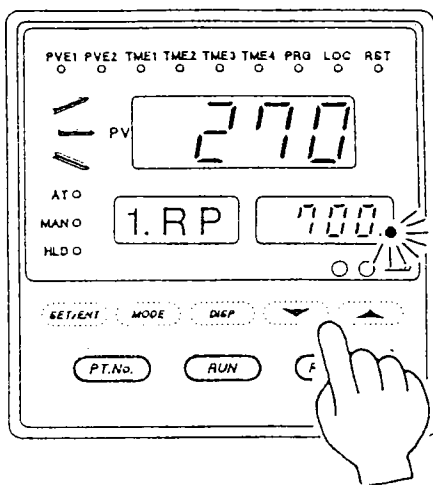
1



- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **SET/ENT** key several times (less than three seconds each time) until the display shown at left appears (for PID group 1).

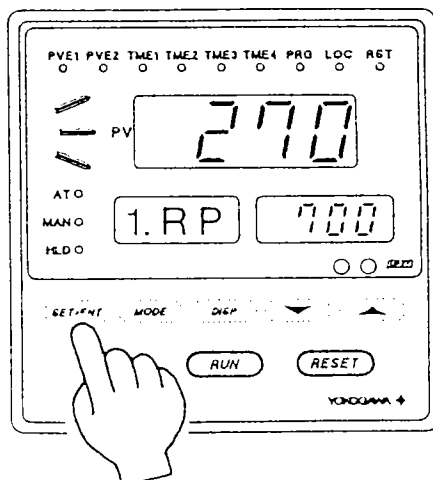
For PID group 2: **2.RP**

2



Use the **▼** and **▲** keys to set the reference point to the required value.
 [The decimal point will be flashing. (Note)]

3



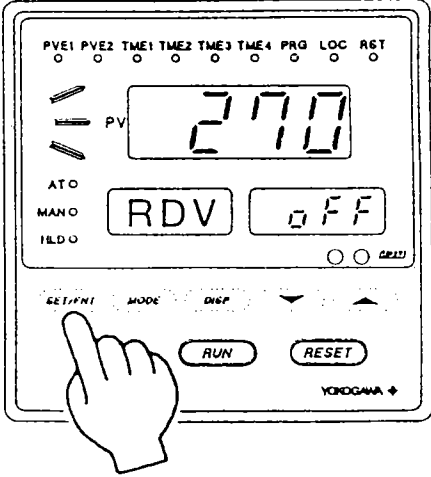
Press the **SET/ENT** key again. This completes the setting. (Note)
 [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

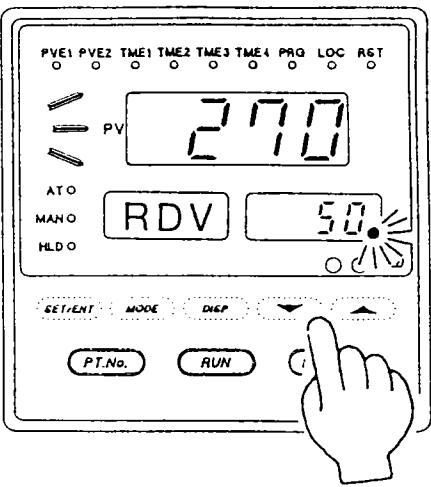
⑨ Setting the reference deviation (RDV)



1



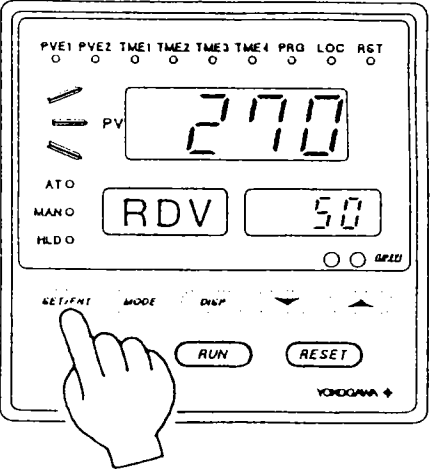
- With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).
- Press the **SET/ENT** key several times (less than three seconds each time) until the display shown at left appears .

2



Use the  and  keys to set the reference deviation to the required value.
[The decimal point will be flash-
ing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting. (Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also Note 3 in the “Notes on Setting Operation Parameters” (p.12).

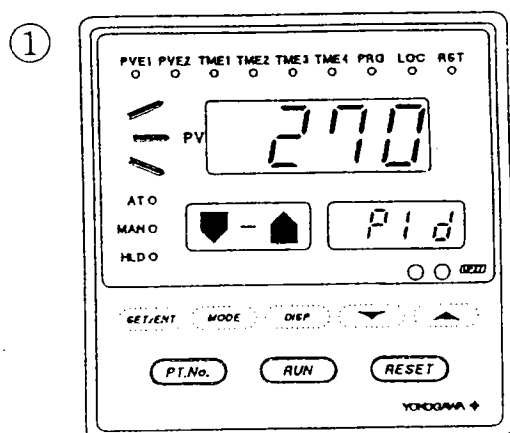
Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

4.3 Local Mode Parameter Setup Menu Display

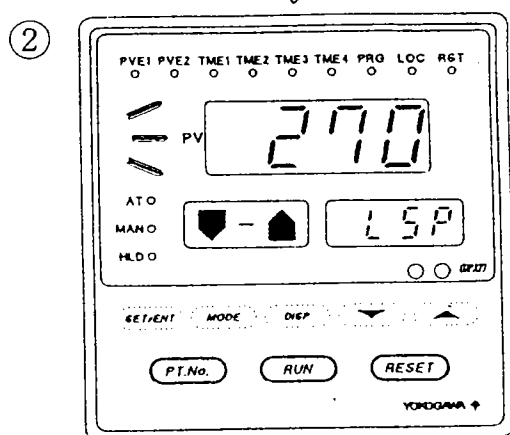
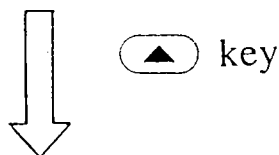
Calling up this menu display enables the following parameters to be set (changed): L.SP, PID, E9A, E9B, E10A, and E10B.

Calling Up the Local Parameter Setup Menu Display

- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to change to the Control Parameter Setup Menu Display (see p.16).
- ② Press the **(▲)** key once to go to the Local Mode Parameter Setup Menu Display shown below.



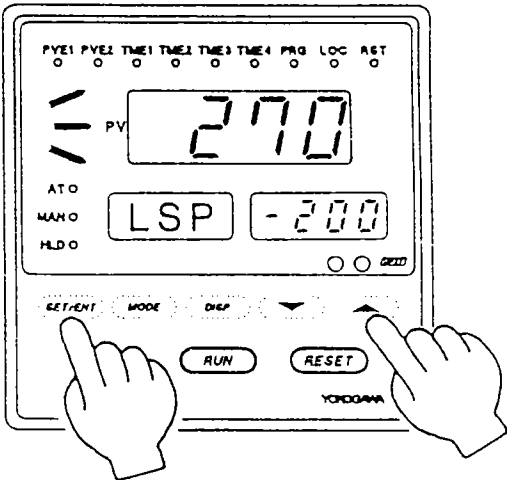
Control Parameter
Setup Menu Display



Local Mode Parameter Setup
Menu Display

① Setting the local fixed setpoint (L.SP)

1

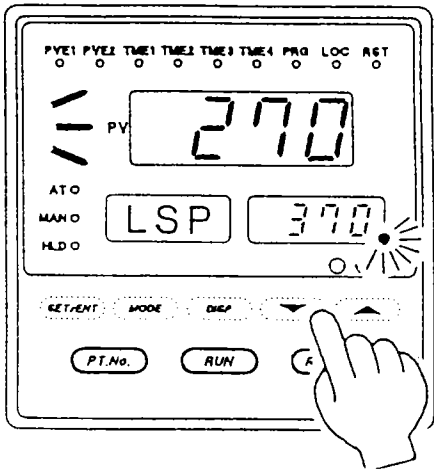


① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).

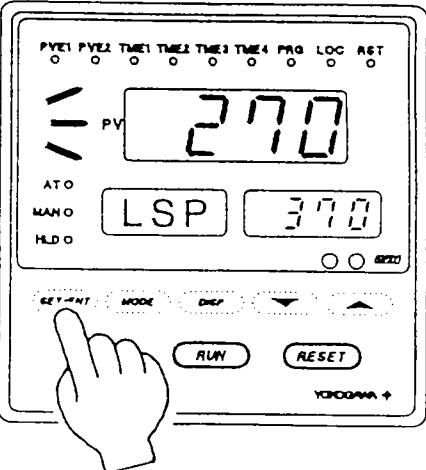
③ Press the **SET/ENT** key once to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set the fixed setpoint to the required value.
[The decimal point will be flashing. (Note)]

3



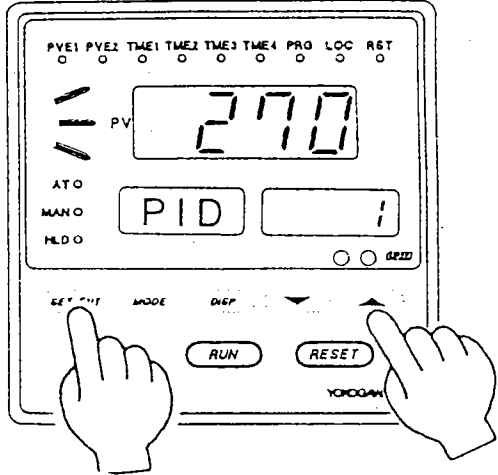
Press the **SET/ENT** key again. This completes the setting. (Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

② Setting the local PID group number

1

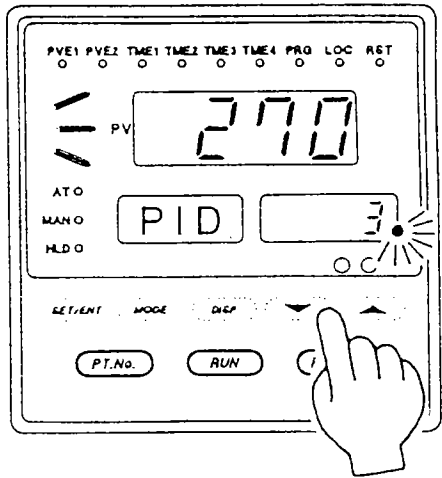


① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).

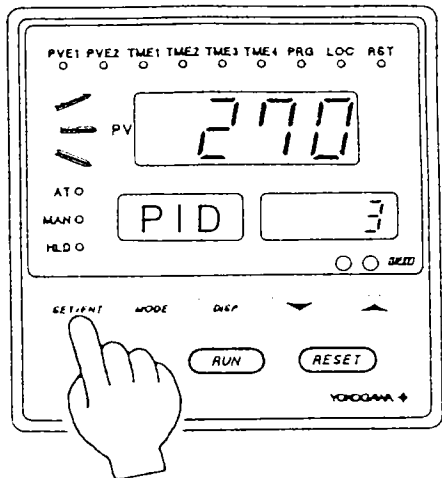
③ Press the **SET/ENT** key once to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set the local PID group number to the required value.
[The decimal point will be flashing. (Note)]

3

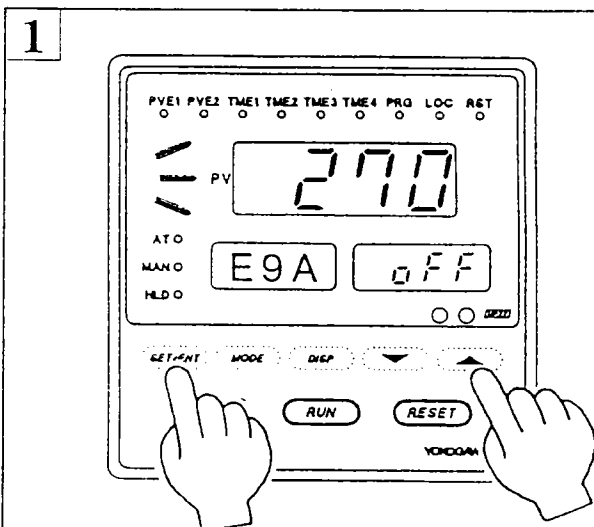


Press the **SET/ENT** key again. This completes the setting. (Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

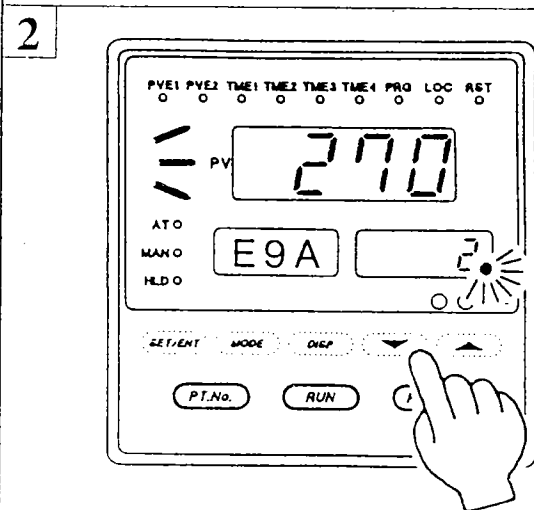
Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

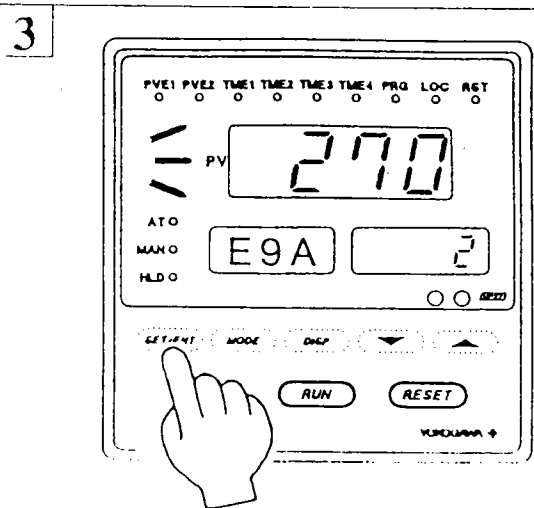
③ Setting the local event 9 type (E9A)



- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **(▲)** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).
- ③ Press the **(SET/ENT)** key once to go to the display shown in the figure at left.



Use the **(▼)** and **(▲)** keys to select a local event 9 type (set the E9A to the required value).
[The decimal point will be flashing. (Note)]



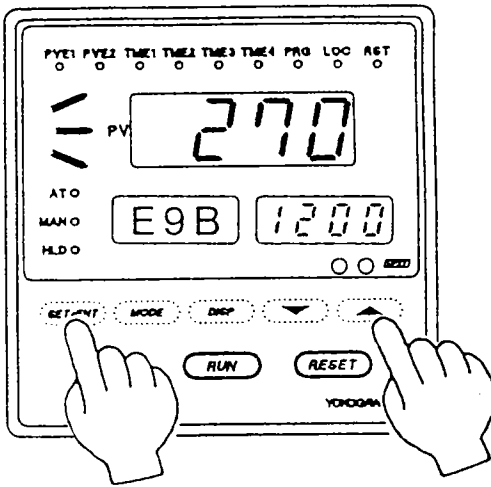
Press the **(SET/ENT)** key again. This completes the setting. (Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

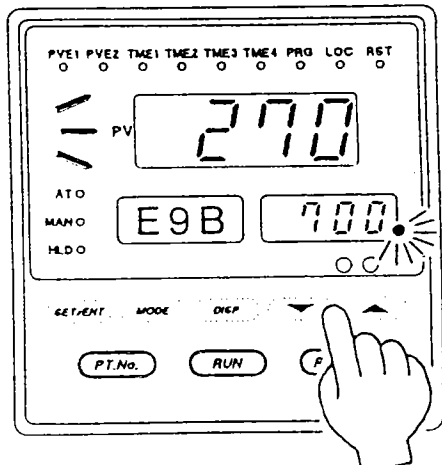
Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

④ Setting the local event 9 value

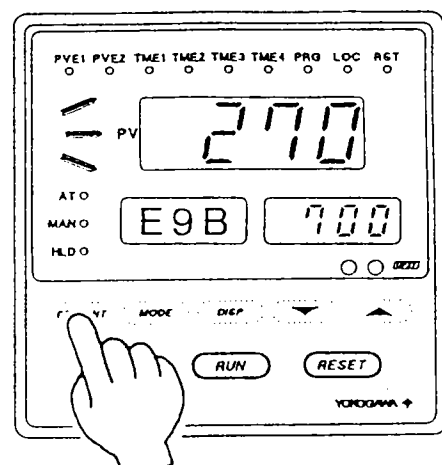
1



2



3



① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).

③ Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the **▼** and **▲** keys to set the E9B to the required value. [The decimal point will be flashing. (Note)]

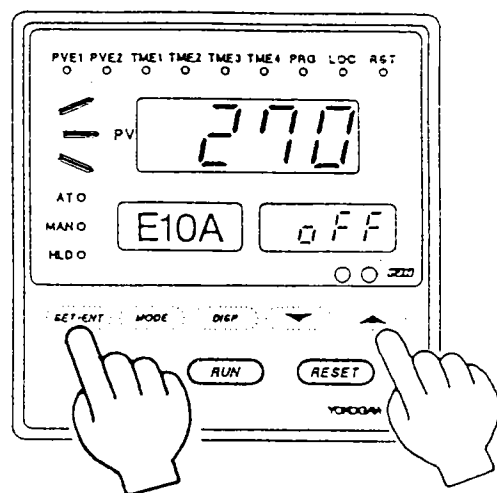
Press the **SET/ENT** key again. This completes the setting. (Note) [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

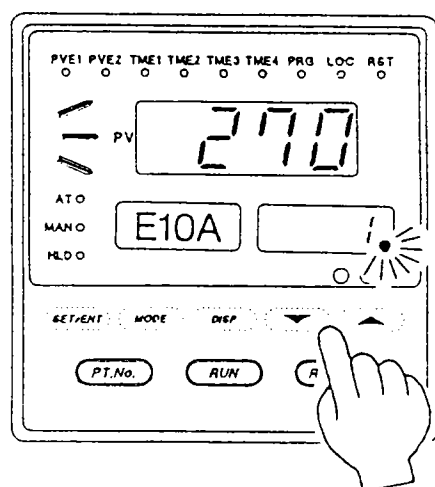
⑤ Setting the local event 10 type

1



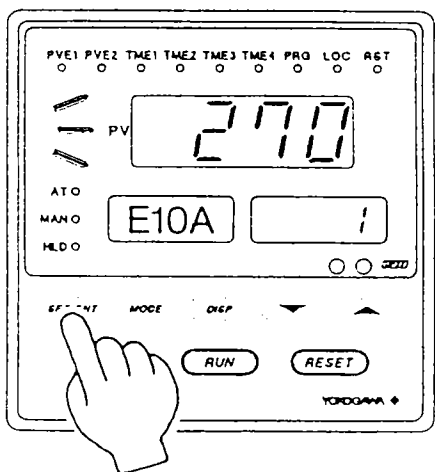
- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **(▲)** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).
- ③ Press the **(SET/ENT)** key once to go to the display shown in the figure at left.

