RM18L
HYBRID RECORDER
(MULTIPOINT TYPE RECORDER)
INSTRUCTION MANUAL

Ohkura

HXPRM18mnL0002E
FEB.2001 (4th Edition)

DESCRIPTION	CHG.NO.	4	8/2/'01	Kawa	Hoso	Gyaku	4版に変更、p.17,20,33,35,81変更、3版廃図	大沢 -116

DR.	CHK.	APP'D.
Kawa	Hoso	Oda

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Thank you for purchasing our RM18L Hybrid Recorder.
In order to use all the functions of this instrument effectively and safely, read this manual thoroughly to understand the instrument fully, prior to using it.

No.	Instruction Manual	Description
1	RM18L Hybrid Recorder Instruction Manual (This manual)	Describes setting and wiring for regular operations of the recorder to printing operations, setting of user data such as alarm setting values, and maintenance. It also provides the setting information on input range and recording scale.
2	RS-232C Interface Instruction Manual (Option)	Describes wiring, setting, communication protocols required for communications.
3	RS-422A Interface Instruction Manual (Option)	

How to Read Instruction Manual

⚠ **WARNING** ; Negligence of this notification could endanger the life of an operator or result in an injury. Be sure to read.

⚠ **CAUTION** ; Negligence of this notification could damage this instrument. Be sure to read.

[Note] ; Notification required to use this instrument safely and properly.

[Reference] ; Tips for using this instrument.

[Note]

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BE SURE TO OBSERVE THE FOLLOWING WARNINGS AND THOSE IN THE TEXT IN ORDER TO SECURE SAFETY IN HANDLING THE INSTRUMENT.

⚠ WARNINGS

General

When tampering with wiring, fuse, or inside the instrument(including removal of an main unit), be sure to disconnect this instrument from the main power source in order to prevent an electric shock.

Protective Grounding

1) In order to prevent an electric shock, be sure to provide protective grounding prior to turning on the instrument.
2) Do not cut a protective grounding conductor or disconnect protective grounding.

Power Source

1) Make sure that the supply voltage for this instrument conforms to the voltage of the supply source.
2) Attach a protective cover prior to turning on this instrument.

Fuse

1) In order to prevent a fire, use only our specified fuse.
2) Do not short-circuit a fuse holder.

Working Environment

Do not operate this instrument in the environment where it is exposed to a combustible/ explosive/corrosive gas or water/steam.

Input and Output Wiring

Provide input and output wirings after turning off the power.

⚠ CAUTIONS

Input and Output Wiring

Do not use empty terminals for other purposes such as relaying, etc.

Inside of Instrument

Do not touch the switches, etc. inside the instrument. Also, do not replace the main unit or printed circuit boards. When this is neglected, we cannot guarantee functioning of the instrument. Be sure to contact our dealer where you purchased this instrument, or our sales representative.

Transportation

When transporting this instrument or the equipment with this equipment incorporated, take proper preventive measures so that the door will not be opened, and that the main unit will and that the inner module will be not flied out. (Tightening of transportation screws, and so on)

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⚠ [CAUTIONS]

Instruction Manual

1) Ensure that this instruction manual is delivered to an end user.
2) Prior to handling this instrument, be sure to read this manual.
3) If you have any questions on this manual or find any errors or omissions in this manual, contact our sales representative.
4) After reading this manual, keep it carefully by the instrument.
5) When the manual is lost or stained, contact our sales representative.
6) When the manual is incorrectly collated or have missing pages, contact our dealer where you purchased this instrument, or our sales representative.

Installation

1) When installing this instrument, put on a protective gear such as safety shoes, helmet, etc. for your safety.
2) Do not put your foot on the installed instrument or get on it, because it is dangerous.

Maintenance

Only our servicemen or persons authorized by OHKURA are allowed to remove and disassemble the main unit and printed circuit boards.

Disposal

1) Discard the replaced batteries in a correct way.
2) Do not incinerate plastics of maintenance parts and replacement parts.
A harmful gas may be produced.

Cleaning

1) Use dry cloth to clean the surface of this instrument.
2) Do not use any organic solvent.
3) When cleaning the instrument, turn off the power.

Revisions

This instruction manual is subject to change without prior notice.

Evasion of Responsibility and Guarantee

Be sure to observe the cautions in operating, maintaining, and repairing this instrument.
We will not be responsible for or guarantee the damages resulting from negligence of them.

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1. INTRODUCTION

1 — 1 Checking the Accessories

Upon delivery of this instrument, unpack and check its accessories and appearance.

If there are any missing accessories or damages on the appearance, contact our dealer where you purchased the instrument, or our sales representative.

Following accessories should be attached.

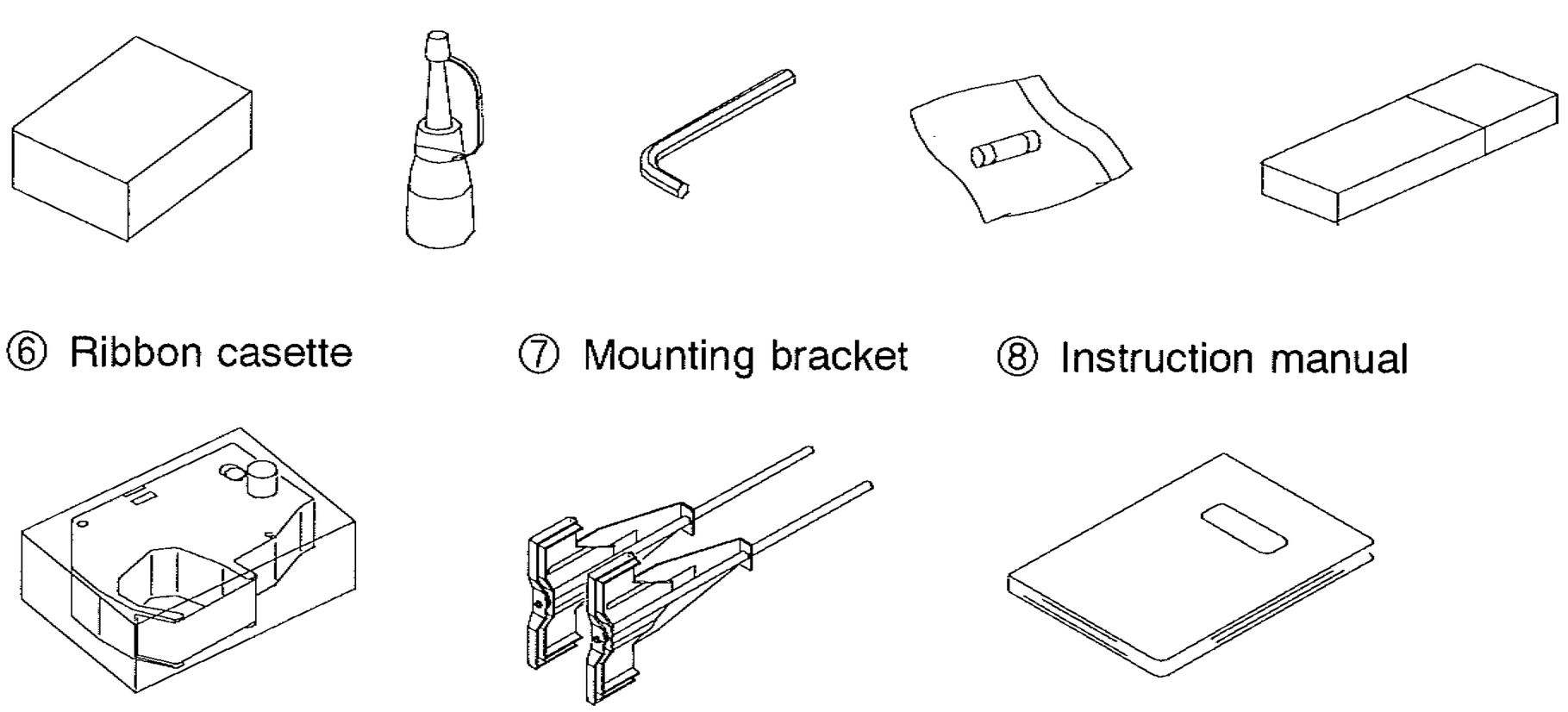

Fig. 1.1 Accessories

Table 1.1 List of Accessories

No.	Part Name	Type	Q'ty	Remarks
1	Box	H 2 H 0 7 8 2 7	1	Storage box for the parts 2 through 7
2	Lubricant oil	H 4 A 1 2 2 9 0	1	
3	L-wrench	H P S A A 0 0 3 A 0 0 1	1	For M3 screws
4	Fuse	W P S J 0 1 1 D 0 0 0 0 0 1 A	1	250V 2A (T2A)
5	Chart paper	H Z C A A 1 0 2 5 A F 0 0 1	1	100-divided uniform scale
6	Ribbon cassette	H P S R 0 0 1 H 0 0 0 5	1	
7	Mounting bracket	H 4 A 1 3 2 9 9	2	Panel mounting
8	Instruction manual	H X P R M 1 8 m n L 0 0 0 2 E	1	This manual

1-2 Removing Shipping Screws and Cushion

This instrument is protected against shocks and vibrations during transportation by shipping screws and cushion. Remove them before using the instrument.

⚠ CAUTION

1. With the cushion attached, the instrument cannot perform recording or printing.
2. When installing onto the panel, leave the shipping screws attached to protect the main unit.

Removing the Shipping Screws

① Open the door.
(It opens to the left.)

② Remove two shipping screws
(M4×8) .
Then, main unit can be drawn out.

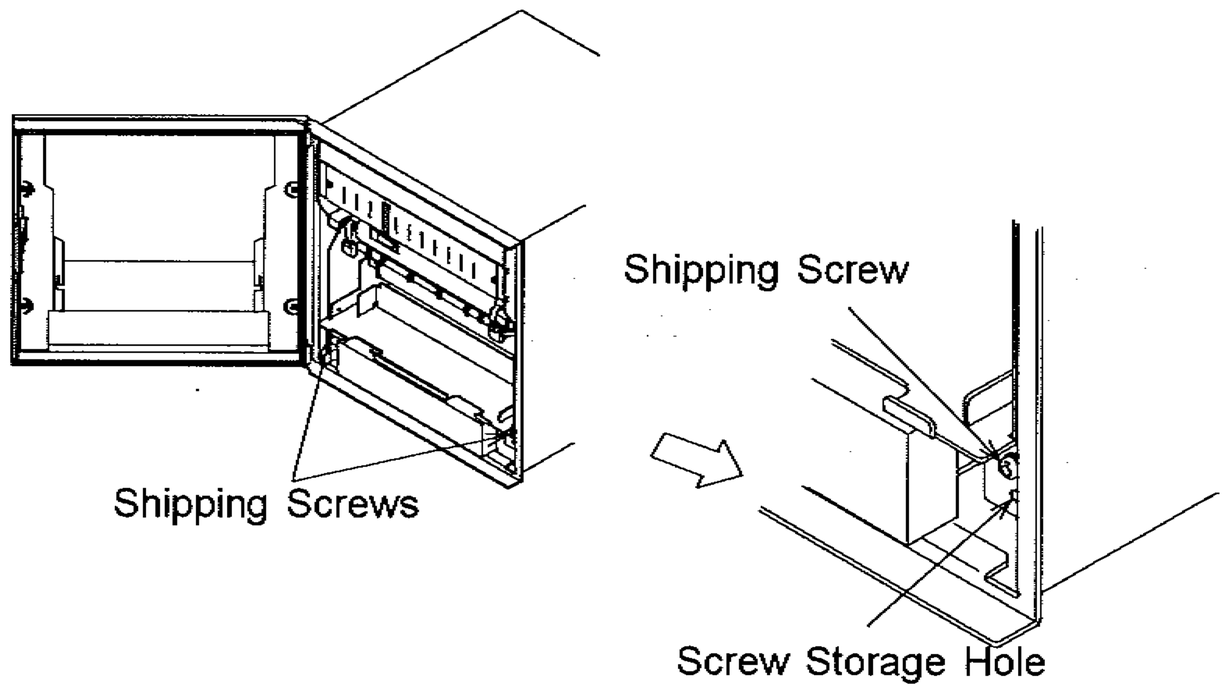

Fig. 1.2 Location of Shipping Screws

⚠ CAUTION

The shipping screws are required when transporting this instrument alone or incorporated into the equipment, or when repacking it. Be sure to attach them into the screw storage holes.

Removing the Cushion

⚠ CAUTION

The printer cushion is required when transporting this instrument alone or incorporated into the equipment, or when repacking it. Be sure to attach them into the screw storage holes.

① Pressing down the unlocking lever located at the lower right part of main unit, hold a draw-out handle and draw main unit towards you until it stops at an intermediate stopper.

② Remove the printer cushion from the printer.

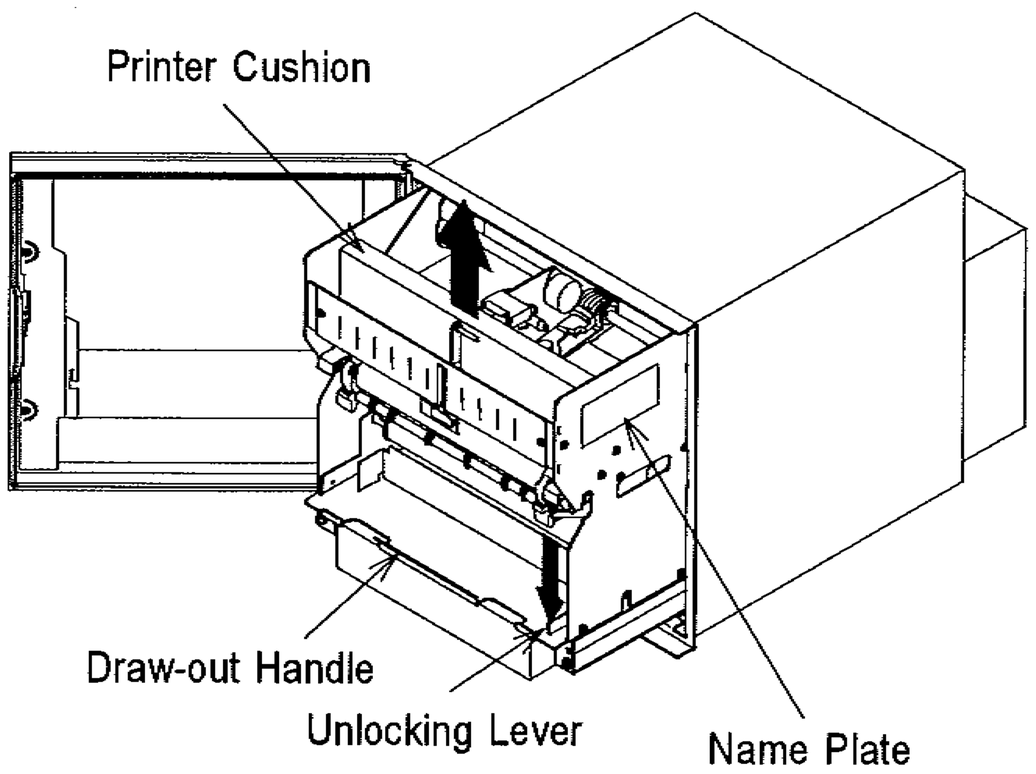

Fig. 1.3 Removing the Printer Cushion

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1 – 3 Checking the Type and Specifications

A name plate, which provides a type, etc., is affixed to the right side of the main unit.
Make sure that this instrument meets your requested specifications, seeing the following tables.
Also, make sure that a scale plate and a type of input are as specified.
See Page 58 (9-3) for how to draw out the internal unit.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	M	1	8			L		0		0	1	A	0	
				①		②	③		④		⑤			⑥

① Model

06	6-Multipoint type recorder
12	12-Multipoint type recorder
24	24-Multipoint type recorder
30	30-Multipoint type recorder

② Structure

L	Standard

③ Communications

0	None
1	RS-232C
2	RS-422A

④ DI/DO

0	None
1	8 relays
2	5 DIs
3	8 relays + 5 DIs

⑤ Door

1	N1.5(Standard)

⑥ Special Specifications

O	None
Y	Yes

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When storing the instrument temporarily, remove the ribbon cassette from the main unit.

(See 5-2 on Page 19)

Store the instrument in the following environment. When the instrument has been incorporated into the equipment, store it in the following environment as well.

⚠ CAUTION

Storage in a poor environment may damage the appearance, functions, and service life of the instrument.

Storage Environment

- A place with little dust.
- A place free from combustible, explosive, or corrosive gases (SO_2, H_2S, etc.) .
- A place free from vibrations or shocks.
- A place free from water or steam or high humidity (95% RH or more) .
- A place free from direct sunshine or high temperature (50°C or more) .
- A place free from an extremely low temperature (-20°C or less) .

An indication card has been affixed to the door upon delivery. When you replace it by an acryl plate, etc., comply with the following recommended dimensions.

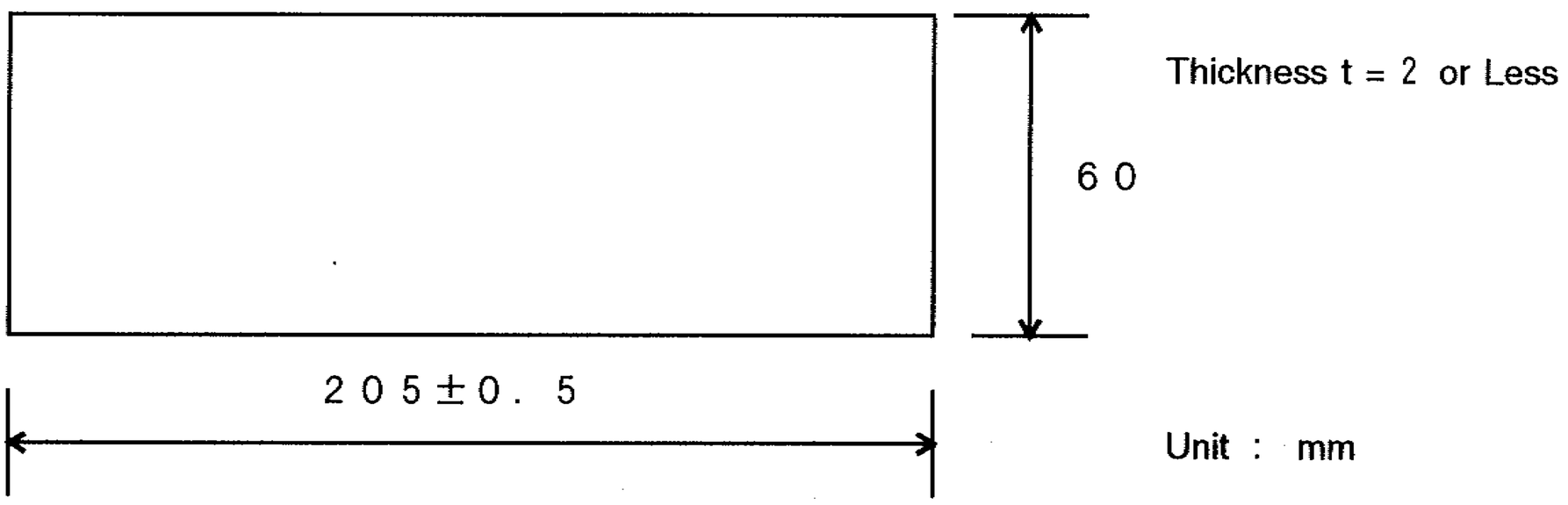

Fig. 1-4 Recommended Dimensions of Indication Card

⚠ CAUTION

When the new indication card is beyond the recommended dimensions, it may break the door or its mounting section.

The RM18L Hybrid Recorder has digital recording capabilities such as list printout, log printout, date printout, and alarm printout, in addition to conventional analog recording capabilities.
A variety of options are also available to meet diverse needs.

Features

● Non-contacting

A non-contact electromagnetic potentiometer is used for position detection, and a high-voltage resistant photo-MOS relay for input switching, thus realizing the longer life and easier maintenance of each block.

● Free power source applicable worldwide

A free power source available for 85 to 264 V AC is used.

● Capable of mixing TC, mV, V, and resistive temperature detector inputs

Capable of connecting TC, mV, V, and resistive temperature detector inputs to each channel respectively. A mixture of various inputs is allowed.

● Abundant on-board options

Provided with a variety of options such as communication capability (RS-232C/RS-422A), 5 DIs, 8 relay outputs to allow high system extensibility.

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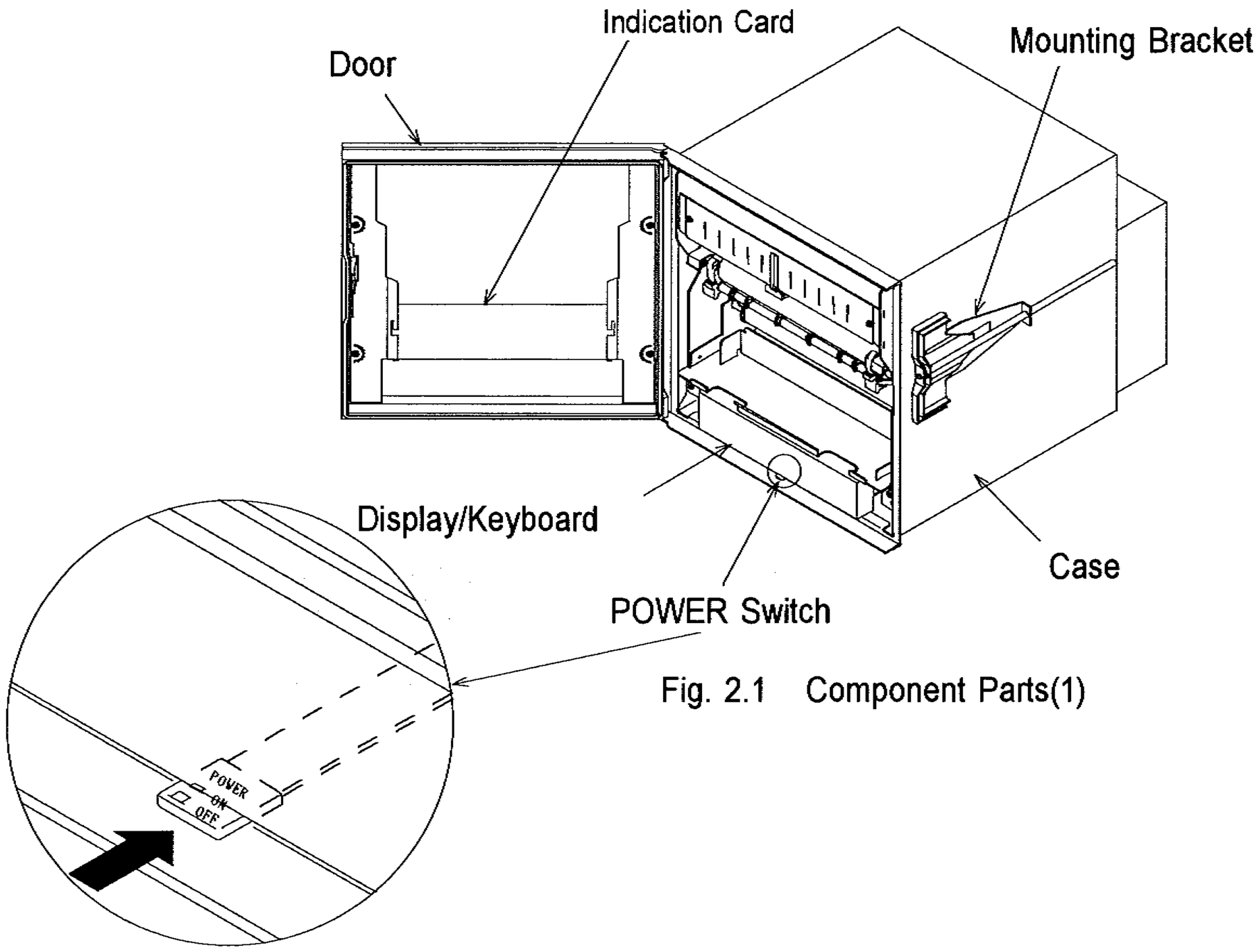

Fig. 2.1 Component Parts(1)

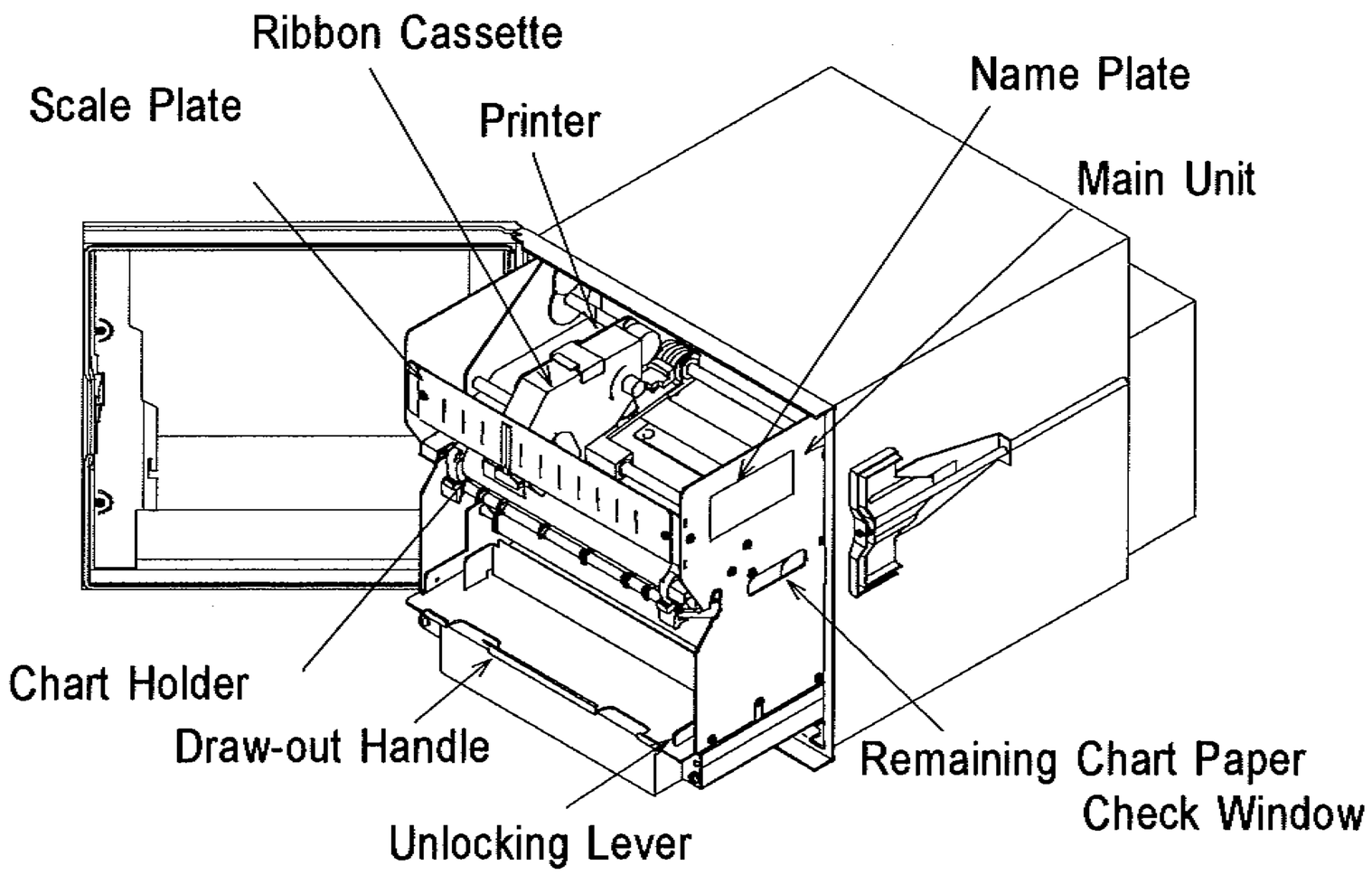

Fig. 2.2 Component Parts(2)

Display

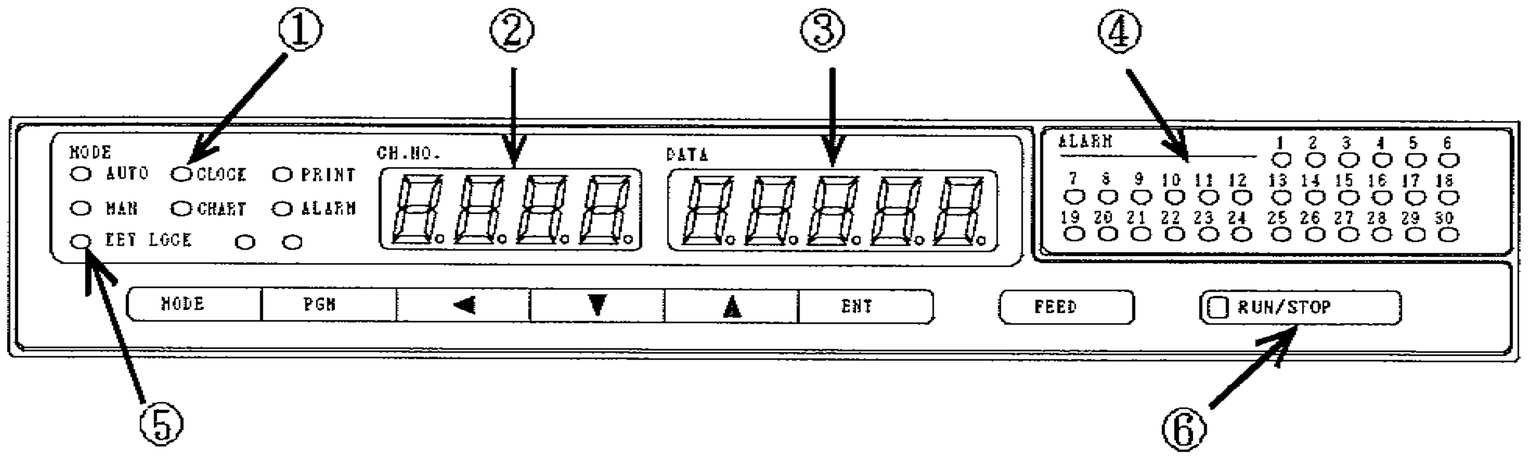

Fig. 2.3 Display (For 30-Multipoint Type Recorder)

Table 2-1 Description of Display

No.	Name	Description	Remarks
①	Mode(MODE) Indicator Lamps	A lamp for a selected user mode is illuminated.	For the user mode, see 6-3 (Pages 22 to 27) .
②	Display (1)	Displays a channel number or setting item name. When an alarm occurs, an alarm value is displayed.	The display changes depending on the mode.
③	Display (2)	Displays a measured value, various set values, date, time, etc. When an error occurs, it is displayed.	For the error(self diagnosis), see 11-2 (Page 74).
④	Alarm indicator lamps (1 ○ ~ 30 ○)	A channel number corresponding to an alarm is illuminated.	For the alarms, see 7-7(Pages 35 and 36). The number of alarm indicator lamps differs depending on the number of input channels.
⑤	KEY LOCK lamp (▭KEY LOCK)	Indicates whether the keys are locked Illuminated when they are locked.	For the key lock state, see 7-2(Page 29).
⑥	RUN/STOP lamp (▭RUN/STOP)	Illuminated when recording is running, and unilluminated when it is stopping. Blinking when initializing the data.	When unilluminated(STOP mode), recording and data sampling are not performed. A display value just before stopping is held.

Since the displays (1) and (2) are 7-segment LEDs, the alphabets are symbolized for display.
See the following symbolized alphabets for display.

[Reference] Symbolized Alphabets for Display

A	b	C	d	E	F	G	H	I	J	K	L	M	N
A	B	C	D	E	F	G	H	I	J	K	L	M	N
o	P	q	r	S	t	U	v	w	X	y	z	γ	
O	P	Q	R	S	T	U	V	W	X	Y	Z	γ	

Uppercase and lowercase letters are not distinguished.

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User Mode

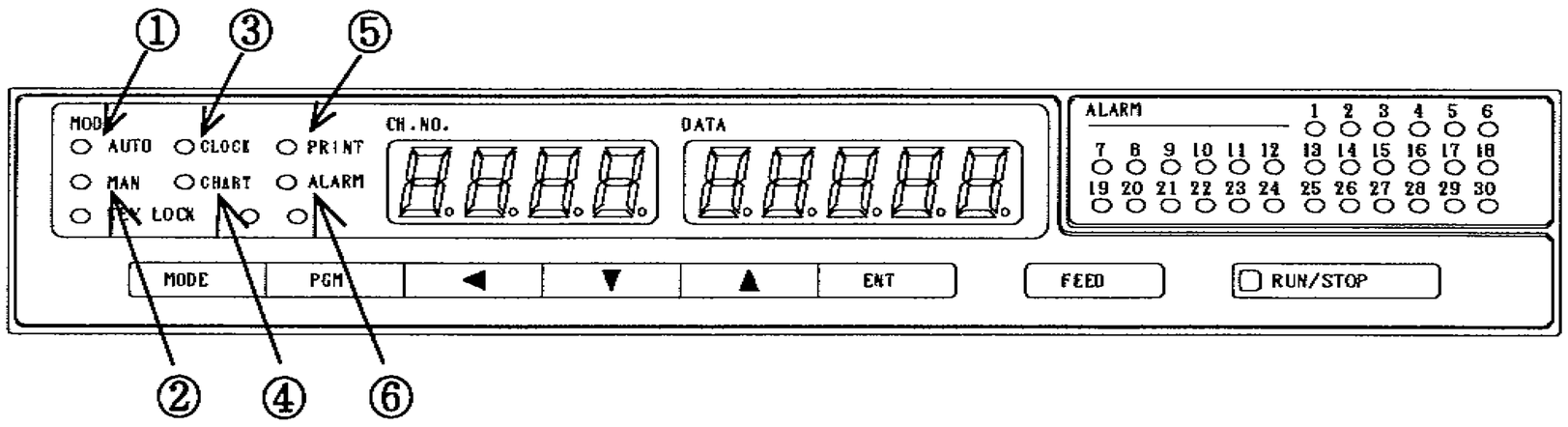


Fig. 2.4 User Mode Functions

Table 2.2 User Mode Functions

No.	Indicator Lamp	Mode	Outline of Function	Details
①	AUTO	AUTO mode	Displays the measured values for all the channels sequentially in synchronization with dot printing.	Page 23 (6-3)
②	MAN	MANUAL mode	Displays the measured value for the channel selected by the ▼ or ▲ key.	Page 23 (6-3)
③	CLOCK	CLOCK mode	Displays and alters the year, month, day, and time.	Page 23 (6-3)
④	CHART	CHART mode	Displays and sets a chart paper feed rate.	Page 24 (6-3)
⑤	PRINT	PRINT mode	Starts manual logging print and list print, and sets a time log and dot skip.	Page 25 (6-3)
⑥	ALARM	ALARM mode	Displays the alarm setting state, sets an alarm value, and sets an alarm output.	Page 35 (7-7)

Operation Keys

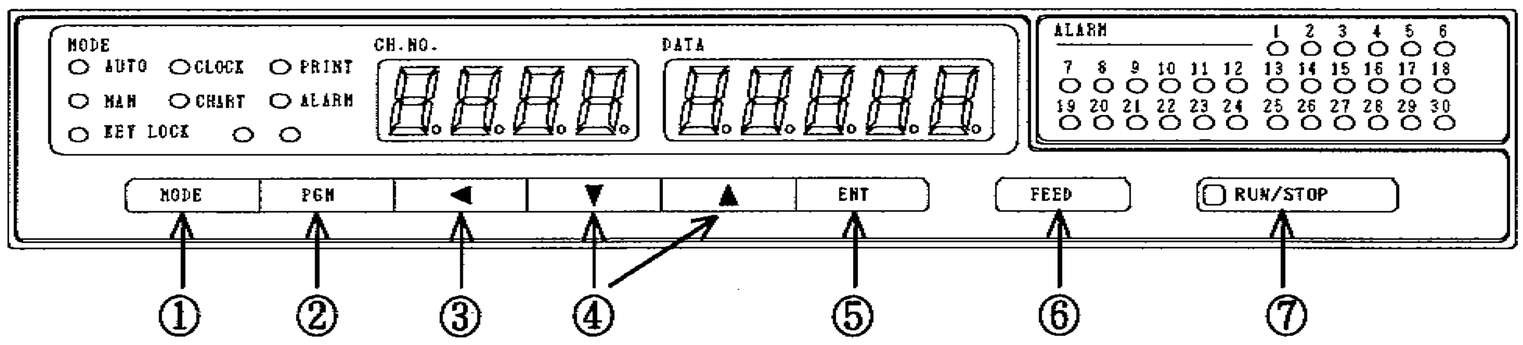


Fig. 2.5 Key Names

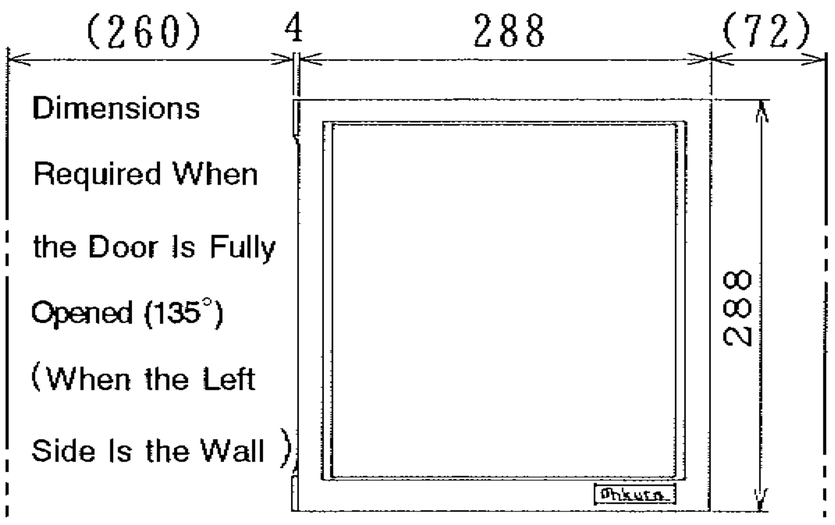
Table 2.3 Key Functions

No.	Key	Key Function
①	MODE	Selects the user mode.
②	PGM	Switches to the parameter setting enable state(input mode).
③	◀	Moves backward through the selection items when setting a parameter. Moves a changing digit to the left in the input mode.
④	▲	Counts up a numerical value or item.
	▼	Counts down a numerical value or item.
⑤	ENT	Determines a selected numerical value or item when setting a parameter. Moves a changing digit to the right in the input mode.
⑥	FEED	Feeds the chart paper quickly.
⑦	RUN/STOP	Starts/stops the function.