2



Use the **(▼)** and **(▲)** keys to select a local event 10 type (set the E10A to the required value). [The decimal point will be flashing. (Note)]

3



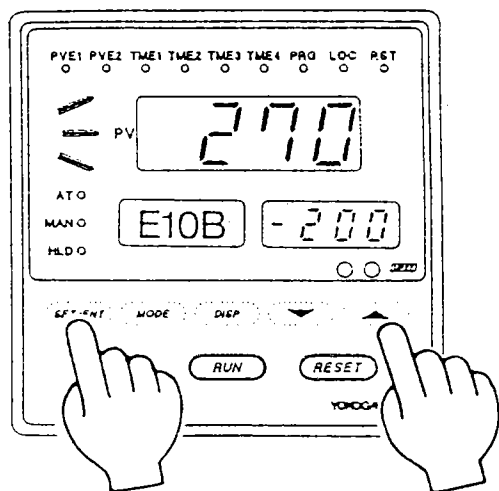
Press the **(SET/ENT)** key again. This completes the setting. (Note) [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

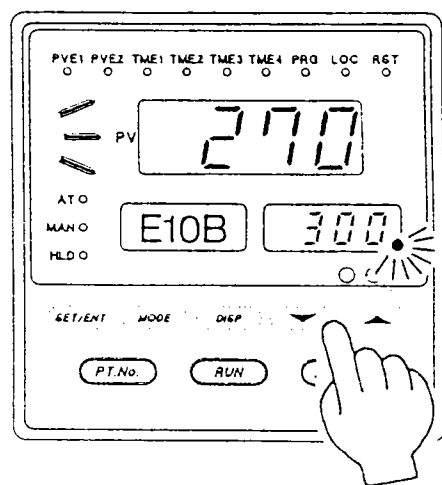
⑥ Setting the local event 10 value

1



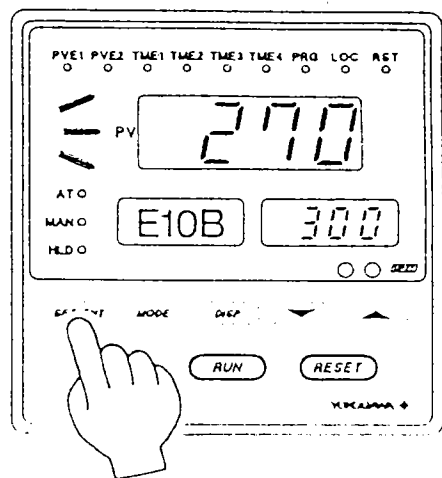
- ① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **▲** key once to call up the Local Mode Parameter Setup Menu Display (see p.28).
- ③ Press the **SET/ENT** key once to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set the E10B to the required value. [The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting. (Note) [The decimal point will now be ON steady (or OFF, if the value is an integer).]

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

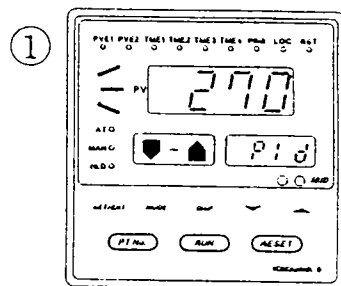
4.4 Program Patterns Setup Menu Display

This menu display is called up to create program patterns. The parameters that can be set (changed) are as follows.

- Program operation and operation start parameters (one each for each program pattern)
SSP, STC, WTM, WZN, RCY, RST, RED
- Program pattern setup parameters (set for each individual segment)
TSP, TIM, PID, and event parameters

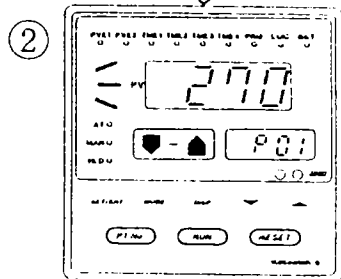
Calling Up the Program Pattern Setup Menu Display

- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p. 16).
- ② Press the **(▲)** key twice to go to the Program Pattern 1 Setup Menu Display, as shown below.



Control Parameter
Setup Menu Display

Press **(▲)** key twice



Program Pattern 1
Setup Menu Display

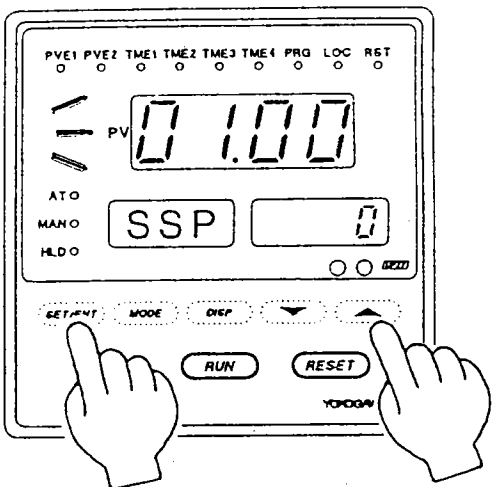
- ② To set parameters for program patterns 2 to 15, press the **(▼)** and **(▲)** keys until you come to the desired program pattern setup menu display.

4.4.1 Setting the Program Operation Parameters and Operation Start Parameters

① Starting Set Point (SSP)

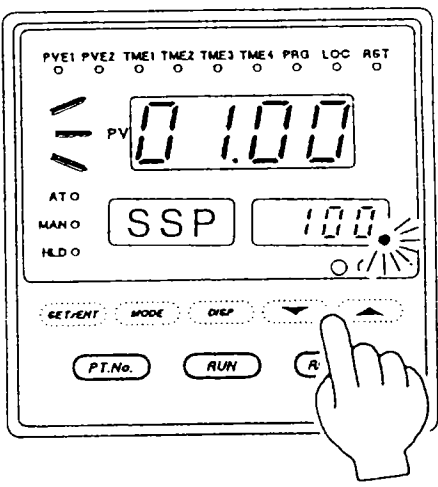
Note: The example shown is for setting program pattern 1.

1



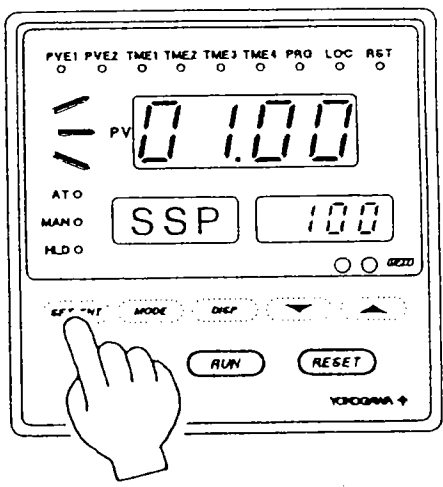
- ① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).
- ③ Press the **SET/ENT** key once to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set the starting setpoint to the required value).
[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting.(Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

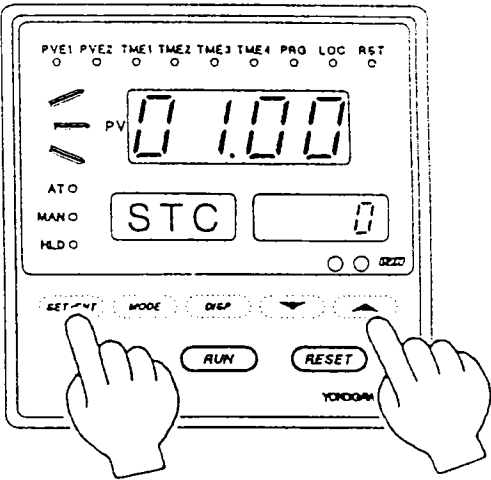
Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value

② Start Code (STC)

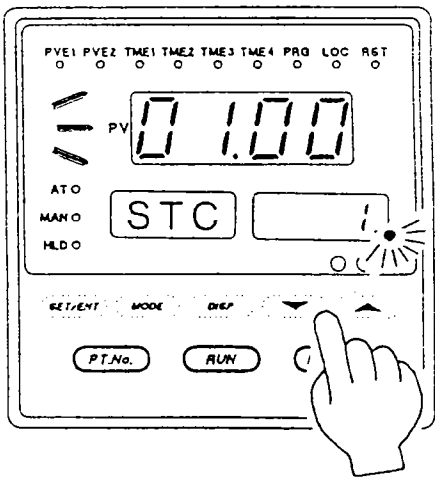
Note: The example shown is for setting program pattern 1.

1



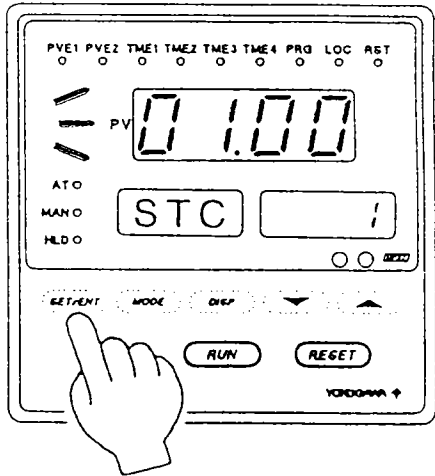
- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **(▲)** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).
- ③ Press the **(SET/ENT)** key twice to go to the display shown in the figure at left.

2



Use the **(▼)** and **(▲)** keys to set the start code to the required value).
[The decimal point will be flashing. (Note)]

3



Press the **(SET/ENT)** key again. This completes the setting.(Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

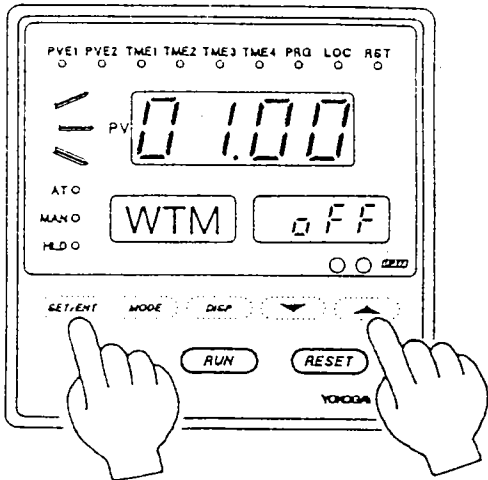
Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

③ Wait Time (WTM)

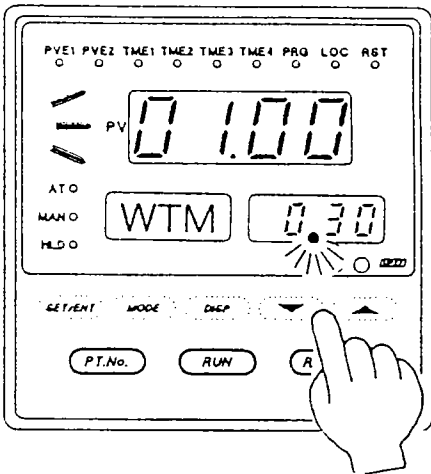
Note: The example shown is for setting program pattern 1.

1



- ① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).
- ③ Set STC to “-1”. (see p.37)
- ④ Press the **SET/ENT** key to go to the display shown in the figure at left.

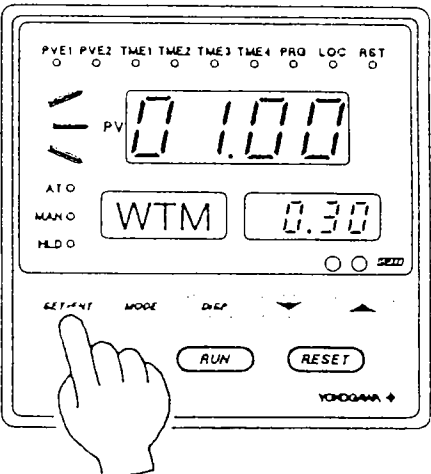
2



Use the **▼** and **▲** keys to set the wait time to the required value).

[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting.(Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

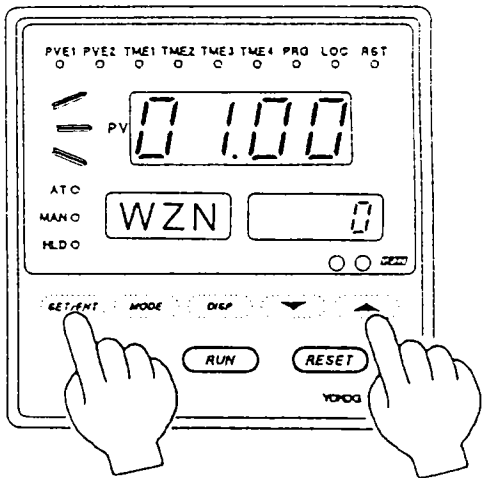
Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

④ Wait Zone (WZN)

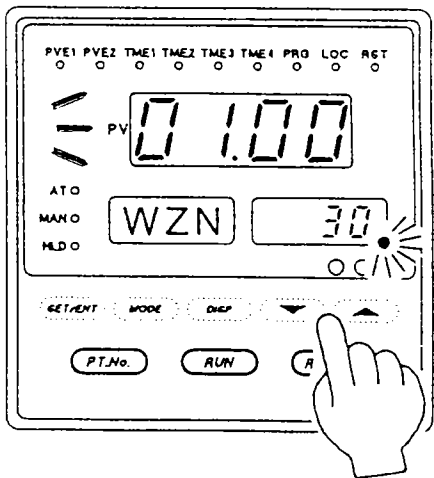
Note: The example shown is for setting program pattern 1.

1



- ① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).
- ② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).
- ③ Set STC to "-1". (see p.37)
- ④ Press the **SET/ENT** key several times to go to the display shown in the figure at left.

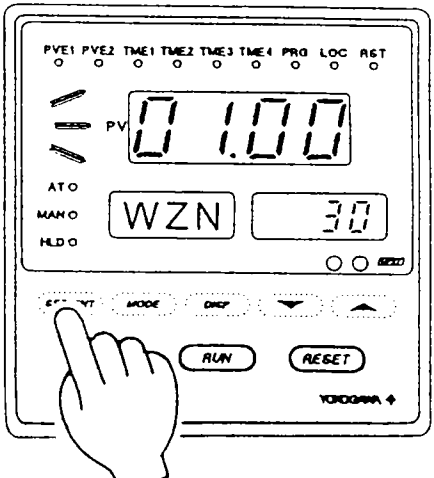
2



Use the **▼** and **▲** keys to set the wait zone to the required value).

[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting. (Note)

[The decimal point will now be ON steady (or OFF, if the value is an integer).]

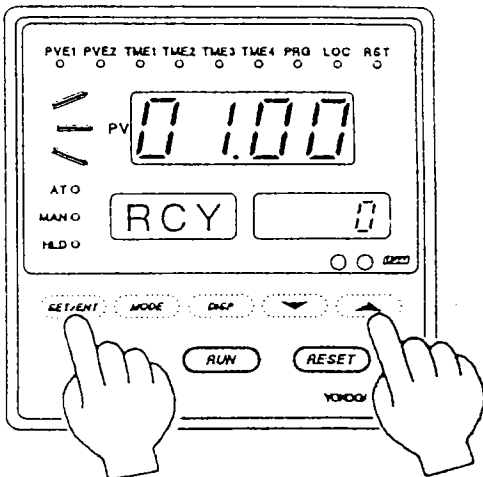
Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

⑤ Number of Repeat Cycles (RCY)

Note: The example shown is for setting program pattern 1.

1



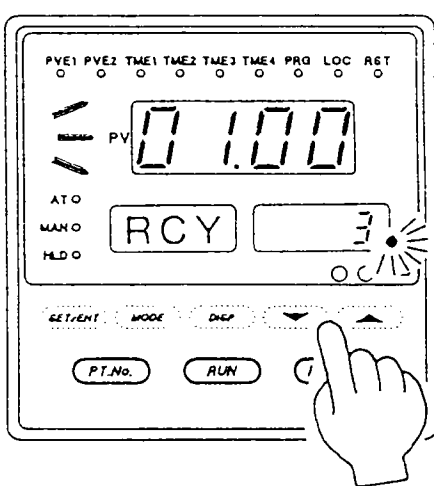
① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).

③ Set STC to “-1”. (see p.37)

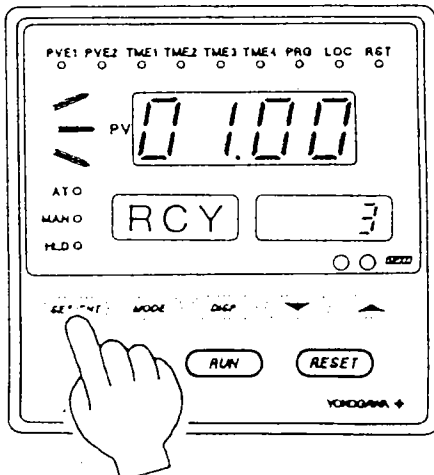
④ Press the **SET/ENT** key several times to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set the number of repeat cycles to the required value.
[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting. (Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

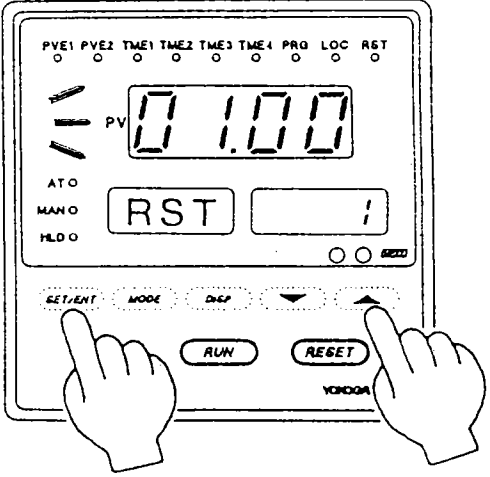
Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value

⑥ Repeat Start Segment No.

Note: The example shown is for setting program pattern 1.

1



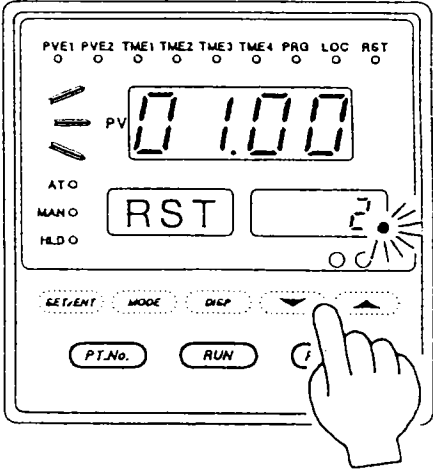
① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).

③ Set STC to “-1”. (see p.37)

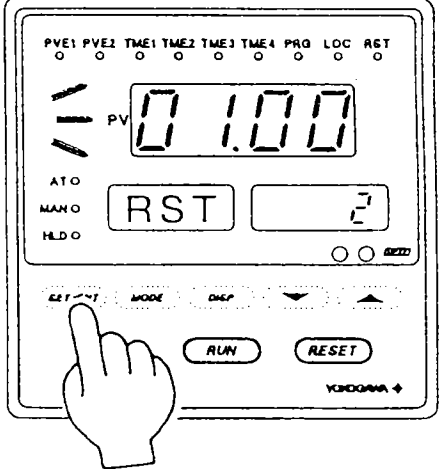
④ Press the **SET/ENT** key several times to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set therepeat start segment No. to the required value).
[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting.(Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

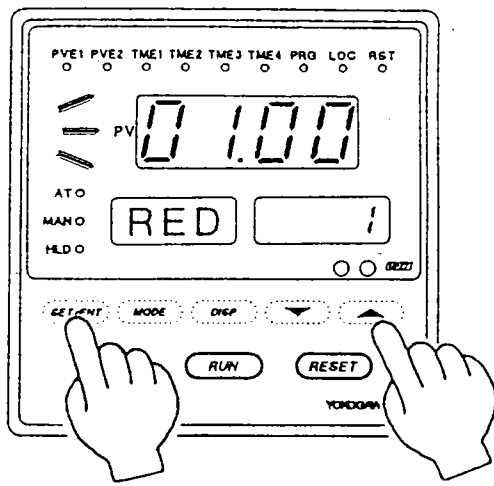
Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

⑦ Repeat End Segment No.

Note: The example shown is for setting program pattern 1.

1



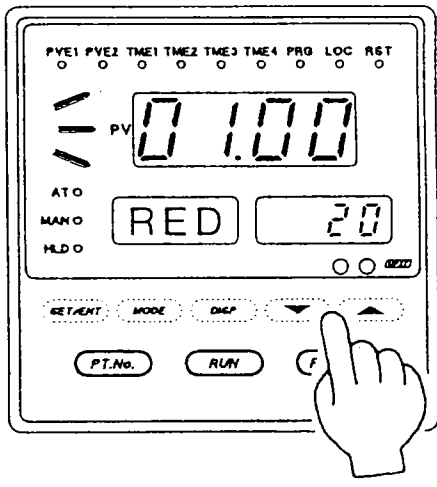
① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p16).

② Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display (see p.35).

③ Set STC to “-1”. (see p.37)

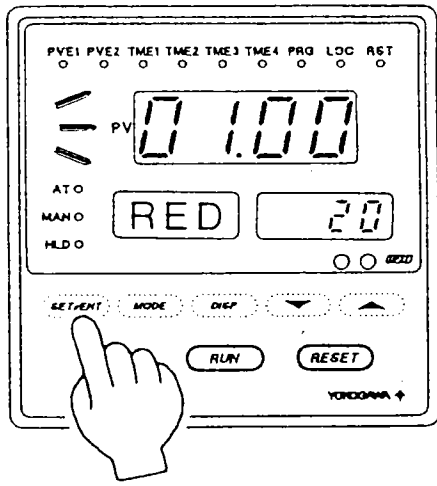
④ Press the **SET/ENT** key several times to go to the display shown in the figure at left.

2



Use the **▼** and **▲** keys to set therepeat end segment No. to the required value).
[The decimal point will be flashing. (Note)]

3



Press the **SET/ENT** key again. This completes the setting.(Note)
[The decimal point will now be ON steady (or OFF, if the value is an integer).]

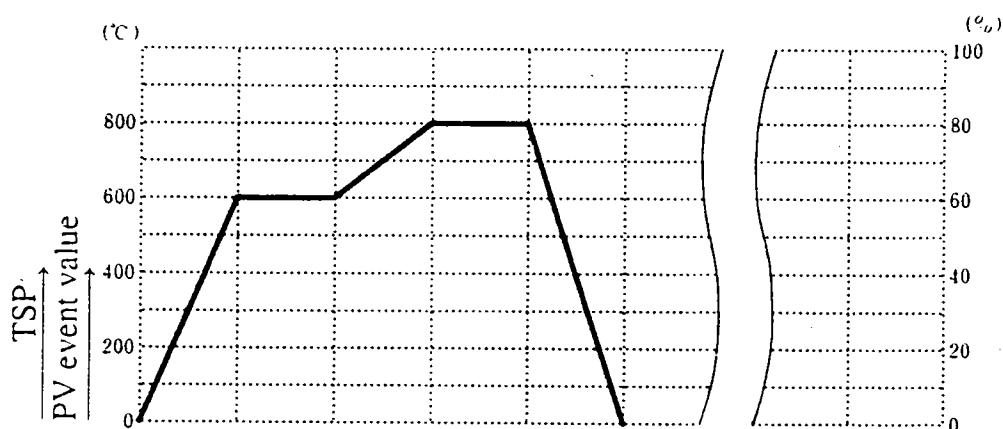
Note: See also **Note 3** in the “Notes on Setting Operation Parameters” (p.12).

Note: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

4.5 Setting a Program Pattern

This section explains the procedure for setting up the program pattern shown in the table below. The example below shows only that part of the procedure for setting up Segment 1 of Program Pattern No. 1.

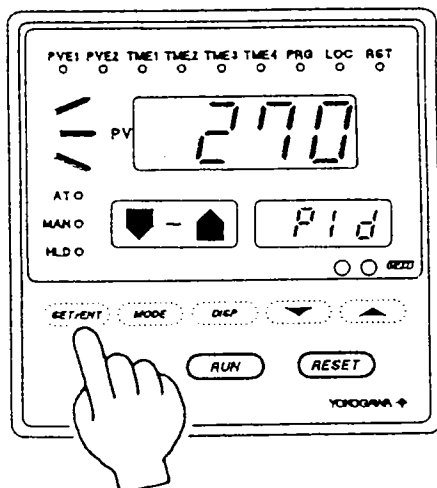
Note: Before setting up a program pattern, you should first create a program pattern setting table as shown in the example below. In setting up the program you will enter the parameters in the same order as they appear in the table below, so filling out the table in advance will help you to avoid confusion when entering the parameters.



S.NO segment No.	1	2	3	4	5			
TSP target setpoint	600°C	600°C	800°C	800°C	0°C			
TIM segment time	30 min	60 min	30 min	2 hr	30 min			
EV1 event No. 1	1							
TY1 (PV event), ON1 (time event)	20 min							
PE1 (PV event), OF1 (time event)	50 min							
EV2 event No. 2	9							
TY2 (PV event), ON2 (time event)	3							
PE2 (PV event), OF2 (time event)	10°C							
EV3 event No. 3								
TY3 (PV event), ON3 (time event)								
PE 3 (PV event), OF3 (time event)								
EV4 event No. 4								
TY4 (PV event), ON4 (time event)								
PE 4 (PV event), OF 4 (time event)								
JC Junction code	1	0	1	0	0			

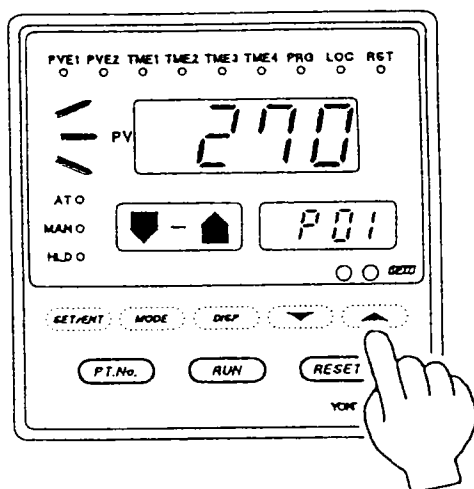
The following example is for setting program pattern No. 1.

1



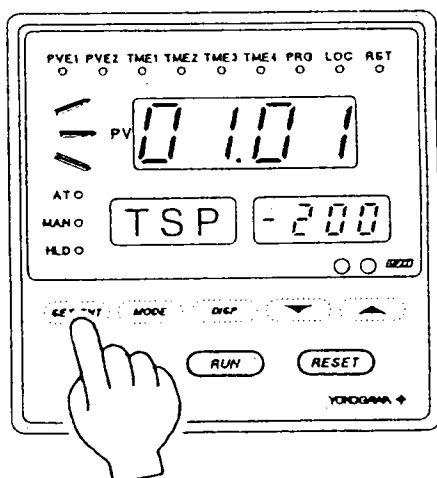
With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

2



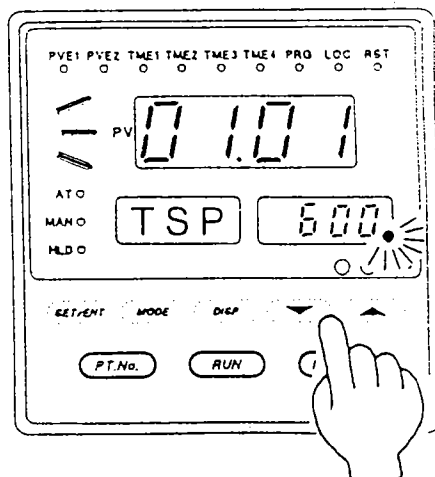
Press the **▲** key twice to call up the Program Pattern 1 Setup Menu Display.



3



Press the **SET/ENT** key several times to go to the display shown in the figure at left.

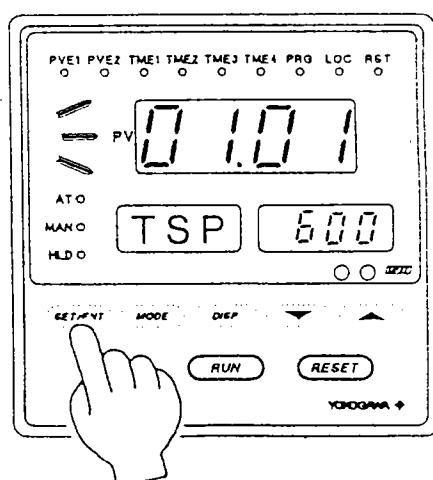
4



Use the  and  keys to set the target setpoint to “600”.

[The decimal point will be flashing. (Note 1)]

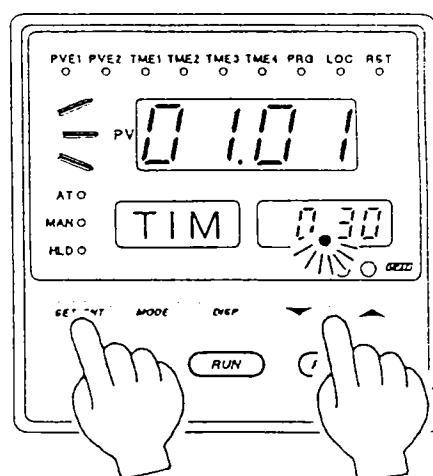
5





Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn OFF.]

6



Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the  and  keys to set the segment time to “00.30”.

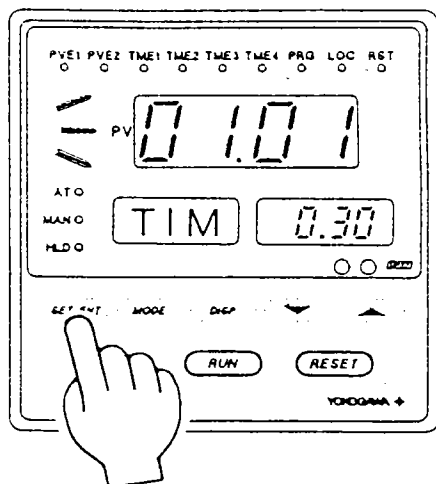
[The decimal point will be flashing. (Note 1)]

* Refer to “TMU” (Initial setup Manual, P.41, 44 and P.48) for setting time unit.

Note 1: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

Note 2: See also **Note 3** in the “Notes on Setting Operating Parameters” (p.12).

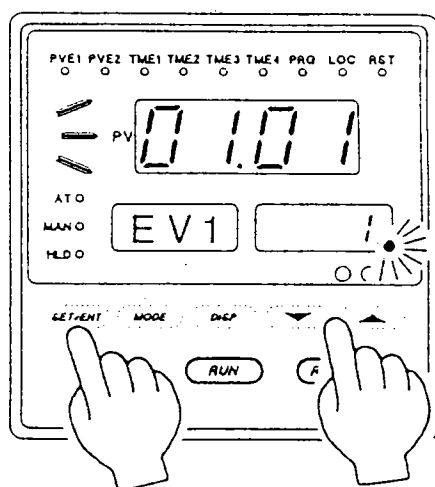
7



Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will stop flashing and remain ON.]

8

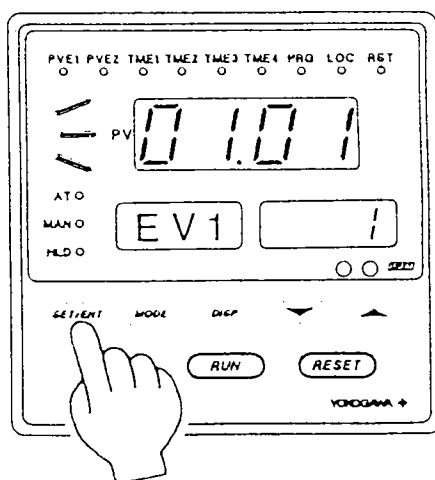


Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the **▲** and **▼** keys to set the event 1 type to "1". (This makes it a "Time Event".)

[The decimal point will be flashing. (Note 1)]

9



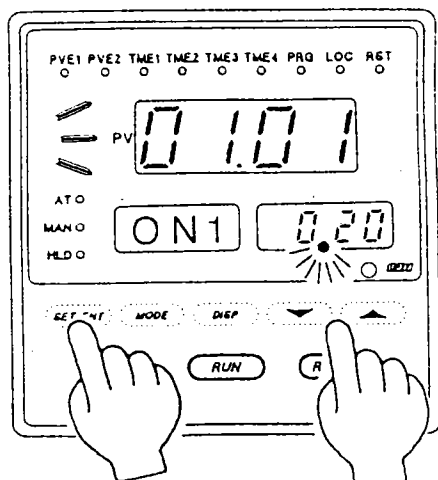
Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn OFF.]

Note 1: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

Note 2: See also [Note 3] in the "Notes on Setting Operating Parameters" (p.12).

10

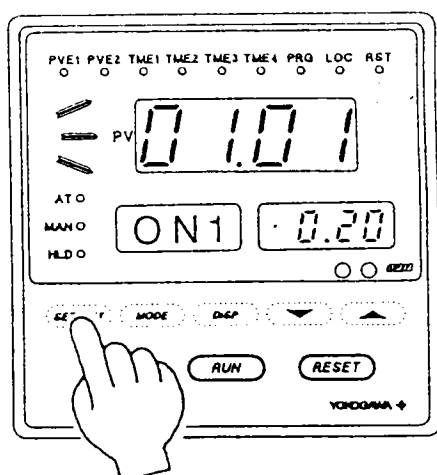


Press the **(SET/ENT)** key once to go to the display shown in the figure at left.

Use the **(▼)** and **(▲)** keys to set the time event ON time to "00.20".

[The decimal point will be flashing. (Note 1)]

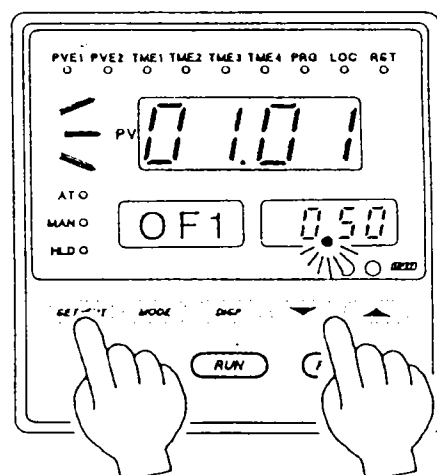
11



Press the **(SET/ENT)** key again. This completes the setting (Note 2).

[The decimal point will stop flashing and remain ON.]

12



Press the **(SET/ENT)** key once to go to the display shown in the figure at left.

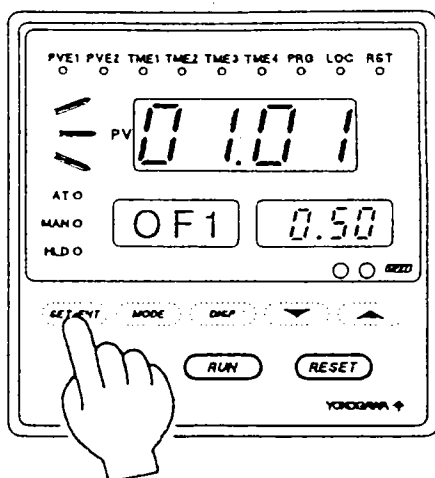
Use the **(▼)** and **(▲)** keys to set the time event OFF time to "00.50".

[The decimal point will be flashing. (Note 1)]

Note 1: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

Note 2: See also [Note 3] in the "Notes on Setting Operating Parameters" (p.12).

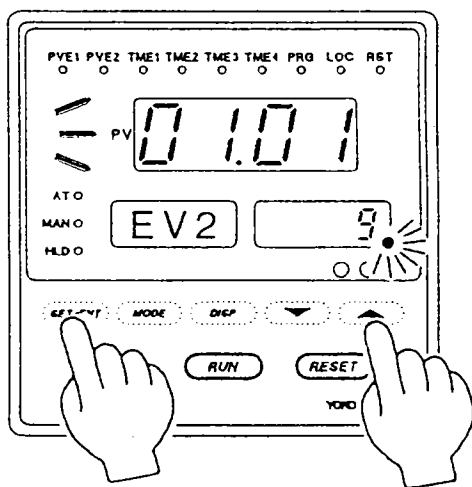
13



Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will stop flashing and remain ON.]