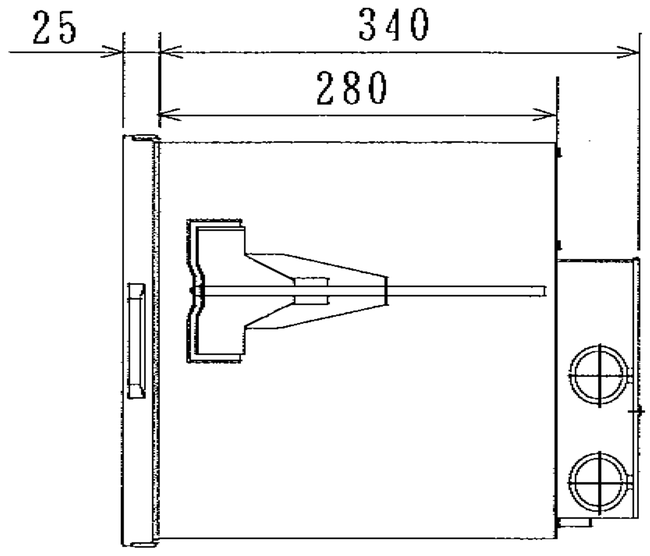
3. INSTALLATION

3 – 1 Outside Dimensions Drawing and Panel Cut Dimensions

<Front>

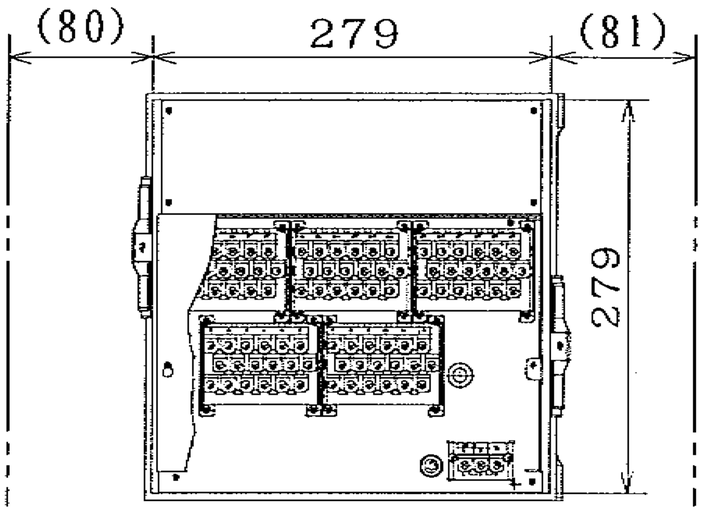


<Side>

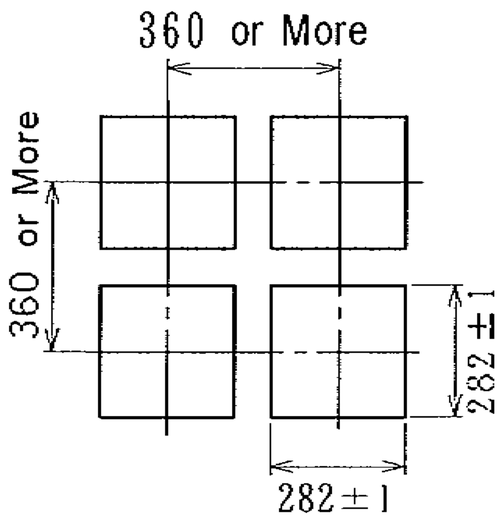


Unit : mm

<Rear>



<Panel Cutting>



⚠ CAUTION

For maintenance and safety of the instrument, it is recommended to secure the spacings larger than the parenthesized dimensions per unit.

Fig. 3.1 Outside Dimensions and Panel Cut Dimensions

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⚠ WARNING

Do not install the instrument in a place exposed to a combustible, explosive, or corrosive gas (SO_2, H_2S, etc.).

⚠ CAUTION Install the instrument in the following places

Install the instrument in the following places

- A place free from where humidity often changes.
- A place of normal temperature (25 ℃ or so).
- A place exposed to as little mechanical vibrations as possible.
- A place with as little dust as possible.
- A place affected by the electromagnetic field as little as possible.
- A place not directly exposed to high radiant heat.
- A place where the altitude is up to 2000m.
- Humidity has an effect on the chart paper and ink. Use the instrument in a humidity range of 20 to 80%RH (60%RH is optimum).
- This instrument needs the inside installation.

Mounting to the Panel

- A steel plate not thinner than 1.2 ㎜ is recommended as a mounting panel.
- The maximum thickness of the mounting panel is 7 ㎜.

Inclination

- Install the instrument horizontally.
- The instrument should be installed so that its inclination should be 0 ° at the front and within 30 ° at the rear.

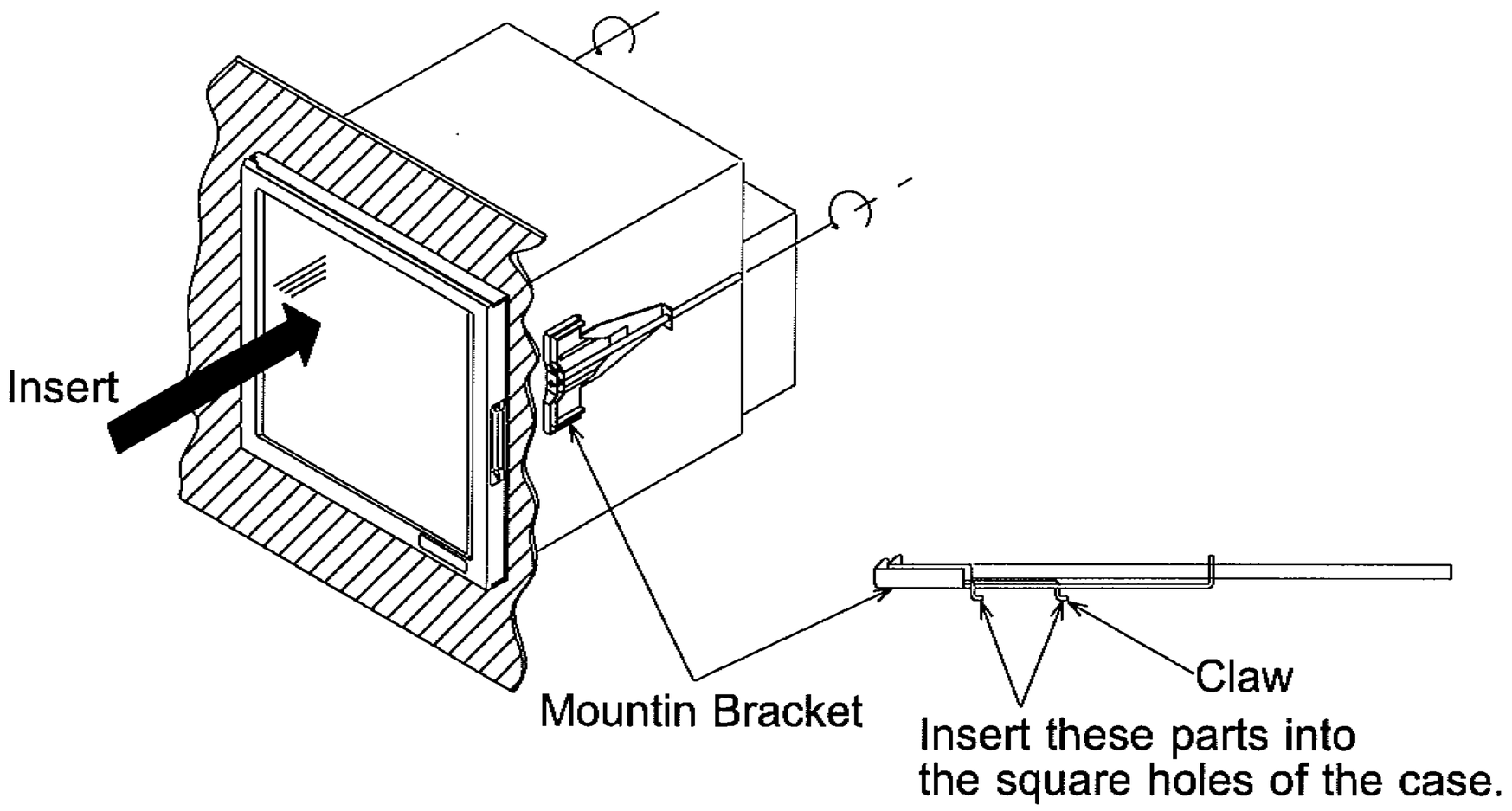

Fig. 3.2 Mounting to the Panel

⚠ CAUTION

Be sure to fix the main unit with the shipping screws for safety work and protection of the main unit. (See Fig. 1.2 on Page 2)

(1) Fix the main unit with the shipping screws.
(2) Insert the instrument through the front of the panel.
(3) Insert the claws of the mounting bracket into the square holes on the left and right sides of the case.
(4) Tighten the screws of the mounting bracket with a regular screwdriver and attach to the panel. Do not tighten by an excessive force. It would distort the case into contact with main unit and door.
Adequate tightening torque : Approx. 2N·m (20kgf·cm)
(5) After installing the instrument, put the transportation screws in the screw storage holes again.

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Terminal Layout

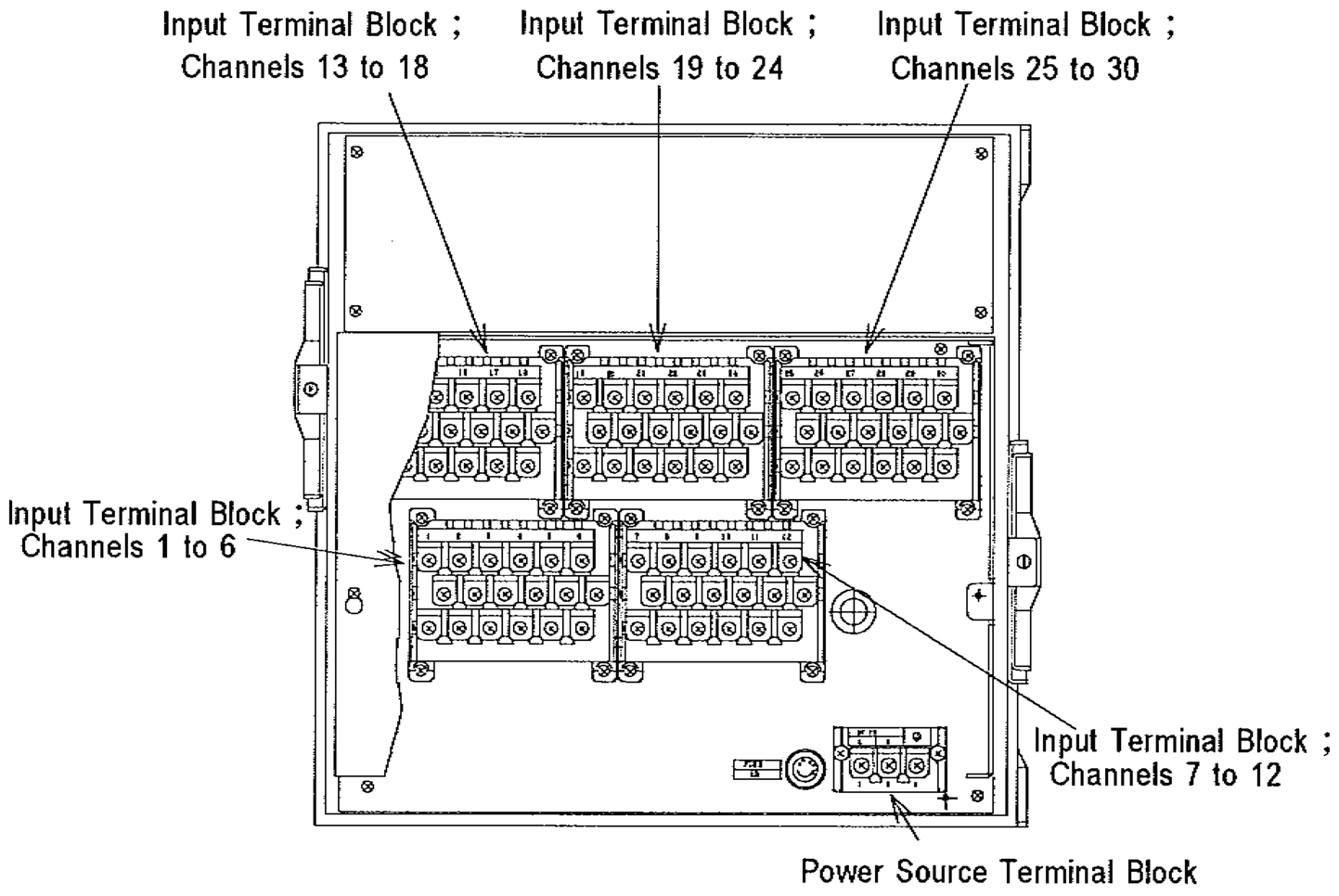


Fig. 4.1 Terminal Layout (Rear View)

Power Source Wiring

⚠ WARNING

⚠ ① In order to prevent an electric shock, be sure to provide protective grounding prior to turning on the instrument.
② Do not cut a protective grounding conductor or disconnect protective grounding.
③ Make sure that the supply voltage for the instrument conforms to the voltage of the supply source.
④ Attach a transparent protective cover prior to turning on the POWER of the instrument.
⑤ In order to comply with the requirement of safety standard EN61010, the recorder shall have one of the following as a disconnecting device, fitted within easy reach of the operator, and labelled as the disconnecting device.
A switch or circuit breaker which complies with the requirements of IEC947-1 and IEC947-3.

⚠ CAUTION Precautions for Wiring the Power Source

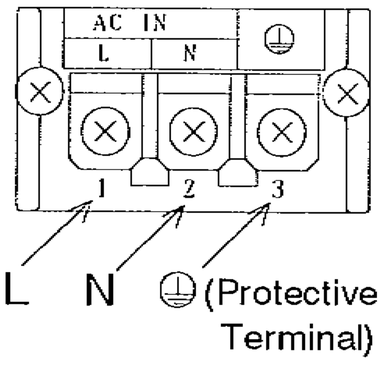
① As an electric wire for the power source, use a 600 V vinyl insulated wire (JIS C 3307) or its equivalent or above.
② Attach a press-fitting terminal with insulated sleeve (for M4) to the end of the electric wire.
③ Provide a Class-3 (grounding resistance value : 100Ω max, minimum diameter of the grounding conductor : 1.6mm) or above connection for a protective grounding terminal.
④ If the protective grounding conductor is shared by other instrument, there may be an effect caused by noise coming from the grounding conductor. It is recommended not to share it with other instrument.

Wiring Procedure

① Turn off the POWER switch of the instrument.
② Remove the transparent protective cover of the power source terminal block.
③ Connect the power source electric wire as shown in Fig. 4.2.
Connect the non-grounding side of the power source to the No.1 terminal.
④ Put back the transparent protective cover.
⑤ Make sure that protective grounding is properly provided.

L : Line
N : Neutral line
⏚ : Ground line

Power Source Terminal Block



Power Source 85 to 264VAC

Fig. 4.2 The Power Source Wiring

⚠ WARNING

Turn off the POWER prior to wiring an input line.

⚠ CAUTION Precautions for Wiring the Input Line

① Precautions for the input electric wire

- See that no noise is mixed in input wiring. For input wiring, it is recommended to use a shielding wire or twisted wire effective for noise.
- In case of thermocouple input, connect a thermocouple wire directly or use a compensation lead wire. It is recommended to use a shielded input line.
- In case of resistive temperature detector input, dispersion of 3-wire line resistance should be less than the below mentioned values. It is recommended to use a shielded input line.

  For Pt 100, JPt 100 ; 50m Ω or less

  For Pt 50, Cu 10Ω ; 10m Ω or less
- When it is likely to be effected by induction noise, particularly when wiring near the high-frequency power source, it is recommended to use a shielded twisted wire.
- Attach a press-fitting terminal with insulated sleeve(for M4) to the end of the electric wire.

② Precautions for wiring

- The wiring between the instrument and measurement point should be kept away from the power circuit (25V or higher circuit or DO circuit).
- Short-circuit unused input terminals. (Short-circuit between "+" and "-" in case of mV, V, or thermocouple input, and short-circuit among A, B, and b in case of resistancer thermometer bulb input.)
- When grounding a shielding wire, etc., connect it to the protective grounding terminal of the instrument.

Wiring Procedure

① Turn off the power of the instrument.
② Remove the rear cover of the input terminal block.
③ Wire the input lines according to the wiring examples shown in Fig. 4.3, Fig. 4.4 (Page 14), and Fig. 4.5 (Page 14).
④ Put back the rear cover.

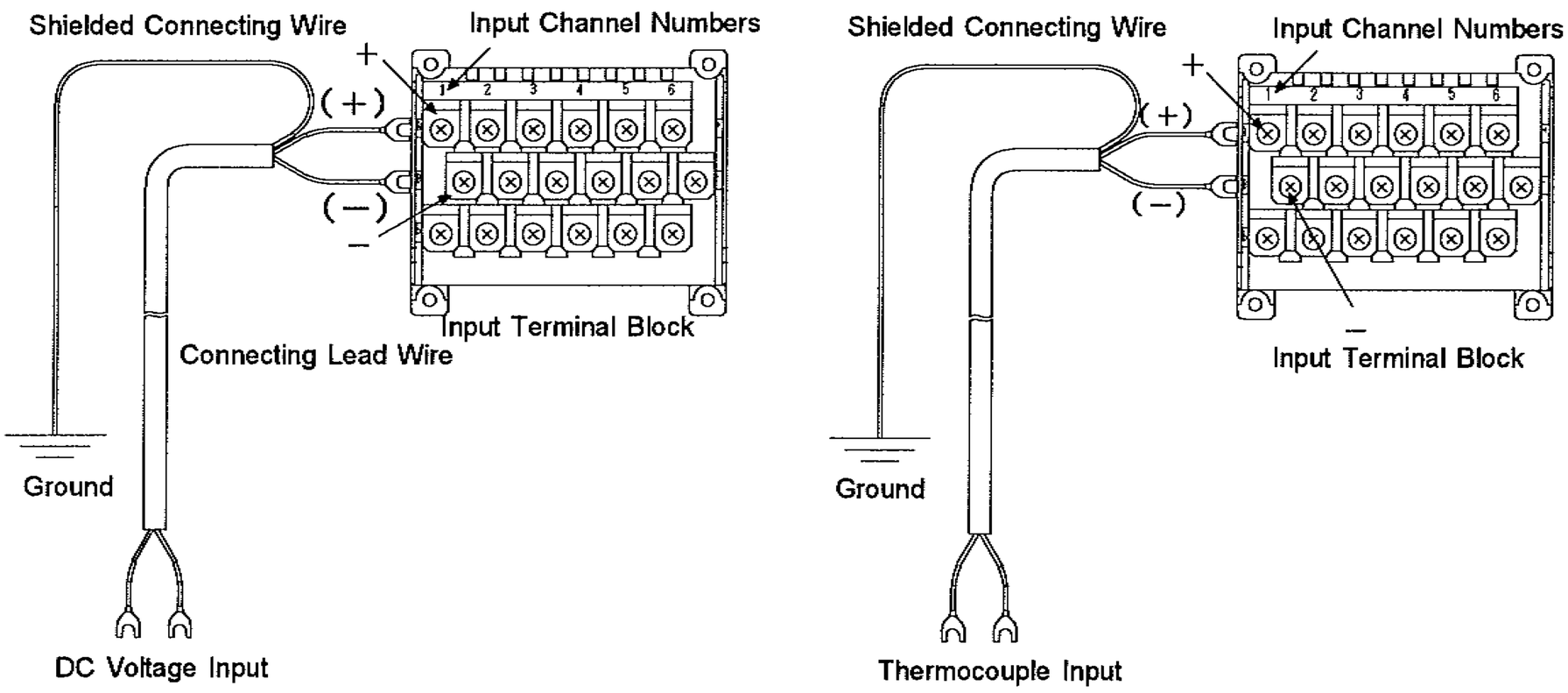


Fig. 4.3 Input Wiring (For mV, V, and Thermocouple Inputs)

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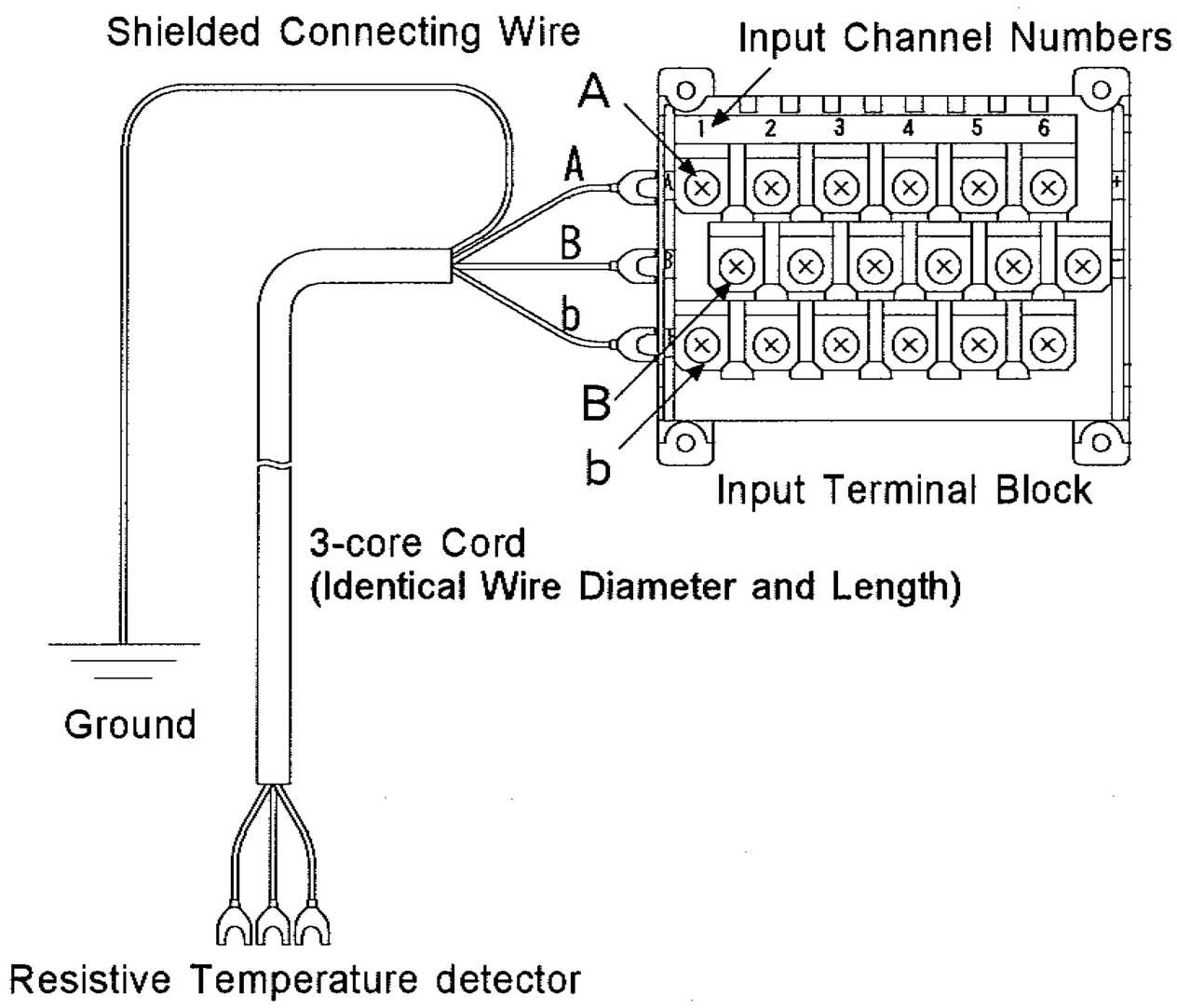

Fig. 4.4 Input Wiring (For Resistive Temperature detector)

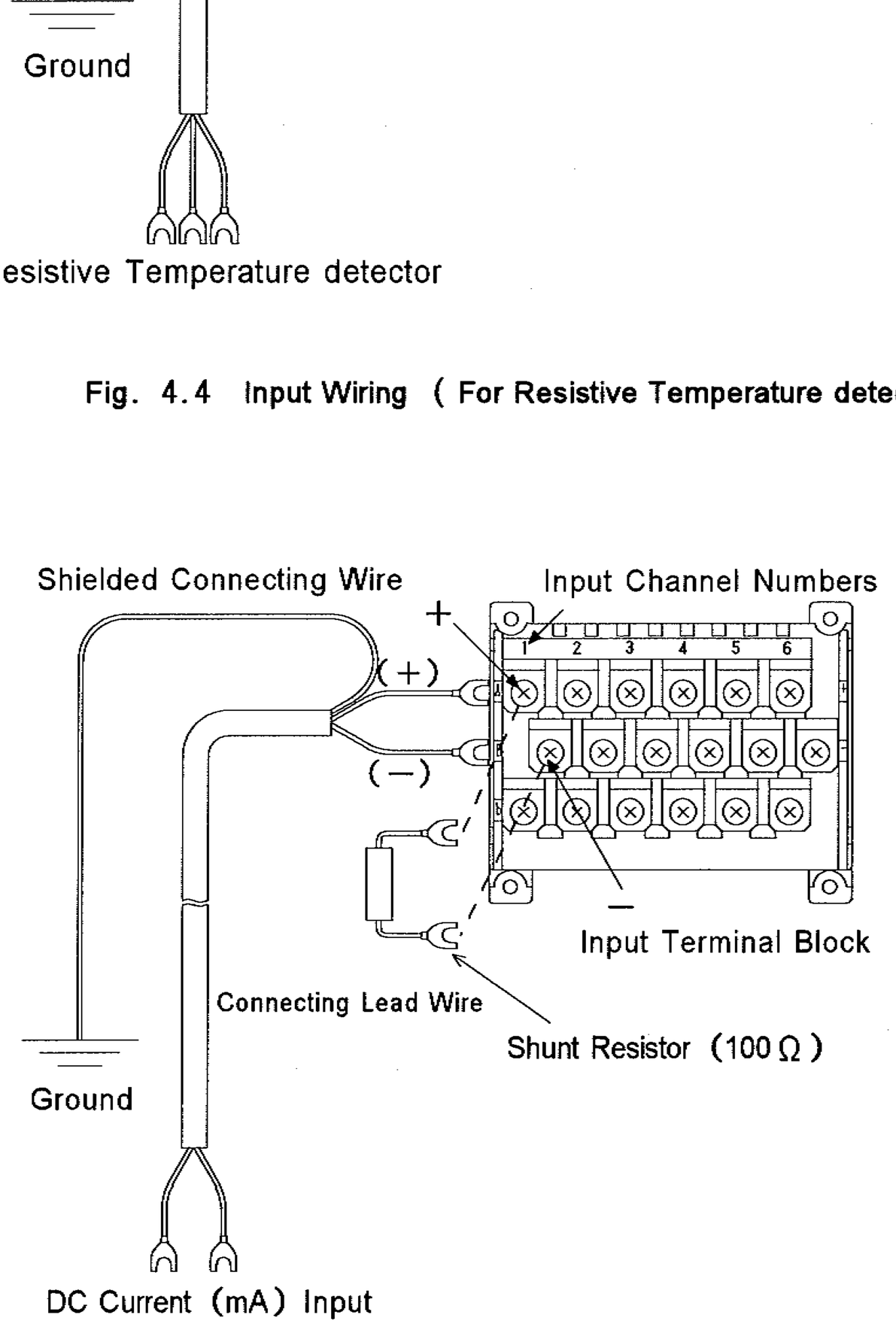

Fig. 4.5 Input Wiring (For mA Input)

[Notes]

- Attach the shunt resistor to the input terminal block of the instrument.
- Input accuracy is effected with the shunt resistor. Use the following recommended resistor.

Resistant value : 100 Ω Rated power : 1/8W Tolerance : ±0.1% or less
Temperature coefficient : ±50ppm or less

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⚠ WARNING

① Be sure to wire after turning off the POWER.
② When the power source has been connected to the Alarm output, turn off that power source.
③ When a hazardous voltage supplies to alarm terminals:
  a) Never touch terminals preventing from electric shock.
  b) Attach covers to terminals.
  c) Wires should be double shielded.
  d) Adopt round pressure terminal connectors with insulation cover for wire, preventing from lose connection.

⚠ CAUTION Precautions for Wiring the DI/Alarm Output

Precautions for Wiring the DI

① DI input has the drive power source incorporated. Do not apply a voltage to a DI input terminal from the outside.
② A DI input contact capacity should be a forward/reverse withstand voltage of 50V DC, 16mA or more, ON resistance of 20Ω max (wiring resistance included) .
③ Do not use unused terminals as relay terminals.

Precautions for Wiring the Alarm Output

① An alarm output contact capacity is as follows :
  250VAC : 3A at maximum (Resistance load)
  30VDC : 3A at maximum (Resistance load)
  125VDC : 0.5A at maximum (Resistance load) , 0.1A at maximum
  L/R=40ms at maximum (Induction load)
② Attach an anti-surge protective circuit(surge absorbers, etc.) to an output terminal, as required.
③ Attach a press-fitting terminal with insulated sleeve(for M4) to the end of an electric wire.
④ Keep alarm output wiring away from input wiring.

DI Wiring Example

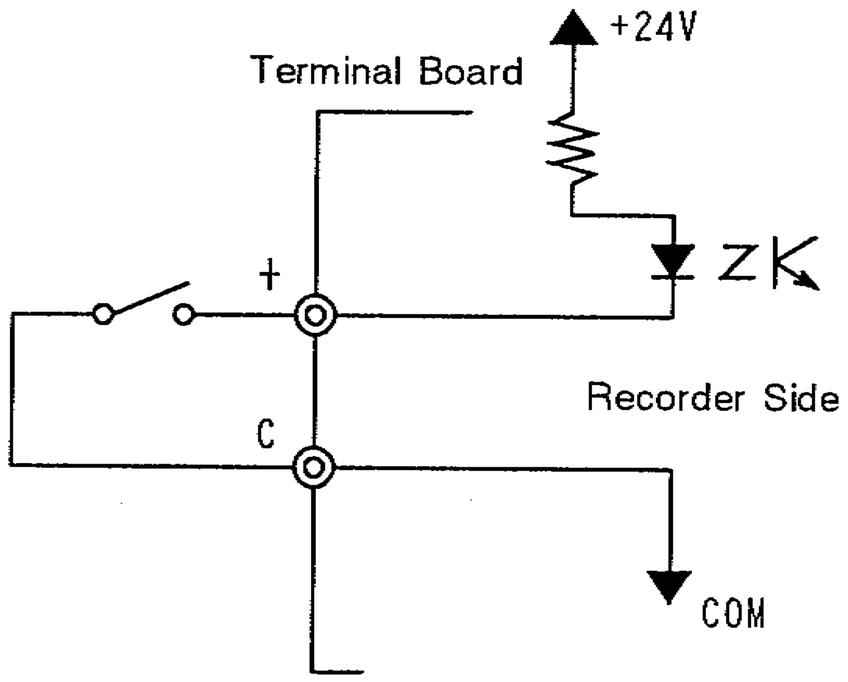

Fig. 4.6 DI Wiring Example

Alarm Output Wiring Example

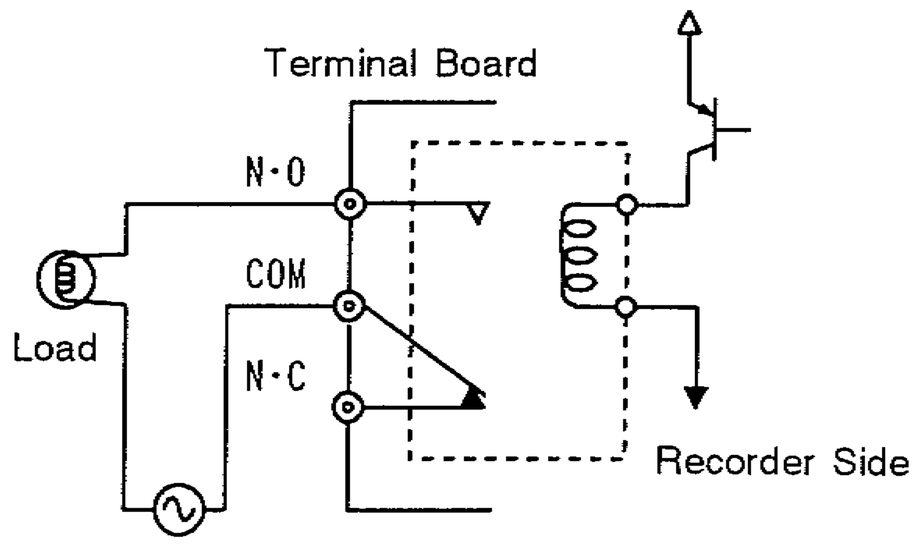

Fig. 4.7 Alarm Output Wiring Example

[Note]

The DI/Alarm output (option) consists of a combination of 5 DI inputs and 8 alarm output (relay output) contacts.

4 – 3 DI/Alarm Output Wiring (Option)

Wiring Procedure

Wire the DI/Alarm Output according to Fig. 4.8.

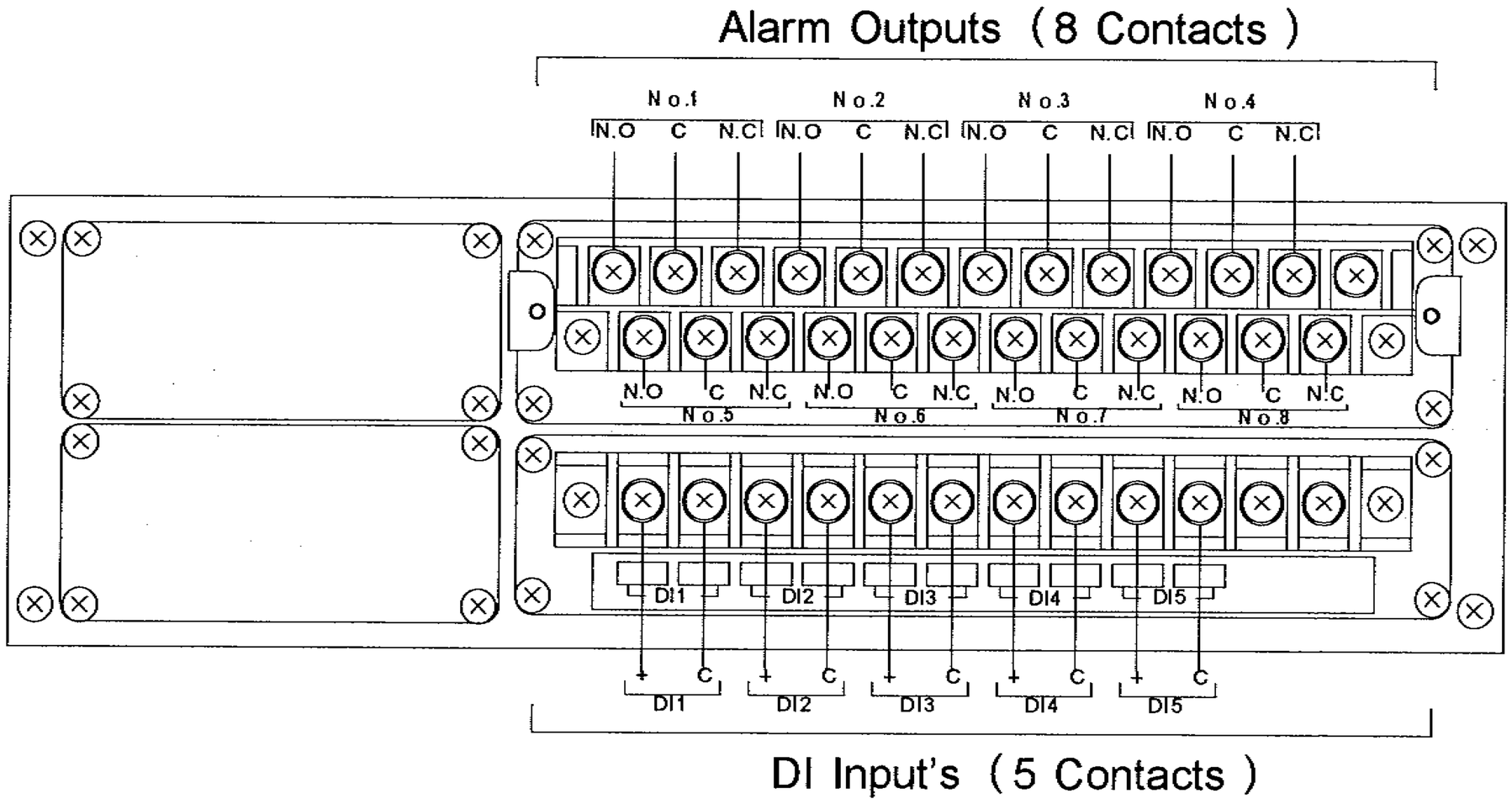

Fig. 4.8 Wiring for DI Input's (5 DI Contacts) and Alarm Output (8 Alarm Output Contacts)

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⚠ CAUTION

use our standard chart paper for proper recording.

(1) Press the POWER switch to turn off the power. Or, with the power left turned on, press RUN/STOP key to stop recording.

⚠ CAUTION

If the chart holder is lowered with the recorder being running, the printer may be damaged. When replacing the chart holder, be sure to take the step (1) first.

(2) Open the door and remove the chart holder. To remove it, hold its both ends with both hands and pull it upward.

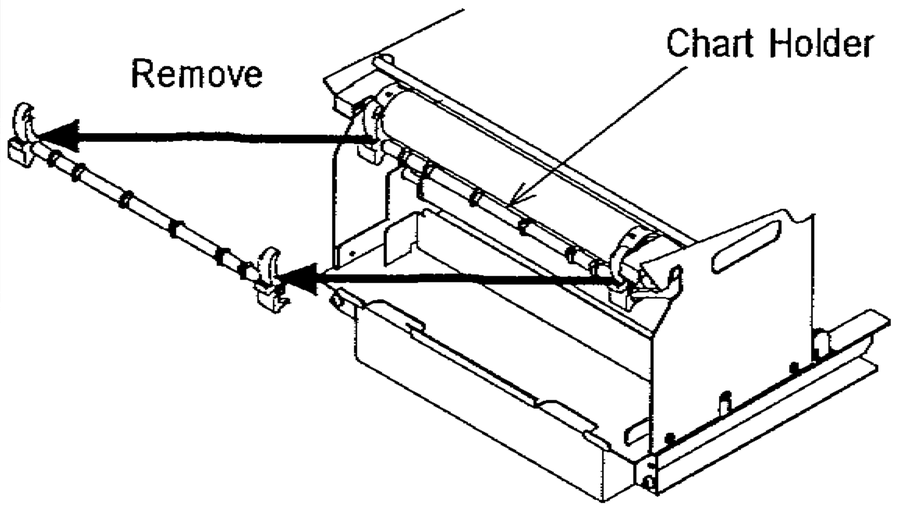


Fig. 5.1 Removing the Chart Holder

(3) Hold the levers located on the left and right sides of the chart holder and unlock to incline the holder forward.

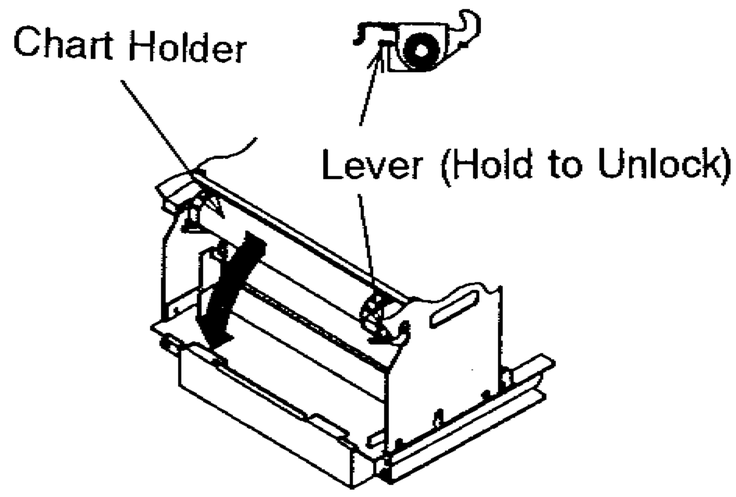


Fig. 5.2 Inclining the Holder Forward

(4) Unlock the chart cover with both index fingers to open it. When replacing the chart paper, take out used chart paper.

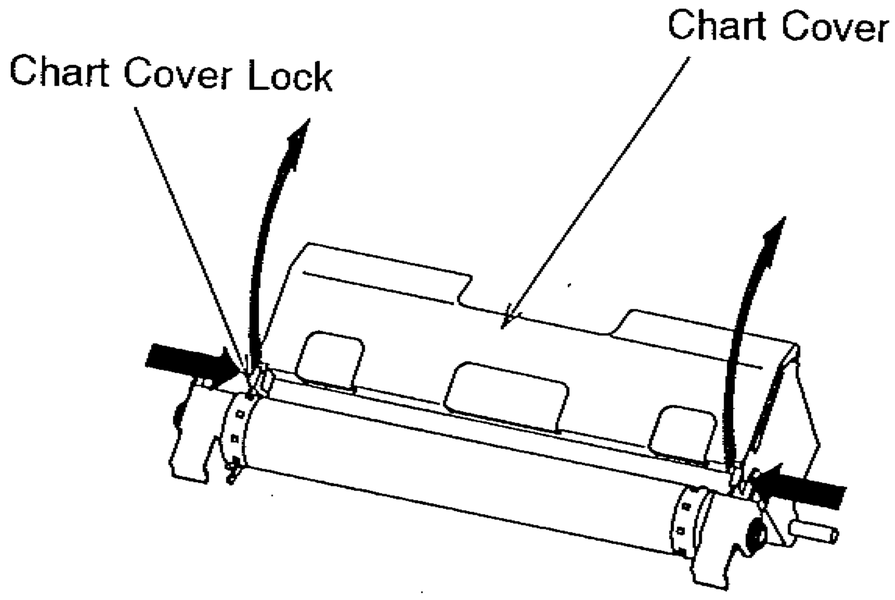
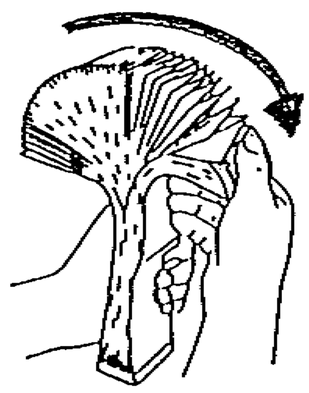


Fig. 5.3 Unlocking the Chart Cover

(5) Loosen new chart paper you want to set.



[Note]

If the chart paper is stuck at perforations, it may not be fed properly. Be sure to loosen it.

Fig. 5.4 Loosening the Chart Paper

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(6) Unfold about 3 pages of the chart paper. With square holes on the left side, set it in the paper housing so that its draw-out position will be as illustrated in the figure below.

[Note]

Make sure that the left and right holes are properly set. Set the chart paper over the shaft.
(The shaft is covered with the chart paper.)

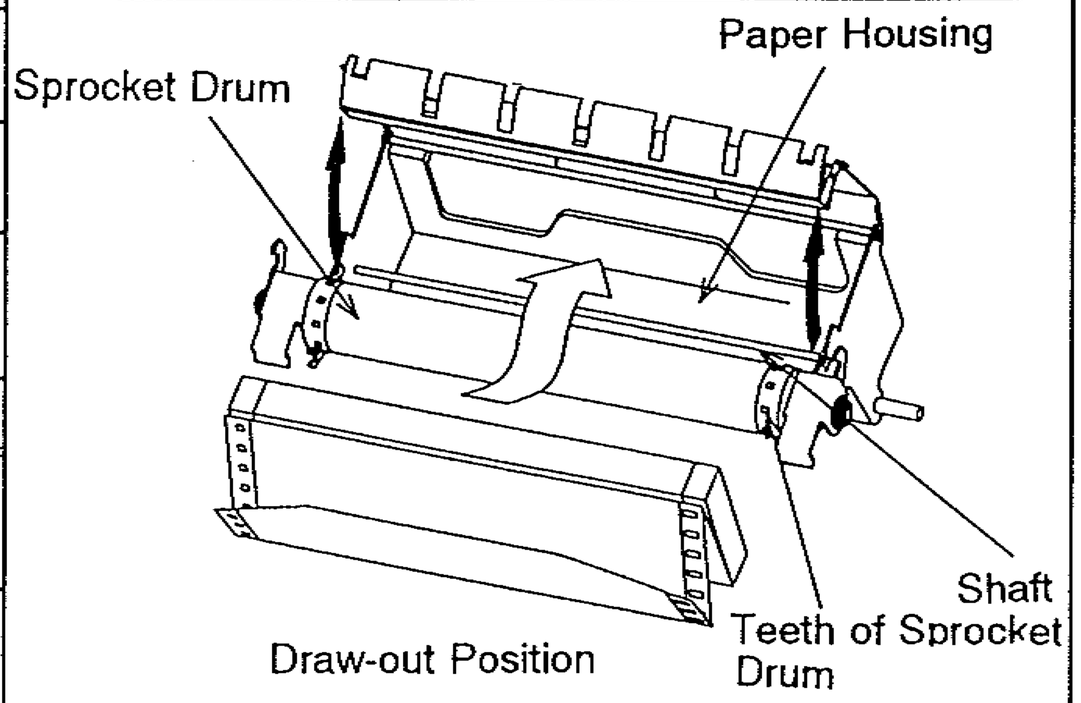

Fig. 5.5 Setting the Paper

(7) Make sure that the chart paper is bent downward and its holes are properly aligned with the teeth of the sprocket drum, and close the chart cover until it is locked.
Next, hold the levers of the chart holder with both hands and pull up the holder.
Move the levers lightly left and right, and up and down to make sure that the chart holder is attached to the main unit.

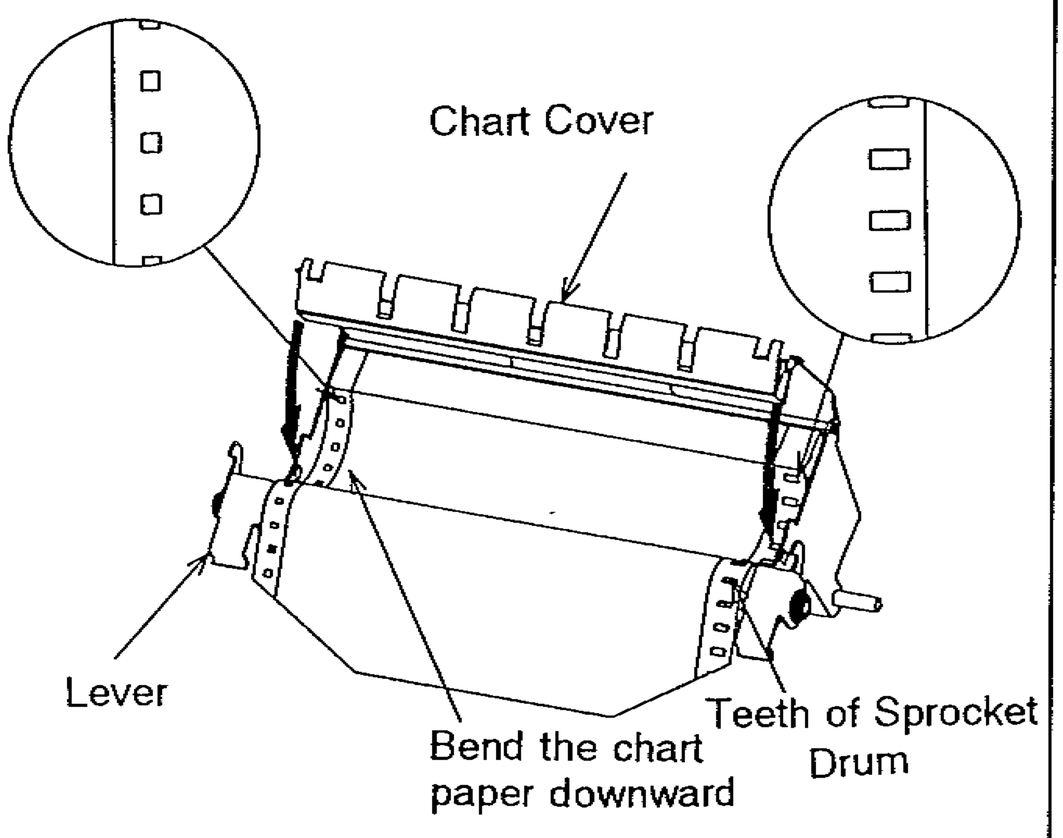

Fig. 5.6 Assembling the Chart Holder

(8) Wind the chart paper, aligning its holes with the teeth of the sprocket drum, and put back the chart holder to its original position.
When this is done, make sure that the left and right holes in the chart paper are properly engaged with the teeth of the sprocket drum.

(9) Prior to running the recorder, press FEED key on the display/keyboard with the power turned on to eliminate a play of the chart paper from between the gears of the chart holder.

[Notes]

① Be sure to feed the chart paper by about 4 to 6 pages prior to running the recorder.
② When the chart paper cannot be fed properly by pressing FEED key, check the setting condition of the chart paper.

[Reference]

A triangular mark(△) on the chart holder indicates 20mm before a dot printing position. Use it to adjust a printing timing.

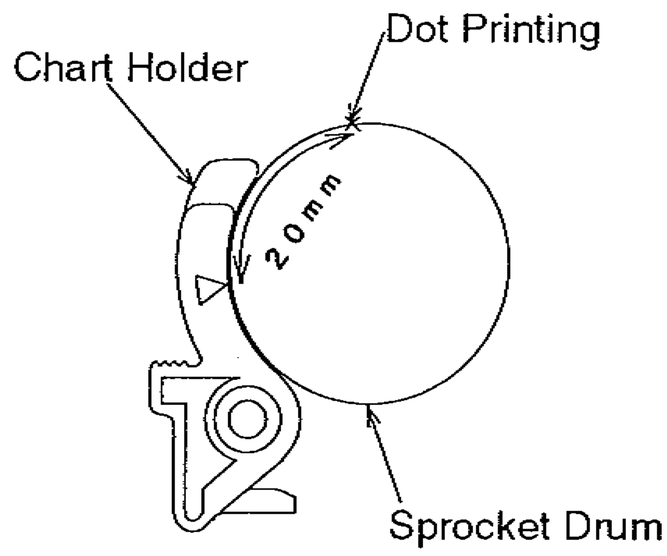

Fig. 5.7 Sprocket Drum and Dot Printing Position

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(1) Press the POWER switch to turn off the power. Or, with the power left turned on, press RUN/STOP key to stop recording.

(2) Pressing down the unlocking lever, hold a draw-out handle and draw the internal unit towards you until it stops.
(See Fig. 1.3 on Page 2)

(3) With your fingers, move the printer to the center of the main unit.

(4) When replacing the ribbon cassette, remove a clamp from it and draw out the ribbon cassette in the removing direction shown in Fig. 5.8 to remove it.

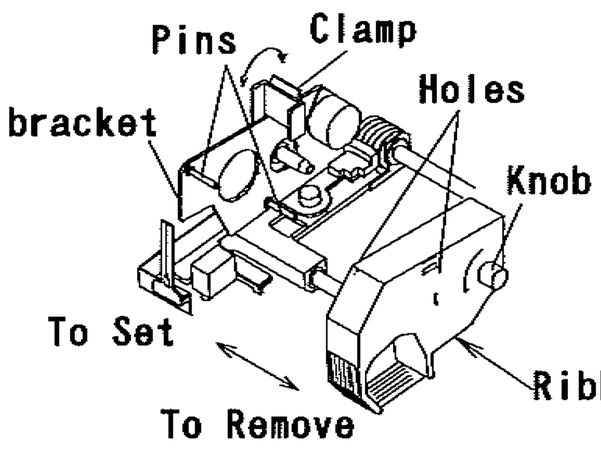

Fig. 5.8 Printer and Ribbon cassette

⚠ CAUTION

When removing the ribbon cassette, be careful not to damage the cable.

(5) Turn the knob of the new ribbon cassette in the arrow-indicated direction(counterclockwise) to eliminate slack of the ribbon.

⚠ CAUTION

If the knob of the ribbon cassette is turned in the other direction(clockwise), the ribbon may not be fed properly.

(6) Align the holes in the ribbon cassette with the bracket pins and set the ribbon cassette.

⚠ CAUTION

When setting the ribbon cassette, be careful not to damage the cable.

(7) Turn the knob of the ribbon cassette in the arrow-indicated direction to eliminate slack of the ribbon again.

(8) Make sure that the ribbon cassette is properly set and the ribbon is also properly set in the printer.

(9) Put back the main unit into the case. Push it inside until it comes to a stop.

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⚠ WARNING

Prior to turning on the power, make sure that the supply voltage meets the specifications for the instrument and the instrument is properly grounded.

⚠ CAUTION PRECAUTIONS ON THE WIRING

Prior to turning on the power, make sure that the chart paper is set in the chart holder.
If the printer is activated with no chart paper set, the sprocket drum(cylindrical part) of the chart holder may be damaged.

Open the front door and press the POWER switch located at the lower center to turn on the power.
Once the power is turned on, figures and characters are appeared in the front display.
The instrument will be ready to run(user mode) in about 5 seconds, including the initialization screen.
If the POWER switch is pressed with the power turned on, the power will be turned off.

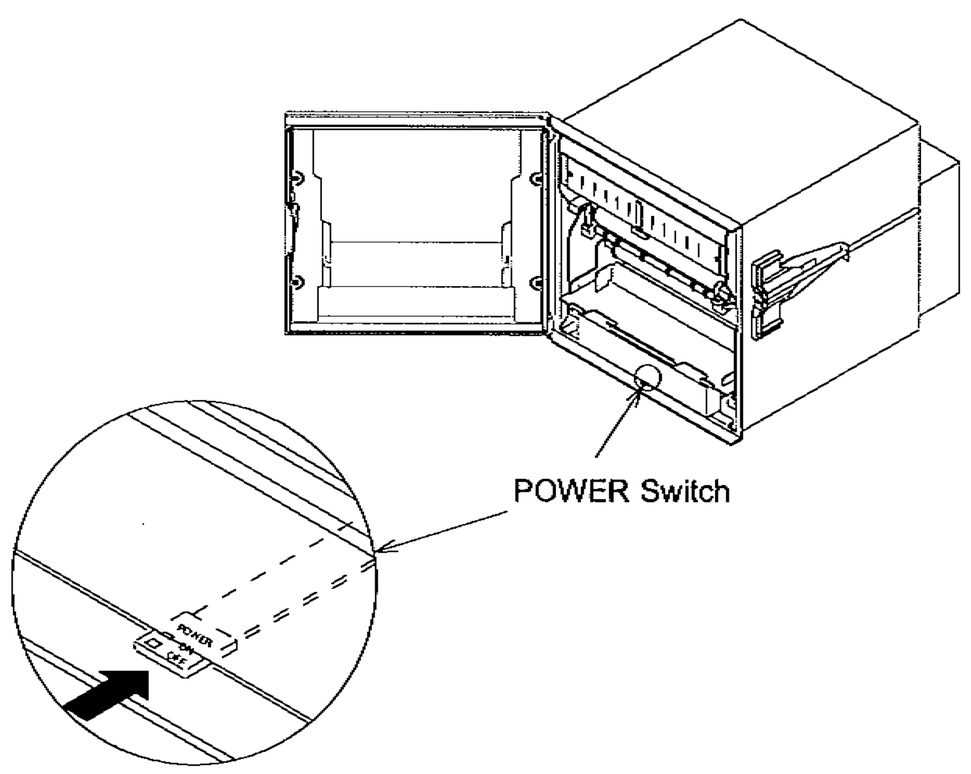


Fig. 6.1 Turning on the Power

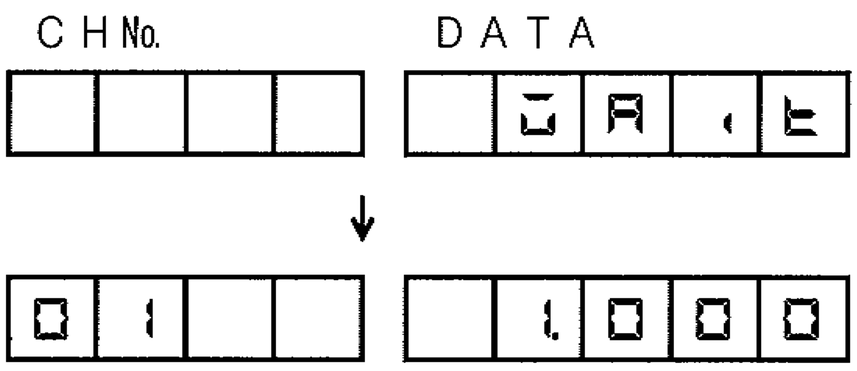


Fig. 6.2 Display Screen at Power-on

Table 6.1 Conditions after Initialization Screen

① Display mode	▭AUTO < AUTO mode >
② RUN/STOP key	RUN
③ Printout data	All the printout data and analog data prior to power-off are cleared.
④ Alarm and self-diagnosis	Alarm indications and outputs prior to power-off are not reset.
⑤ Key lock	Key lock state

[Notes]

① When the power fails, the display is initialized after power recovery, resulting in the above-mentioned initial conditions.
② The printout data are cleared in initialization. When the power is turned off during printout, printout operation does not continue after even if power is recovered.

30-channel Dot Printing Identification

This instrument identify 30-channel dot printing by means of 6-color ink ribbons and suffix printout.

⚠ CAUTION

In order to protect the chart paper, dot printing is not performed when the distance between the previous dot printing position and the next one for an identical channel is less than 0.2mm in the chart paper feed direction or less than 0.5mm in the scale direction.

Table 6.2 30-channel Dot Printing Identification Table

Color	Dot Printing Channel
Purple	Ch.1 , 7 , 13 , 19 , 25
Red	Ch.2 , 8 , 14 , 20 , 26
Black	Ch.3 , 9 , 15 , 21 , 27
Green	Ch.4 , 10 , 16 , 22 , 28
Blue	Ch.5 , 11 , 17 , 23 , 29
Brown	Ch.6 , 12 , 18 , 24 , 30

Time Print and Date Print

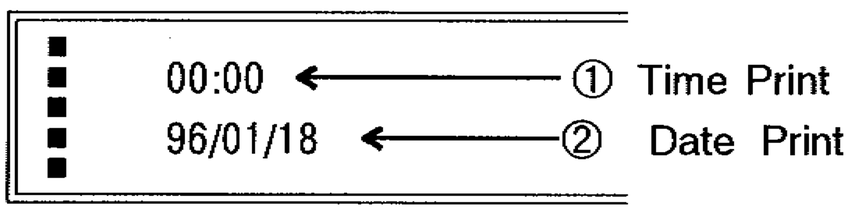


Fig. 6.3 Example of Time Print and Date Print

For selection of the time print and date print and date printing function, see 8-6.

[Note]

printing is synchronized with chart paper feed.

Time print and date print depends on a chart paper feed rate.

Table 6.3 Time printing Timing

Chart Paper Feed Rate	Description
9mm/h or less	No printout
10 to 29mm/h	Printed every 6hours
30 to 100mm/h	Printed every other hour(even-number hours)
101mm/h or more	Printed every hour

Table 6.4 Date printing Timing

Chart Paper Feed Rate	Description
4mm/h or less	No printout
5mm/h or more	Printed at specified time

User Mode

The user mode displays and sets the measured values, time, chart paper feed rate, and alarms required for daily maintenance. There are 6 user modes as shown in Fig. 6.4 and they are switched sequentially by pressing [MODE] key.

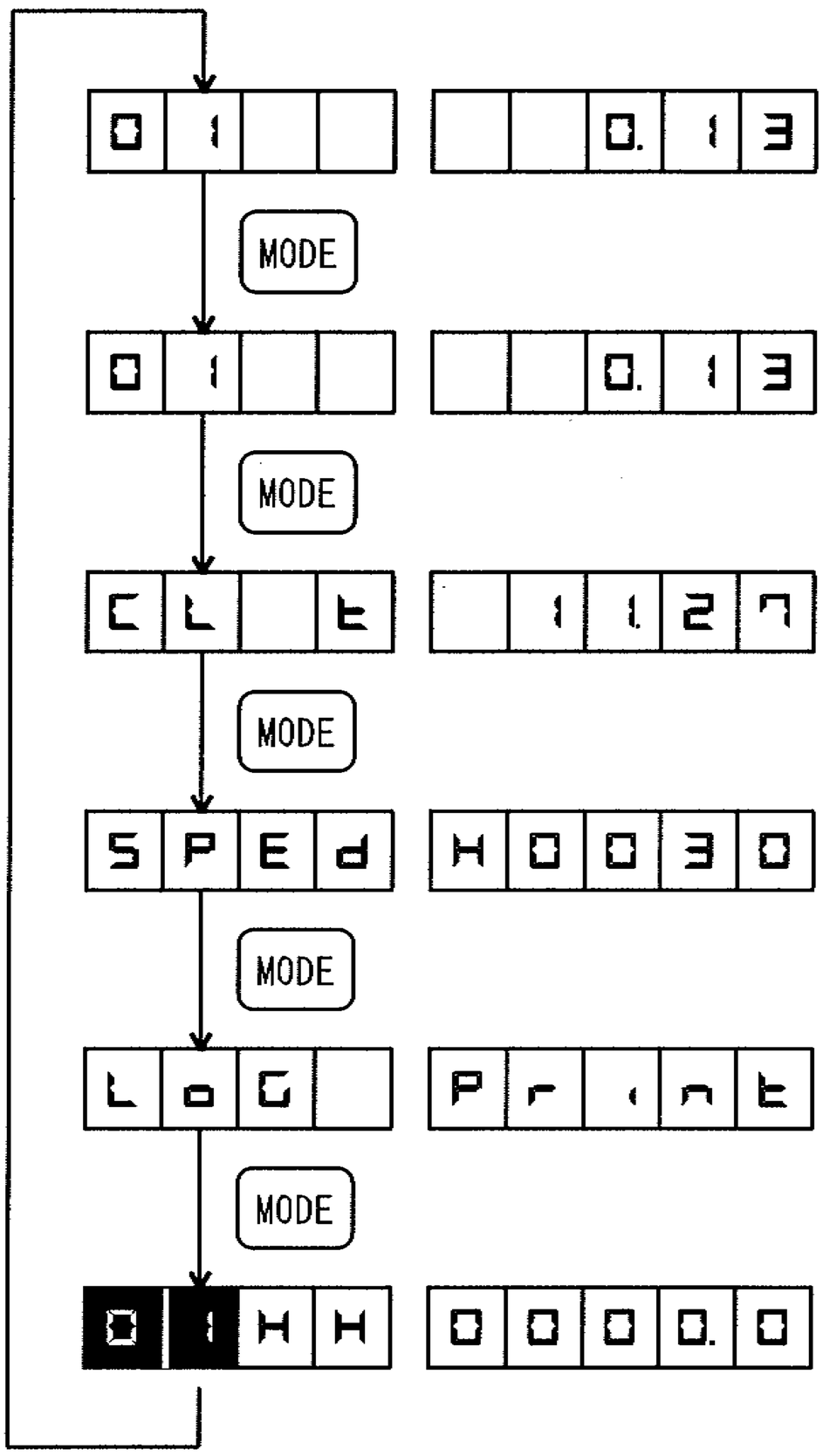


Fig. 6.4 User Mode Display

▭AUTO 〈AUTO Mode〉

The AUTO mode switches the selected channel sequentially at intervals of 5 seconds to perform dot printing and display.

① Press [MODE] key to turn " ▭AUTO" mode indicator lamp.
② The measured value is automatically switched in synchronization with dot printing.

[**Note**]
No measured value is displayed for the channel where dot print skip has been set.

▭MAN 〈MANUAL Mode〉

The MANUAL mode displays the selected fixed channel.

① Press [MODE] key to turn on the" ▭MAN" mode indicator lamp.
② Select the display channel with [▼] or [▲] key. (MANUAL mode 1)
③ Press [ENT] key. The" ▭MAN" indicator lamp blinks and sampling is performed only on the display channel at intervals of 0.5 second. (MANUAL mode 2)
④ To cancel the MANUAL mode, press [MODE] key.

[**Reference**] **Operations in MANUAL Modes 1 and 2**

Function		MANUAL Mode 1	MANUAL Mode 2
Display	Display (1)	Displays the channel number	Displays the channel number
	Display (2)	Displays the measured value. However," SE oF is displayed for the channel where dot print skip has been selected.	
Dot printing		Performed	Not performed
Alarm judgment		Performed	Performed only for the display channel
Time log printout		Performed	Not performed
Self diagnosis		Performed	Not performed
Display sampling cycle		Synchronized with dot printing	0.5sec. cycle

▭CLOCK 〈CLOCK Mode〉

The CLOCK mode displays the current year, month, day, and time.

① Press [MODE] key to turn on the" ▭CLOCK" mode indicator lamp.
② Use [▼] or [▲] key to display each item.

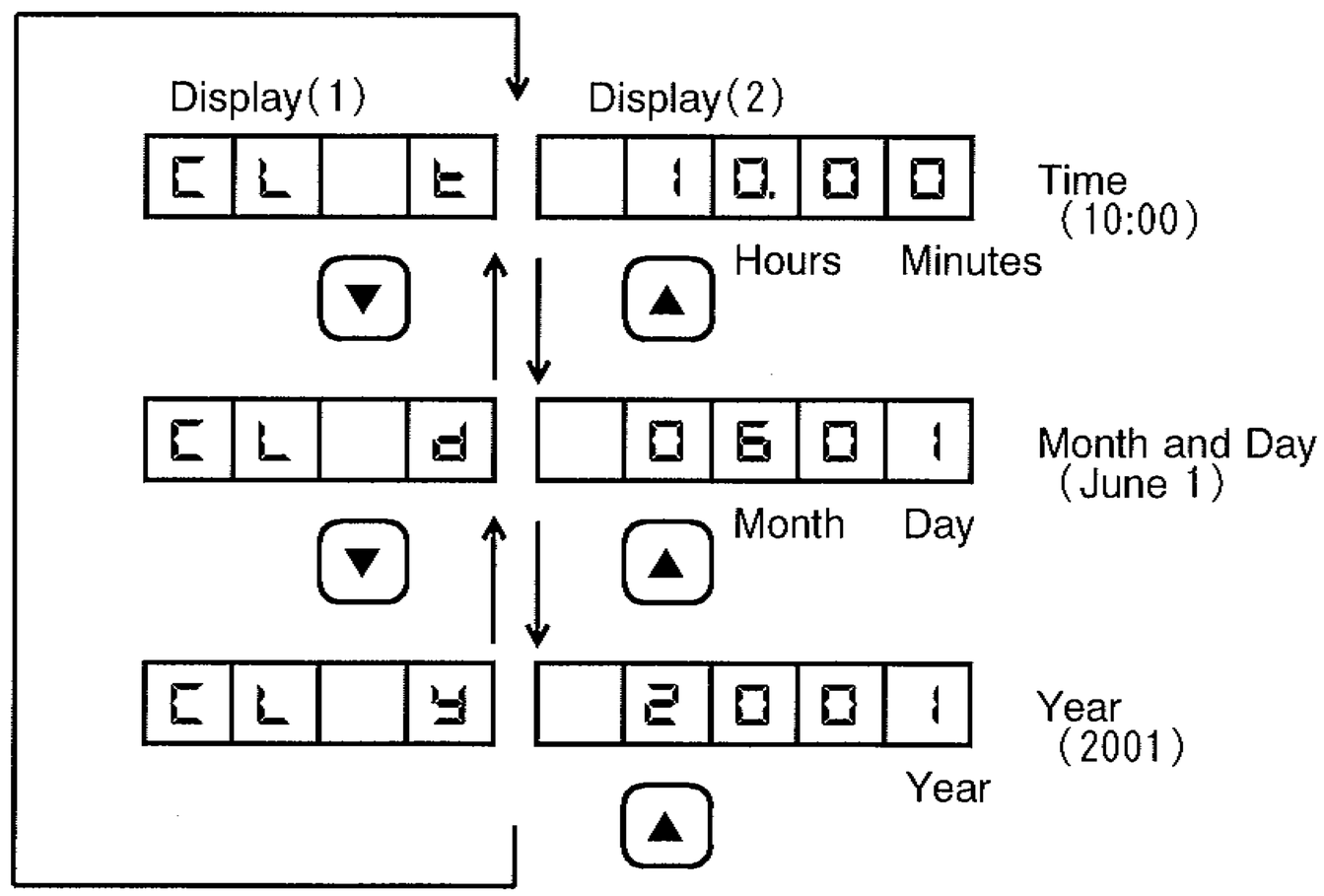


Fig. 6.5 CLOCK Mode Display Screen

▭CHART＜CHART Mode＞

The chart mode displays and sets the current chart speed.

Display(1) Display(2)

Fig. 6.6 CHART Mode Display Screen

[Reference] Initial Setting
Chart speed selection
30mm/h

[Note]

In order to protect the chart paper, dot printing is not performed when the distance between the previous dot printing position and the next one for an identical channel is less than 0.2mm in the chart paper feed direction or less than 0.5mm in the scale direction. To print all the dots, a chart paper feed rate of 15mm/h or higher is required.