14

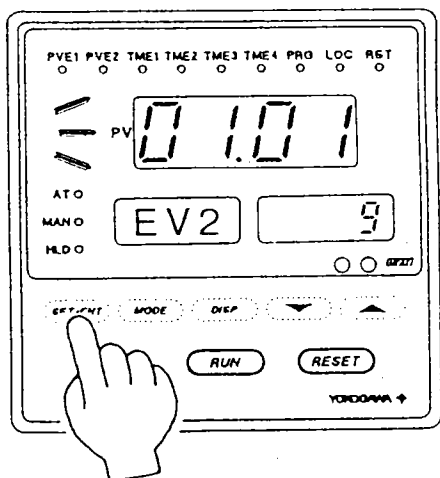


Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the **▼** and **▲** keys to set the event 2 type to "9". (This makes it a "PV event".)

[The decimal point will be flashing. (Note 1)]

15



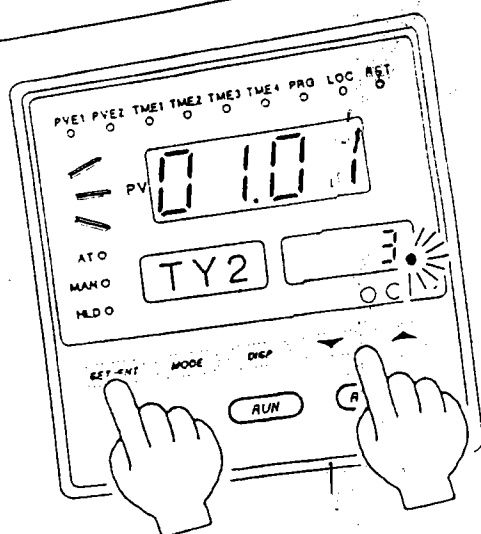
Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn OFF.]

Note 1: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

Note 2: See also **Note 3** in the "Notes on Setting Operating Parameters" (p.12)

16

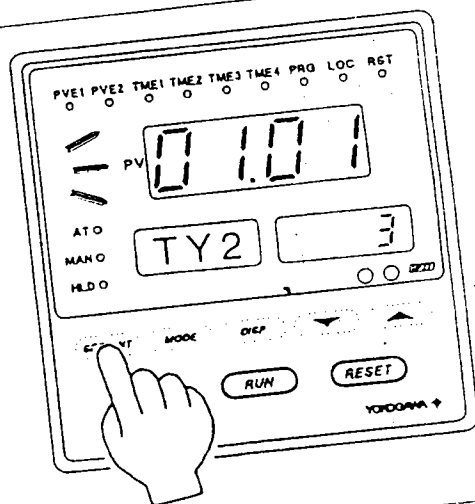


Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the **▼** and **▲** keys to set the PV event type to "3".

[The decimal point will be flashing. (Note 1)]

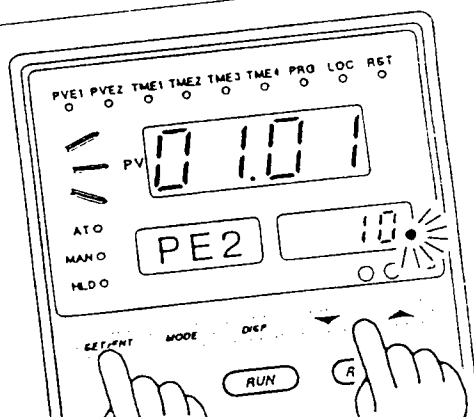
17



Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn off.]

18

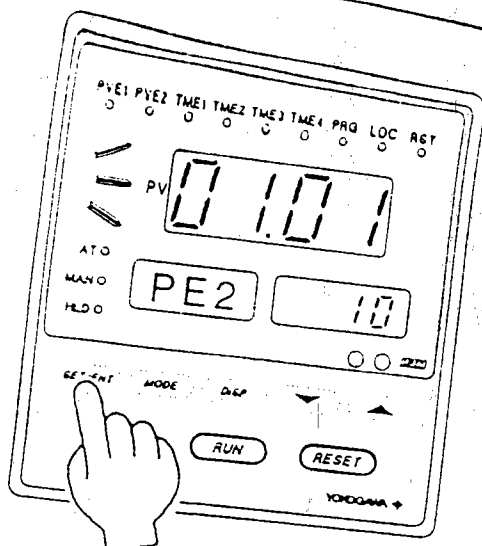


Press the **SET/ENT** key once to go to the display shown in the figure at left.

Use the **▼** and **▲** keys to set the PV event value to "10".

[The decimal point will be flashing. (Note 1)]

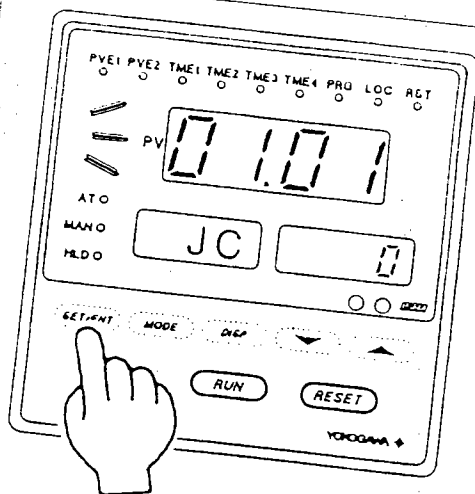
19



Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn OFF.]

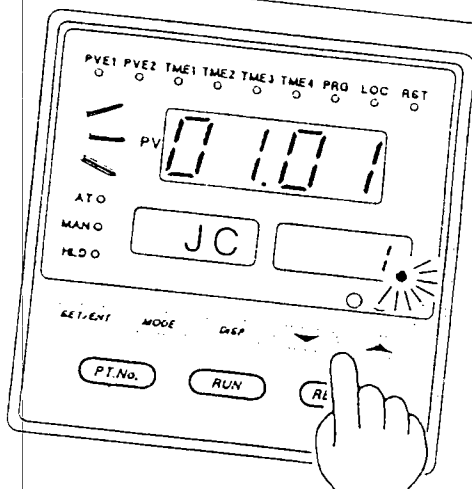
20



Press the **SET/ENT** key once to go to the display shown in the figure at left.

[We will not set up event 3 and event 4 in this example. We will assume that the event 3 and event 4 types have been left at the factory shipment default value (OFF).]

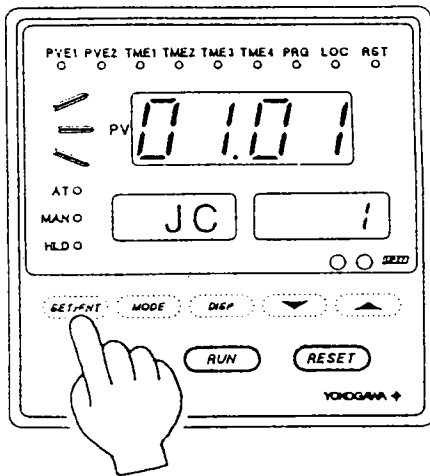
21



Use the **▼** and **▲** keys to set the junction code to "1".

[The decimal point will be flashing. (Note 1)]

22



Press the **SET/ENT** key again. This completes the setting (Note 2).

[The decimal point will turn OFF.] Pressing the **SET/ENT** key once more will advance the UP27 to the display for the segment 2 target setpoint.

If you wished to return to the Program Pattern 1 Setup Menu Display, you would press the **DISP** key once.

Note 2: See also **Note 3** in the "Notes on Setting Operating Parameters" (p.12).

○ Refer to IM 4P2F5-02E (P.40) to set Junction Code (JC) for the last segment.

Note: A segment which has no segment time (TIM = -) is invalid.

A segment before the segment should be the last segment.

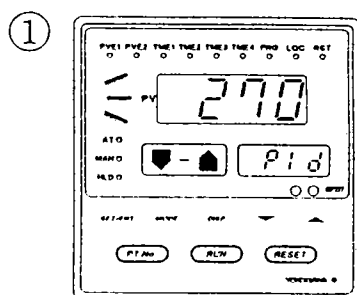
4.6 Program Pattern Operation Menu Display

From this menu display, you can:

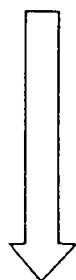
- Display the number of unused segments
- Display the number of segments being used in a specified program pattern
- Copy program patterns
- Delete program patterns

Calling Up the Program Pattern Operation Menu Display

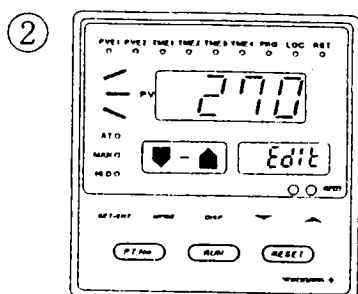
- ① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display
- ② Press the **(▼)** key once (or the **(▲)** key several times) to go to the Program Pattern Operation Menu Display.



Control Parameter
Setup Menu Display



Press **(▼)** key once
(Or, press **(▲)** key
several times)

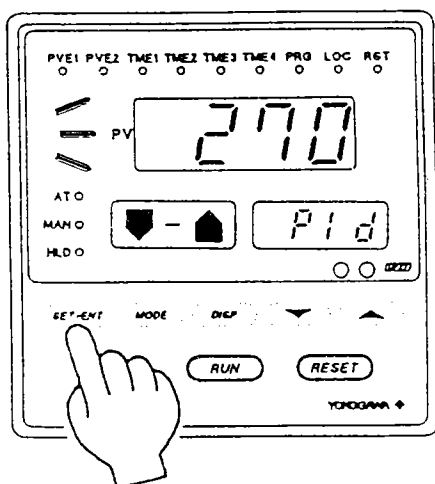


Program Pattern
Operation Menu Display

① Displaying the Number of Unused Segments

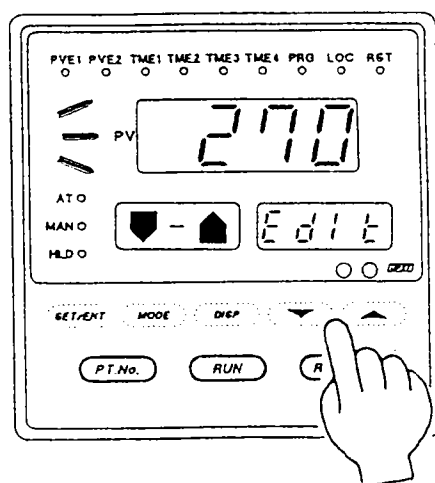
This procedure shows the total number of segments not presently in use, so that you can see how many segments remain available for you to use.

1



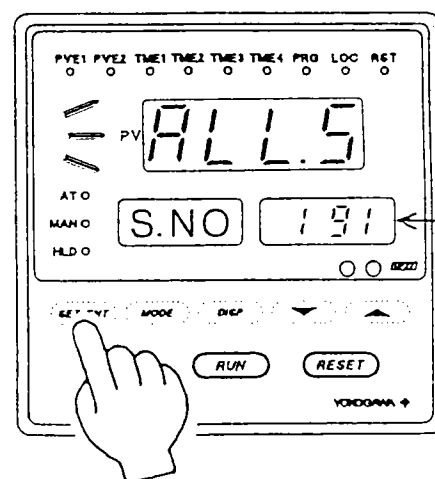
With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

2



Press the **▼** key once (or the **▲** key several times) to go to the Program Pattern Operation Menu Display.

3

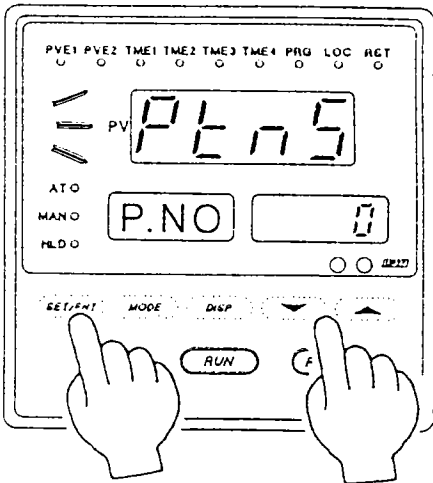


Pressing the **SET/ENT** key once will display the number of unused segments.

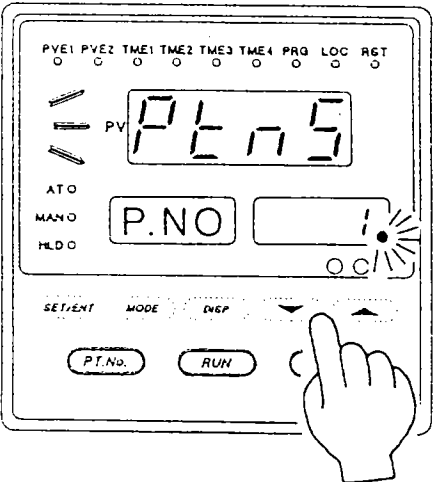
② Displaying the Number of Segments in a Specified Program Pattern

This procedure displays the number of segments being used in a program pattern from No. 1 to No. 15.

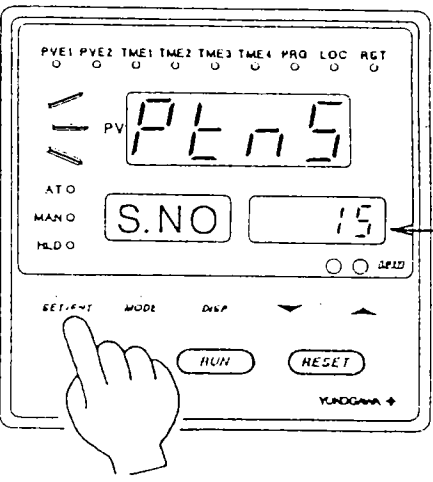
1



2



3



① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

② Press the **▼** key once (or the **▲** key several times) to go to the Program Pattern Operation Menu Display (see p.52).

③ Press the **SET/ENT** key twice to go the display shown in the figure at left.

Use the **▼** and **▲** keys to set the program pattern No. for which to display the number of segments in use.

[The decimal point will be flashing. (Note 1)]

Press the **SET/ENT** key once.
(Note)

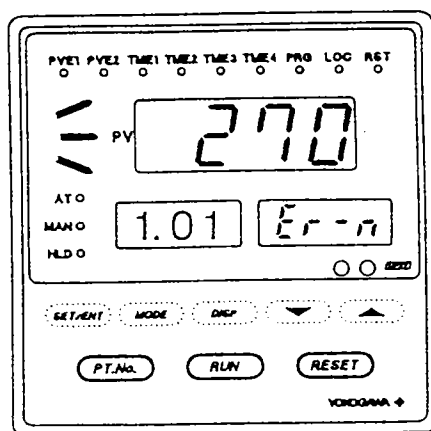
(This displays the number of segments in use for the program pattern specified in **2** above.

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note 1: The decimal point will start flashing when the **ON** (OFF) is set.

Note: Programming Error Display

If a program pattern or segment copy or deletion could not be successfully performed (in the following page 56 to page 60), one of the error codes shown in the table below will be displayed. (Pressing any key will erase the error code "n".)



n	Reason why delete or copy unsuccessful
0	At the time the pattern copy source was specified, that copy source program did not exist. At the time the pattern copy source was specified, that program pattern was currently being run.
1	At the time the pattern copy destination was specified, another program pattern was already registered at that copy destination.
2	At the time the pattern copy destination was specified, the copy would have exceeded the maximum total of 192 segments.
3	At the time the pattern clear was attempted, the pattern to be cleared did not exist. At the time the pattern clear was attempted, that program was currently being run.
4	New segment cannot be registered because program is currently running. Segment cannot be added because program is currently running. New segment cannot be registered because would exceed 192 segments. Segment cannot be added because would exceed 192 segments. New segment cannot be registered because would exceed 60 segments. Segment cannot be added because would exceed 60 segments. Cannot add segment here because this segment does not exist.
5	Segment cannot be deleted because program is currently running.

③ Copying a Program Pattern

The UP27 lets you copy a previously created program pattern to a different program pattern No.

1

① With the Operation Display on display, press the **(SET/ENT)** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

② Press the **(▼)** key once (or the **(▲)** key several times) to go to the Program Pattern Operation Menu Display (see p.52).

③ Press the **(SET/ENT)** key several times to go the display shown in the figure at left.

2

Use the **(▼)** and **(▲)** keys to set the program pattern No. to be copied.

[The decimal point will be flashing. (Note 1)]

3

Press the **(SET/ENT)** key once. (Note)

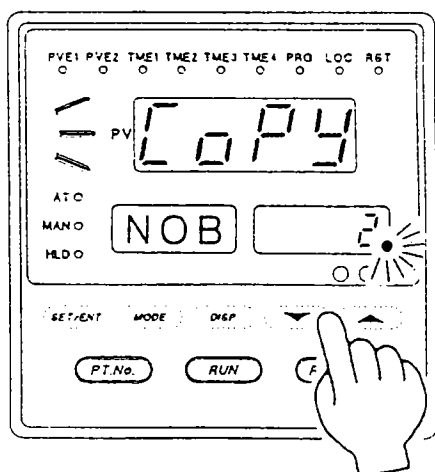
The display changes to shown the display at left.

Press the **(SET/ENT)** key once again.

Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note 1: The decimal point will stop flashing and remain ON (or OFF if the

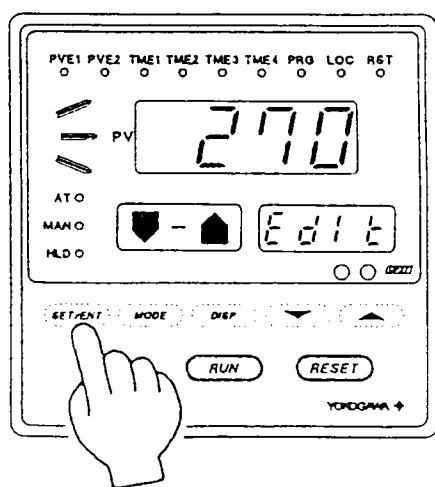
4



Use the and keys to set the program to which you wish to copy the pattern. (The example shows pattern 2.)

[The decimal point will be flashing. (Note 1)]

5



Press the **SET/ENT** key once. This executes the copy, and returns the display to the Program Pattern Operation Menu Display.

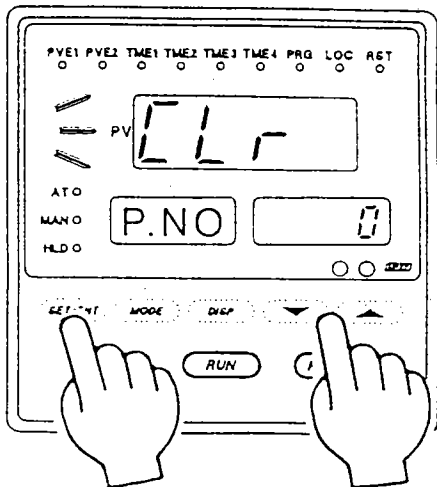
Note: See also **Note 3** in the "Notes on Setting Operation Parameters" (p.12).

Note 1: The decimal point will stop flashing and remain ON (or OFF if the value is an integer) if you return the display to the original value.

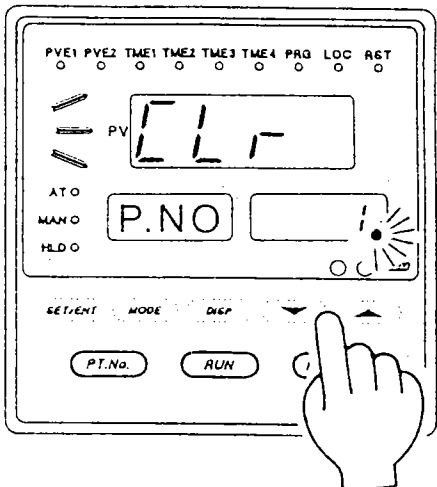
④ Deleting a Program Pattern

This procedure is used to delete a previously created program pattern. All parameters for the program pattern No. that you delete will return to the default values in effect when the UP27 was shipped.

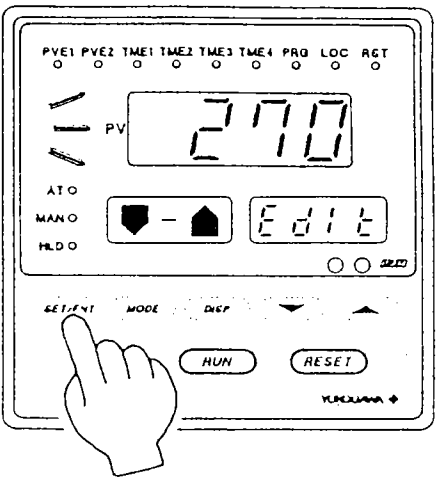
1



2



3



① With the Operation Display on display, press the **SET/ENT** key for at least three seconds to call up the Control Parameter Setup Menu Display (see p.16).

② Press the **▼** key once (or the **▲** key several times) to go to the Program Pattern Operation Menu Display (see p.52).

③ Press the **SET/ENT** key several times to go the display shown in the figure at left.

Use the **▼** and **▲** keys to set the program pattern No. to be deleted.

[The decimal point will be flashing. (Note 1)]

Press the **SET/ENT** key once. This deletes the program pattern, and returns the display to the Program Pattern Operation Menu Display.

Note: See also [Note 3] in the "Notes on Setting Operation Parameters" (p.12).

Note 1: The decimal point will stop flashing and remain ON (or OFF if the

⑤ Adding/Inserting a Program Segment

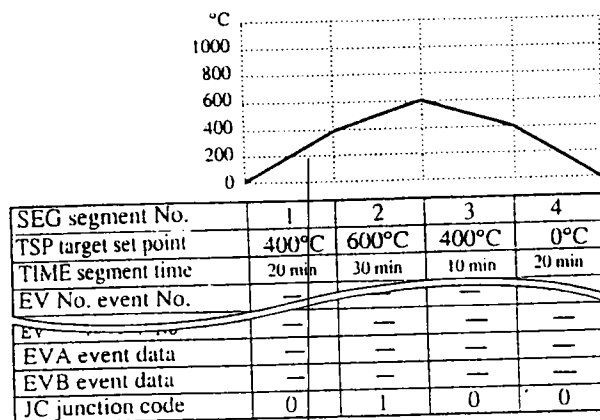
This procedure lets you insert an additional segment into a program pattern.

The following describes both how to insert an additional program segment, and how the insertion affects the segment parameters.

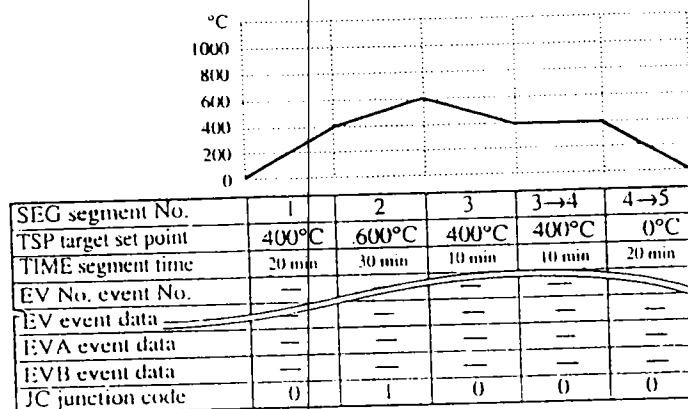
Insertion Procedure

- (1) Set the UP27 to some mode other than PROGRAM operation (so that the PRG lamp is OFF).
- (2) Call up the junction code (JC) setup display for the segment at the point where you wish to insert the new segment.
- (3) Use the \blacktriangledown and \blacktriangle keys to set the junction code (JC) to INS, and enter it using the SET/ENT key.
The segment is now added.

① Example of pattern before insertion at segment No. 3



② Example of pattern after insertion at segment No. 3





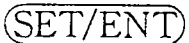
- After the insertion at segment No. 3, the segment data from the pre-insertion segment No. 3 is pushed forward to segment No. 4, and a copy

⑥ Deleting a Program Segment

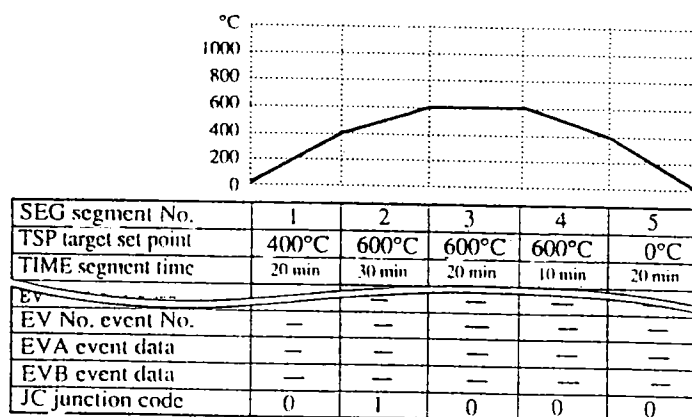
This procedure lets you delete a segment from a program pattern.

The following describes both how to delete a program segment, and how the deletion affects the segment parameters.

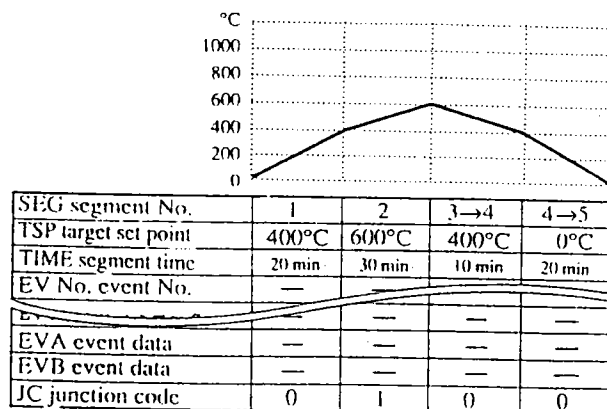
Deletion Procedure

- (1) Set the UP27 to some mode other than PROGRAM operation (PRG lamp is OFF).
- (2) Call up the junction code (JC) setup display for the segment to be deleted.
- (3) Use the  and  keys to set the junction code (JC) to DEL, and register using the  key.
The segment is then deleted.

① Example of pattern before deleting segment No. 3



② Example of pattern after deleting segment No. 3



• After segment No. 3 is deleted, the segments are renumbered.

5. OPERATION

Note

Before beginning operation, read the “Initial Setup Manual” (IM 4P2F5-02E) and make sure that you properly execute those tasks (installation, wiring, parameter setup, etc.) required to prepare the UP27 for operation.

5.1 Status when Power is turned ON

- When power is turned ON, operation depend on the restart code (RST). (See Page 79)
- Note that if you are using an external contact input to switch modes, and that contact is ON (closed) when you turn on power to the UP27, the UP27 will not recognize that external contact as ON; it will treat it as OFF (open).
The UP27 will treat the contact as being ON (closed) at the time of its first change from OFF (open) to ON (closed) after power-on.
- There is no power switch in the UP27. If one is needed, you must provide one separately.
- If the UP27 detects a malfunction at power-on, a display appears to indicate the nature of the error. If the UP27 does not go to Operation Display ① (or the Setup Parameter Setup Menu Display) at power-on, see p.82.

5.2 Changing Operating Parameters

- See p.12 through p.60.
- For the default operating parameters in effect when your UP27 was shipped from the factory, refer to the “Operating Parameter Summary Table” at the back of this manual.

Note: External Contact Function Assignments

- The DI terminal functions differ depending on whether your UP27 has or does not have the /RS-422 option (communications interface function).
- The user must select which functions to assign to the DI terminals, using the DI selection parameter (DIS) in the setup parameters (control output parameters).

External contact rating: 12 VDC, 10mA minimum

External contact selection for program pattern and operation mode									
[With /RS422 not specified]			[With /RS422 specified]						
Terminal	DIS = 0	DIS = 4	Terminal	DIS = 0	DIS = 1	DIS = 2	DIS = 3	DIS = 4	※
18	Pattern 8		18	Pattern 8	HOLD	ADVANCE	ADVANCE	ADVANCE	
19	Pattern 4		19	Pattern 4			HOLD	Pattern 4	
20	Pattern 2		20	Pattern 2					
29	Pattern 1		29	Pattern 1					
9	RESET		21	Not used (for /RS-422)					
10	P. RUN		22	Not used (for /RS-422)					
21	ADVANCE		9	RESET					
22	HOLD	KEYLOC	10	P. RUN					
11	COM		11	COM					

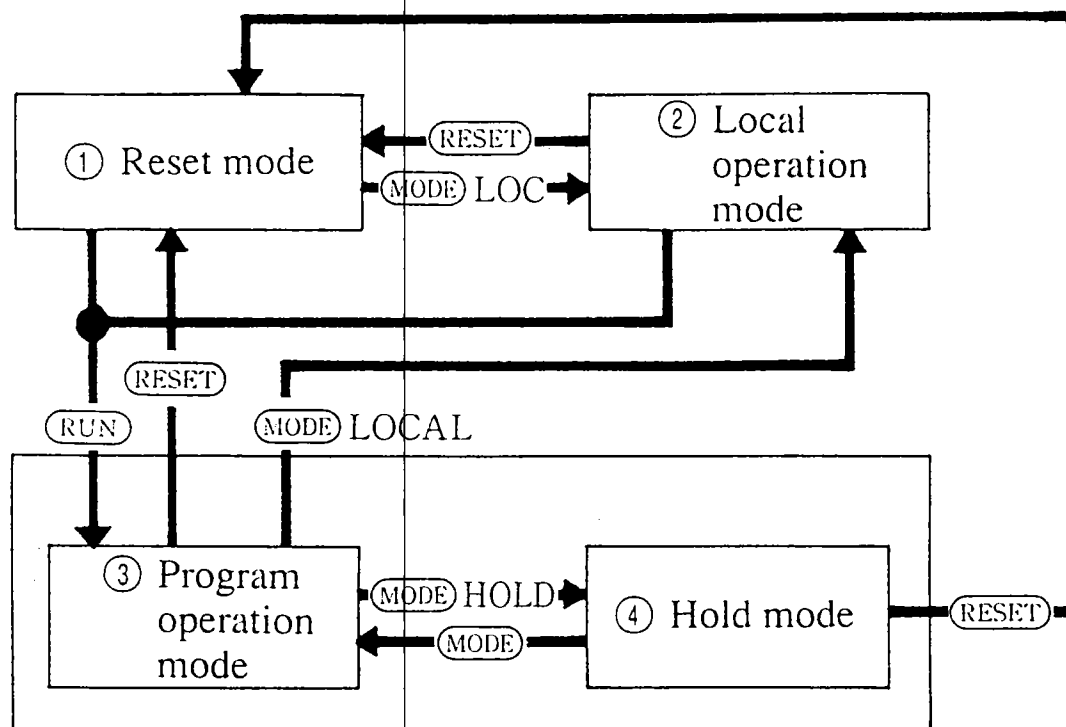
※ Specifying DIS (setup parameter) code (0 to 4) changes the function of terminals (<18>, <19>).

Note: For mode transfers, the last contact closure to occur always takes priority.

Example: If during program run ⑩ – ⑪ closed) a reset signal (⑨ – ⑪ closed) is applied, the UP27 is reset. To run the program again, the contact across ⑩ – ⑪ must be opened and then reclosed.

5.3 Operating Mode Transfers

- The relationship between the operating modes is shown in the figure below.



- The accompanying table shows the relationships between each modes and the behavior of the set point and control output, and which modes and parameters you can manipulate by key operations.

	Target set point	Control output	Modes and parameters manipulable by key operations
Reset mode (see p.66)	0%	AUTO (automatic): Preset output value MAN (manual): Preset output value	Program pattern No. selection Program operation start Local mode
Local mode (see p.67)	Fixed set point	AUTO (automatic): Value from control computation MAN (manual): Value from manual operation	Fixed set point During MAN (manual) operation, the output value. Reset mode Program operation mode Hold mode
Program operation mode (see p.65)	Value from program pattern	AUTO (automatic): Value from control computation MAN (manual): Value from manual operation	During MAN (manual) operation, the output value. Reset mode Local mode Hold mode
Hold mode (see p.68)	Value of program pattern at time of entry into hold mode	AUTO (automatic): Value from control computation MAN (manual): Value from manual operation	During MAN (manual) operation, in the case of a soak segment, the set point and remaining segment time. Reset mode Program operation mode

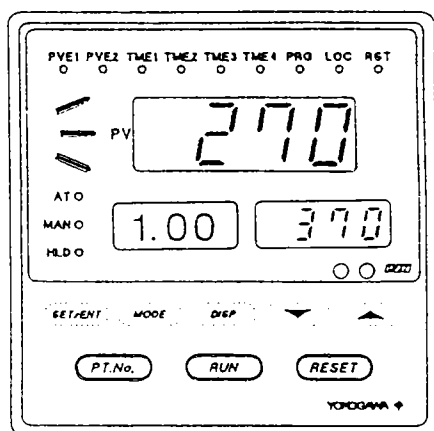
5.4 Selecting Operating Program Pattern

- The program pattern for program operation can be selected using the **(PT.NO.)** key or an external contact.

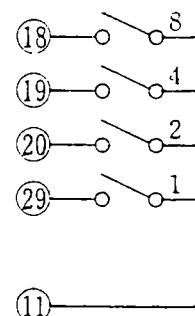
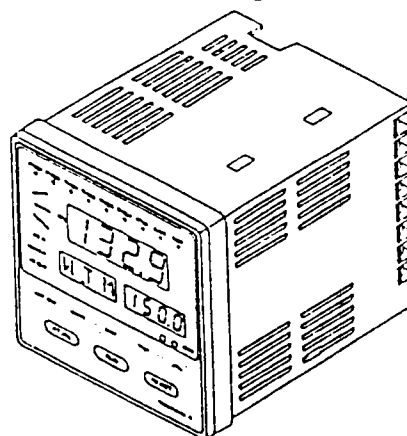
Note: An external contact has priority over key operation.

The program pattern can be selected using key operation only if external contacts PTE 4-1 are all set to OFF (open).

- Selection Using Key Operations
- Selection Using External Contact



The **(PT.NO.)** key is used to select.



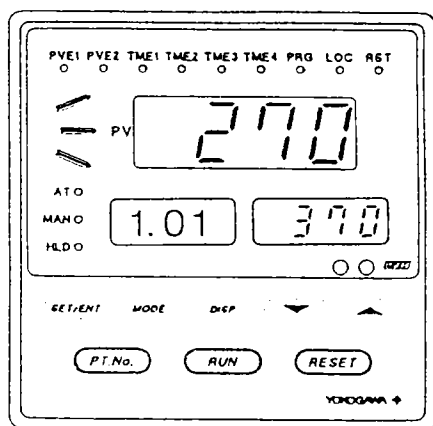
Voltage-free ("dry") contact (contact rating, 12 V DC, 10 mA minimum). Note that Terminal No. ⑱ function may differ depending on how the UP27 is set up; see "Note: External Contact Function Assignments" (p.62).

5.5 Starting Program Operation (Running a Program)

- The selected program pattern can be set to RUN (operation start) using the **(RUN)** key or an external contact.

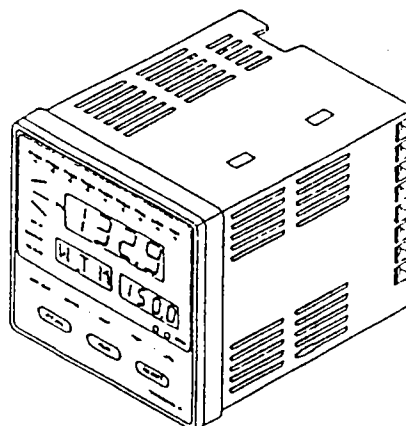
Note: The external mode contacts and key operations have equal priority; whichever occurs last will decide the mode.

- Starting Operation Using Key Operations



The **(RUN)** key will start operation.

- Starting Operation Using External Contact



A transition from OFF (open) to ON (closed) will start operation.

Voltage-free contact (contact rating, 12 V DC, 10 mA, minimum).

See "Note: External Contact Function Assignments" (p.62).

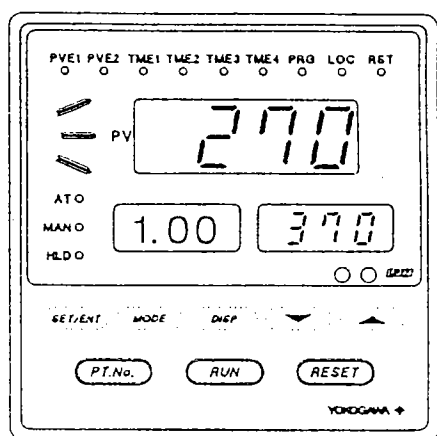
- A transition of this external contact ((10) – (11)) to ON (closed) during program hold (HOLD) mode will release the HOLD. The HLD lamp will turn OFF.
- When program operation starts, the PRG lamp goes ON.