When chart speed selection (option) has been set, the display is as following Fig. 6.7.

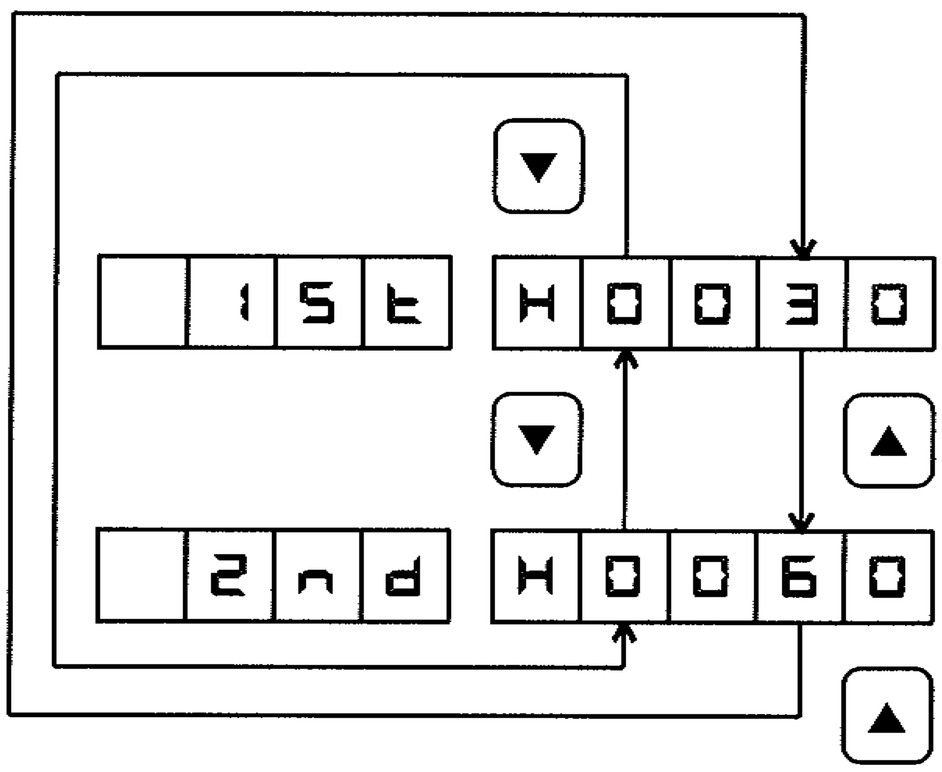


Chart Speed Display (1st)

Chart Speed Display (2nd)

Fig. 6.7 CHART Mode Display Screen When Setting the Chart Speed

[Reference] Initial Setting
① 1st speed set value
30mm/h
② 2nd speed set value
60mm/h

▭PRINT <PRINT Mode>

The PRINT mode starts manual logging print and list print (printing of setting parameters).

① Press [MODE] key to turn on the "▭PRINT" mode indicator lamp.

② The display screen is as following Fig. 6.8.

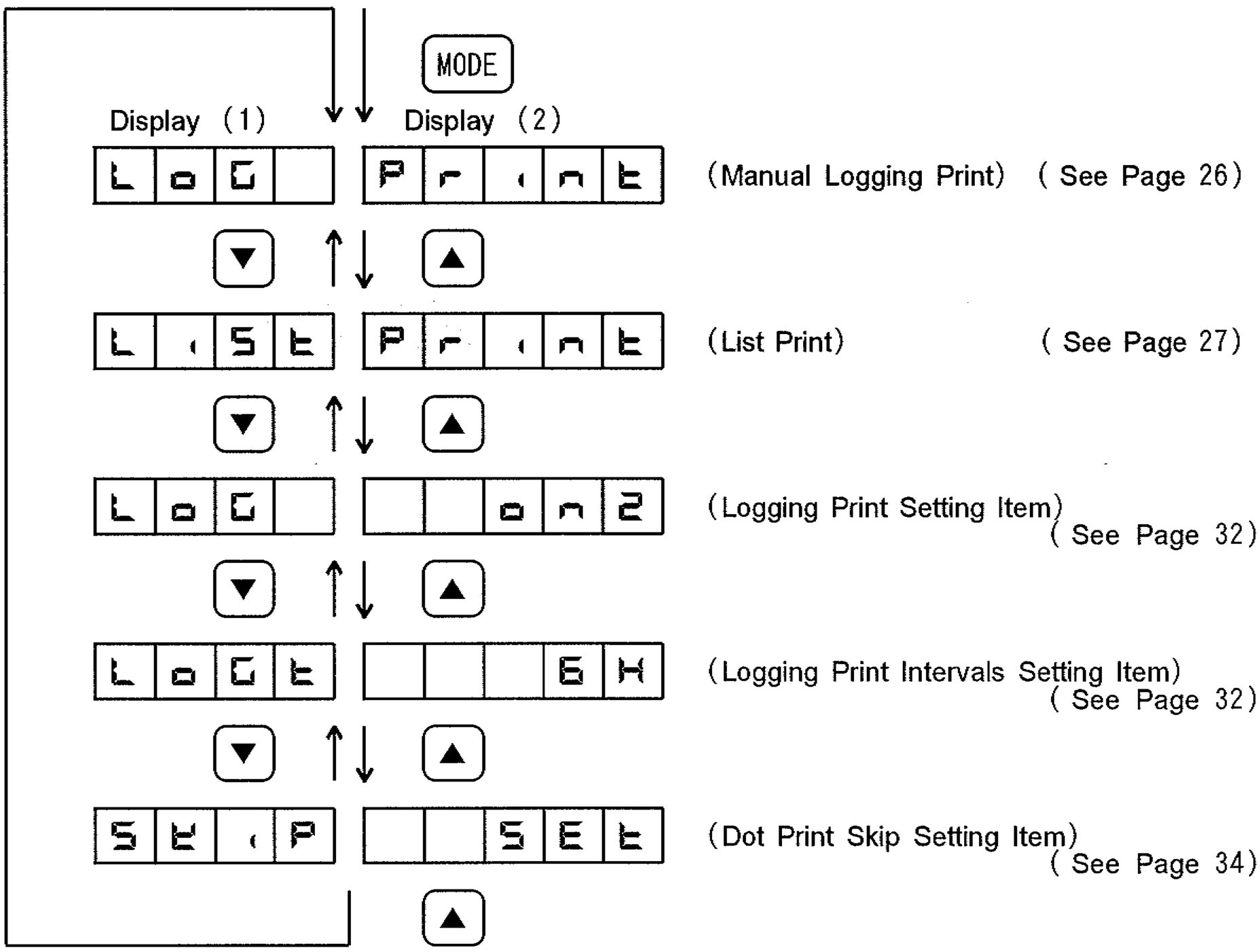


Fig. 6.8 PRINT Mode Display Screen

[Reference] Printing Priority

There is the following printout priority. When multiple printing are started simultaneously, one with higher priority is accomplished first, followed by one with lower priority upon completion of the higher-priority one.

← Higher Lower →

List Print >Alarm on Print >Alarm Recovery on Print >Logging Print >Date Print >Time Print

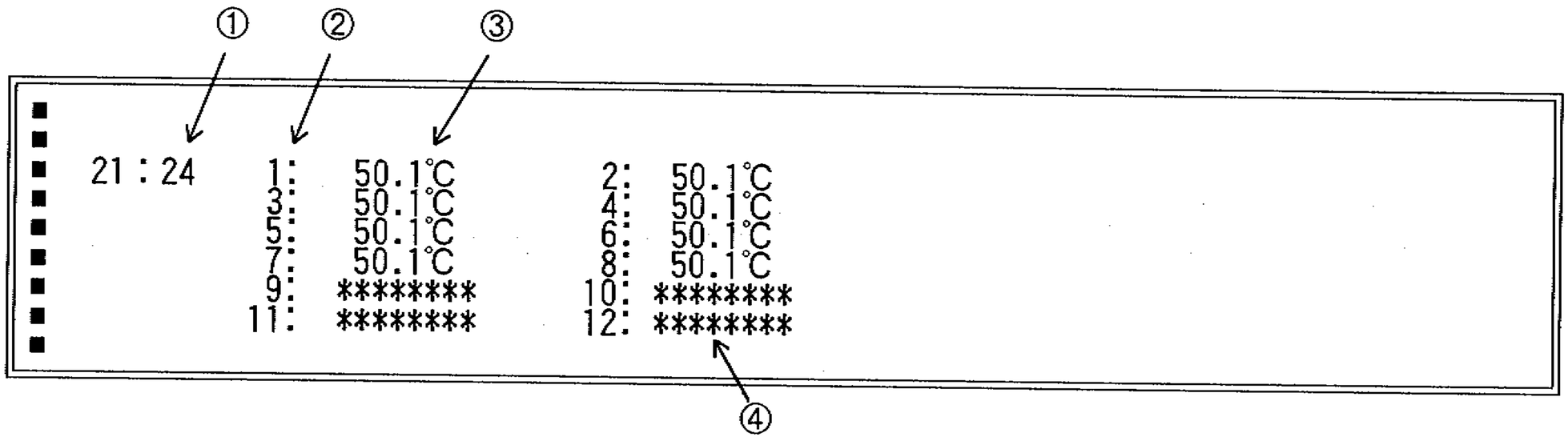
Manual Logging Print

LOG Print

↓ ENT

Runs manual logging print.

The displays (1) and (2) link during printing.



① Time ② Channel Number ③ Measured Value ④ When Dot Print Skip Is Set

Fig. 6.9 Manual Logging Print Example

[Notes]

① Printing is provided only when the recorder is running.
② Since log printing is asynchronous with chart paper feed, dot printing and data sampling are not performed.
③ To stop log printing forcibly, press RUN/STOP key to place the recorder in the STOP mode. In this case, other waiting data are also cleared.

[Reference] Log Printing Time

Logging print time differs depending on the number of channels, printing contents, or whether an alarm is issued.

No. of Channels	Log Printing Time
6	Approx. 1min. 15sec.
12	Approx. 2min. 20sec.
24	Approx. 4min. 25sec.
30	Approx. 5min. 30sec.

Printing conditions

Measured value : 0.0℃ for all channels

List Print

L	ı	S	t		P	r	ı	n	t

↓ ENT Runs list print.

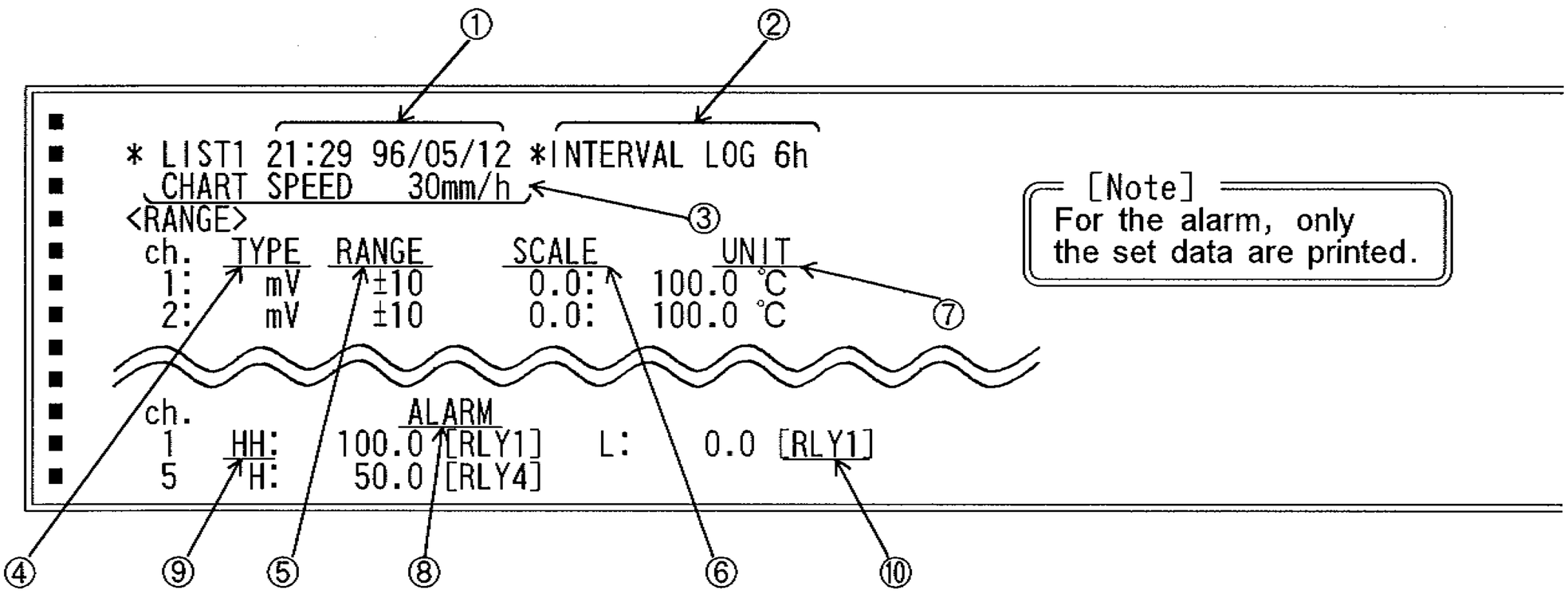
The displays (1) and (2) link during printing.

[Notes]

① Printing is provided only when the recorder is running.

② Since list printing is asynchronous with chart paper feed, dot printing and data sampling are not performed.

③ To stop list printing forcibly, press RUN/STOP key to place the recorder in the STOP mode. In this case, other waiting data are also cleared.



[Note]
For the alarm, only the set data are printed.

① Date and time of printout
② Time log printout setting
③ Chart speed setting
④ TYPE : Input type
⑤ RANGE : Input range
⑥ SCALE : Scale plate zero and span point value
⑦ UNIT : Unit of the measured values
⑧ ALARM : Alarm setting
⑨ HH, H, etc. : Alarm set values
⑩ RLY : Alarm output setting

Fig. 6.10 List Print Example

[Note]

The following input types are printed in abbreviations.

Input Type	Abbreviation
PR40－20	PR4
Au－Fe	AuF
PLⅡ	PL2
JPt100	JPT
Pt100	PT1
Pt50	PT5
Cu10Ωat0℃	CU1
Cu10Ωat25℃	CU2

[Reference] List Printing Time

List print duration subjects to change by numbers of channel, contents of printing and conditions of alarm setting.

No. of Channel	List Printing Time
6	Approx. 4min.
12	Approx. 6min.
24	Approx. 11min.
30	Approx. 14min.

Printing Conditions

Input range : 0 to 5V (All channels)

Scale : 0 to 100 (All channels)

Unit of measured values : ℃ (All channels)

Alarm set value : None (All channels)

7 − 1 Setting Range

Table 7.1 lists the setting items. The initial values listed in table 7.1 have been set unless otherwise specified upon ordering.

[Notes]

① When each setting is altered, the setting parameters will not be initialized even if the instrument is turned off.

② In Table 7.1, the items marked "Option" can be set only when they are optionally specified upon ordering.

Table 7.1 User Mode Setting Parameters

Setting Item	Settable Range	Initial Setting	Remarks
CLOCK mode (▭CLOCK)			
Date and time	Year 1999 to 2098 Month 01 to 12 Day 01 to 31 Hours 00 to 23 Minutes 00 to 59	Current time	
CHART mode (▭CHART)			
Chart speed Chart speed setting 1st rate 2nd rate	 1 to 1800mm/h 1 to 1800mm/h	 30mm/h 60mm/h	 Option
PRINT mode (▭PRINT)			
Logging print Logging print run Logging print intervals Printout start time	 ON 1 (Asynchronous) ON 2 (Synchronous) OFF 10, 20, and 30 minutes At intervals of 1, 2, 3, 4, 6, 8, 12, and 24 hours 0 to 23	 ON 2 6hours —	 The start time can be set only when the loging print intervals are 8 hours or more.
Dot print skip setting [Note] Set for each channel	ON Prints dots OFF Does not print dots (skip)	All channels ON	
ALARM mode (▭ALARM)			
Alarm value setting [Note] The following alarm types can be set for each channel 〈4 Alarm Types〉 HH alarm H alarm L alarm LL alarm [Note] Set for each channel	-19999 to 99999 A decimal point position and the unit of set values comply with the setup set values.	Common to all channels HH : 0.0 H : 0.0 L : 0.0 LL : 0.0	
Alarm output setting [Note] One output can be set for each alarm type of each channel	Relays 1 to 8, OFF [Note] OFF : No relay (DO) output Relays 1 to 8 : Display and relay output provided	Relays 1 to 8 OFF	Relay output is optional

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Key Lock State

In the key lock state," ⊂KEY LOCK" lamp is illuminated.

[Reference] Key Lock Conditions

① When the power is turned on and initialization is performed
② When no keys has been operated for about 3minutes after unlocking the keys

Unlocking the Keys

To unlock the keys, press both [PGM] and [ENT] keys simultaneously for about 3seconds.
" ⊂KEY LOCK" lamp is turned off and the keys are unlocked.

[Reference] Key Lock Target Data

① Alarm set value, alarm output setting
② Chart paper feed rate
③ Year, month, day, hours, minutes
④ Logging Print setting
⑤ Dot print skip setting
⑥ Setup data
⑦ Calibration

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7. SETTING

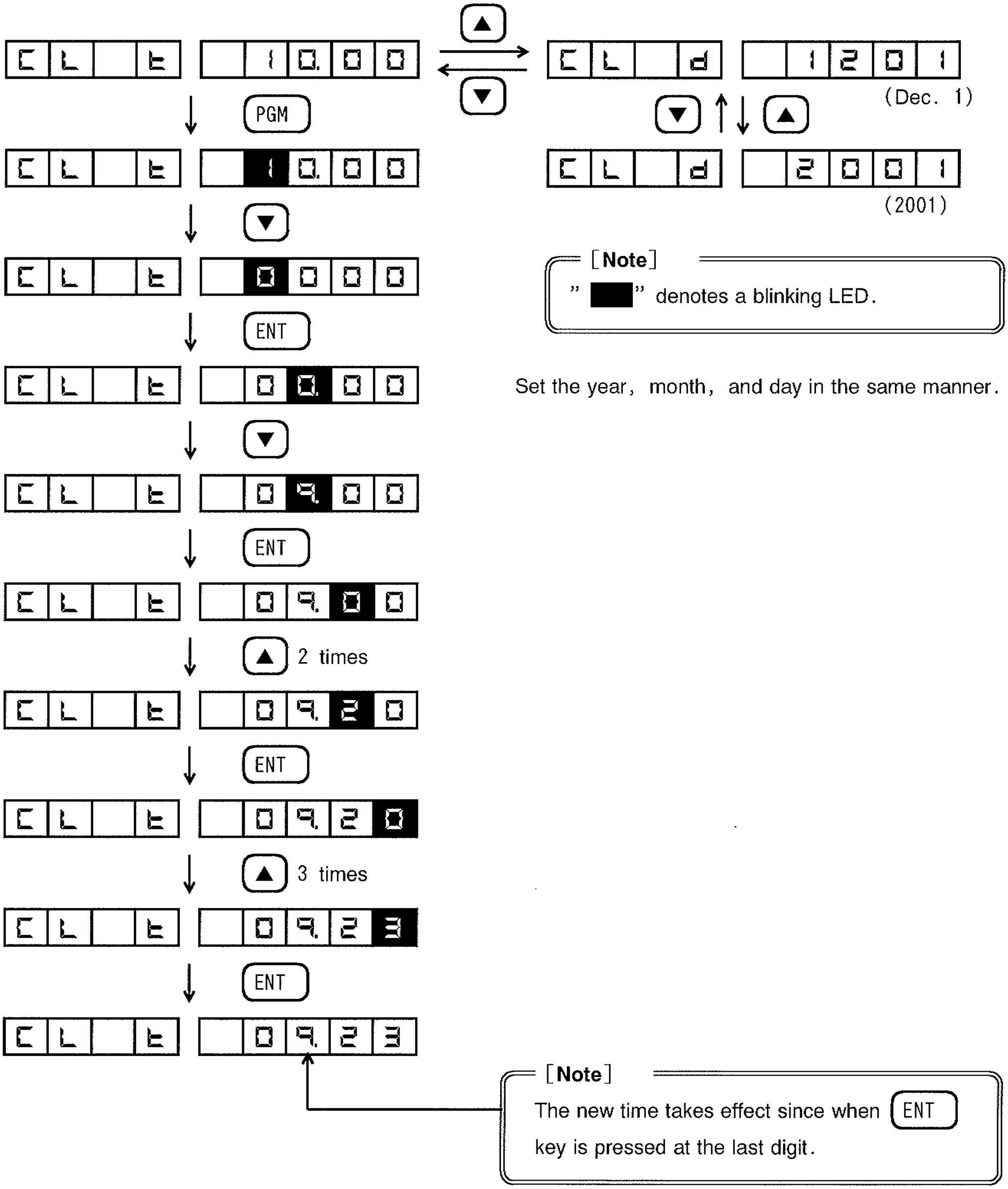
7 − 3 Time (Year, Month, Day, Hours, Minutes)

Take the following steps ① and ②, and then, see "Setting Example" to set the time.

① Press [MODE] key to turn on " ▭CLOCK" indicator lamp.

② Press both [PGM] and [ENT] keys simultaneously for about 3 seconds to unlock the keys.

〈**Setting Example**〉 (Changing the time from 10:00 to 09:23)



[**Note**]

" ■ " denotes a blinking LED.

Set the year, month, and day in the same manner.

[**Note**]

The new time takes effect since when [ENT] key is pressed at the last digit.

Fig. 7.1 Time Setting Example

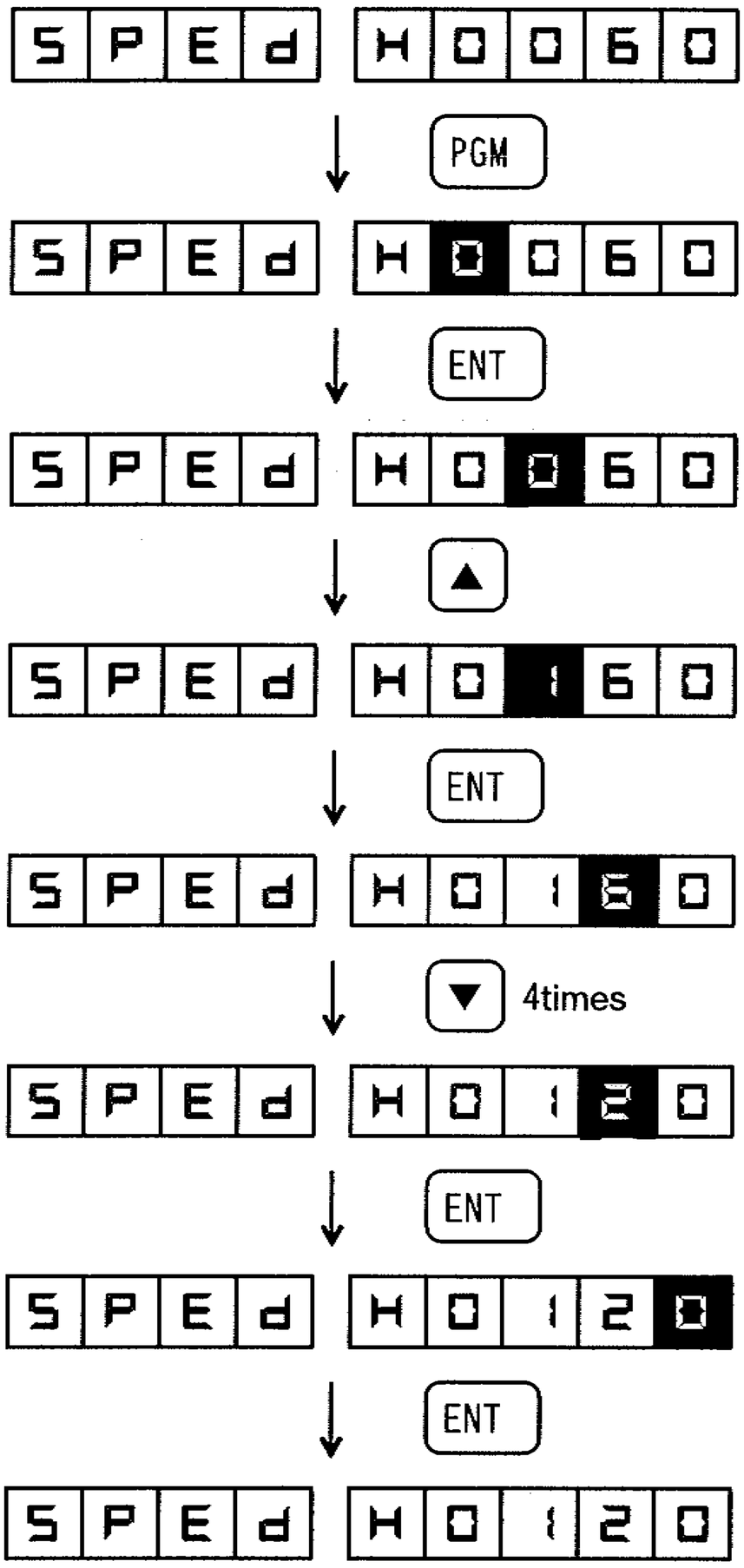
7 − 4 Chart Speed

Take the following steps ① and ②, and then, see "Setting Example" to set the chart speed.

① Press [MODE] key to turn on " ▭CHART" indicator lamp.

② Press both [PGM] and [ENT] keys simultaneously for about 3seconds to unlock the keys.

< Setting Example > Changing the chart speed from 60mm/h to 120mm/h



(End of Setting)

Fig. 7.2 Chart speed Setting Example

[Note]

" ■ " denotes a blinking LED.

[Reference] Settable Range

1 to 1,800mm/h

[Reference] Initial Setting

Chart speed : 30mm/h

[Note]

When chart speed selection(option) has been set, the display (1) shows 1St , 2nd .

Set the respective chart speed.

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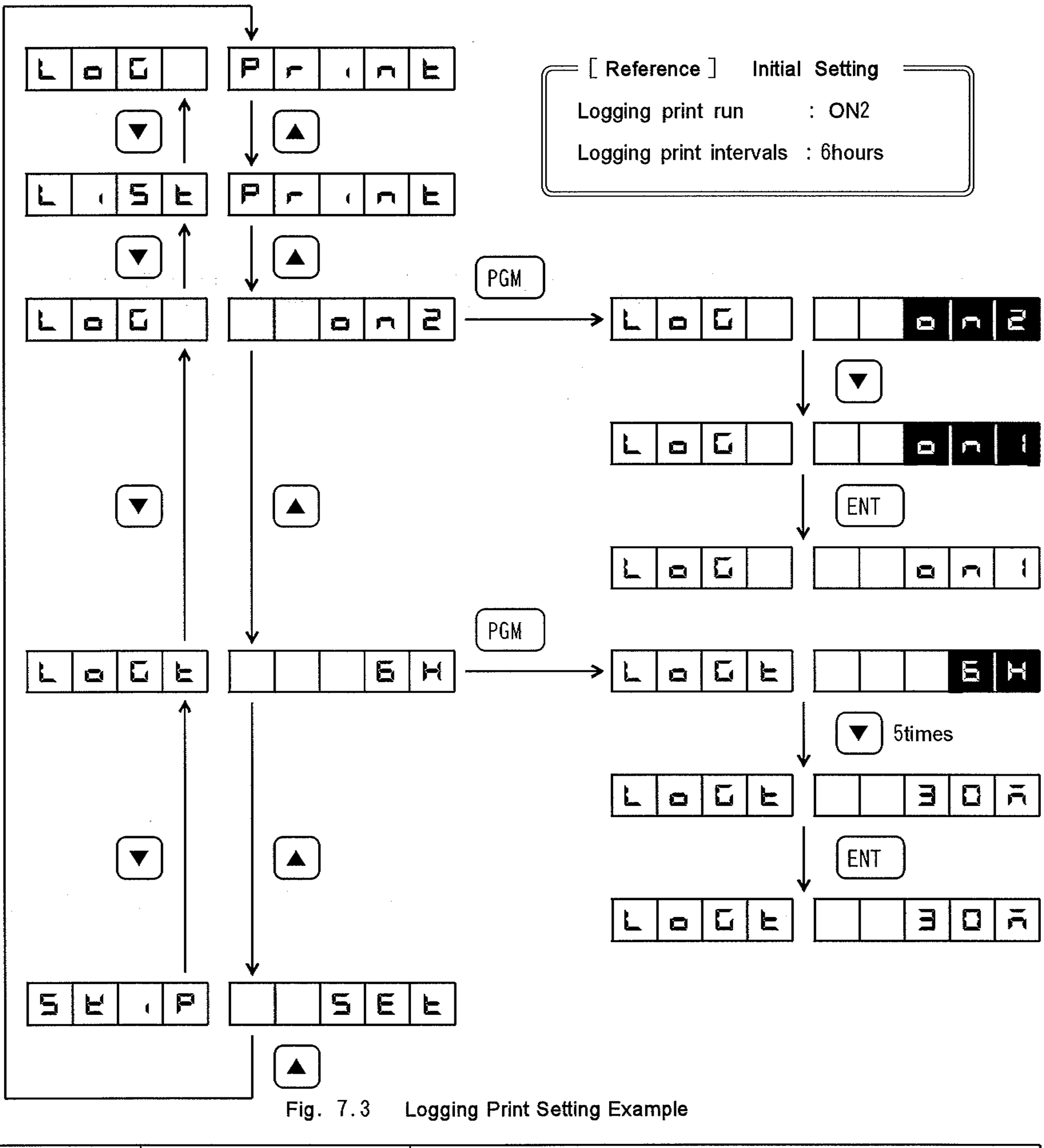
7 – 5 Logging Print

Take the following steps ① and ②, and then, see "Setting Example" to set logging print.

① Press (MODE) key to turn on " ▭PRINT" indicator lamp.

② Press both (PGM) and (ENT) keys simultaneously for about 3seconds to unlock the keys.

< Setting Example > Logging print run : ON1, Logging print intervals : 30minutes



[Reference] Initial Setting

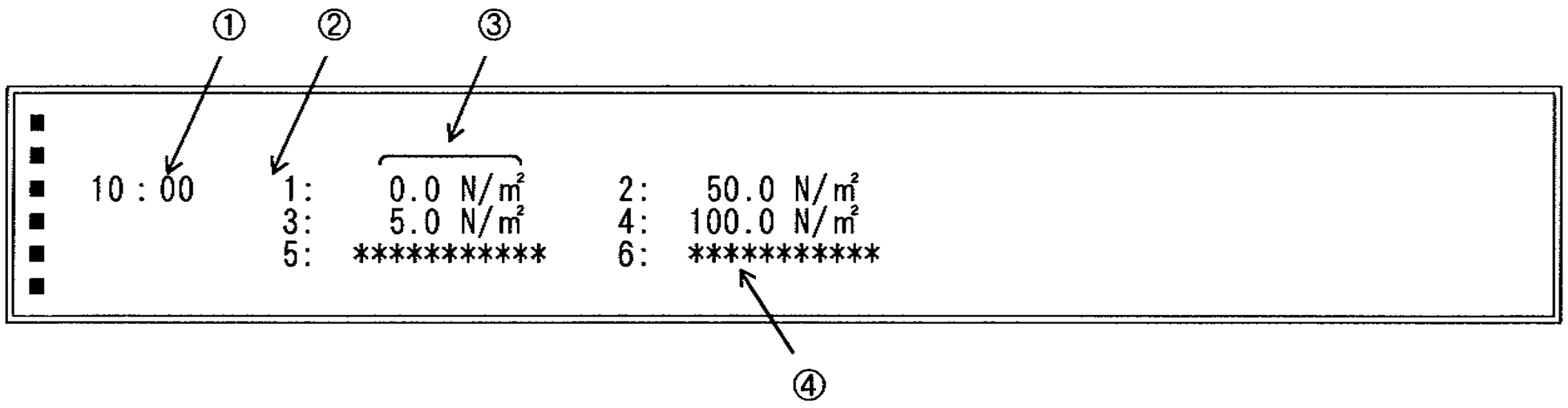
Logging print run : ON2

Logging print intervals : 6hours

Fig. 7.3 Logging Print Setting Example

Display (2)	Screen Name	Function
on 1	Logging print run (Chart paper forced feed)	Performs logging print. Once printing is initiated, the chart paper is fed forcibly, including a line feed according to the printing format. Data sampling is suspended during printing.
on2	Logging print run (Chart paper feed synchronous)	Performs logging print. Since printout is performed according to the set chart paper feed rate, analog recording is not suspended. To perform log printing properly, it is necessary to set the chart paper feed rate higher than the specified value. (See Page 33)
oFF	Logging print cancel	Does not perform time printout.

Logging Print Example



① Time ② Channel Number ③ Measured Value ④ When Dot Print Skip Is Set

Fig. 7.4 Logging Print Example

[Note] Logging print Intervals

Display (2)	Printout Intervals	Start Time Setting	Min. Chart Speed for Logging Print ※
10M	10minutes 00, 10, 20, 30, 40, and 50minutes of every hour	Disallowed	144 mm / h
20M	20minutes 00, 20, and 40minutes of every hour	Disallowed	72 mm / h
30M	30minutes 00 and 30minutes of every hour	Disallowed	48 mm / h
1H	1hour Every hour	Disallowed	24 mm / h
2H	2hours 00, 02, 04, ····· 22hours	Disallowed	12 mm / h
3H	3hours 00, 03, 06, ····· 21hours	Disallowed	8 mm / h
4H	4hours 00, 04, 08, ····· 20hours	Disallowed	6 mm / h
6H	6hours 00, 06, 12, and 18hours	Disallowed	4 mm / h
8H00	8hours Start time, start time + 8, and start time + 16hours	Allowed	4 mm / h
12H00	12hours Start time and start time + 12hours	Allowed	2 mm / h
24H00	24hours Daily start time	Allowed	2 mm / h

※ The minimum chart speed shows an example for the 12-Multipoint type recorder.

7 – 6 Dot Print Skip

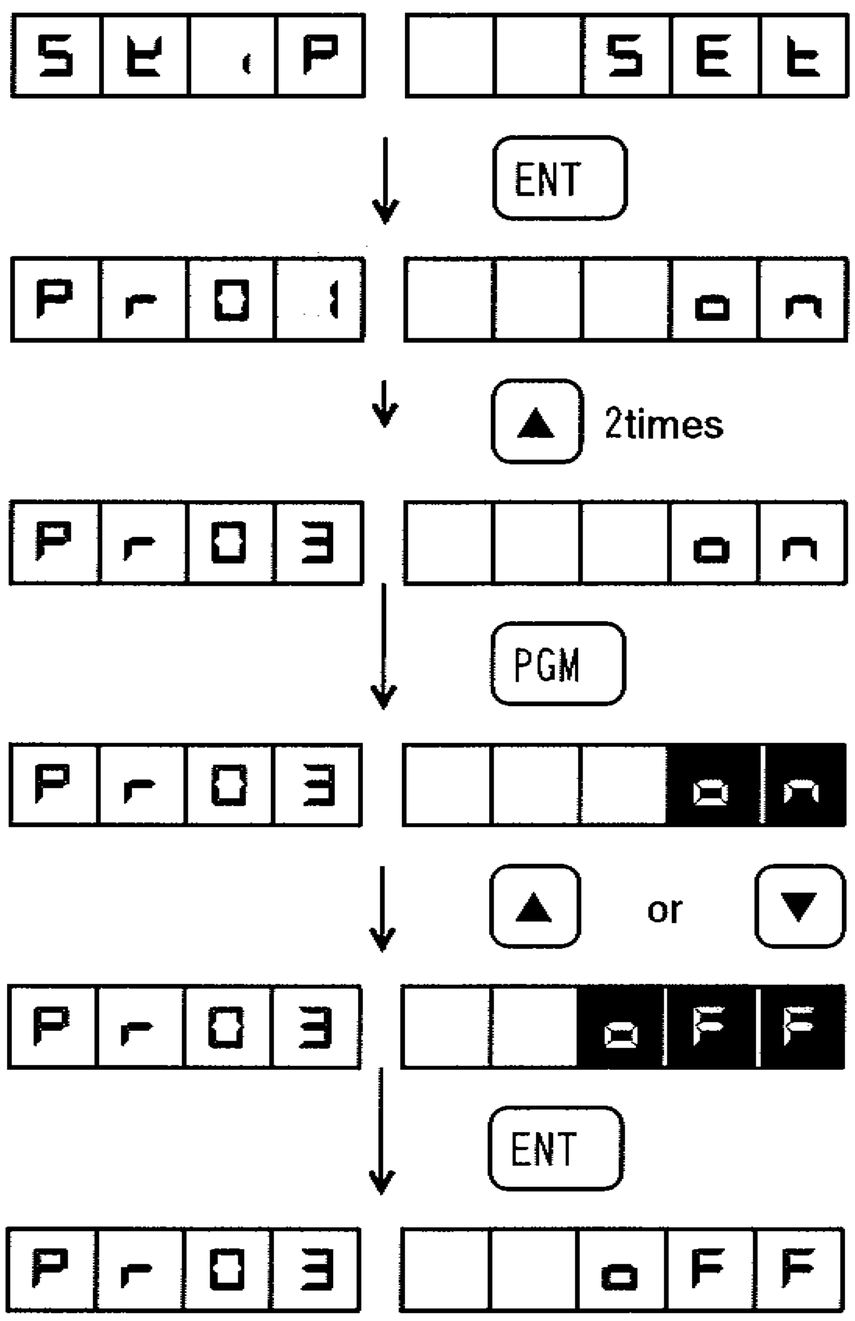
In this section, you set a dot print skip channel as follows.

① Press both [PGM] and [ENT] keys simultaneously for about 3seconds to unlock the keys.

② Press [MODE] key to turn on " PRINT" indicator lamp.

③ Use [▲] or [▼] key to display " SET P" .

< Setting Example > Skipping dot printing for the channel-3.



[Reference] Functioning of Dot Print Skip Channel

① Does not perform dot printing.

② Does not display a measured value in the AUTO or MANUAL mode.

③ Does not output an alarm.

④ Prints a measured value with "*" in logging print.

[Note]

" ■ " denotes a blinking LED.

[Note]

The setting state can be cancelled by pressing [◀] or [MODE] key.

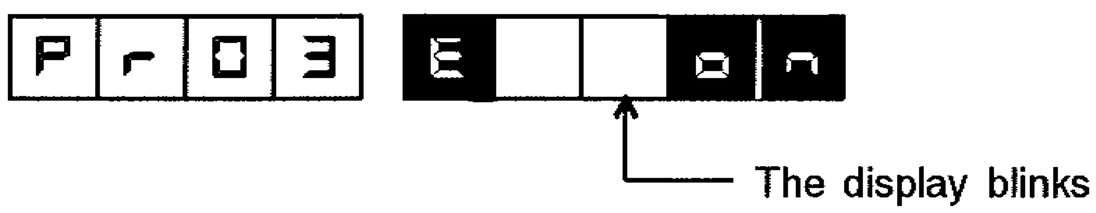
Fig. 7.5 Dot Print Skip Setting Example

[Note]

Dot print skip cannot be set for all the channels.

If so attempted, the display will blink as follows to prohibit it.

Select at least one channel.



In this section, you confirm and set the alarms.

Screen Configuration

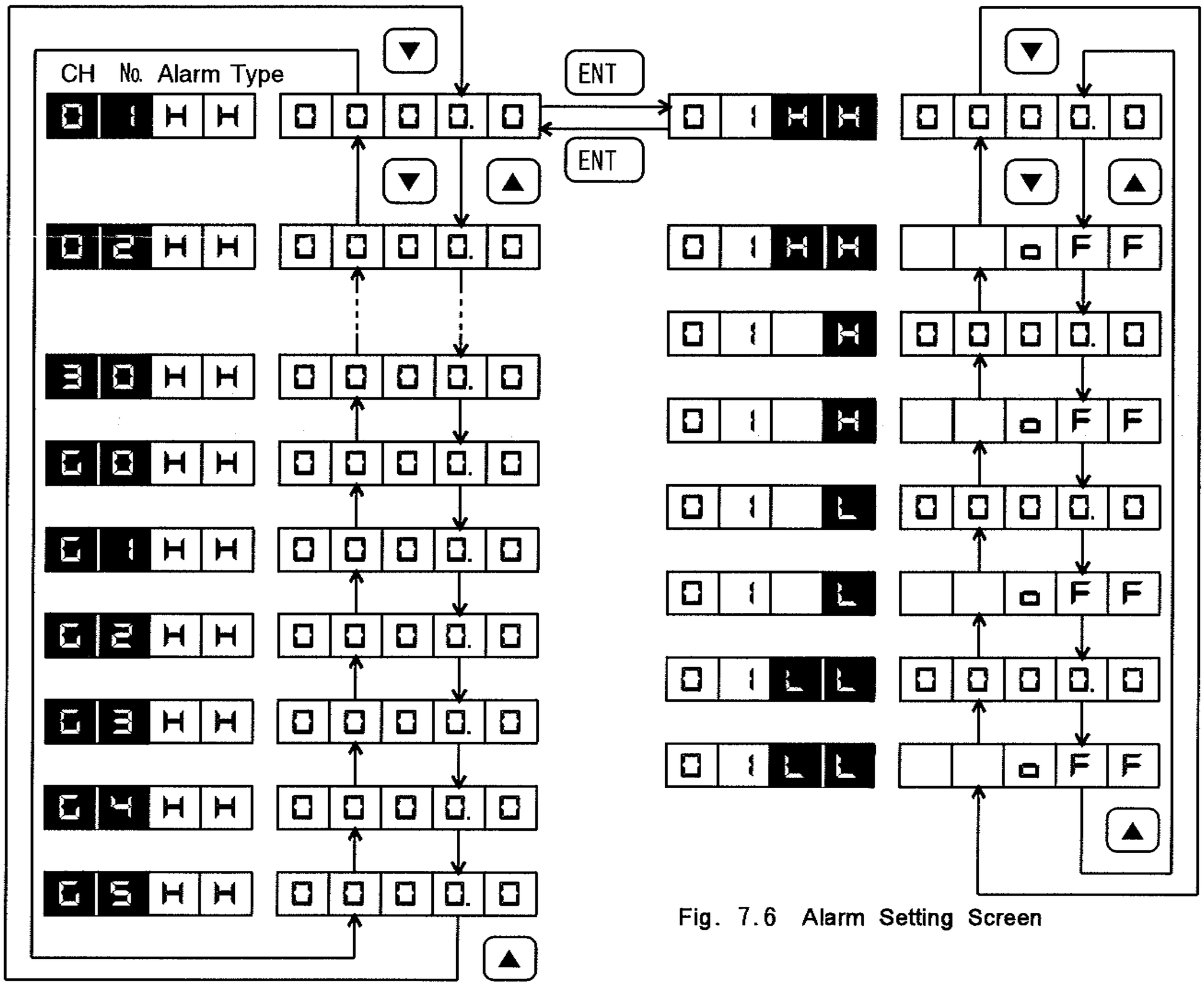


Fig. 7.6 Alarm Setting Screen

[Note]
In addition to alarm setting per channel, you can collectively set them by groups.
There are 5groups; G0(all channels), G1(channels 1 to 6), G2(channels 7 to 12), G3(channels 13 to 18), G4(channels 19 to 24), and G5(channels 25 to 30).
When confirming the set values, the data of the first channel in that group is displayed.

List of Alarm Setting Items

Table 7.2 List of Alarm Setting Items

Display(1) Ex. Channel 1	Alarm	Description	Settable Range
0 1 HH	HH alarm	Activated when a measured value is higher than an alarm set value.	-19999～99999 [Note] A decimal point position complies with the set value in the setup data.
H	H alarm		
LL	LL alarm	Activated when a measured value is lower than an alarm set value.	
L	L alarm		

[Note]
An alarm is outputted synchronously with dot printing.

[Reference]
① One alarm output can be set for each alarm item.
② The same alarm output number can be specified for a different alarm type or different channel.

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7 − 7 Alarm (▭ALARM)

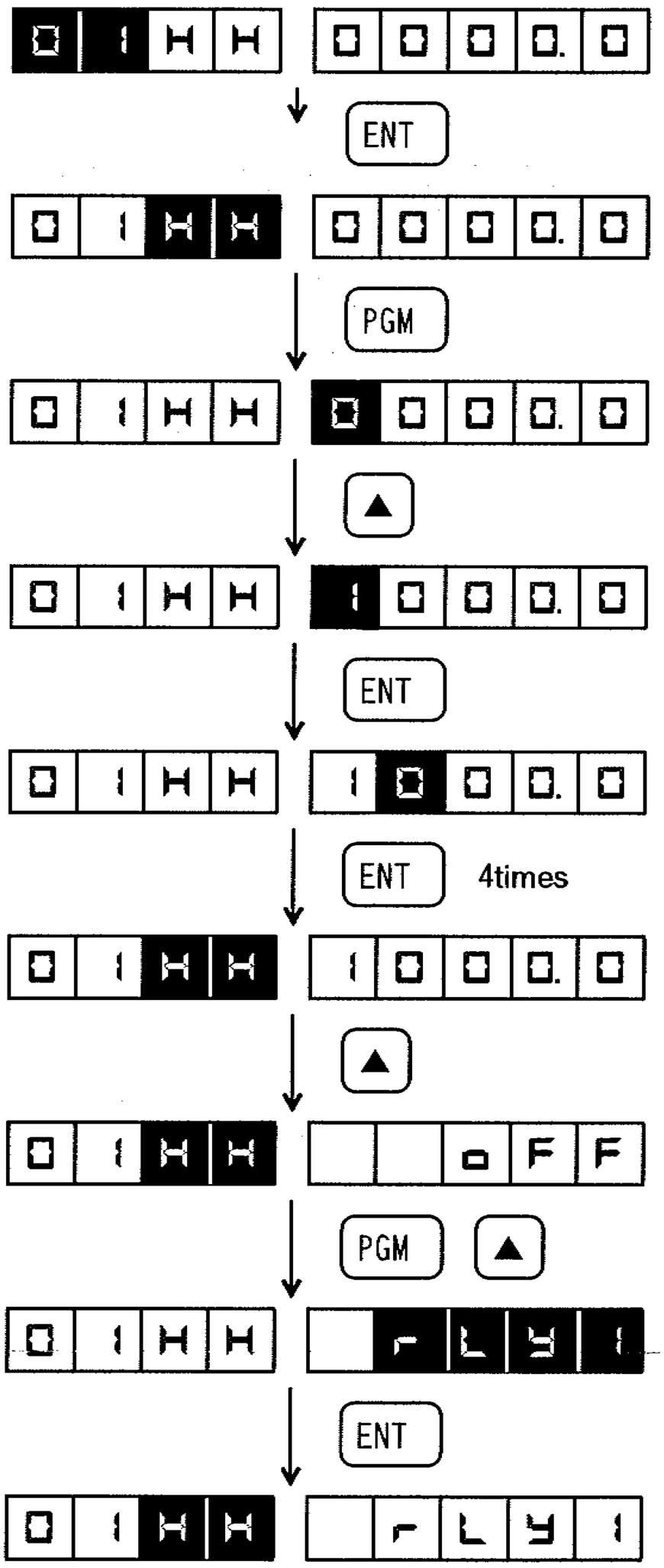
Set the alarm according to the setting example below.

< Setting Example > Setting a HH alarm value 1000.0 for the channel-1 and assigning an alarm output to the RLY1

① Press [MODE] key to turn on " ▭ALARM" indicator lamp.

② Press both [PGM] and [ENT] keys simultaneously for about 3seconds to unlock the keys.

③ Set an alarm value and alarm output relay number.



[Note]

"■" denotes a blinking LED.

(End of setting)

Fig. 7.7 Alarm Setting Example

8. SETUP　8 − 1 Setup Mode

In this section, you set the setup data(input range, burnout operation, scaling/recording scale, unit, printing function, alarm hysteresis, DI function, communication rate/address) and conduct an operation test on the display.

[Notes]

① Upon delivery, the setup data have been set according to the specifications given to us upon ordering.
② When the setup data is altered, the previous data cannot be restored even if the instrument is turned off.

Switching to the Setup Mode

0 1 ‥ ‥　‥ 1 0 0. 0　MANUAL mode (MAN)
Press [MODE] key to illuminate " ▭MAN" indicator lamp.

① Unlock the keys. (Press [PMG] + [ENT] simultaneously for 3 seconds or more. Make sure that " ▭KEY LOCK" indicator lamp is turned off.)
② Switch to the Setup mode. (Press [▼] + [ENT] simultaneously for 3 seconds or more.)

0 1 r G　‥ n u ‥ 1　Setting the input range → See Page 38
↓ [MODE] " ▭CHART" lamp illuminated

0 1 b 0　‥ ‥ o F F　Setting the burnout operation → See Page 40
↓ [MODE] " ▭CHART" lamp illuminated

0 1 S C　‥ ‥ S E t　Setting the recording scale value → See Page 41
↓ [MODE] " ▭CHART" lamp illuminated

0 1 U t　‥ ‥ 2 3 1　Setting the printing unit code → See Page 44
↓ [MODE] " ▭CHART" lamp illuminated

P r ‥ t　‥ ‥ ‥ o n　Setting the printing function → See Page 48
↓ [MODE] " ▭PRINT" lamp illuminated

H y S ‥　‥ 0 0 0. 5　Setting the alarm hysteresis width → See Page 50
↓ [MODE] " ▭ALARM" lamp illuminated

d 1 - 1　‥ ‥ o F F　Setting the DI function, communication rate, etc. → See Page 51
↓ [MODE]

d 1 S P　‥ t E S t　Display test mode → See Page 54
↓ [MODE]

E n d ‥　‥ ‥ ‥ ‥ ‥　End of the setup mode
[MODE]　[ENT]

[Note]
" ■ " denotes a blinking LED.

Return to the AUTO mode

Fig. 8.1 Setup Mode

[Notes]

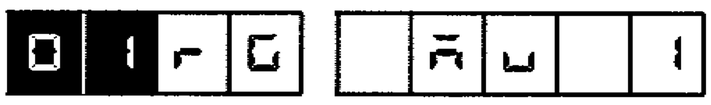
① In the setup mode," ▭AUTO" and " ▭MAN" indicator lamps are blinking.
② In the setup mode, measurement and dot printing are not performed, but the chart paper is fed.

8 – 2 Setting the Input Range

In this section, you set the input range. (A setting example is shown on Page 39)

① Selecting the Channel Where You Want to Set the Input Range

When selecting the channel-1, use ▲ or ▼ key to select the following:



② Selecting the Setting Item

Press PGM key.

The right screen blinks.

Use ▲ or ▼ key to select the input range,

and press ENT key.

[Note]
"■" denotes a blinking LED.

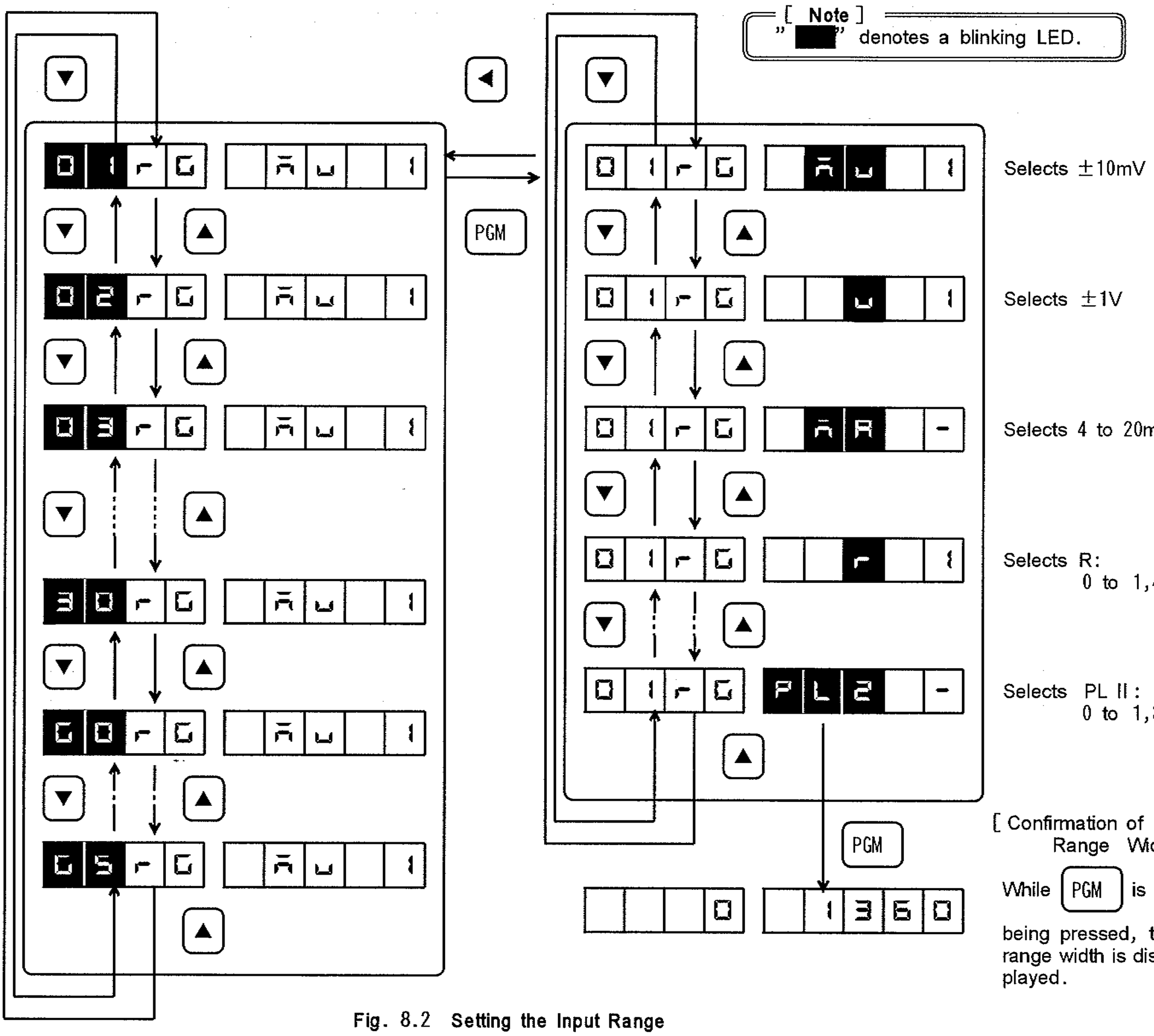


Fig. 8.2 Setting the Input Range

[Note]
In addition to input range setting per channel, you can collectively set it by groups. There are 5 groups; G0(all channels), G1(channels 1 to 6), G2(channels 7 to 12), G3(channels 13 to 18), G4(channels 19 to 24), and G5 (channels 25 to 30). When confirming a set value, the data of the first channel in that group is displayed.

[Note]
Page 39 shows the input range display symbols versus range widths.

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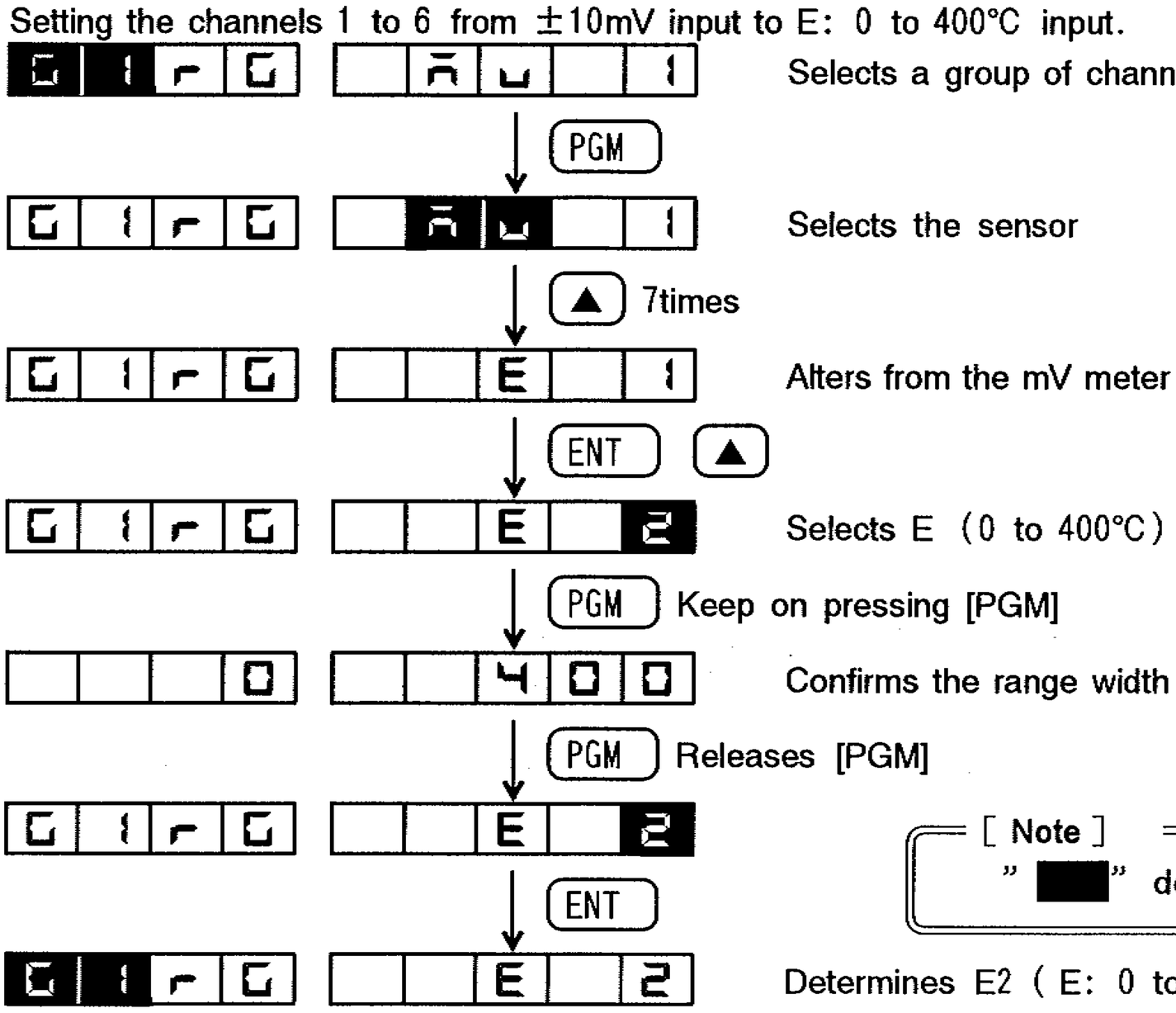
③ Setting Example

Setting the channels 1 to 6 from ±10mV input to E: 0 to 400℃ input.



[Note]
" ■ " denotes a blinking LED.

Fig. 8.3 Input Range Setting Example

Range Code	Display Symbol	Range Width	Range Code	Display Symbol	Range Width
001		±10mV	031		J 0～500℃
002		±50mV	032		J -200～650℃
003		±200mV	033		J -200～300℃
004		±1V	034		J -200～500℃
005		±5V	035		J -200～900℃
006		±20V	036		J -200～750℃
007		0-5V	037		T 0～150℃
008		1-5V	038		T 0 ～400℃
009		4-20mA	039		T -200～350℃
010		R 0～1450℃	040		T -200～400℃
011		R 0～1760℃	041		G 0～ 2320℃
012		S 0～1760℃	042		C 0～ 2320℃
013		B 0～1830℃	043		N 0～ 900℃
014		K 0～ 100℃	044		N 0～ 1260℃
015		K 0～ 700℃	045		PR40-20 0～1880℃
016		K 0～ 900℃	046		U -200～400℃
017		K -200～100℃	047		L -200～900℃
018		K -200～400℃	048		Au-Fe 0～300℃
019		K -200～650℃	049		JPt100at0℃ -50～100℃
020		K -200～1370	050		JPt100at0℃ -200～600℃
021		K 0～1000℃	051		Pt100at0℃ -50～100℃
022		E 0～ 150℃	052		Pt100at0℃ -200～600℃
023		E 0～ 400℃	053		Pt50at0℃ -50～100℃
024		E -200～500℃	054		Pt50at0℃ -100～250℃
025		E -200～600℃	055		Pt50at0℃ -200～550℃
026		E -200～900℃	056		Cu10Ωat25℃ -50～200℃
027		E -200～250℃	057		Cu10Ωat0 ℃ -50～200℃
028		E -200～400℃	058		PLⅡ 0～1360℃
029		E -200～700℃	059		
030		J 0～150℃	060		

Table 8.1 Range Codes Table

8 – 3 Setting Burnout Operation

In cases of mV input(200mV range excluded) or thermocouple input, you can set burnout analog recording operation just in case the input is disconnected.

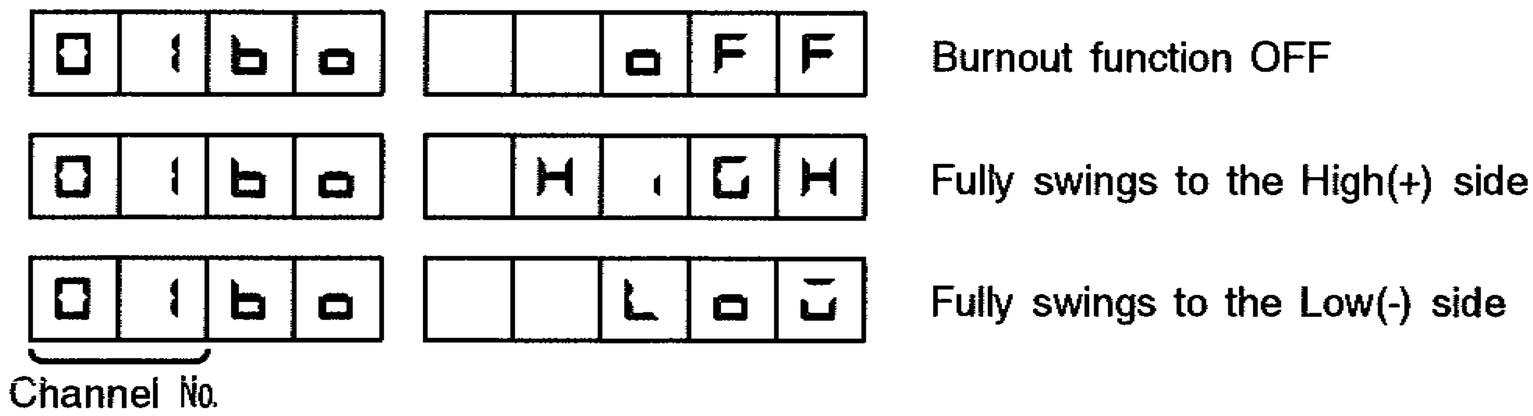
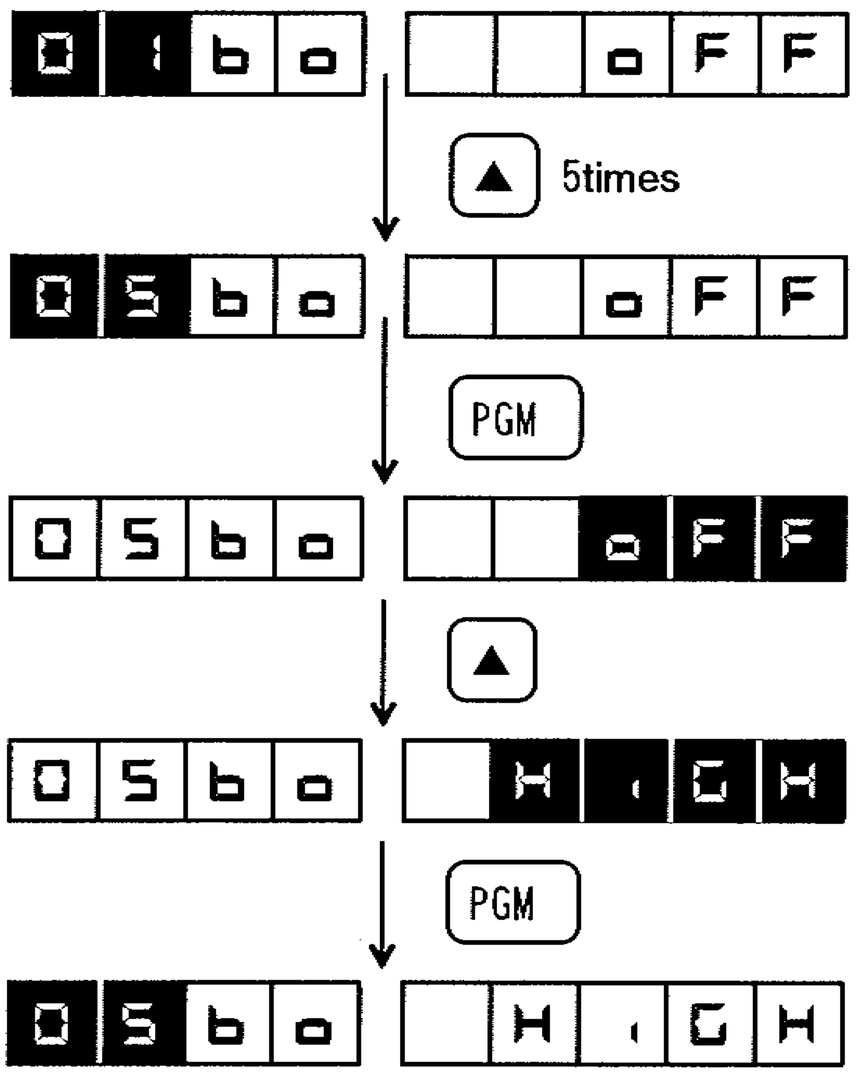


Fig. 8.4 Burnout Screen Configuration

< Setting Example >

Setting Burnout High for the channel 5



[Note]

See Page 37 for how to call this screen.

[Note]

" ■ " denotes a blinking LED.

Fig. 8.5 Burnout Setting Example

8 – 4 Setting the Recording Scale Value

In this section, you set the zero and span points for the recording scale and a decimal point position for the display and printout. When scaling is required for the mV, V, or mA meter, set in this mode.

Also set in this mode when making zone recording.

① Recording scale setting screen configuration (in case of mV, V, or mA meter)

Recording scale value setting screen

[Note]
" ■ " denotes a blinking LED.

< Input Zero >
Sets an input range zero point.

< Scale Zero >
Sets a recording scale zero point.

< Input Span >
Sets an input range span point.

< Scale Span >
Sets a recording scale span point.
Sets a decimal point position for the display and printout.

< Position Zero >
Sets a zero point indicating position for zone recording.

< Position Span >
Sets a span point indicating position for zone recording.

[Note]
When zone recording is not made, it is unnecessary to set the position zero/span point.

Fig. 8.6 Recording Scale Value Setting Screen

[Note]
See Page 43 for thermocouple or resistance thermometer bulb input.

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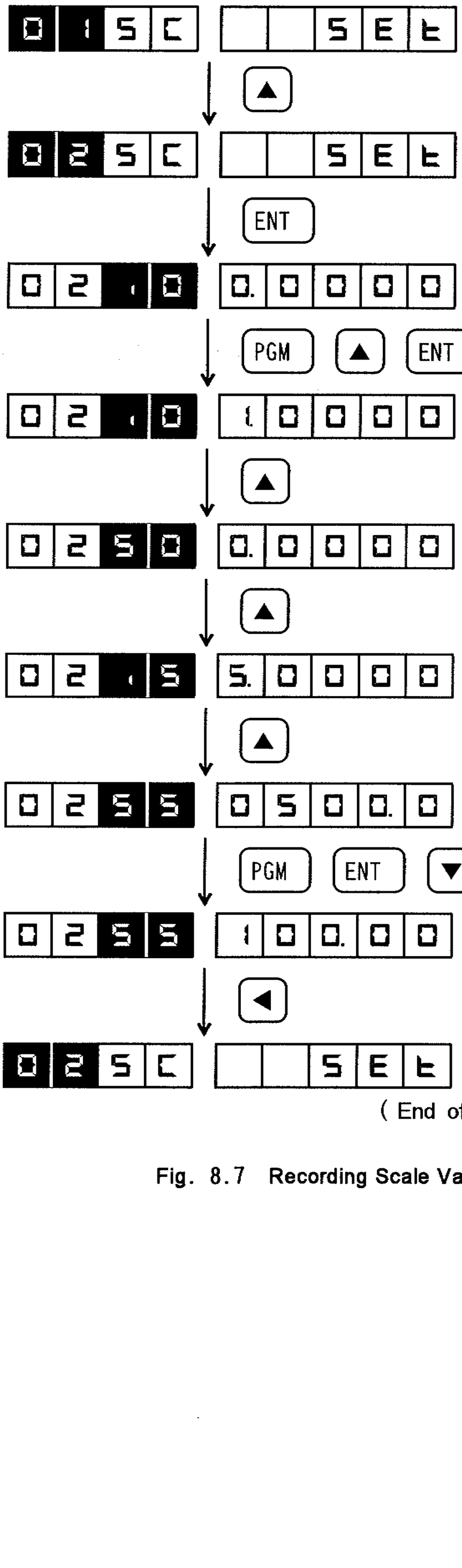
8 – 4 Setting the Recording Scale Value

< Setting Example >

Changing 0 to 5V input range, 0.0 to 500.0 display/recording range to 1 to 5V input range, 0.00 to 100.00 display/recording range, respectively, for the channel 2.



[Note]
" ■ " denotes a blinking LED.

Selects the channel 2.

Changes a zero point input value from 0 to 1.

Changes a span point scale value from 500.0 to 100.00.

[Note]
The decimal point position for the display and printout is determined here.

(End of setting)

Fig. 8.7 Recording Scale Value Setting Example

8 – 4 Setting the Recording Scale Value

② Recording scale setting screen configuration
(in case of thermocouple or resistive temperature detector input)

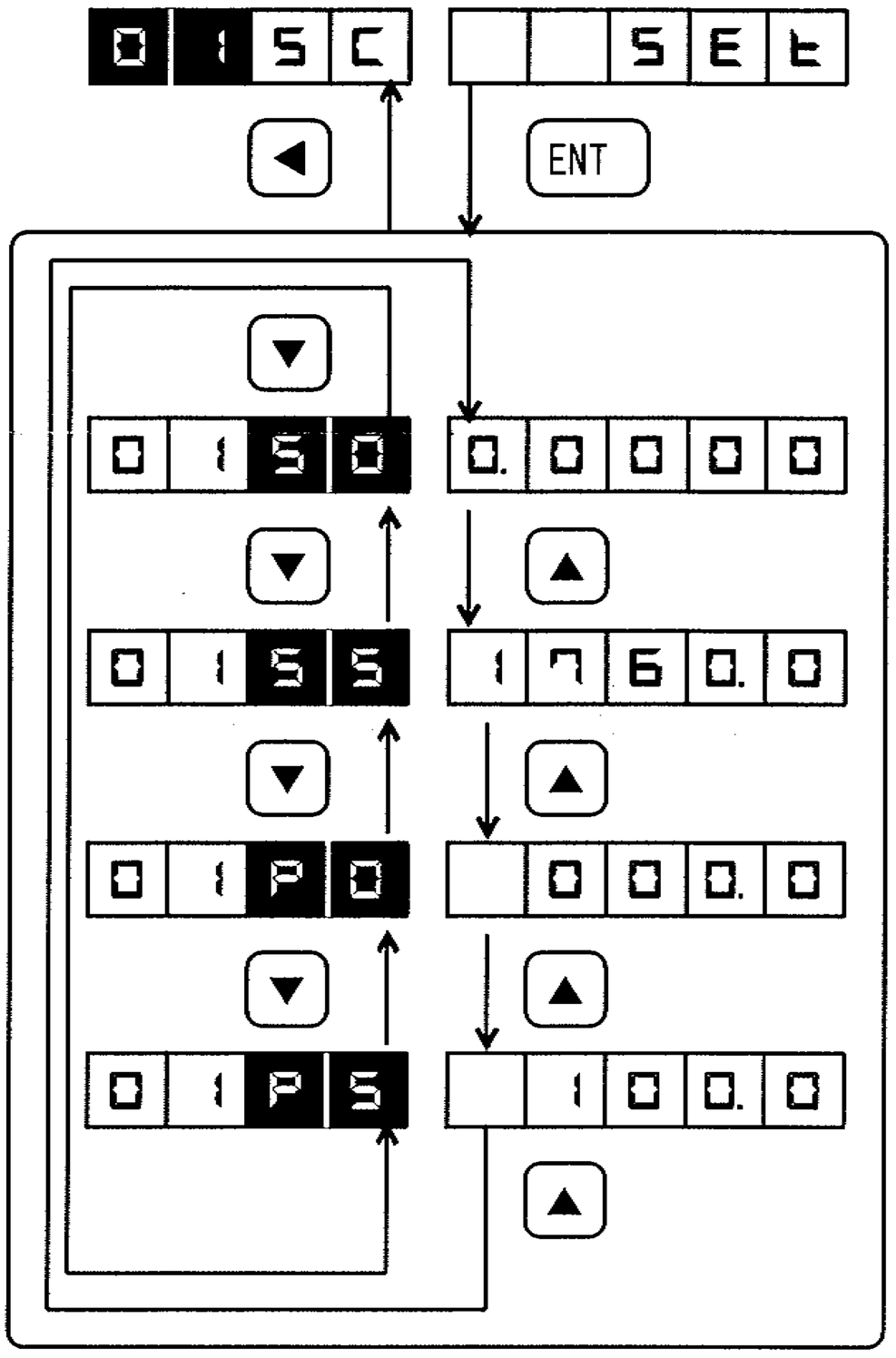


Fig. 8.8 Recording Scale Value Setting Screen

Recording scale value setting screen

[Note]
" ■ " denotes a blinking LED.