5.6 Stopping (Resetting) Program Operation

- Program operations can be stopped (RESET) using the **RESET** key or an external contact.

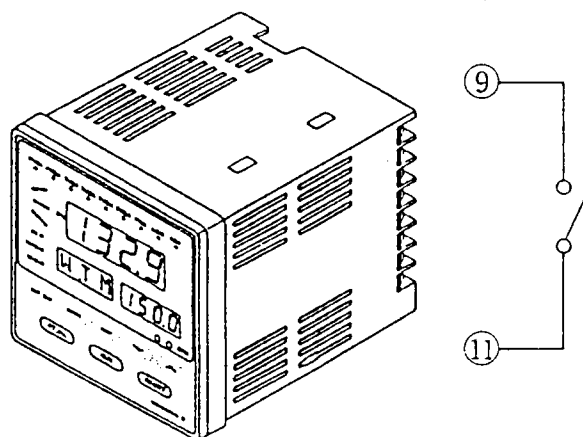
Note: The external mode contacts and key operations have equal priority; whichever occurs last will decide the mode.

- Stopping Operation Using Key Operation



Using **RESET** key to stop operation

- Stopping Operation Using External Contact



A transition from OFF (open) to ON (closed) will stop operation.
Voltage-free contact (contact rating, 12 V DC, 10 mA, minimum).
See "Note: External Contact Function Assignments" (p.62).

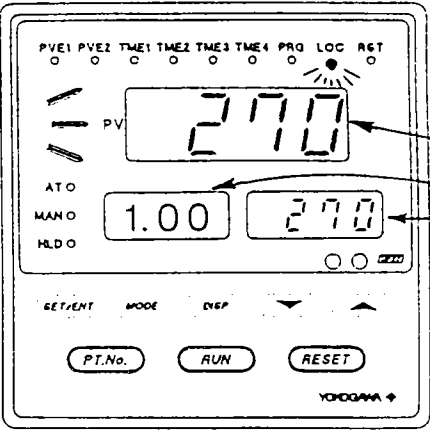
- When program operation stops, the RST lamp turns ON.

5.7 Starting Fixed Set Point Control (Local) Operation

- To start fixed set point control operation (local mode), use the **MODE** key to change the mode. (See p.72)

5.8 Changing the Value of the Local Fixed Set Point

1



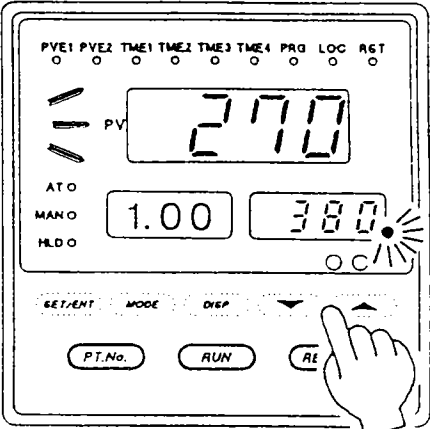
Measured value PV display



Displays the program pattern No. of the program that is to start next.

Fixed set point display

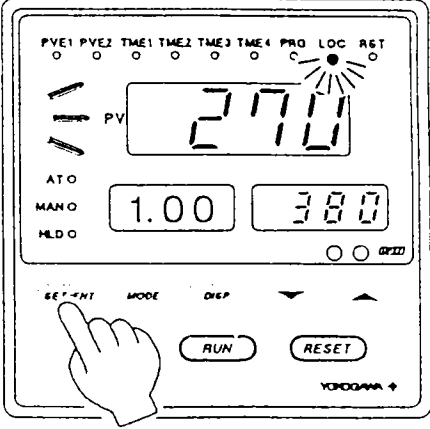
- Display Operation Display <1> (see p.8).
- Transfer the UP27 to local mode.

2



Use the  and  keys to set the fixed set point to the required value.

3



Press the **SET/ENT** key once. This completes the setting of the new fixed set point.

[The decimal point will now be ON steady (or OFF, if value is an integer).]

Note: In step **[3]**, be sure to not press the **SET/ENT** key for more than three seconds (see Section 3.1, "Key Operation Principles").

[If the **SET/ENT** key is pressed twice in step **[3]**, the display will go to

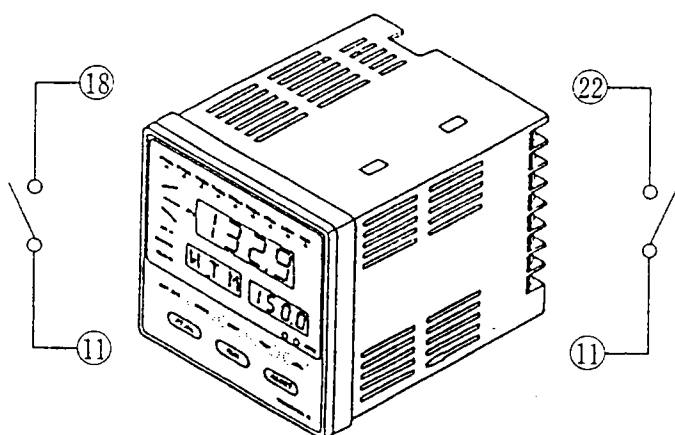
5.9 Transferring to Hold Mode, and Releasing Hold Mode

The UP27 can be set to hold mode (or hold mode can be cancelled) using key operations or via the external contact terminals.

To release hold using an external contact, set the contacts connected to P.RUN (⑩ – ⑪) to ON (closed).

When the UP27 is in hold mode, the HLD lamp will be ON.

● Transferring to Hold Mode Using External Contact

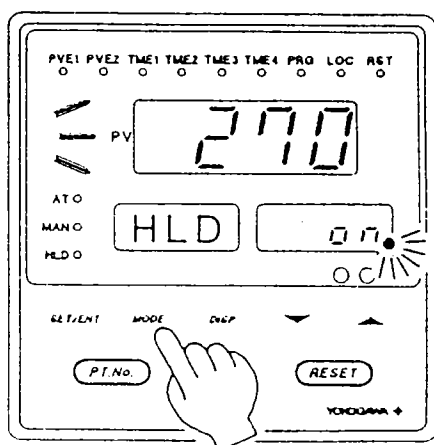


A transition from OFF (open) to ON (closed) initiates hold mode. Voltage-free contact (contact rating, 12 V DC, 10 mA, minimum).

Note: See "External Contact Function Assignments" (p.62)

● Switching to Hold Mode Using Key Operations

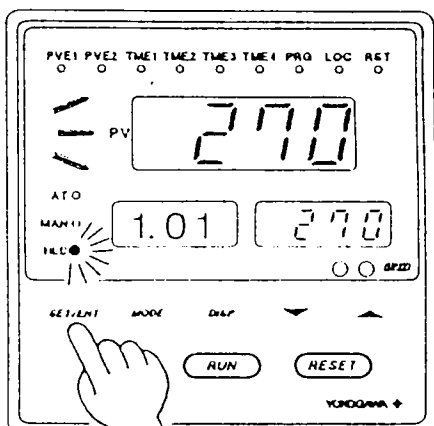
1



With the Operation Display on display, press the **MODE** key once.

If the UP27 is not in hold mode, the display will show OFF.

2



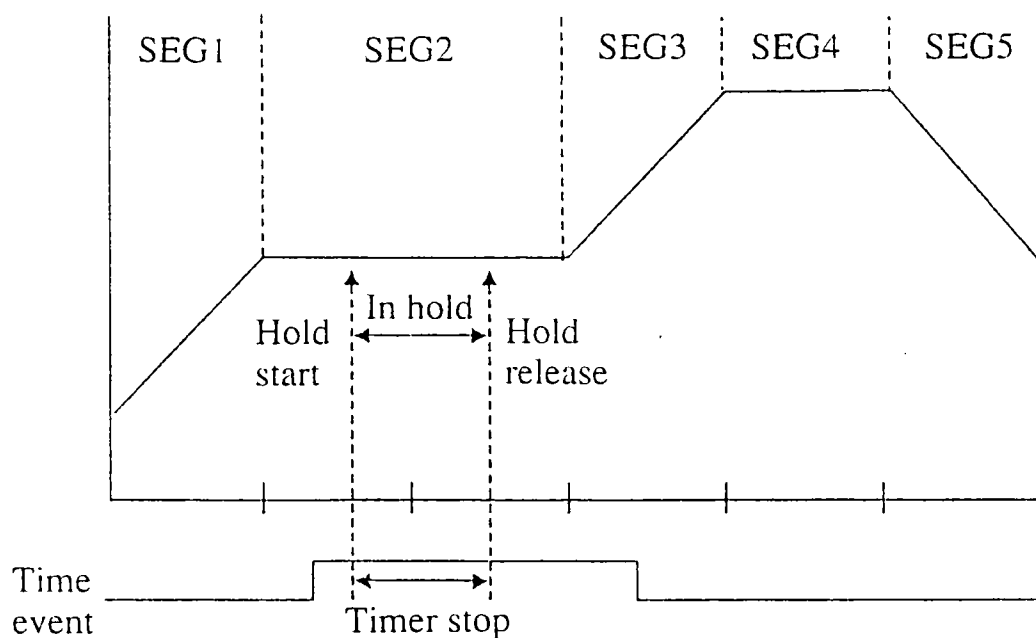
Press the **SET/ENT** key once. This switches the UP27 to hold mode.

[The display returns to the Operation Display.]

5.9.1 Operation While in Hold

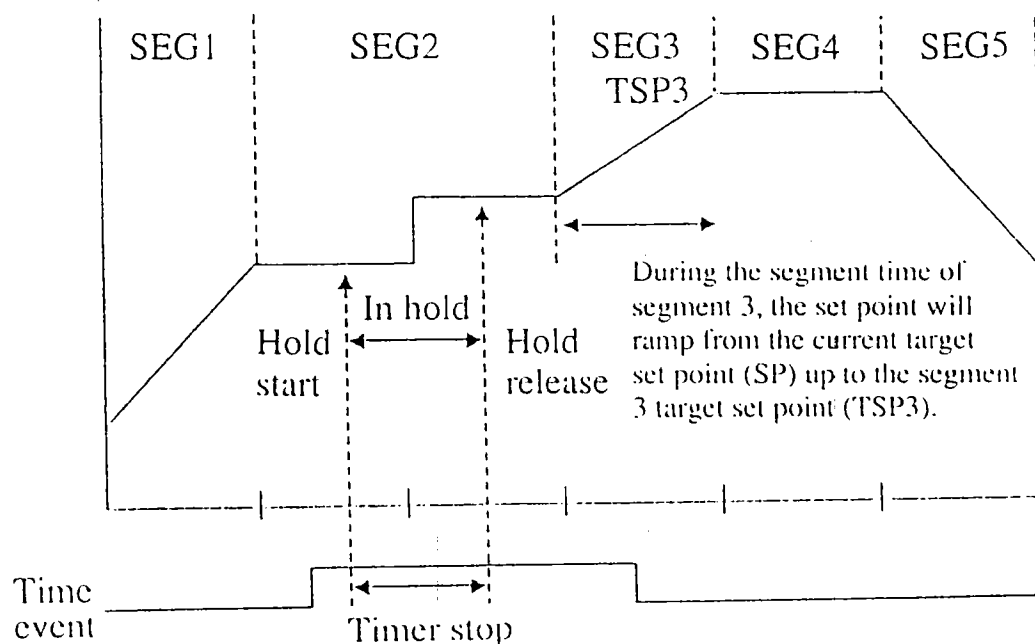
When the UP27 is in hold mode, you can change the segment time and set point if, (and only if) program is in a soak segment. The following examples show how UP27 operation will differ depending on whether or not such changes are made.

- ① If neither the set point nor the segment time of the soak segment is changed while in hold:



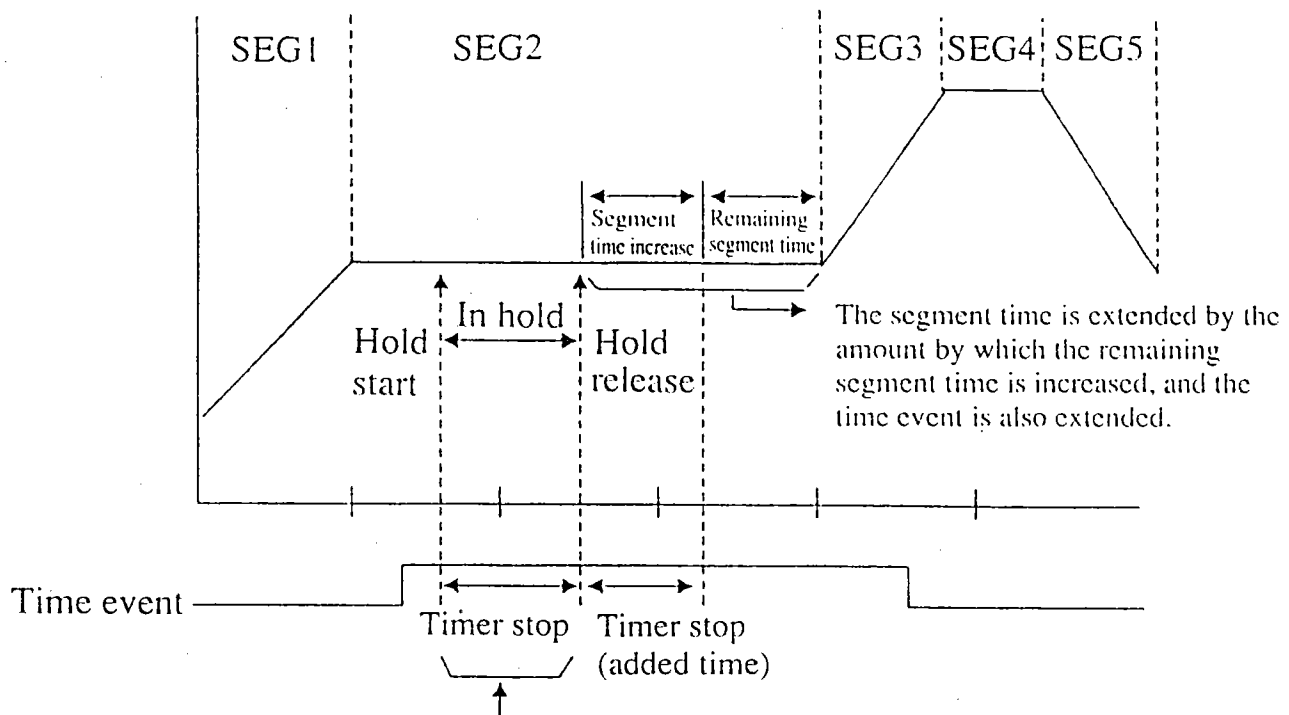
The time event, too, is held while the UP27 is in hold.

- ② If the set point of the soak segment is changed while in hold:



The time event, too, is held while the UP27 is in hold.

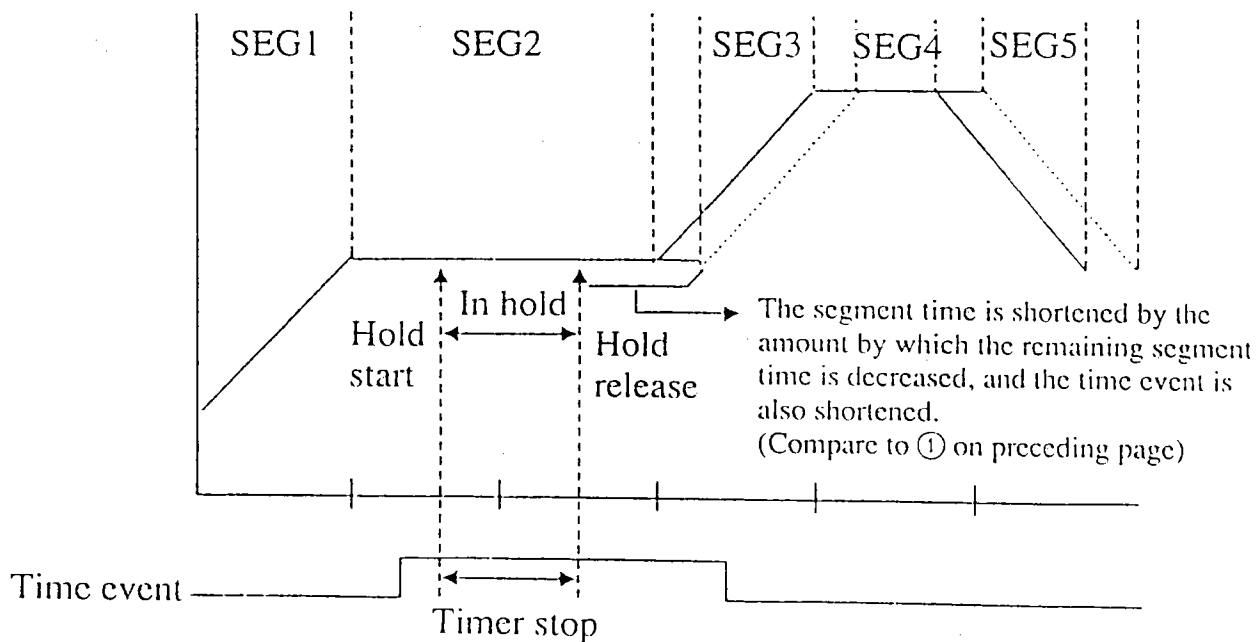
- ③ If the segment time is increased while in hold:



The time event, too, is held while the UP27 is in hold.

After hold is released, the time event time is also increased by the amount of the segment time increase (timer is stopped during this time).

- ④ If the segment time is decreased while in hold:



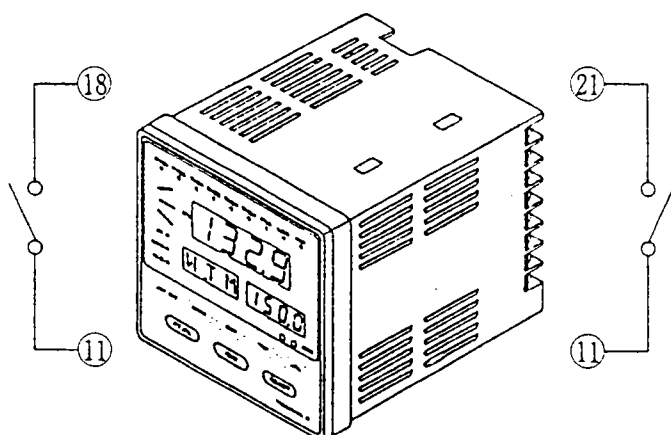
The time event, too, is held while the UP27 is in hold.