< Scale Zero : Zero Point Scale Value >
Sets an input range zero point.

< Scale Span : Span Point Scale Value >
Sets a recording scale span point.
Sets a decimal point position for the display and printout.

< Position Zero >
Sets a zero point indicating position for zone recording.

< Position Span >
Sets a span point indicating position for zone recording.

[Note]
When zone recording is not made, it is unnecessary to set the position zero/span point.

< Setting Example >
Changing the setting for the channel 1 from 0 to 1,760℃ to 1,000 to 1,600℃.

Fig. 8.9 Re Setting Example

[Note]
See Page 41 for mV, V, or mA input.

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8 – 5 Setting the Printout Unit Code

In this section, you set a printout unit code for measured values according to the unit codes list (Pages 45 and 47).

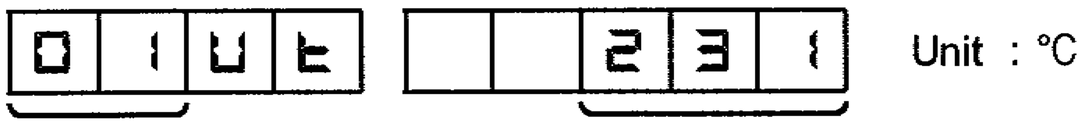
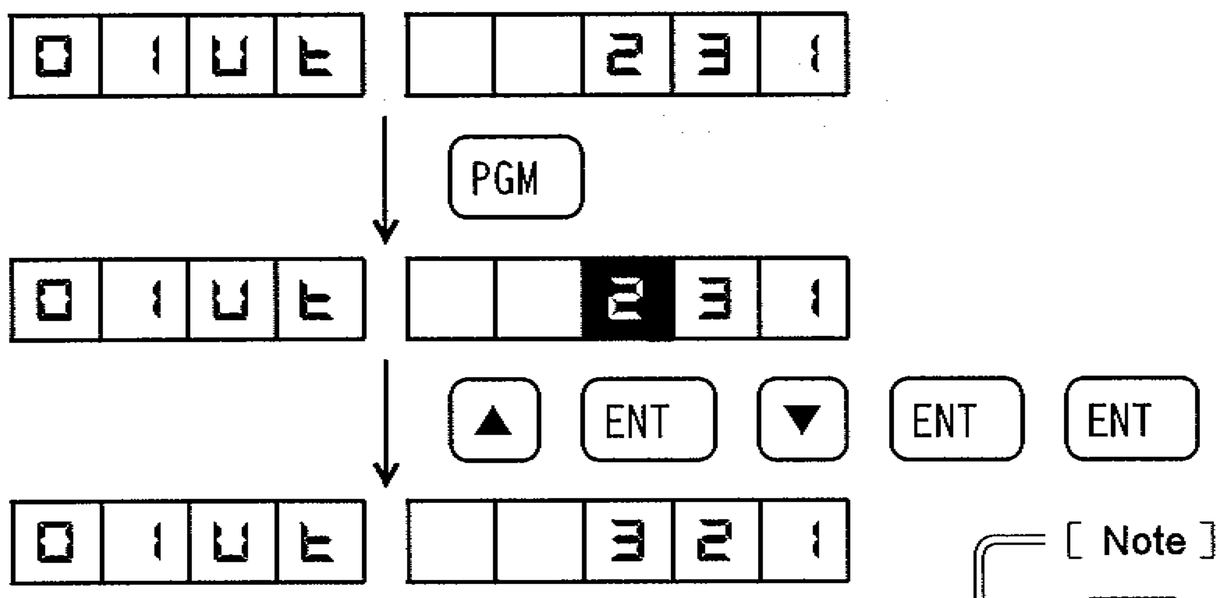


Fig. 8.10 Printout Unit Code Setting Screen

< Setting Example >

Changing the unit for the channel 1 from ℃ (unit code : 231) to MV (unit code : 321) .



[Note]

" ■ " denotes a blinking LED.

Fig. 8.11 Printout Unit Code Setting Example

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1	Sep.1'98	Kawara	Horao	Oda	

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8 – 5 Setting the Printout Unit Code

	Unit Code	Symbol		Unit Code	Symbol		Unit Code	Symbol
STANDARD	00	m	ROTATING SPEED	50	s^{-1}	SPEED	100	m／s
	01	km		51	min^{-1}		101	m／min
	02	cm		52	r／min		102	m／h
	03	mm		53	------		103	km／h
	04	μm		54	------		104	cm／s
	05	nm		55	rps		105	cm／min
	06	Å		56	rpm		106	cm／h
	07	°		57	rph		107	mm／s
	08	′		58	------		108	mm／min
	09	″		59	m^{-1}		109	mm／h
	10	m^2	MASS	60	kg		110	rad／s
	11	km^2		61	g		111	rad／min
	12	cm^2		62	mg		112	rad／h
	13	mm^2		63	μg		113	------
	14	------		64	------		114	------
	15	a		65	t		115	°／s
	16	ha		66	u		116	°／min
	17	------		67	------		117	°／h
	18	rad		68	ct		118	kn
	19	sr		69	car		119	kt
	20	m^3	DENSITY	70	kg/m^3	ACCELERATION	120	m/s^2
	21	km^3		71	t/m^3		121	------
	22	cm^3		72	g/m^3		122	------
	23	mm^3		73	g/cm^3		123	------
	24	------		74	------		124	------
	25	L		75	kg／L		125	rad/s^2
	26	kL		76	g／L		126	$°/s^2$
	27	mL		77	mg／L		127	------
	28	------		78	mol／L		128	Gal
	29	------		79	L／moL		129	------
TIME	30	s		80	kg/m^2	DYNAMIC	130	N
	31	ks		81	t/m^2		131	MN
	32	ms		82	g/m^2		132	kN
	33	μs		83	g/cm^2		133	mN
	34	------		84	kg/cm^2		134	------
	35	y		85	------		135	kgm／s
	36	mon		86	------		136	------
	37	d		87	------		137	kgf
	38	h		88	mol/m^3		138	gf
	39	min		89	m^3／mol		139	------
FREQUENCY	40	Hz		90	kg／m	MOMENT	140	Nm
	41	GHz		91	t／m		141	MNm
	42	MHz		92	g／m		142	kNm
	43	kHz		93	g／cm		143	mNm
	44	------		94	mg／m		144	------
	45	cps		95	------		145	kgm^2/s
	46	cpm		96	tex		146	kgm^2
	47	cph		97	mol		147	kgfm
	48	c		98	mol／kg		148	kgfcm
	49	c／s		99	kg／mol		149	gfcm

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3						

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8 – 5 Setting the Printout Unit Code

	Unit Code	Symbol		Unit Code	Symbol		Unit Code	Symbol
PRESSURE	150	Pa	ENERGY	200	J	FLOW	250	kg／s
	151	MPa		201	GJ		251	kg／min
	152	kPa		202	MJ		252	kg／h
	153	mPa		203	kJ		253	------
	154	hPa		204	mJ		254	------
	155	------		205	------		255	------
	156	------		206	ev		256	t／s
	157	------		207	Mev		257	t／min
	158	------		208	kev		258	t／h
	159	------		209	------		259	------
	160	N／m^2		210	------		260	m^3／s
	161	N／mm^2		211	------		261	m^3／min
	162	------		212	------		262	m^3／h
	163	------		213	------		263	------
	164	------		214	------		264	------
	165	------		215	------		265	------
	166	------		216	------		266	L／s
	167	------		217	------		267	L／min
	168	------		218	------		268	L／h
	169	------		219	------		269	------
	170	N／m	ENGINEERING	220	W		270	Bq
	171	mN／m		221	GW		271	Gy
	172	------		222	MW		272	C／kg
	173	------		223	kW		273	Sv
	174	------		224	mW		274	------
	175	------		225	------		275	mr／h
	176	------		226	------		276	Ci
	177	------		227	------		277	rad
	178	------		228	------		278	R
	179	------		229	------		279	rem
VISCOSITY	180	Pas	TEMPERATURE	230	K	RADIOACTIVITY	280	cd
	181	mPas		231	° C		281	cd／m^2
	182	m^2／s		232	° F		282	Lx
	183	mm^2／s		233	mK		283	Lxs
	184	------		234	K^{-1}		284	------
	185	------		235	------		285	------
	186	------		236	------		286	sb
	187	------		237	------		287	ph
	188	------		238	------		288	------
	189	------		239	------		289	------
	190	m^3／s		240	J／K		290	Lm
ACOUSTIC	191	m^2／s		241	kJ／K		291	Lm／m^2
	192	m／s		242	J／(kgK)		292	Lm／w
	193	km／s		243	kJ／(kgK)		293	Lms
	194	W／m^2		244	J／kg		294	Lmh
	195	------		245	kJ／kg		295	------
	196	Pas／m		246	W／(mK)		296	W／sr
	197	Pas／m^3		247	W／(m^2K)		297	W／(srm^2)
	198	Ns／m		248	J／mol		298	W／m^2
	199	------		249	J／(molK)		299	------

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8 – 5 Setting the Printout Unit Code

	Unit Code	Symbol
CURREUT	300	A
	301	MA
	302	kA
	303	mA
	304	μA
	305	nA
	306	A m²
	307	A／m
	308	A／m²
	309	Oe
VOLTAGE	310	V
	311	MV
	312	kV
	313	mV
	314	μV
	315	------
	316	V／m
	317	kV／m
	318	mV／m
	319	------
ELECTRIC POWER	320	W
	321	MW
	322	kW
	323	mW
	324	μW
	325	VA
	326	kVA
	327	Mvar
	328	var
	329	kvar
ELECTRIC RESISTANCE	330	Ω
	331	MΩ
	332	kΩ
	333	mΩ
	334	μΩ
	335	MΩcm
	336	Ωm
	337	kΩm
	338	mΩm
	339	μΩm
INDUCTANCE	340	H
	341	mH
	342	μH
	343	nH
	344	pH
	345	------
	346	H／m
	347	μH／m
	348	nH／m
	349	H⁻¹

	Unit Code	Symbol
STATIC CAPACITY	350	F
	351	mF
	352	μF
	353	nF
	354	pF
	355	------
	356	F／m
	357	μF／m
	358	nF／m
	359	------
CONDUCTANCE	360	S
	361	kS
	362	mS
	363	μS
	364	μS／cm
	365	------
	366	S／m
	367	MS／m
	368	kS／m
	369	------
QUANTITY OF ELECTRICITY	370	C
	371	kC
	372	mC
	373	μC
	374	nC
	375	pC
	376	Ah
	377	Cm
	378	C／m²
	379	C／m³
FLUX	380	Wb
	381	mWb
	382	Wbm
	383	Wb／m
	384	kWb／m
	385	Mx
	386	T
	387	mT
	388	μT
	389	Gs
OTHERS	390	%
	391	‰
	392	ppm
	393	ppb
	394	dB
	395	pH
	396	phon
	397	Nm³／h
	398	Unit
	399	------

	Unit Code	Symbol
OTHERS	400	------
	401	mSv／h
	402	Sv／h
	403	μSv／h
	404	------
	405	mGy／h
	406	Gy／h
	407	μGy／h
	408	------
	409	mBq／h
	410	Bq／h
	411	μBq／h
	412	------
	413	
	414	
	415	
	416	
	417	
	418	
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8 – 6 Setting the Printing Function

In this section, you set whether time print, date print, alarm on print, or alarm recovery on print is to be provided/unprovided.

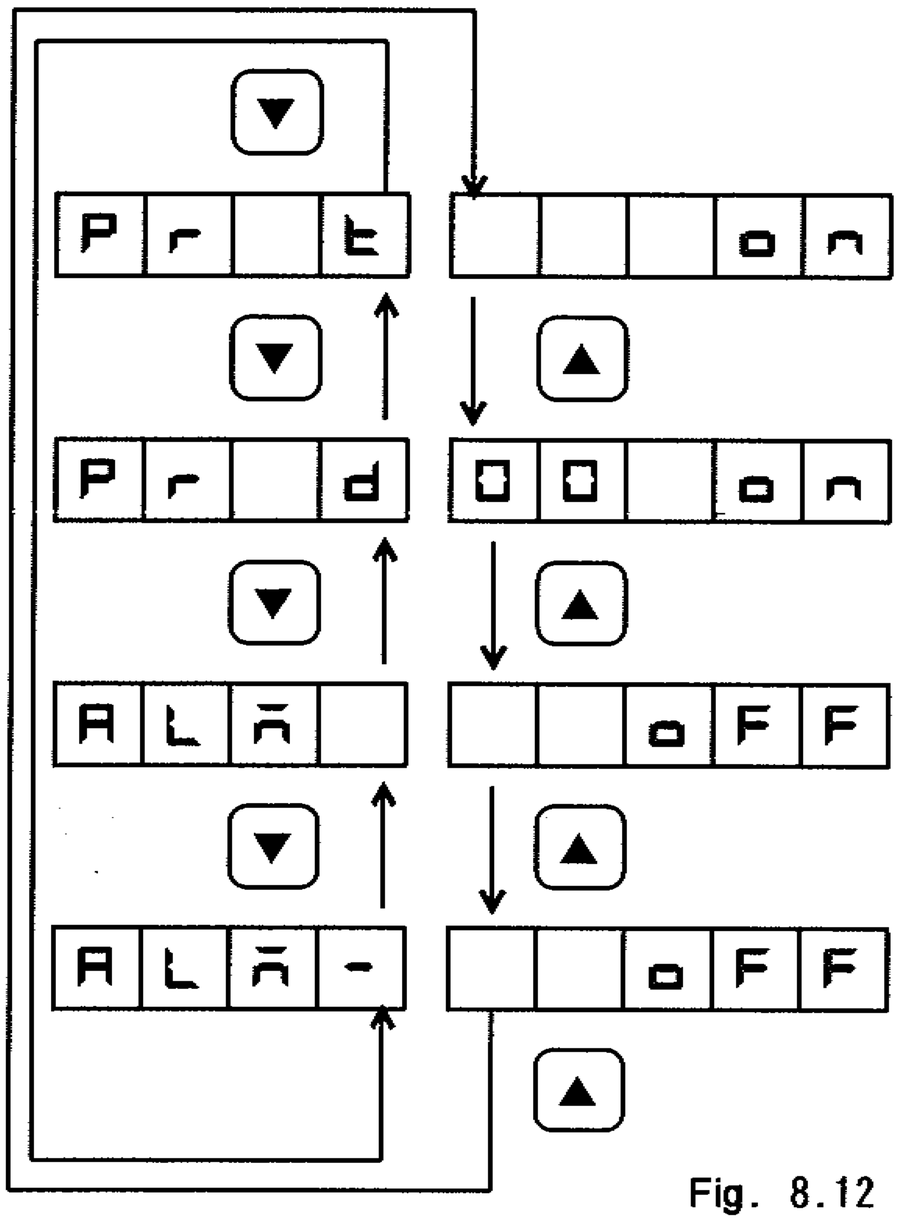
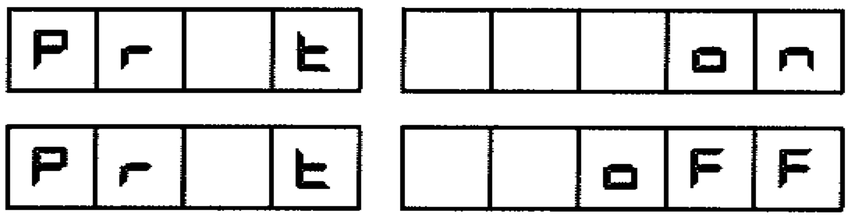


Fig. 8.12 Printing Function Setting Screen Configuration

Setting Time Print Operation

You set whether time print is to be provided or unprovided. When altering the setting, press PGM ▲ ENT keys in that order.

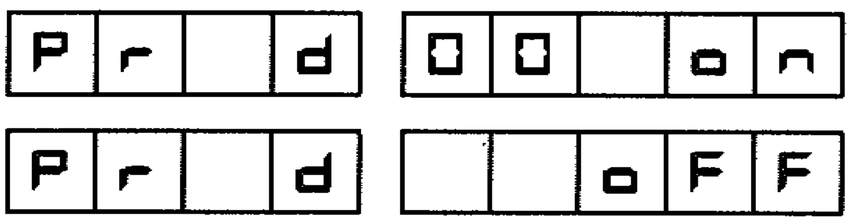


[Reference]
An initial value is " on" .

Fig. 8.13 Time Print Setting Screen

Setting Date Print Operation

You set whether date print is to be provided or unprovided.



[Reference]
An initial value is
" 00 on" .

Printed time by an hour also can be set with date printout function.

Fig. 8.14 Date Print Setting Screen

< Setting Example >

Providing date print at 5:00

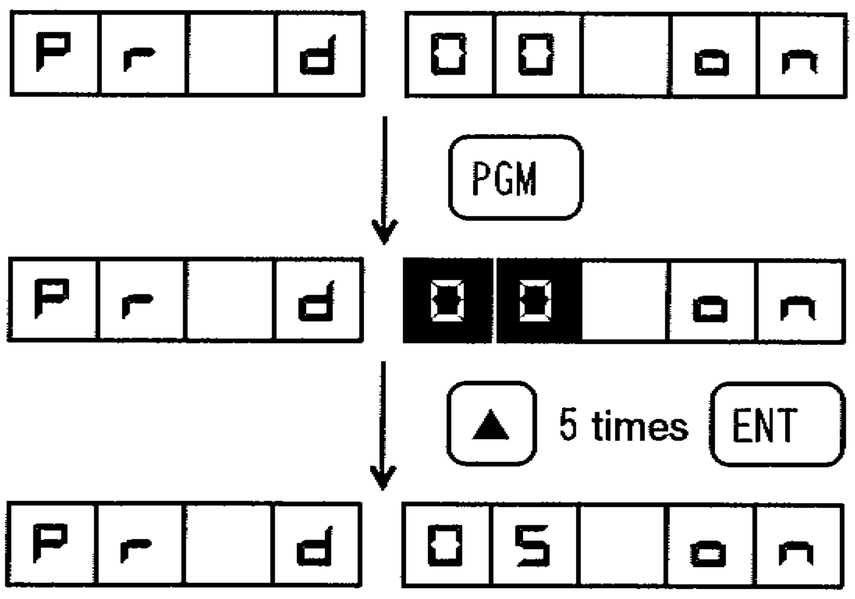
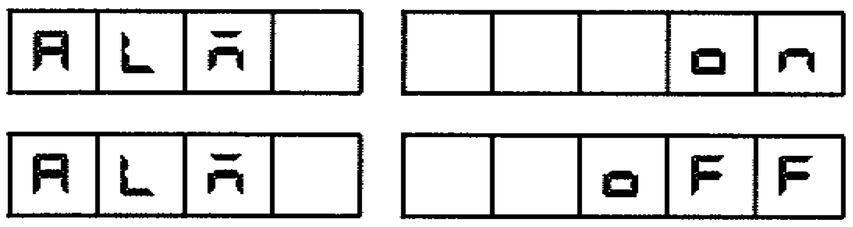


Fig. 8.15 Date Print Setting Example

[Note]
" ■ " denotes a blinking LED.

Setting Alarm on Print

You set whether alarm on print is to be provided or unprovided. When altering the setting, press PGM ▲ ENT keys in that order.



Provided

Unprovided

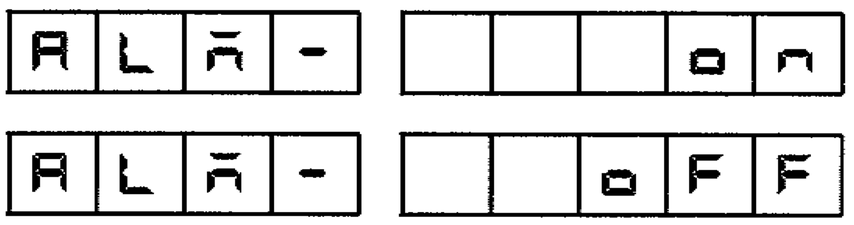
Fig. 8.16 Alarm on Print Setting Screen

[Reference]

An initial value is "oFF" unless otherwise specified.

Setting Alarm Recovery on Print

You set whether alarm recovery on print is to be provided or unprovided.
When altering the setting, press PMG ▲ ENT keys in that order.



Provided

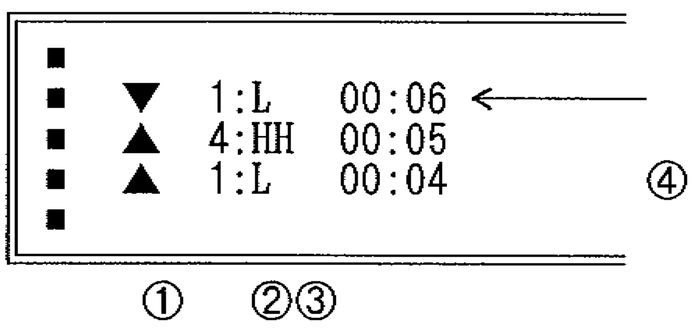
Unprovided

Fig. 8.17 Alarm Recovery on Print Setting Screen

[Reference]

An initial value is "oFF" unless otherwise specified.

< Printout Example >



Prints with red in alarm on print, with purple in alarm recovery on print.

① Alarm mark (▲ : Outbreak, ▼ : Reset)

② Alarm channel number

③ type

④ Alarm(recovery) time

Fig. 8.18 Alarm on Print and Alarm Recovery on Print Example

[Note]

Printout complies with the printing priority on Page 25.

This print can wait one dot during its execution.

Note that 2-dot or more alarm/alarm recovery on print is disabled.

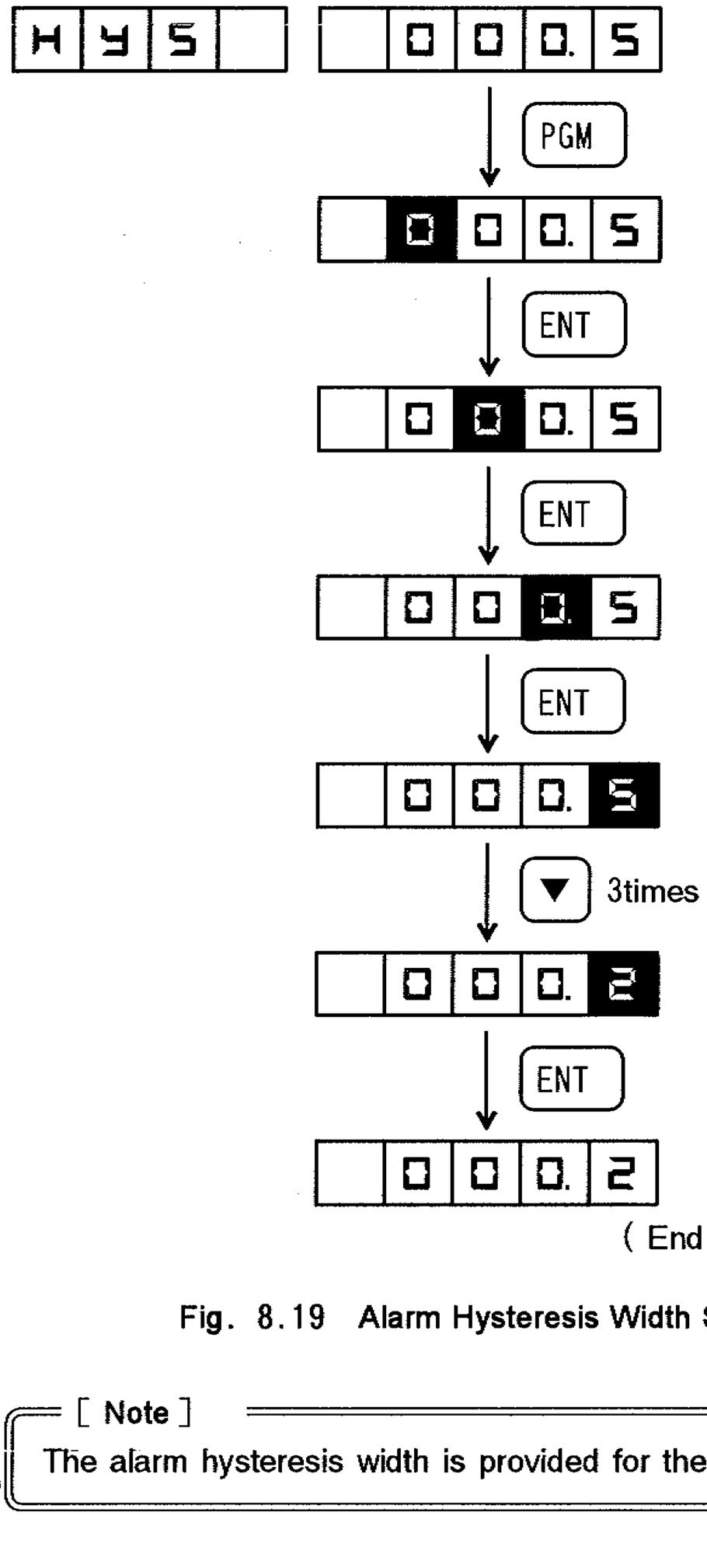
8 – 7 Setting the Alarm Hysteresis Width

In this section, you set a hysteresis width at the time of alarm recovery judgment.
This setting is common to all the channels.

HYS	0005	Sets the alarm hysteresis width.

< Setting Example >

Changing the alarm hysteresis width from 0.5 to 0.2.



[Reference]

An initial value is " 0.5 "
unless otherwise specified.

[Note]

" ■ " denotes a blinking LED.

(End of setting)

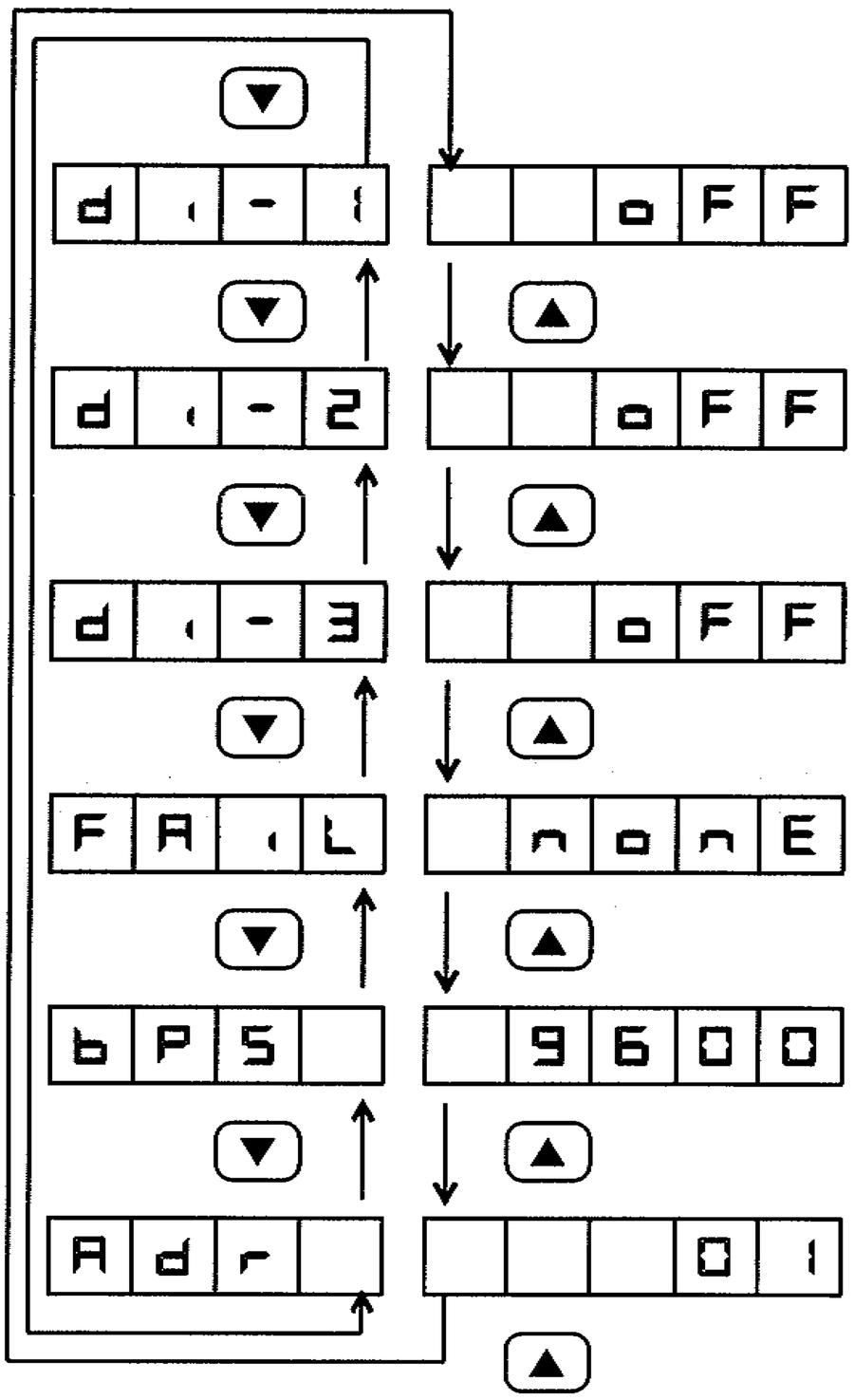
Fig. 8.19 Alarm Hysteresis Width Setting Example

[Note]

The alarm hysteresis width is provided for the full scale of the digital display value.

8 – 8 Setting the DI Function, Communication Rate, Etc.

In this mode, you set the DI1-DI3 functions, fail output relay, communication rate, and communication local address.



Sets the DI (1) function → See Page 51

Sets the DI (2) function → See Page 52

Sets the DI (3) function → See Page 52

Sets the fail output relay → See Page 53

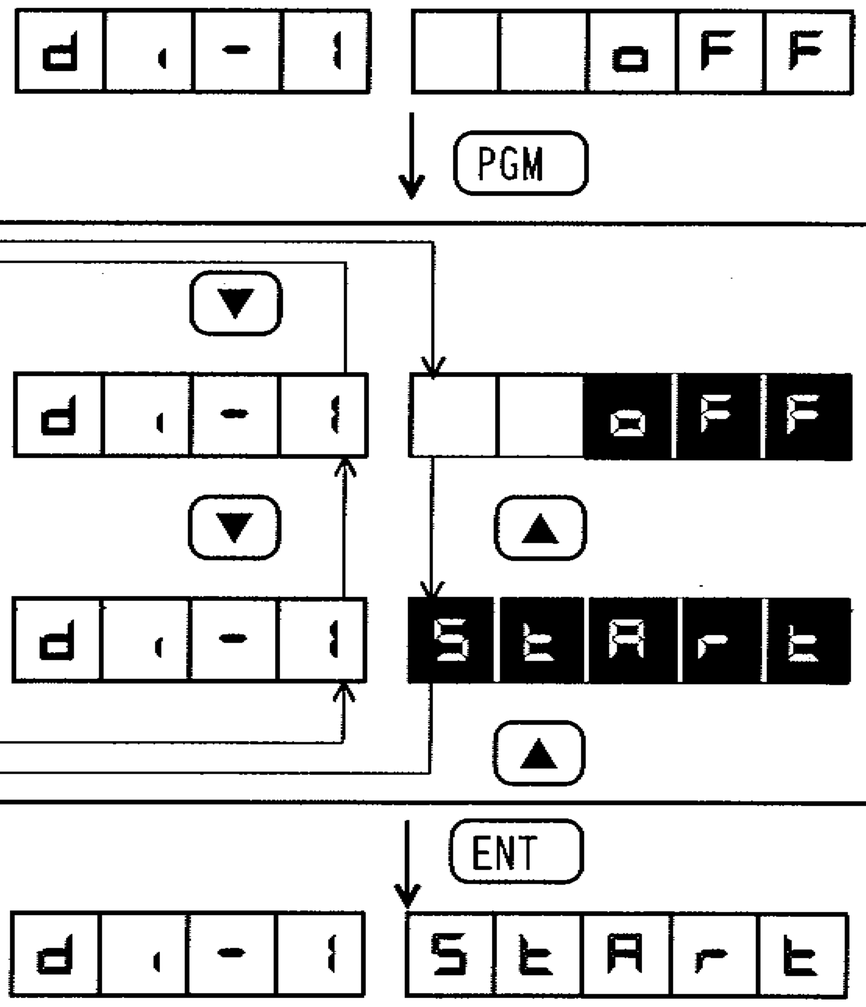
Sets the communication rate → See Page 53

Sets the communication local address → See Page 53

Fig. 8.20 DI Function, Communication Rate, Etc. Setting Screen Configuration

Setting the DI (1) function

You can select the " chart paper start/stop " function for the first DI (DI1).



Sets the DI (1) function

No function

Enables the chart start/stop function

(End of setting)

[Note]

" ■ " denotes a blinking LED.

Fig. 8.21 DI (1) Setting Screen

DI (1) State	Chart Paper Feed State
ON	Start state
OFF	Stop state (Indication and dot printing provided.)

[Note]

To use this function, optional " 5DIs " is required.

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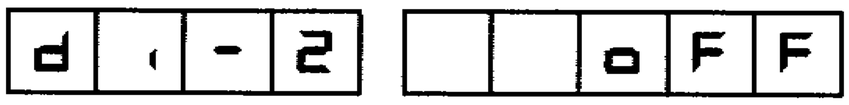
Setting the DI (2) Function

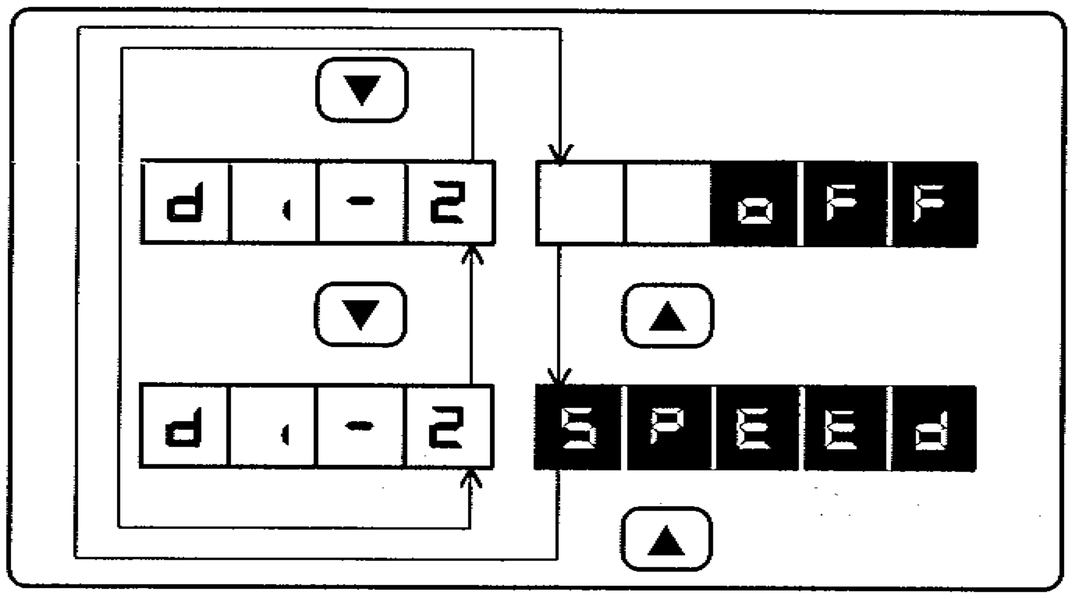
You can select the " chart speed function " for the second DI (DI2) .