The time event time is also shortened by the amount of the segment time decrease (timer is stopped during this time).

5.10 Executing Advance (ADVANCE)

An advance operation (stepping the program pattern forward one segment) can be executed by key operations or an external contact closure.

● Executing Advance Using External Contact

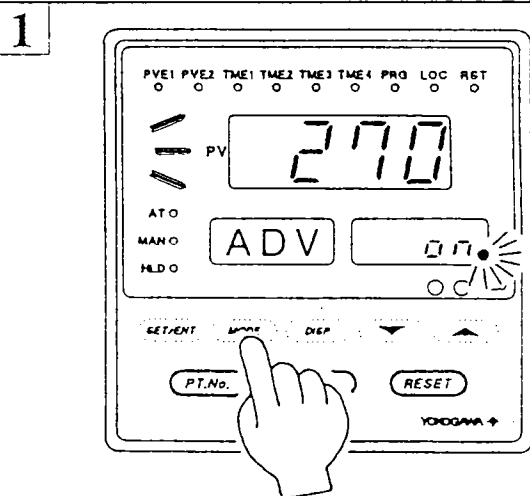


A transition from OFF (open) to ON (closed) will execute an advance.

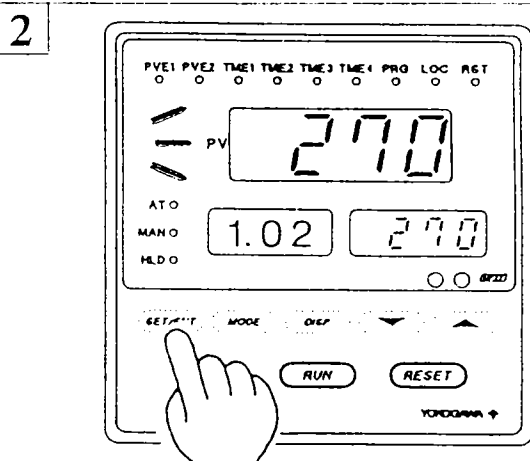
Voltage-free contact (contact rating, 12 V DC, 10 mA, minimum).

Note: See "External Contact Function Assignments" (p.62)

● Executing Advance Using Key Operations



With the Operation Display on display, press the **MODE** key twice.



Press the **SET/ENT** key once. This executes the advance.

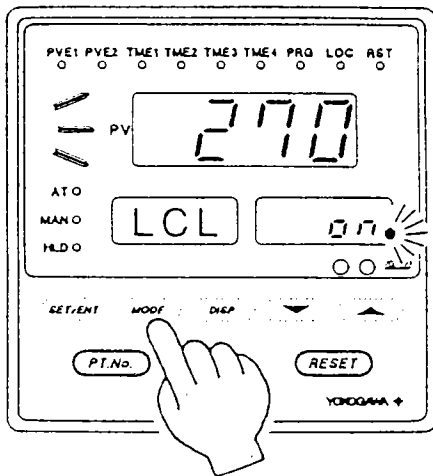
[The display returns to the Operation Display.]

5.11 Transferring to Local Mode

To go to local mode, use the **MODE** key.

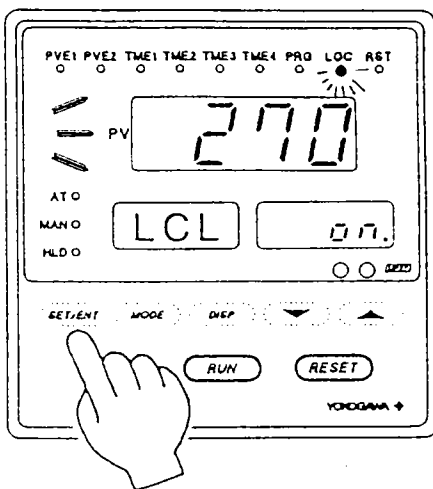
When the UP27 is in local mode, the LOC lamp is ON.

1



With the Operation Display on display, press the **MODE** key several times to go to the display at left.

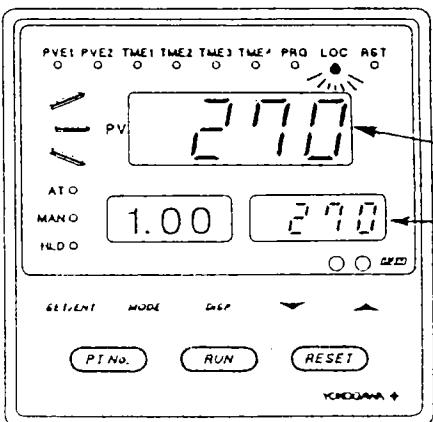
2



Press the **SET/ENT** key once. This sets the UP27 to local mode.

[The display returns to the Operation Display.]

3



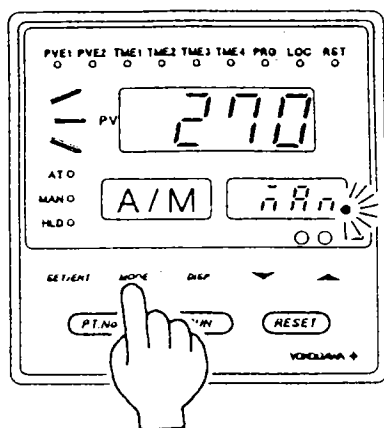
Measured value PV display

Fixed set point display

5.12 Transferring Between AUTO (Automatic) and MAN (Manual)

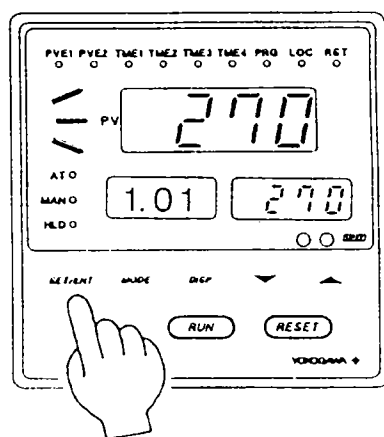
- The UP27 can be switched between AUTO and MAN using key operations (see figure below).
- In MAN (manual), the MAN lamp is ON.
- In AUTO (automatic), the MAN lamp is OFF, and the internally computed control output values are output.

1



With the Operation Display on display, press the **MODE** key several times.

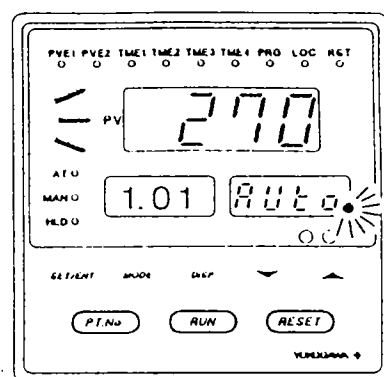
2



Press the **SET/ENT** key once. This sets the UP27 to MAN (manual) mode.

The display goes to the Operation Display.

3



Use the same key operations to go from MAN (manual) to AUTO (automatic).

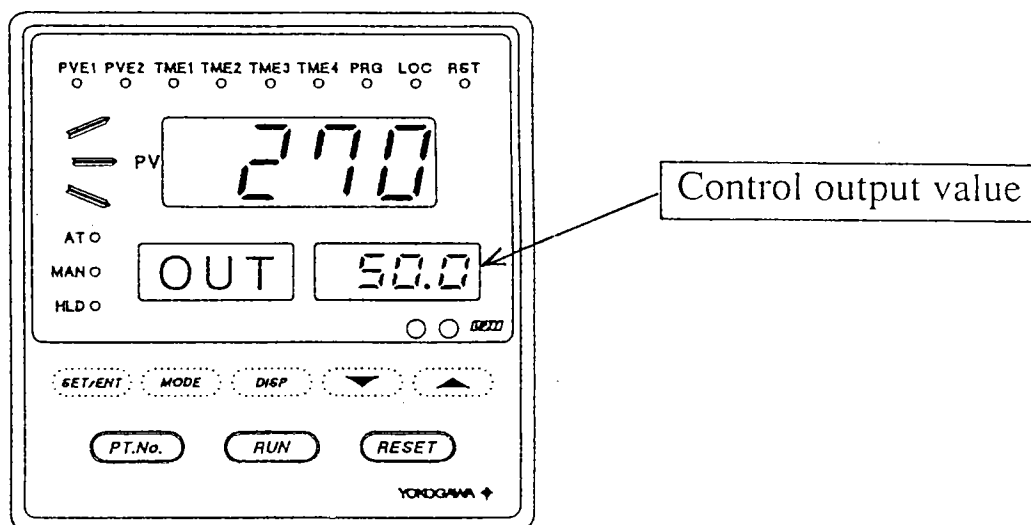
The display changes as shown in the figure at left.



MAN (Manual) Output Manipulation

- The MAN output is manipulated from Operation Display ②. (The UP27 always goes to Operation Display ② immediately after switching to MAN status. See “Switching Operation Displays” on p.8.)

Note: Check that the MAN lamp is ON to be sure that the UP27 is in MAN status.

- The value displayed on Operation Display ② is the control output value.

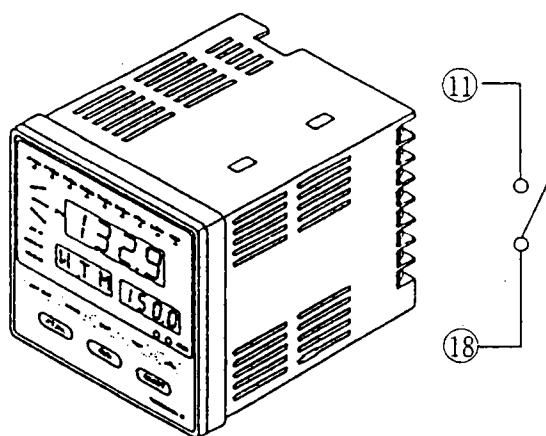


- You can use the  and  keys to change the control output value. (The value that is displayed as the control output value.)

5.13 Selection of Key Lock/Unlock by External Contact

- Executing key lock operation by the external contact (⑪—⑱) locks the setup parameter menu panel (LOC) associated with key lock operation. This function is provided so that parameters thus set cannot be changed by the third person.

● Transfer by external contact



OFF (Open) : Released
ON (Closed): Locked

For voltage-free contact (contact capacity: 12 V DC, 10 mA or more) transfer terminal numbers (⑪—⑱), refer to "Note: Allocations of Functions to External Contacts" on page 62.

5.14 Executing Auto-Tuning

Auto-tuning is a function of the UP27 controller to measure process characteristics and automatically set PID parameters.

5.14.1 Executing Auto-Tuning in Program Operation

Executing auto-tuning can set the optimum PID parameter for each zone of the program.

NOTICE:

The following three parameters can be obtained with auto-tuning; P (proportional band), I (integral time), and D (derivative time). Other parameters corresponding to the same PID number are MR, HY, OH, and OL. However, since these parameters cannot be obtained with auto-tuning, set or change them by key operation.

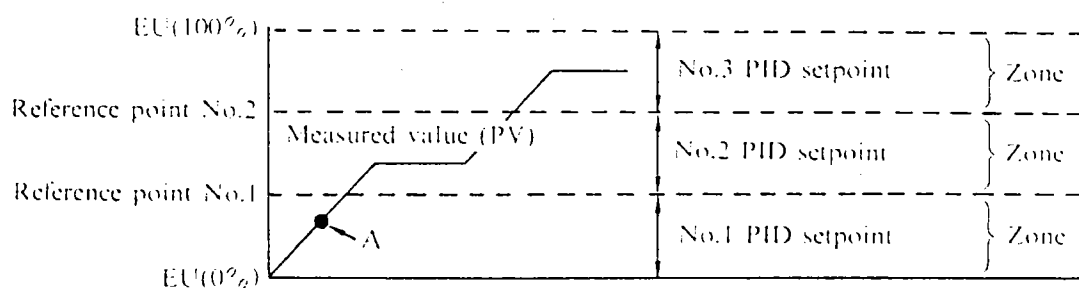
When auto-tuning is executed, the UP27 becomes an ON/OFF controller and outputs alternatively the maximum output^{*1} and the minimum output^{*2}. The UP27 grasps the change of the process variable for this output, computes PID parameters suitable for the object process, and changes the parameters to these new ones.

* 1: 100% or high output limit value (OH)

However, 100% only for relay output or voltage pulse output.

* 2: 0% or low output limit value (OL)

However, 0% only for relay output or voltage pulse output.





As shown in the figure above, individual PID parameters can be set for zones which divide the measuring range [EU (0%) to EU(100%)] into three. Even if the measuring points are in the same segment, program operation is performed by adopting the PID parameters optimal for each zone on both sides of the reference point.

For example, executing auto-tuning at point A in the figure causes the No.1 PID parameters to be obtained.

Note: Since obtaining the No.4 PID parameters by auto-tuning is disabled, set these by key operation.

The No.4 PID parameters are adopted when the actual deviation is greater than the value of the reference deviation (RDV).

How to Start Auto-Tuning

- ① Change the controller to the status of program (AUTO) operation (PRG lamp is ON and MAN lamp is OFF) or HOLD (PRG and HLD lamps are ON and MAN lamp is OFF). (Note 2)
- ② Press the **MODE** key to display .
Flashing
- ③ Pressing the **SET/ENT** key starts auto-tuning.
(During auto-tuning, the AT lamp flashes. When auto-tuning is completed, the lamp goes OFF.)
- ④ If auto-tuning is to be aborted, press the **MODE** key to get  and then press the **SET/ENT** key.
(The AT lamp goes OFF.)
Changing the mode to manual (the MAN lamp is ON) aborts auto-tuning.

Note 1: When auto-tuning is aborted, the values of the PID parameters remain as they were before starting auto-tuning.



Note 2: The target setpoint is fixed to the value at the start of auto-tuning during both the program (AUTO) operation and HOLD statuses. The program progress goes into the status of pausing temporarily. After the completion of auto-tuning, the program continues to progress regardless of the auto-tuning period. (In the HOLD mode, the program continues the HOLD status.)

When auto-tuning is completed, the PID parameters (P, I, and D) are updated to the newly computed values.

5.14.2 Executing Auto-Tuning During Fixed Setpoint Control Operation (LOCAL Mode)

- To start fixed setpoint control operation, change the mode by pressing the **MODE** key. (See Page 72)

How to Start Auto-Tuning

- ① Press the **MODE** key to display **AT** **ON** .
Flashing →
- ② Pressing the **SET/ENT** key starts auto-tuning.
(During auto-tuning, the AT lamp flashes. When auto-tuning is completed, the lamp goes OFF.)
- ③ If auto-tuning is to be aborted, press the **MODE** key to get **AT** **OFF**  and then press the **SET/ENT** key. (The AT lamp goes OFF.)
Flashing →
Changing the mode to manual (the MAN lamp is ON) aborts auto-tuning.

Note 1 : When auto-tuning is aborted, the values of the PID parameters remain as they were before starting auto-tuning.

NOTICE:

The PID parameters used for program operation and fixed setpoint control operation are the same.

That is, in both operation modes, the results obtained by finally executing auto-tuning are used for subsequent control as the PID parameters for each PV zone.

5.15 If Power Fails During Program Operation

A momentary power failure of 20 ms or less has no effect on UP27 operation (normal operation).

For a power failure that is longer than 20 ms, operation after power is recovered differs as follows, depending on whether the power failure duration is less or more than two seconds.

- Power failure of less than approximately two seconds:
Normal operation continues as if no power failure had occurred.
- Power failure of more than approximately two seconds.

Alarms

Continued.

Setup Parameters

All parameters that have been set are maintained.

Auto Tuning

Auto tuning is cancelled (aborted).

Control Operation

Operation depend on the restart code (RST) specified in the setup parameters (control parameters), as follows:

- 0: Operation continues as before power failure when power is recovered.
- 1: When power is recovered, the UP27 goes to MAN (manual) status, and the output is the value specified as the preset output value (see above).
- 2: When power is recovered, the UP27 goes to RESET status, and the output is the value specified as the preset output value (see above).

Note: If power fails while a number is being set using key operations, error code 「XX□□」 may be displayed.

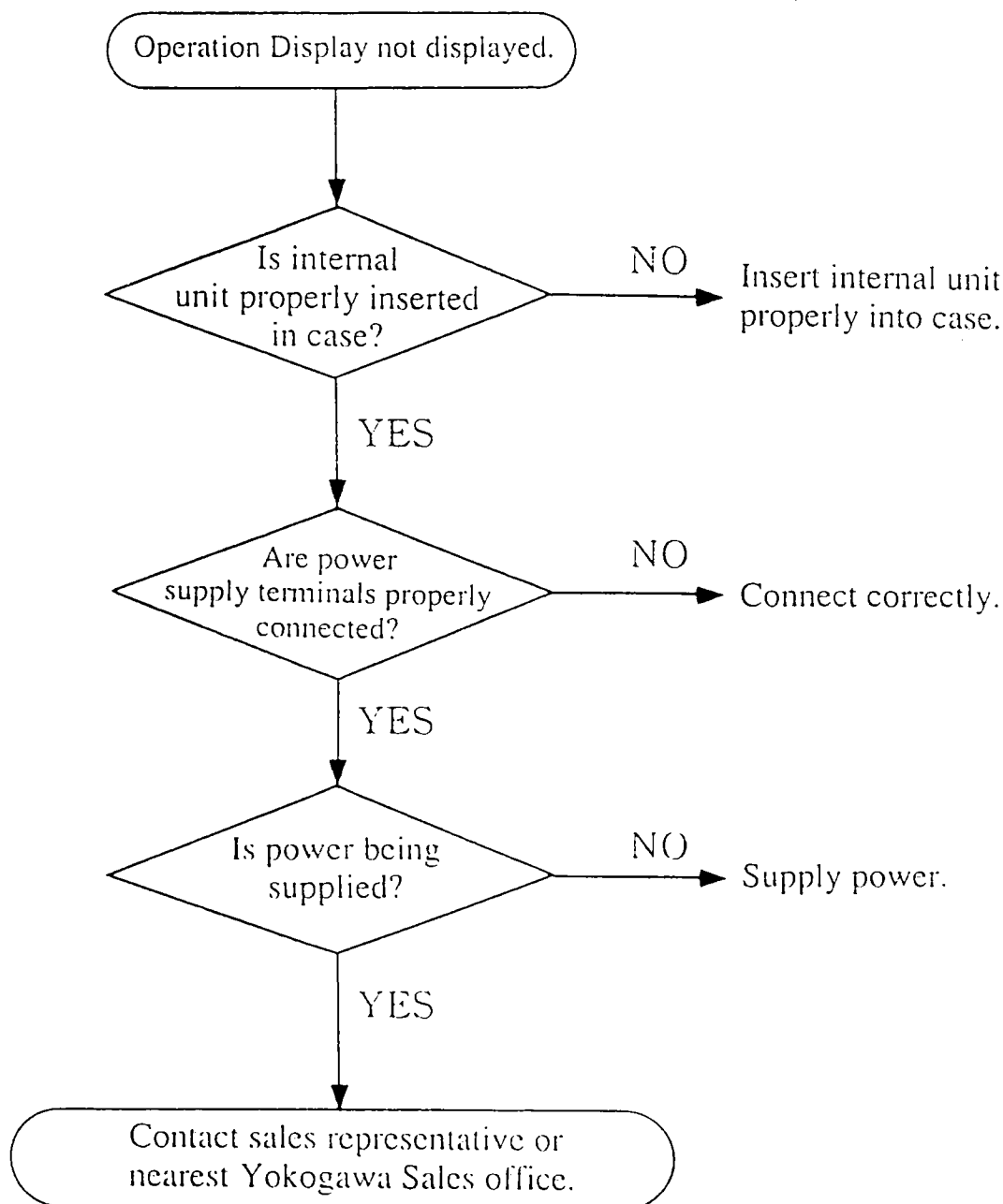
5.16 If an Error Display Appears

See Section 6 (Section 6.3, “Error Displays” on p.83) for appropriate

6. MAINTENANCE

If the Operation Display does not appear when power is supplied to the UP27, follow the troubleshooting flow chart below. If any more complex failure is suspected, contact sales representative or the nearest Yokogawa Service office.