Sets the DI (2) function

[Note]
" ■ " denotes a blinking LED.

PGM



No function

Enables the chart speed selection function

ENT

(End of setting)

Fig. 8.22 DI (2) Setting Screen

DI (2) State	Chart Speed Selection
ON	1st speed
OFF	2nd speed

[Note]
To use this function, optional " 5DIs " is required.

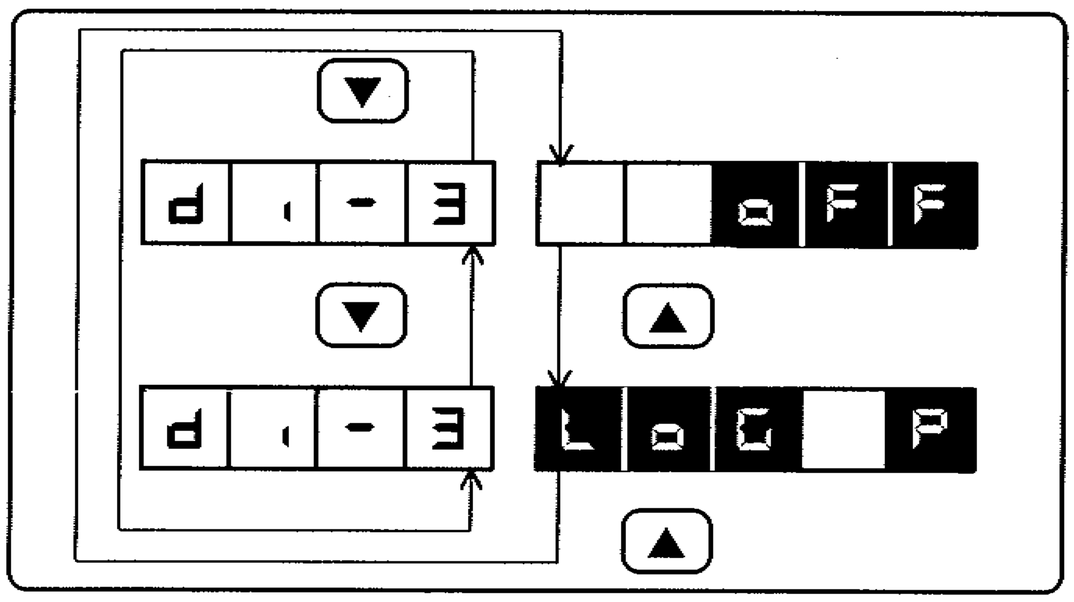
Setting the DI (3) Function

You can select the " external logging print start function " for the third DI (DI3) .

Sets the DI (3) function

[Note]
" ■ " denotes a blinking LED.

PGM



No function

Enables the external logging print start function

ENT

(End of setting)

[Note]
To use this function, optional " 5DIs " is required.

Fig. 8.23 DI (3) Setting Screen

DI (3) State	External Logging Print Start
OFF→ON	Starts logging print (synchronous printing)

8 – 8 Setting the DI Function, Communication Rate, Etc.

Setting the Fail Output Relay

When an error occurs inside the recorder, a relay is driven to output its status.
The relay number to be outputted is RLY No.8 which cannot be altered.
In this section, you set on/off of this function and the logic upon output.

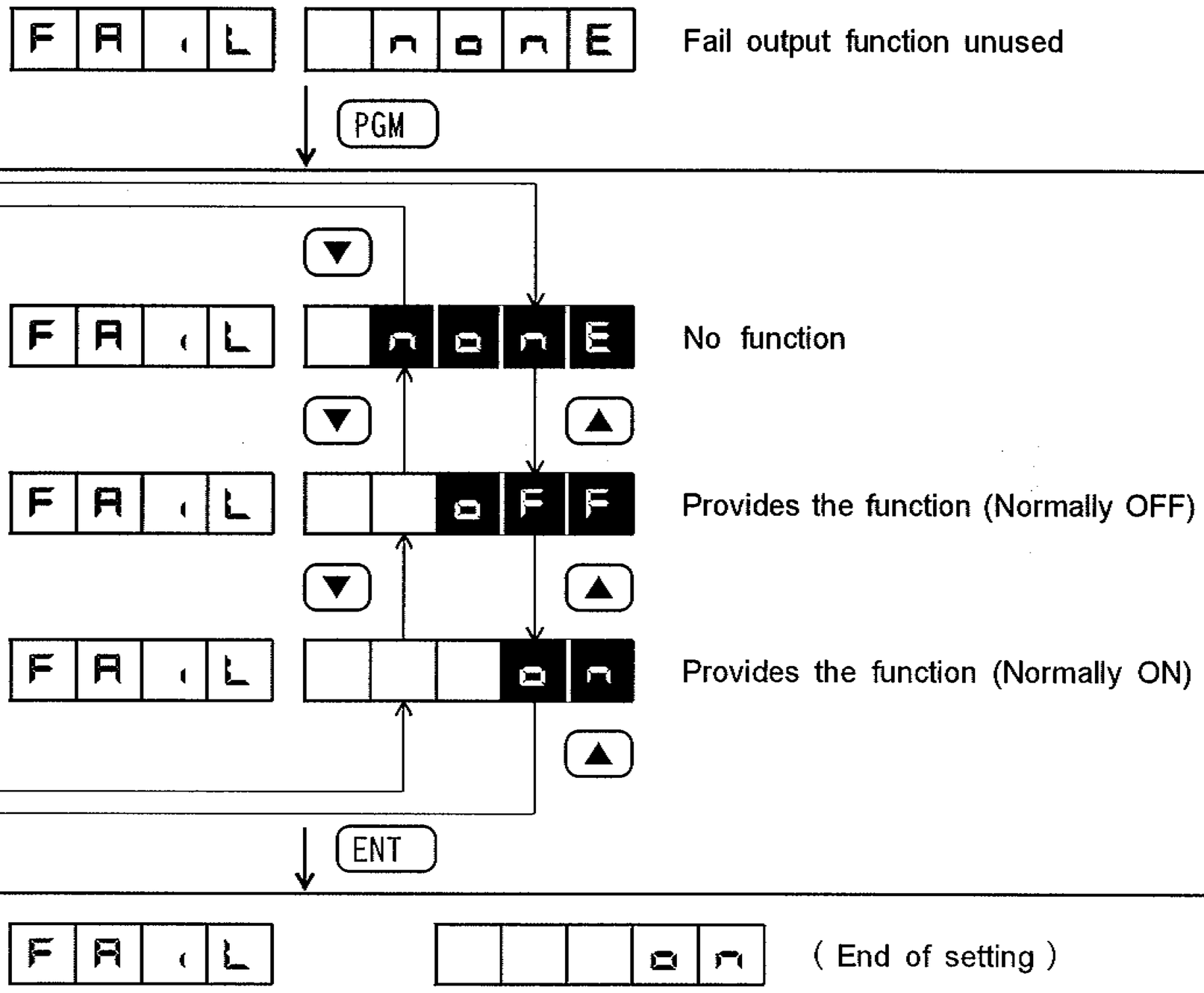


Fig. 8.24 Setting the Fail Output Relay

Fail output relay operation by above-mentioned settings are as shown below.
(The example below assumes that an individual alarm output has been assigned to the No.8 relay.)

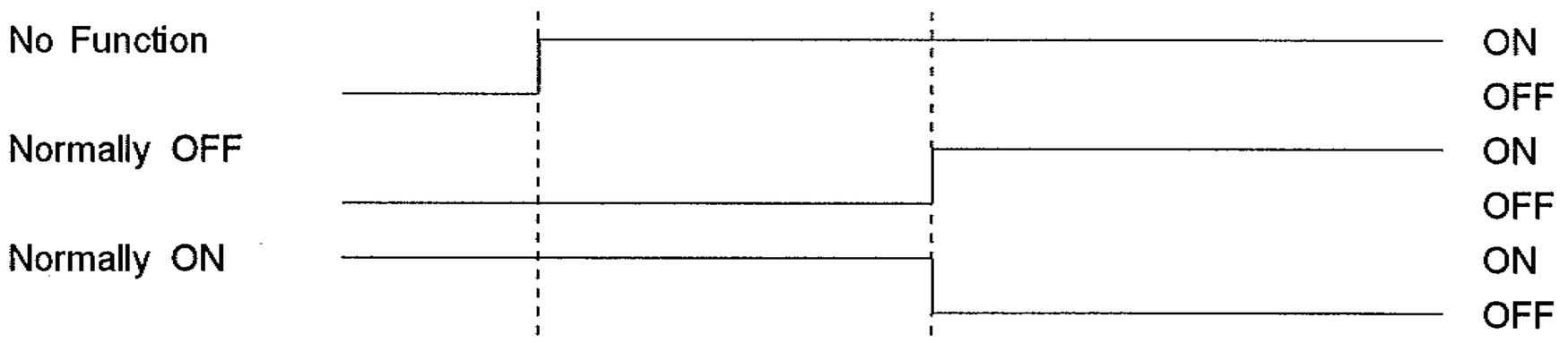
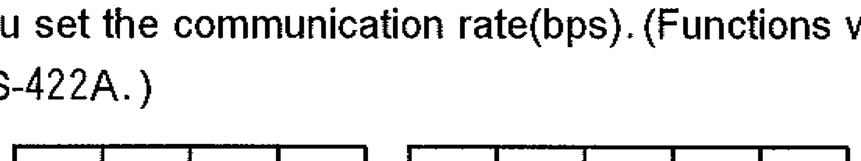


Fig. 8.25 Relay Output Operation

Setting the Communication Rate

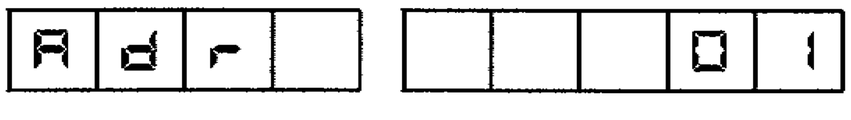
You set the communication rate(bps). (Functions when you specify a communication option, RS-232C or RS-422A.)



(Select 19200, 9600, 4800, 2400, or 1200.)

Setting the Communication Local Address

You set the local address. (Functions when you specify a communication option, RS-422A.)



(Setting range : 01 to 15)

8 – 9 Display Unit Test Mode

In this mode, all the display LEDs are turned on by operating as follows to diagnose hardware related troubles.

Display Test Method

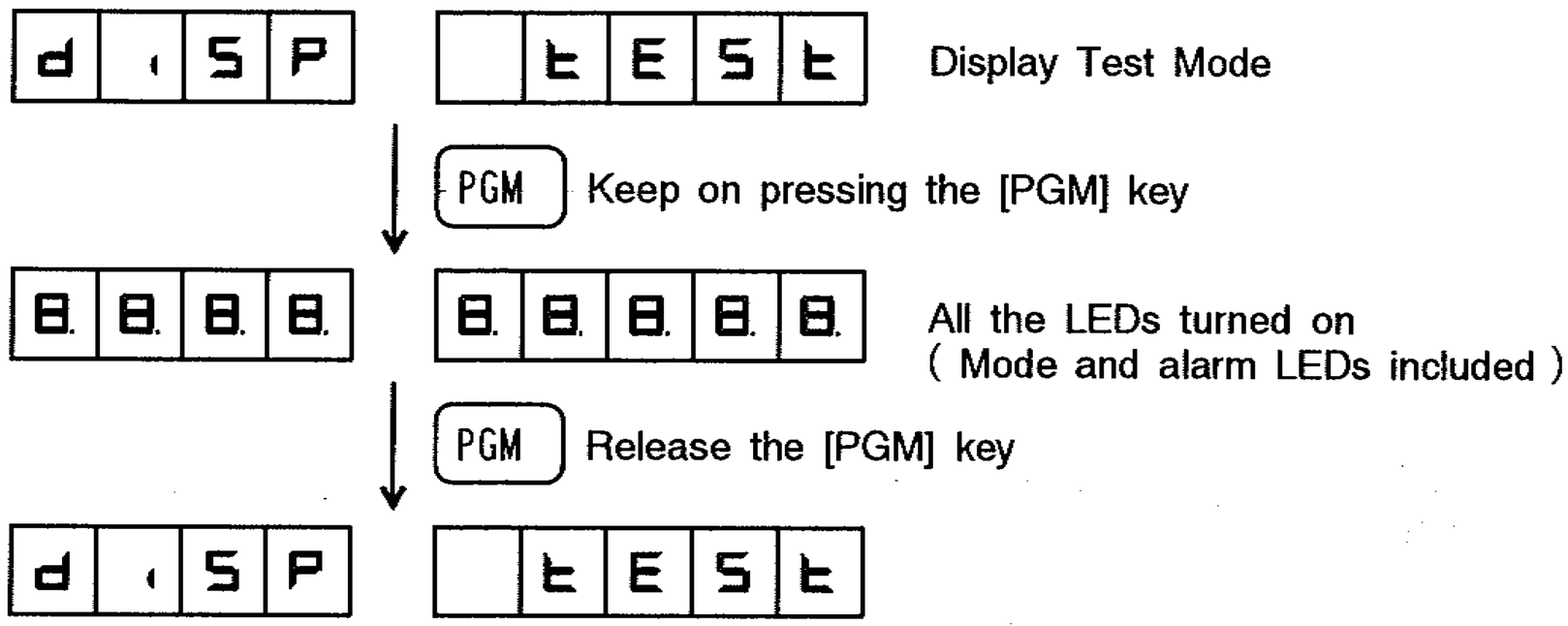


Fig. 8.26 Display Unit Test Screen

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9. MAINTENANCE

9 — 1 Daily Inspections

Inspect the following items. When a defect is found, see 11-1 Troubleshooting(Pages 70 to 73).

Inspection Items

- **Isn't the cursor fully swung ?**

- **Are recording and indication done properly ?**
  - Any big error in a display value or dot printing position ?
  - Any improper dot printing?
  - Any blurred dot printing or printout ?
  - Proper printout ?

- **Is the chart paper fed properly ?**
  - Is the chart paper folded properly ?
  - Aren't the feed holes in the chart paper torn off or broken ?
  - Is the chart paper feed rate correct ?

- **Is there any abnormal sound ?**

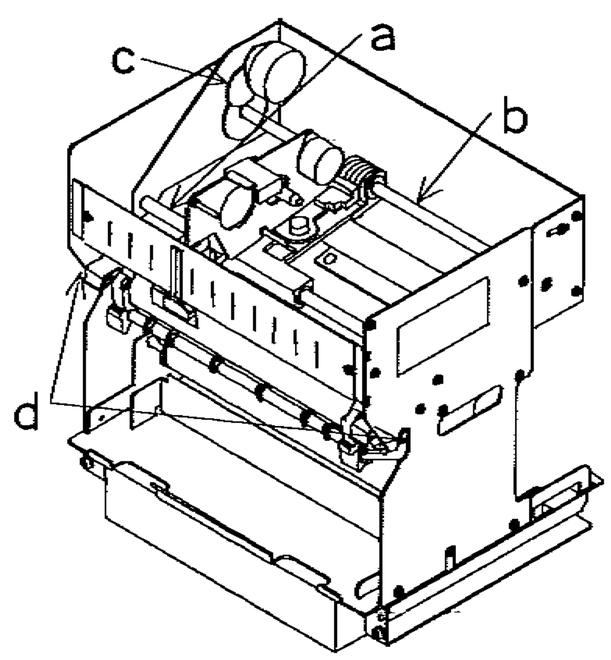
Consumable Parts

Table 9.1 List of Consumable Parts

NO.	Consumable Part	Part Number	Remarks
1	Chart paper	HZCAA1025AF001	Uniform scale divided into 100 (when provided as a standard accessory)
2	Ribbon cassette	HPSR001H0005	
3	Lubricant	H4A12290	LAUNA 40 produced by NIPPON OIL (or its equivalent)
4	Drive cable	HPSU018B10	
5	Fuse	WPSJ011D000001A	250V 2A (T2A)

Maintenance and Servicing]

Table 9.2 Maintenance and Servicing List

Maintenance/ Servicing Item	Remedy
Chart Paper	(1) When the chart paper is running out, a red mark appears on the right of the chart paper. Replace it immediately . **⚠ CAUTION** 1 If dot printing or printout is performed with no chart paper installed, ink may adhere to the sprocket drum or the printer and sprocket drum may be damaged. Be sure to perform dot printing or print with the chart paper installed. 2 It is recommended to use our standard chart paper to ensure proper recording. **Reference** 1 The full length of the chart paper is 23 m. 2 Draw out the main unit. You can check a remaining amount of the chart paper through the remaining chart paper check window located on the right side of the main unit.
Ribbon Cassette	(1) When recording with a ribbon, a dot printing color phases out. To ensure clear recording, replace the ribbon cassette as early as possible. (2) Use the ribbon cassette within one year after its purchase. Due to evaporation of ink, a printing color phases out as time goes on. Replacement recommendation: · After recording 3 rolls of the chart paper (3 months in continuous operation at normal temperature and humidity) · About 6 months when operation is suspended after unpacking **⚠ CAUTION** Never use the ribbon which fiber is damaged. As printing is performed more frequently, replace the ribbon cartridge at shorter intervals. For the details, see Page 57.
Lubrication	In order to always use the instrument in a good condition, check the mechanical moving parts for oil shortage and lubricate them as required. **⚠ CAUTION** 1 Lubricate periodically at the following intervals. 2 When you find any adhered substance caused by oil contamination, eliminate it and lubricate. 3 Apply only one or two drops of oil and wipe away excessive oil. <Where to Lubricate> a : Printer shaft(quarterly) b : Grooved shaft(quarterly) c : Ribbon rocking gear and bearing(quarterly) d : Sprocket drum bearing(yearly)  Internal Unit of Recorder Fig. 9.1 Where to Lubricate

〈 Continued 〉

Maintenance / Servicing Item	Remedy
Fuse ⚠	It is recommended to replace the fuse every other year for preventive maintenance. **⚠ WARNING** When replace the fuse, turn off the power, and then, disconnect the instrument from the main power source. Be sure to use our specified fuse. (Fire prevention) Do not short-circuit the fuse holder. [Replacement Procedure] (1) Turn off the power and disconnect the instrument from the main power source. (2) The fuse is found on the rear of the instrument. (See Fig. 9.2) Use a regular screwdriver to remove the fuse. (3) Set a new fuse.

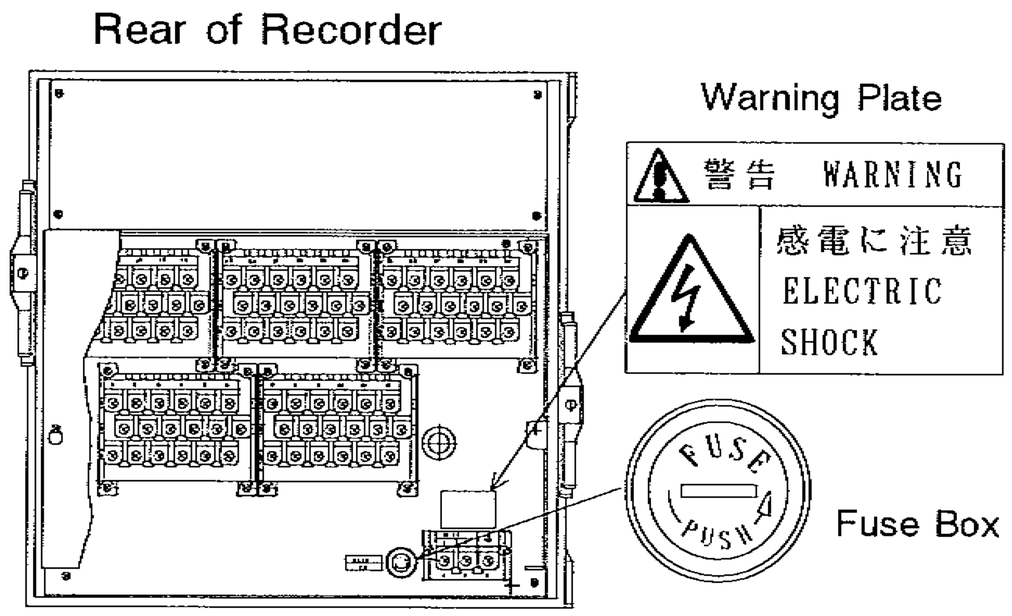


Fig. 9.2 Fuse Setting Position

⚠ CAUTION Logging Print Frequency and Ribbon Replacement Intervals

If the ink ribbon is used longer than its service life, the ribbon fiber will be damaged, resulting in improper ribbon feed or printer trouble. The life of the ribbon is shortened depending on the logging print frequency.
The following table shows the relations between the printout frequency and ribbon replacement intervals. Check the ribbon periodically for damages, and if it is damaged or has its fiber loosened, replace it even before the replacement intervals.

1) Printing life: 100,000 characters(120 million dots, 12 dots per character on the average)
2) Logging print frequency and ribbon replacement intervals

Model \ Logging Print Intervals/Ribbon Replacement Intervals	10 min	20 min	30 min	1 h	2 h	3 h	4 h	6 h	8 h	12 h	24 h	No. of Printing Chars. for Each Log Printout (Standard Value)
6CH	11 day	23 day	34 day	69 day	90 day	→	→	→	→	→	→	60 chars.
12CH	5 day	11 day	17 day	34 day	69 day	90 day	→	→	→	→	→	120 chars.
24CH	2 day	5 day	8 day	17 day	34 day	52 day	69 day	90 day	→	→	→	240 chars.
30CH	2 day	4 day	6 day	13 day	27 day	41 day	55 day	83 day	90 day	→	→	300 chars.

3) The replacement intervals may become shorter than the days mentioned in the table above, depending on the number of printing characters in list/alarm print or logging print.

9-3 Replacing the Drive Cable

The printer of the instrument is linked to the motor by the drive cable. The drive cable is coated with nylon. Cracked or exfoliated coating of the drive cable may add to recording errors or irregular printing. It is recommended to replace the drive cable every other year in order to maintain recording quality.

(1) Removing the main unit

① Press the power switch to turn off the power.

② Pressing down the unlocking lever, hold the draw-out handle and draw it out until it comes to a stop at the position shown in the figure below.

⚠ CAUTION
Support the main unit firmly with hand and draw it out slowly.

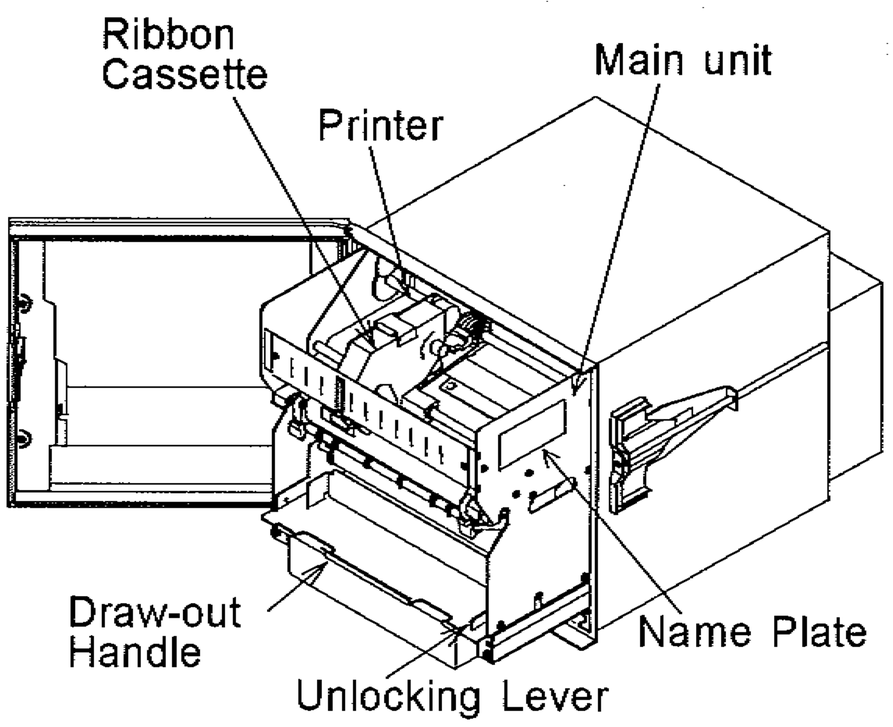


Fig. 9.3 Drawing out the main Unit

③ The main unit is connected with the printed circuit board in the case and a flat cable.
Shift down the levers at both ends of the connector to unlock, and disconnect the flat cable.

⚠ CAUTION
Remove the connector in the inside of the recorder. Prevent damages on the board, do not remove the board from the connector.

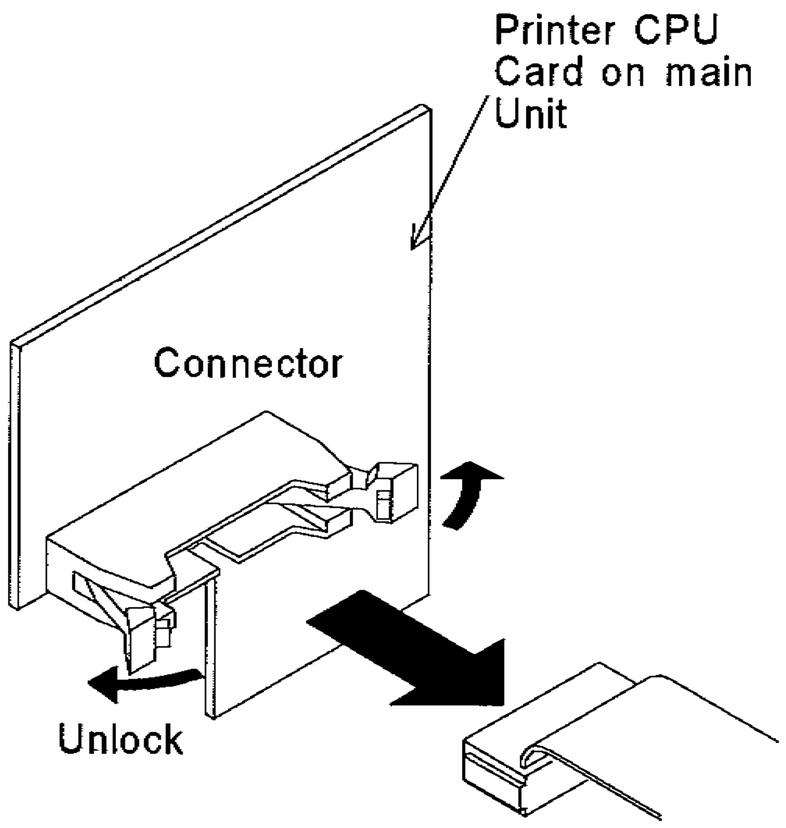


Fig. 9.4 Disconnecting the Flat Cable

(2) Replacing the drive cable

① Remove the ribbon cassette from the printer.

② Using a Phillips screwdriver, remove a drive cable fitting setscrew, and detach the fitting from the printer

③ Loosen a drive cable adjustment fitting setscrew, using the Phillips screwdriver, loosen a pulley setscrew, using an accessory L-wrench, and remove the pulley from the motor shaft.

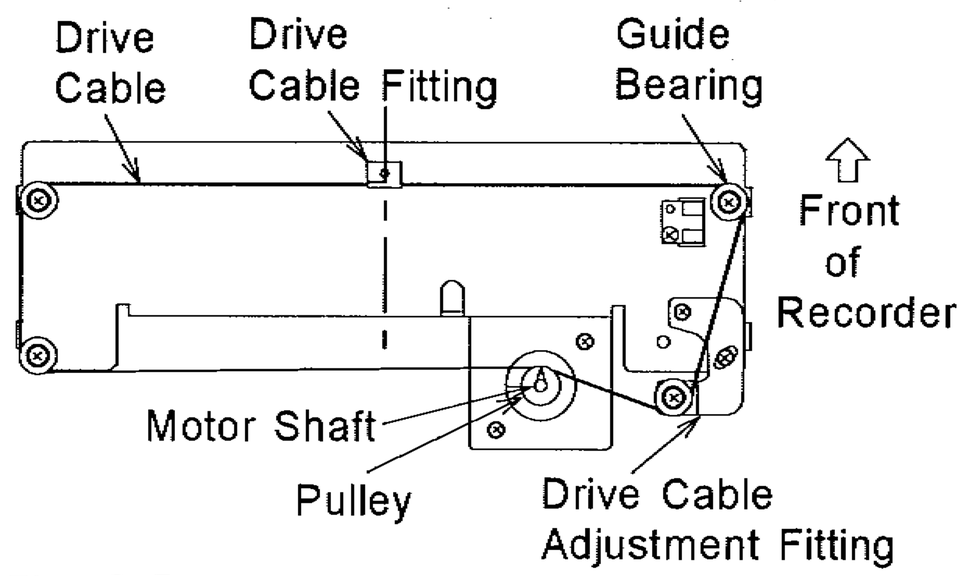


Fig. 9.5 Removing the Drive Cable (Top View)

④ Remove the drive cable from the guide bearing.

⑤ Insert the ball attached to one end of the shorter portion of new drive cable measured from the drive cable fitting into the pulley groove. Wind the drive cable 5 times around the pulley in the counterclockwise direction.

⑥ Insert the ball attached to the other end of the drive cable into the pulley groove and wind it 2 times around the pulley in the clockwise direction.

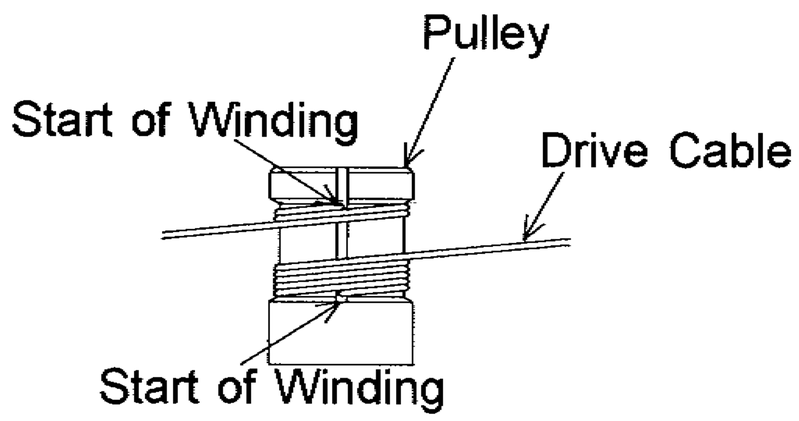


Fig. 9.6 Setting the Drive Cable around the Pulley

⑦ Fix the wound drive cable, using adhesive tape, etc., so that it will not come off while replacing it.

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1	8/9/96	Kawa	Yoso	Oda	
2					
3					

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⑧ According to the figure below, pass the drive cable around the guide bearing and insert the pulley onto the motor shaft.

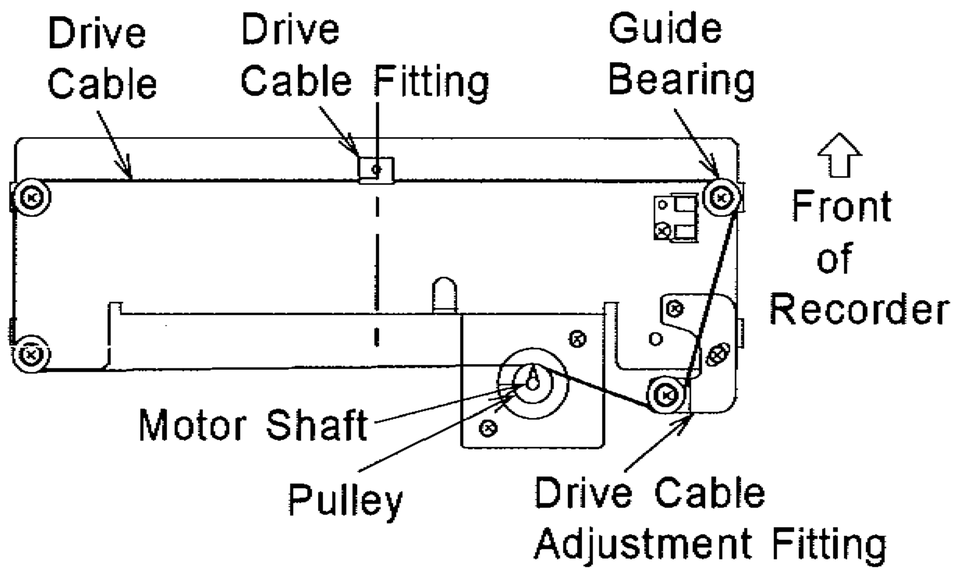

Fig. 9.7 Setting the Drive Cable (Top View)

⑨ Remove the tape used to temporarily fix the pulley. Tighten a pulley setscrew using the accessory L-wrench to fix the pulley onto the motor shaft.

[Note]
Attach the pulley about 0.5 mm away from the mounting plate.

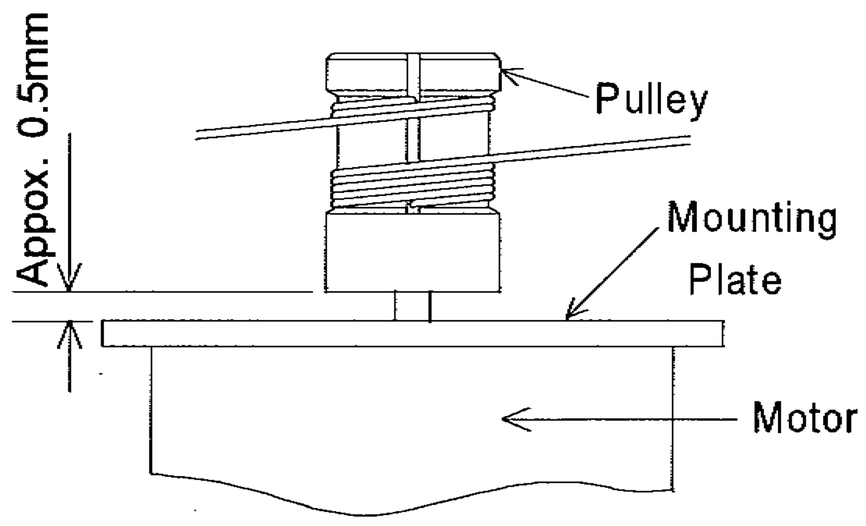

Fig. 9.8 Attaching the Pulley onto the Motor (Side View)

⑩ Move the drive cable to the left and right to wind it around the pulley tightly.

⑪ Adjust the drive cable adjustment fitting parallel to the frame of the inner module and fix with setscrews.