Troubleshooting Flowchart

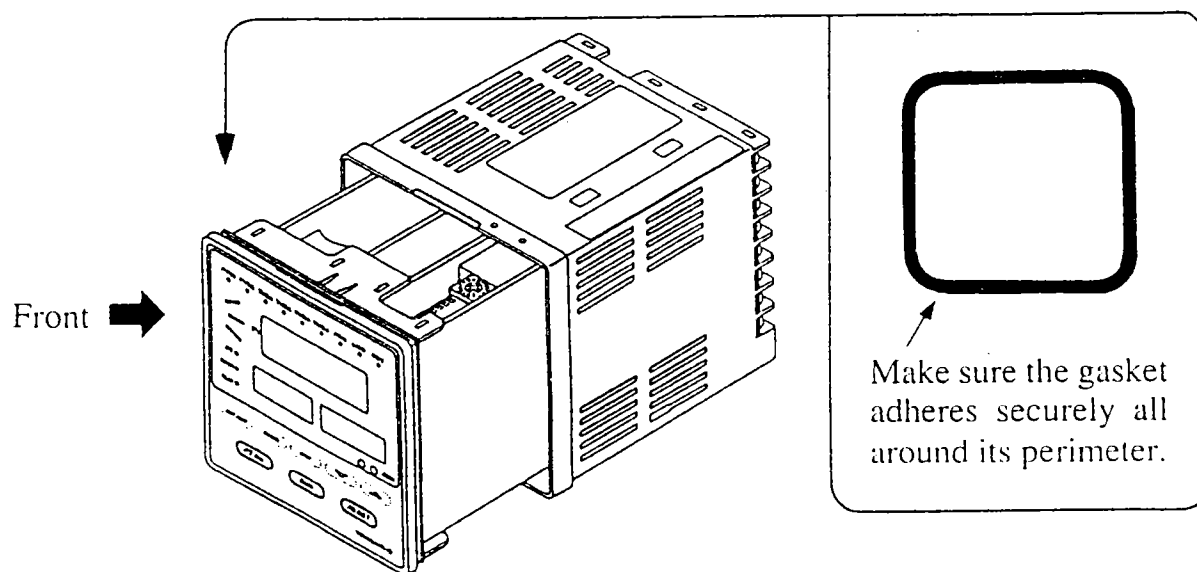


6.1 Replacing Dustproof/Anti O₃ Rubber Gasket

If the dustproof/Anti O₃ rubber gasket begins to deteriorate, it should be replaced. The part number and unit of sale for the rubber gasket are as shown below.

The instrument is shipped with the dustproof rubber gasket upon the shipment from the factory.

	Part number	Unit of sale
Dustproof	B9877AJ	One pc.
Anti O ₃	B9877AL	One pc.



CAUTION

Turn power OFF before pulling out the internal unit.

6.2 Replacing Control Output Relay

If the control output relay wears out, it should be replaced.

The relay used by the UP27 is a DSP1-DC12V (Matsushita Electric). They may be ordered from your YOKOGAWA SALES REPRESENTATIVE or MATSUSHITA ELECTRIC OFFICES.

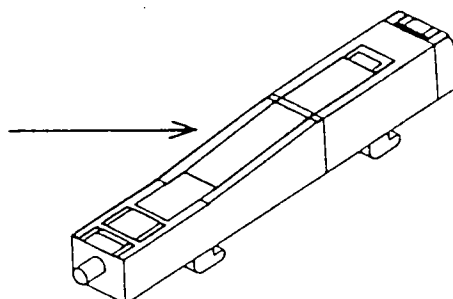
6.3 Exchange Bracket

If the bracket (for installation) is damaged or lost, it can be purchased.

The part number and the unit of sale for the bracket are as shown below.

	Part number	Unit of sale
Bracket	B9877BA	2

Bracket
[One each on top and
bottom of case]

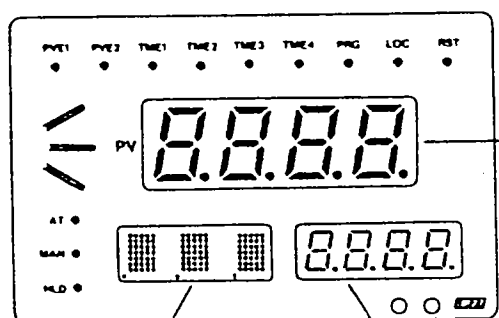


6.4 Error Displays

(Note 1)

Where displayed	Nature of problem	Error code	Action	Measured Value (PV)	Control output
①	Input burnout	b.oUt	Check thermocouple or RTD connection	105%	Preset output value
①	Overscale (over 105% of measurement range)	oUr	Check whether measurement range is appropriate, and sensor is properly connected	105%	Control continues with input at 105%
①	Underscale (under -5% of measurement range)	-oUr		-5%	Control continues with input at -5%
①	RAM failure	FRIL	Request repair	—	According to DIP switch setting ②.
①	ROM failure	FRIL			
①	Software failure	FRIL			
①	System data error	EOO2			
③	EEPROM mask error	XX01 (Note 2)	Request repair	Normal	Preset output value
③	Input range data error	XX02	Re-set input range		
③	Setup parameter error	XX04	Check for improper parameter value, and re-set if found		
③	Backup data error	XX10			
①	Reference junction compensation failure	rJc (Note 3)	Request repair	PV calculated without RJC	Normal
②	EEPROM error	Data type code display flashing		Normal	Normal
—	SUB CPU error	All display OFF		—	According to DIP switch setting ②
①	Program pattern write error	Data type code display flashing		Normal	Preset output value
①	Auto tuning timeout	E200	Note 4 Execute auto tuning again under different conditions.	Normal	Control continues using PID constants from before auto-tuning.
①	A/D converter failure	E300	Request repair	105%	Preset output value

Note 1: The positions for “Where displayed” are:



Data type code display ②

Set point (SP) display ③

Note 2: “XX” is a code (numeric value) that displays the frequency of the power supply being used, or the status of an option.

Note 3: The measured value or *rJc* is alternately displayed.

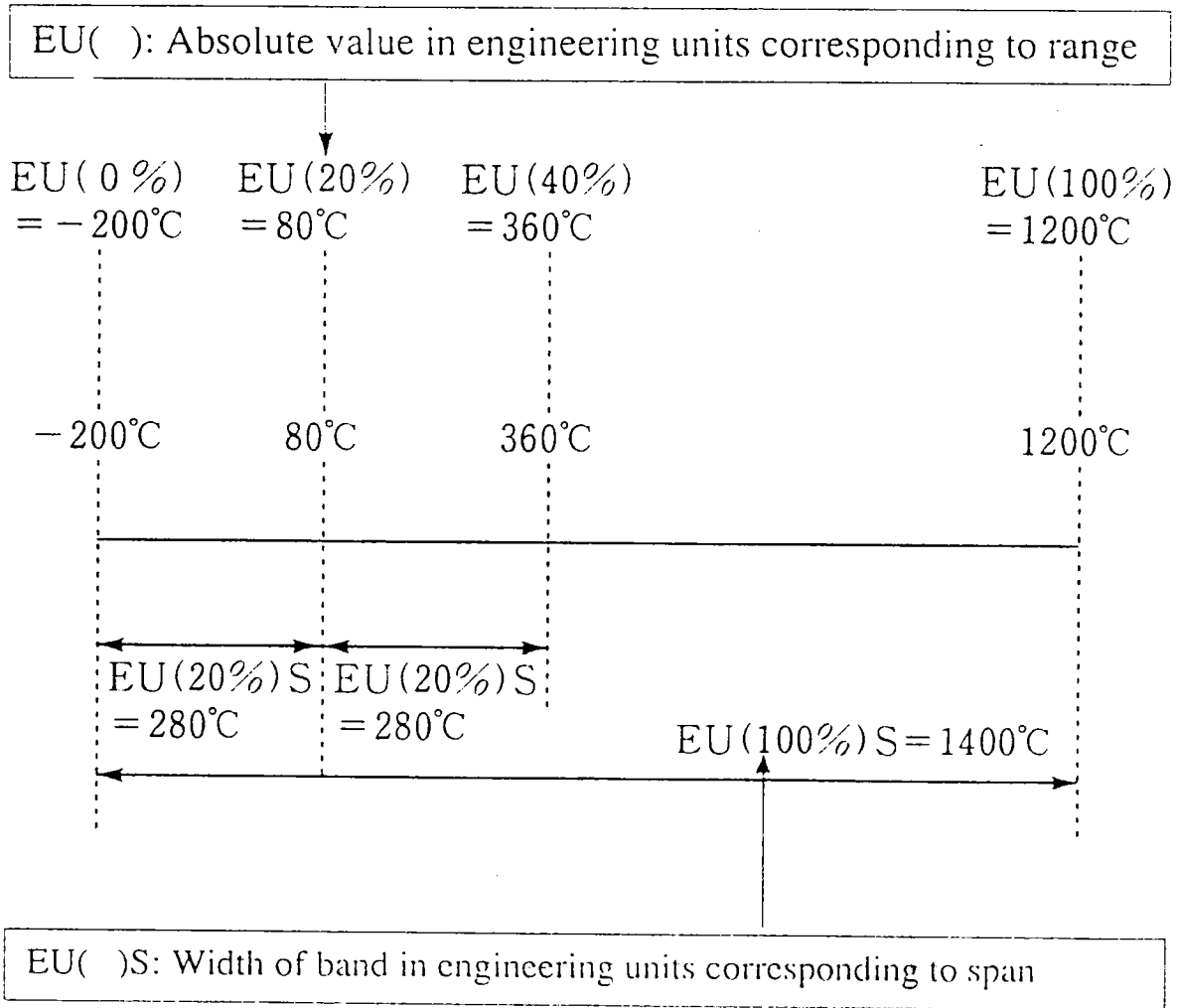
Note 4: Press key to erase error code.

APPENDIX

OPERATING PARAMETER SUMMARY

- Refer to the accompanying table when setting parameters as indicated in Section 5, "Setting Operating Parameters".
- The representations used for units in the table is unique to the UP27; these are described below.

The following illustrates EU() and EU()S. (For a range from -200 to 1200°C .)




Operating Parameter Summary

Item	Symbol	Description	Setting Range	Default when shipped from factory	Customer-specified value	Reference page
Control parameters	SC	"SUPER" function ON/OFF	ON or OFF	OFF		P.29
	*P (Note)	Proportional band	0.1 to 999.9%	5.0%		P.30
	*I (Note)	Integral time	OFF, 1 to 6000 seconds	240 seconds		P.31
	*D (Note)	Derivative time	OFF, 1 to 6000 seconds	60 seconds		P.31
	*MR (Note)	Manual reset value	-5.0 to 105.0%	50%		P.32
	*HY (Note)	ON/OFF control hysteresis	EU(0.0%)S to EU(100.0%)S	EU(0.5%)		P.32
	*OH (Note)	Output high limit value	$-5.0\% \leq OL \leq OH \leq 105.0\%$ (% of computed control output value)	100%		P.32
	*OL (Note)	Output low limit value		0%		P.32
	1.RP 2.RP	Reference point 1, 2	$EU(0\%) \leq 1.RP \leq 2.RP \leq EU(100\%)$	EU(100%)		P.33
	RDU	Reference deviation	EU(0%) to EU(100%)	OFF		P.33

Note: * represents the PID group number (1 to 4).

Item	Symbol	Description	Setting Range	Default when shipped from factory	Customer-specified value	Reference page
Local setting parameters	LSP	Fixed set point (SP)	EU(0%) to EU(100%)	EU(0%)		P.34
	PID	Local PID number	1 to 4	1		P.34
	E9A	Local event 9 (PVE 1) type	OFF, 1 to 20 (For codes, see p.)	OFF		P.34
	E9B	Local event 9 (PVE 1) value	EU(-100%) to EU(100%)	EU(0%)		P.34
	E10A	Local event 10 (PVE 2) type	OFF, 1 to 10 (For codes, see p.)	OFF		P.34
	E10B	Local event 10 (PVE 2) value	EU(-100%) to EU(100%)	EU(0%)		P.34
gram pattern setting parameters (continued)	SSP	Start set point	EU(-0%) to EU(100%)	EU(0%)		P.36
	STC	Start code	0, 1, or 2 (For codes, see p.)	0		P.36
	WTM	Wait time	OFF, 00.0 to 99.59 (hours.min)	OFF		P.38
	WZN	Wait zone	EU(0%)S to EU(10%)S	EU(0%)S		P.38
	PRV	Number of repeat	0 to 999, CONT	0		P.39

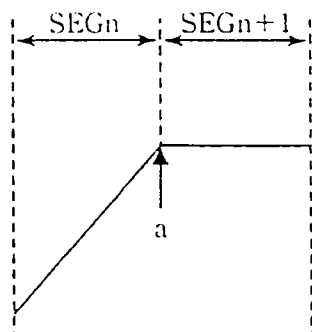
Item	Symbol	Description	Setting Range	Default when shipped from factory	Customer-specified value	Reference page
(Continued)	RST	Repeat start segment No.	$1 \leq RST \leq RED \leq 60$	1		P.39
	RED	Repeat end segment No.		1		P.39
Program setting parameters	TSP	Target set point	EU(0%) to EU(100%)	EU(0%)		P.39
	TIN	Segment time	00.00 to 99.59 (hours.minutes) —: Not used	—		P.39
	EV	Event No.	0, 1 to 4, 9, 10 (None) (Time event) (PV event)	0		P.40
	ON TV	Event data A	PV event: OFF, 1 to 10 Time event: ...: Not used	OFF or 00.00		P.40
	OF PE	Event data B	00.00 to 99.59 (hours.minutes) (For details, see p.)	OFF or 00.00		P.40
	JC	Junction code	0 to 3, INS, DEL	0		p.41

 : Represents the event number (1 to 4).

Reference pages indicate pages in the "Initial Setup Manual" (IM 4P2F5-02E)

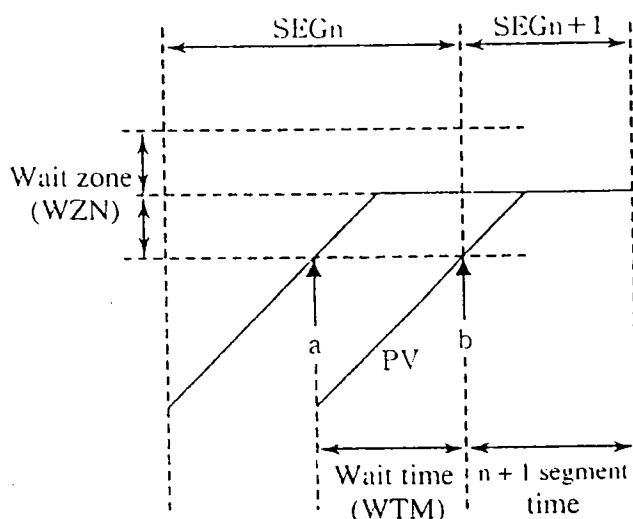
Junction Code Function

(1) JC = 0 (continue at transition)



- * Make transition to segment 'n+1' when segment 'n' ends at point 'a', regardless of the measured value (PV).

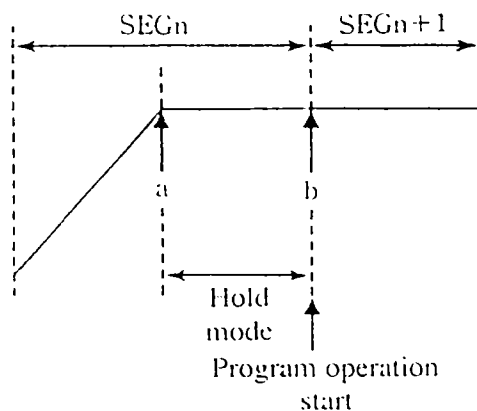
(2) JC = 1 (wait at transition)



- * If the measured value (PV) has not reached the wait zone when segment 'n' ends, the UP27 goes to a wait status at point 'a'.
- * If the PV reaches the wait zone before the wait timer reaches the previously specified wait time (WTM) as at point 'b' (see note), the wait is released, and the program advances to segment 'n + 1'. The time event is held during the wait.

Note: If the wait time elapses before the PV reaches the wait zone, the UP27 goes to segment 'n + 1' regardless of the PV value.

(3) JC = 2 (hold at transition)



- * The UP27 goes to hold mode when segment 'n' ends, at point 'a'. The time event, too, is held.
- * When the hold is released, the program advances to segment 'n + 1'.

If JC = 3 is set, the UP27 goes to LOCAL and RUN status at the end of program pattern execution. (See p.40 and p.48 in IM 4P2F5-01E.)



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