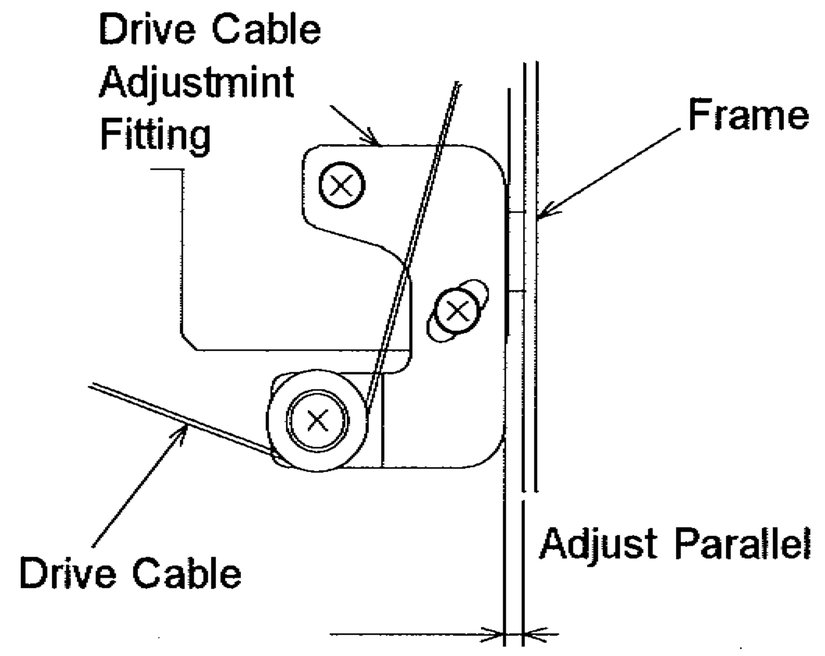

Fig. 9.9 Drive Cable Adjustment Fitting

⑫ Attach the drive cable fitting to the printer.

⑬ Move the printer to the left and right to make sure that the drive cable moves smoothly.

(3) Setting the main unit

① Connect the flat cable coming from the printed circuit board in the case to the connector of the main unit.

② Push the main unit into the case as far as it goes.

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2					
3					
CHG.No.					

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10. CALIBRATION

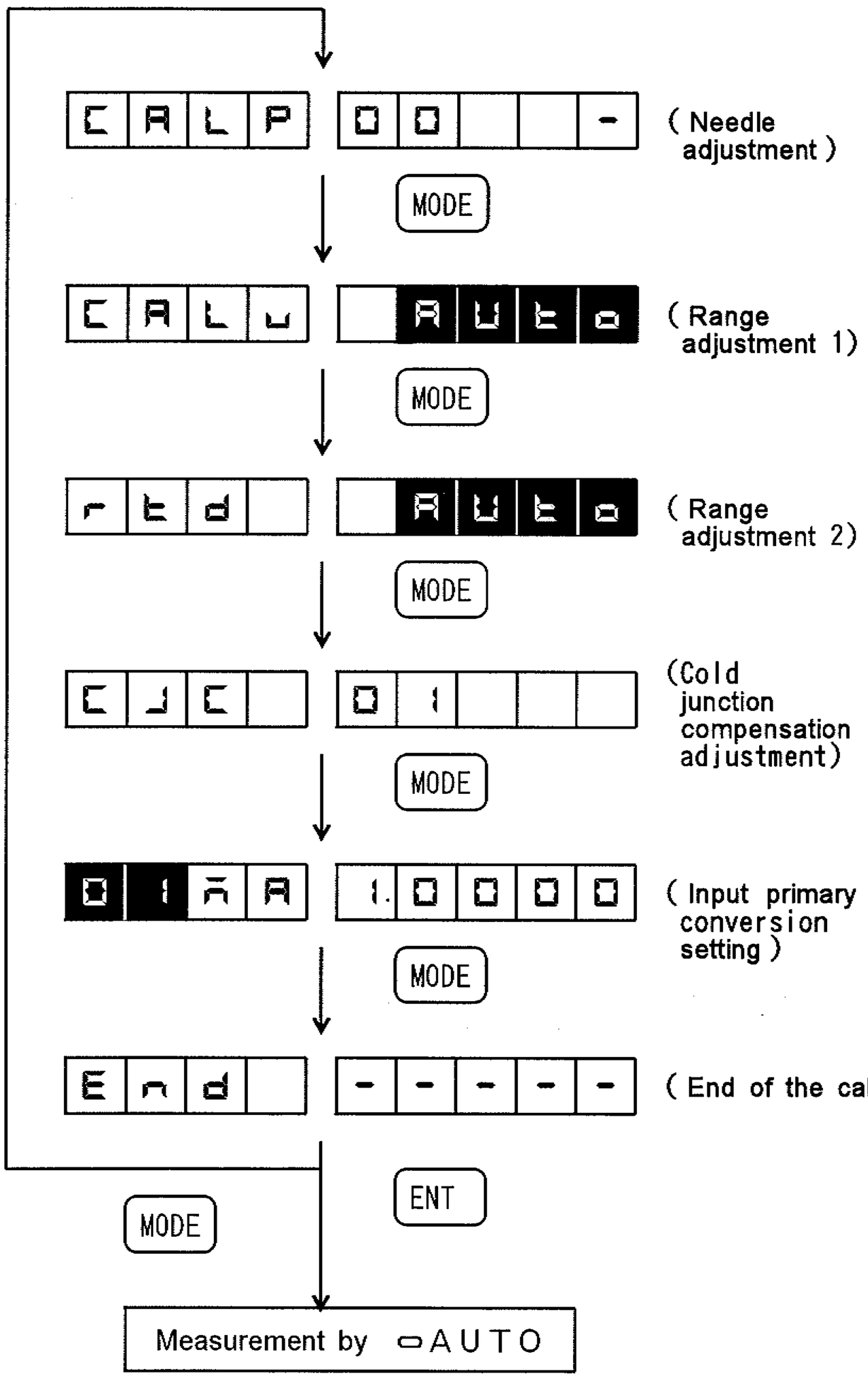
10－1 Calibration Mode

In this section, you make needle adjustment and input calibration.

[Note]

- Make calibration when there is a big error.
- Calibration should be carried out about 30 minutes or more after turning on the power.
- No measurement or dot printing is performed during the calibration mode.

Switching to the Calibration Mode



① Unlocking the keys

Press the PGM and ENT keys simultaneously for about 3 seconds. Press the MODE key to illuminate the "MAN" indicator lamp.

② Switching to the calibration mode

Press the ◀ and ENT key simultaneously for about 5 seconds.

③ The six mode indicator lamps blink and the calibration mode takes effect.

AUTO CLOCK PRINT
MAN CHART ALARM

Fig. 10.1 Switching to the Calibration Mode

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In this section, you adjust the chart paper, scale plate, and cursor positions.

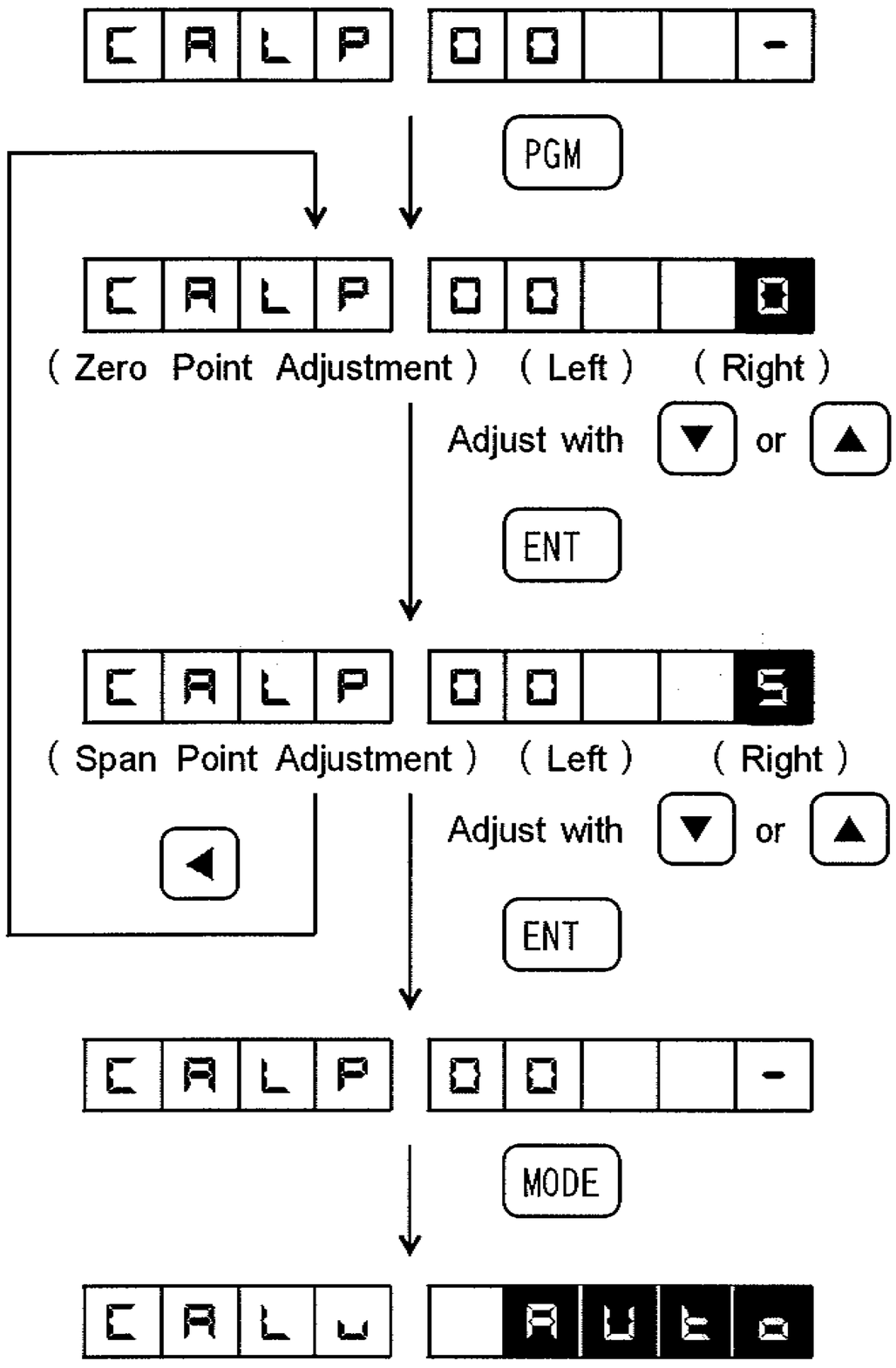

Fig. 10.2 Cursor Adjustment Example

[Note]

■ denotes a blinking LED.

[Note]

- This calibration does not require a calibration signal to be input. Adjustment is allowed even if a measuring input has been applied.
- Do not make adjustment which causes the cursor to fully swing to the zero or span side. Such adjustment may cause a mechanically abnormal sound or hinder normal recording operation. When returned to the user mode, "Error" appears. (See Page 74) This operation can be cancelled by pressing the RUN/STOP key.

< Adjustment Method >

① Using the ▲ or ▼ key, adjust the cursor to scale plate and press the ENT key.

② Print "." in purple color at the zero point and span point positions of the chart paper. At these dot printing positions, make sure that the scale plate position (zero point and span point) and chart paper position (zero point) are aligned with each other.

[Note]

- When the zero point of the scale plate is not aligned with that of the chart paper, adjust the scale plate position to align them.
- The span point recording position of the chart paper moves depending of expansion /contraction of the chart paper. Adjust the scale plate position, based on the zero point.
- Make this adjustment with the recorder running.

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10. CALIBRATION

10－3 Range Adjustment 1 (CALb)

In this section, you make calibration for mV, V, mA, or thermocouple input.

Range adjustment 1 has two kinds of calibrations; auto calibration (display : Auto) and manual calibration (display : mAn).

Manual calibration allows you to calibrate only a required range.

Screen Configuration

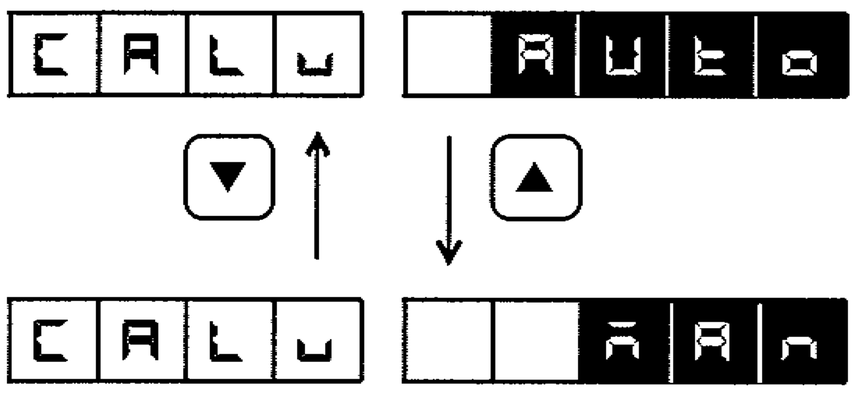


Fig. 10.3 Range Adjustment 1 Screen Configuration

Wiring

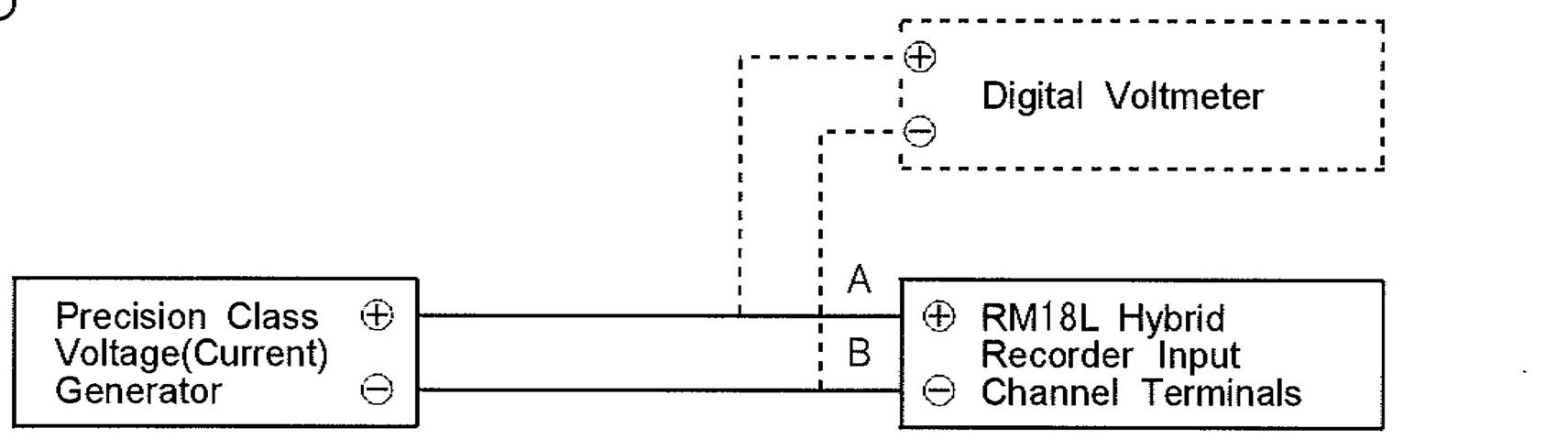


Fig. 10.4 Wiring for Range Adjustment 1

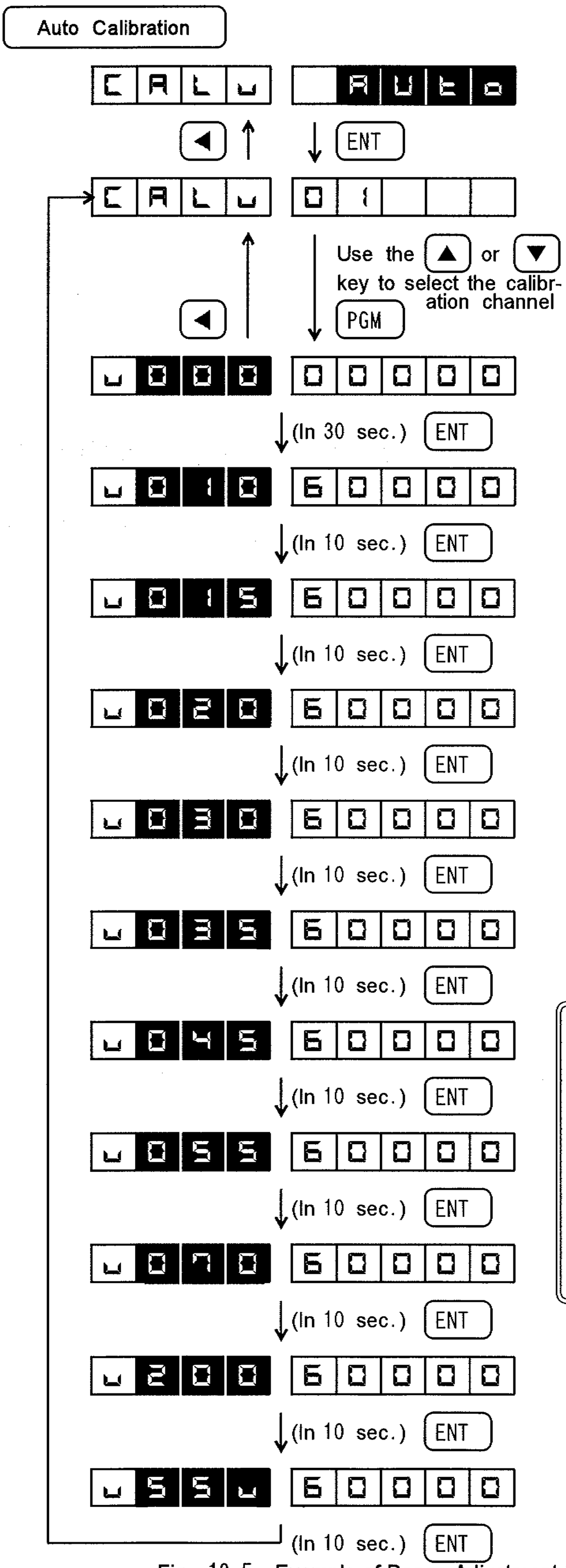
[Note]

● When the mA meter is used and a shunt resistor is attached to the input terminal block, detach a shunt resistor from the calibration channel and calibrate an input signal in voltage.

[Note]

Use the digital voltmeter in the following case.

① When a single unit of the voltage(current) generator cannot meet the calibration input voltage specification on Page 63, use the digital voltmeter with accuracy of ±0.02% or less.



[Note]

■ denotes a blinking LED.

① Select auto calibration (display : AUto)

② Select the channel to which you want to apply an input.

③ Press the PGM key to start calibration.

④ Input a voltage according to the following table.

Input Voltage Display	Input Voltage
␣000	0.000mV ±2μV
␣010	10.000mV ±2μV
␣015	15.000mV ±2μV
␣020	20.000mV ±2μV
␣030	30.000mV ±5μV
␣035	35.000mV ±5μV
␣045	45.000mV ±5μV
␣055	55.000mV ±5μV
␣070	70.000mV ±5μV
␣200	200.000mV ±10μV
␣55␣	5.500V ±1mV

⑤ A calibration time for one point is 30 seconds or more for 0 mV, and 10 seconds or more for the others; press the ENT key after the respective times.

[Note]

A value of the display (2) will be about 0 count for 0 mV input and about 60,000 counts for the other inputs. Since many ranges have been calibrated, a counter value could deviate within ±2,000 counts, but this is a value with in a normal operating range.

Fig. 10.5 Example of Range Adjustment 1 (Auto Calibration)

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Manual Calibration

This instrument provides calibrations corresponding to all the ranges. Like this calibration, however, it can provide calibration only designed for a specific range.

< Setting Example > Inputting through the channel 1

Calibrate the range code No.000 (±10mV)

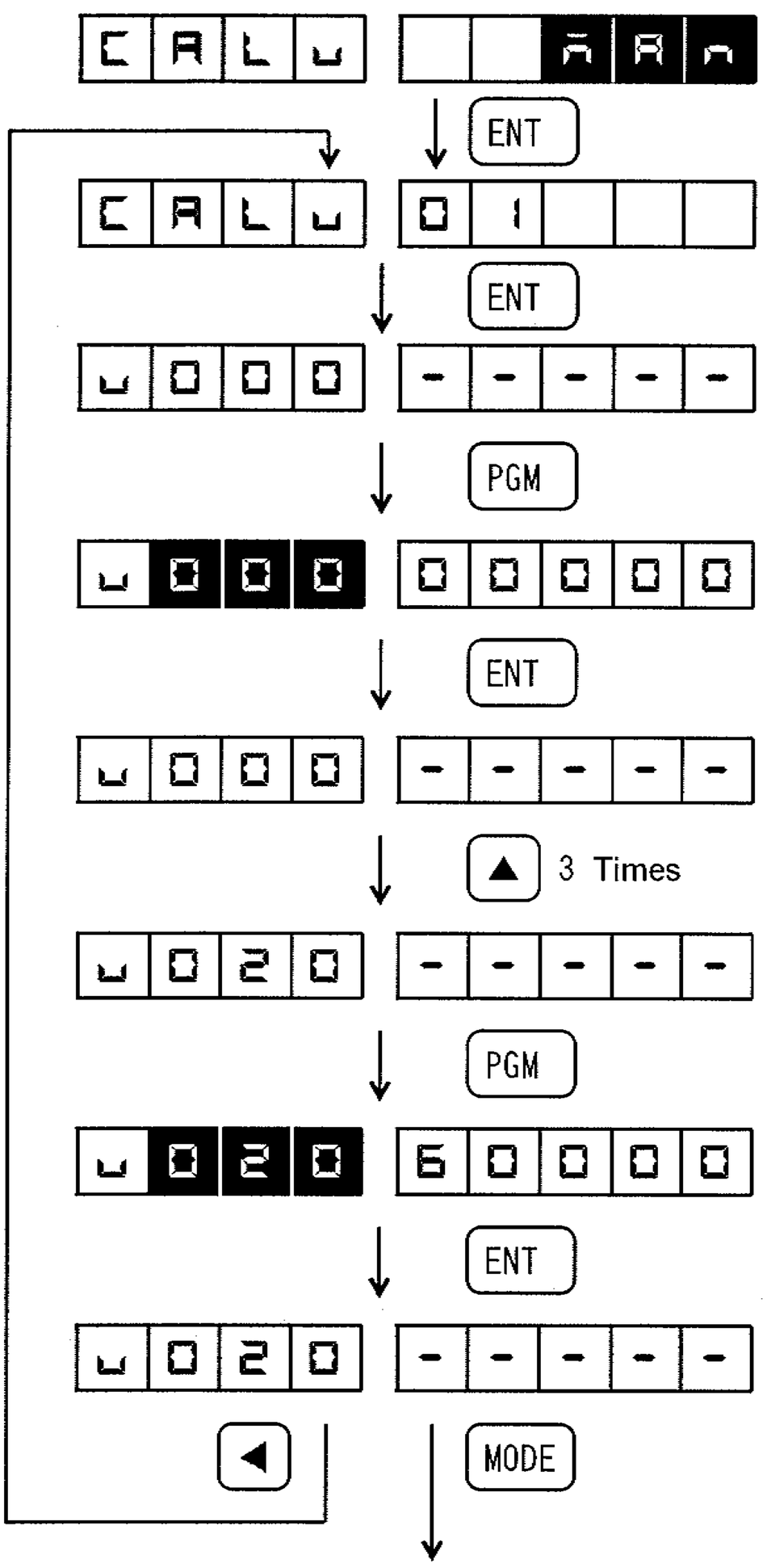


Fig. 10.6 Example of Range Adjustment 1 (Manual Calibration)

[Note]

" ■ " denotes a blinking LED.

① Select manual calibration (display : □Am)

② Select the channel to which you want to apply an input.

③ Make zero point calibration (□000).

④ Input a voltage corresponding to the range code number, according to the following table.

Input Voltage Display	Range Code No.
□000	All the range codes
□010	014,022,030,037,045
□015	017,048
□020	000,003,008,010,012, 013,018,027,033,039
□030	011,015,019,023,028, 031,034,038,040,046
□035	016,024,032,041,042, 043
□045	021,025,036,044
□055	001,004,006,007,020, 035,047,058
□070	026
□200	002,005
□55□	003,004,005,006,007, 008

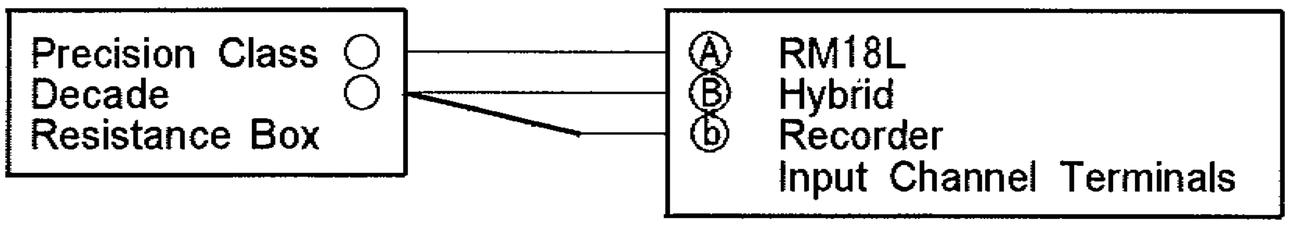
[Note]

- See Page 39 for the range code numbers.
- Note that three points input may be required depending on the range.

In case of resistive temperature detector input, carry out this calibration after range adjustment 1.

Range adjustment 2 has two kinds of calibrations; auto calibration (display : Auto) and manual calibration (display : mAn). Manual calibration allows you to calibrate only a required range.

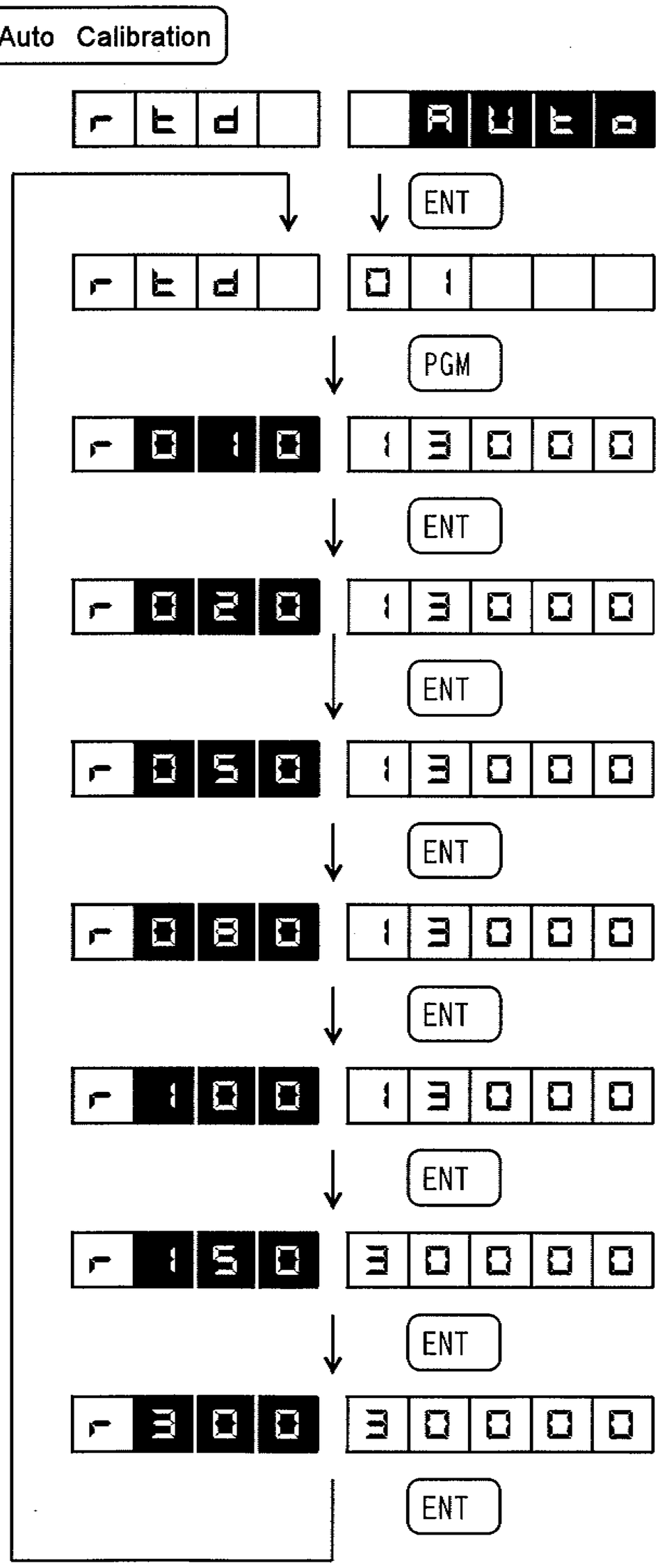
Wiring



[Note]
Deviation of resistance value for each wire should be 6m Ω or less.

Fig. 10.7 Range Adjustment 1 Screen Configuration

Auto Calibration



① Select auto calibration. (display : Auto)

② Select the channel to which you want to apply an input.

③ Press PGM key to start calibration.

④ Input a resistance value according to the following table. After 10 seconds or more, press ENT key.

Input Resistance Display	Input Resistance Value
r010	10.000Ω ± 5mΩ
r020	20.000Ω ± 5mΩ
r050	50.000Ω ±10mΩ
r080	80.000Ω ±10mΩ
r100	100.000Ω ±15mΩ
r150	150.000Ω ±20mΩ
r300	300.000Ω ±35mΩ

[Note]
A value of the display (2) is in a range of 5000 to 50000.

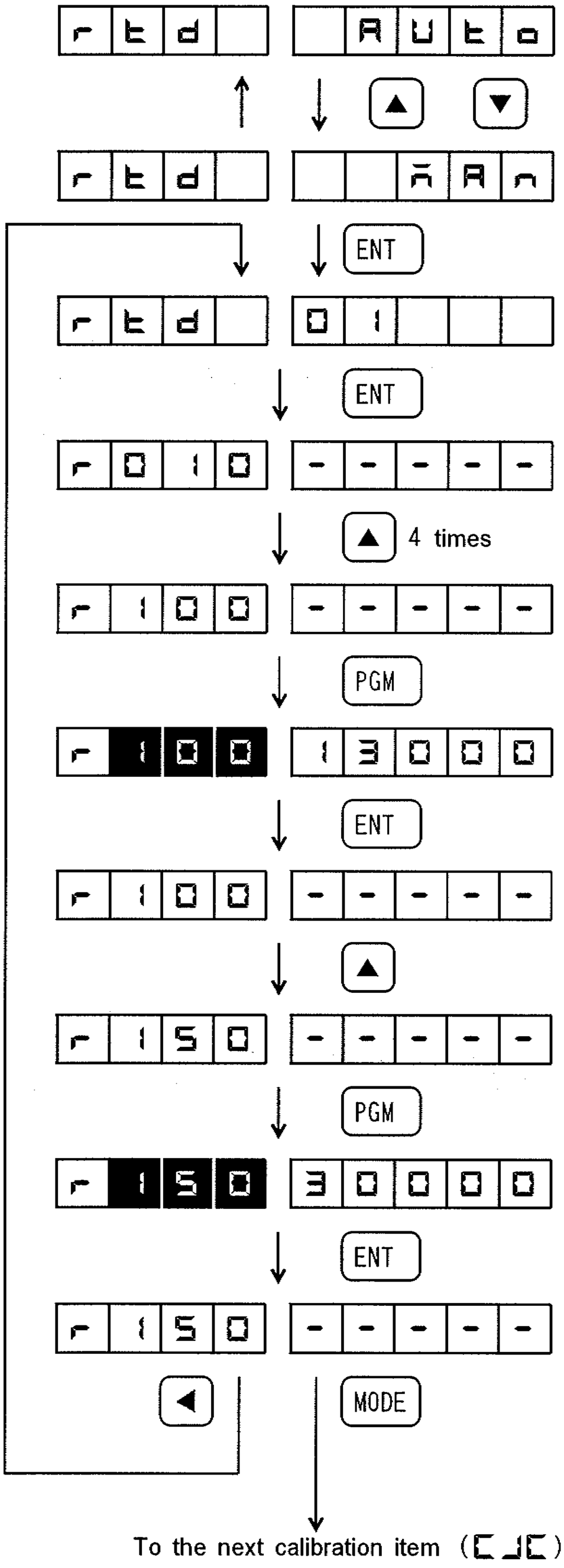
[Note]
" ■ " denotes a blinking LED.

Fig. 10.8 Example of Range Adjustment 2 (Auto Calibration)

Like range adjustment 1, range adjustment 2 provides calibration corresponding to a specific range.

Manual Calibration

< Setting Example > Calibrating the range code No.51 (Pt100) at the channel 1.



[Note]

" ■ " denotes a blinking LED.

① Select manual calibration.
(display : mAn)

② Select the channel to which you want to apply an input.

③ Press PGM key to start calibration.

④ Input a required resistance value according to the following table. After 10seconds or more, press ENT key.

Input Resistance Display	Range Code No.
r010	056,057
r020	056,057
r050	053,054
r080	053
r100	049,050,051, 052,054,055
r150	049,051,055
r300	050,052

[Note]

● See Page 39 for the range code numbers.

Fig. 10.9 Example of Range Adjustment 2 (Manual Calibration)

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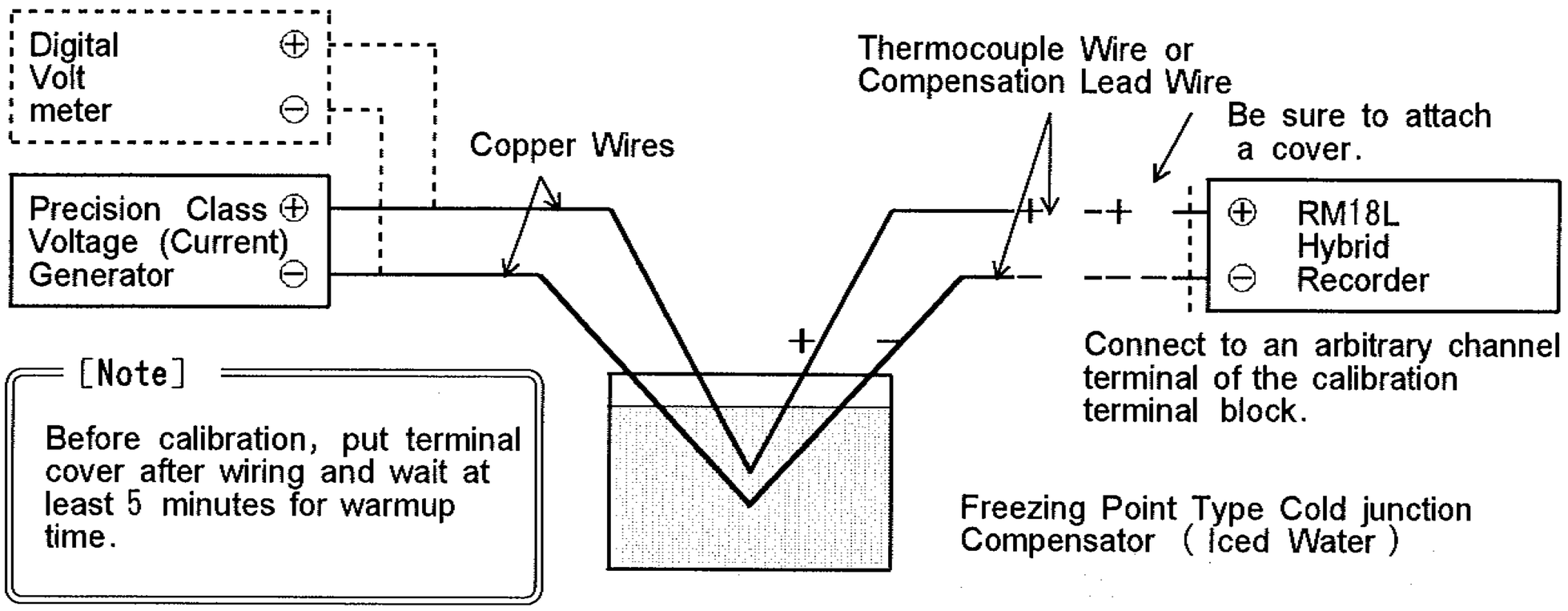
In case of thermocouple input, make this adjustment. Make reference point compensation adjustment for each terminal block. (Input terminal 1～5)

Wiring



[Note]

Before calibration, put terminal cover after wiring and wait at least 5 minutes for warmup time.

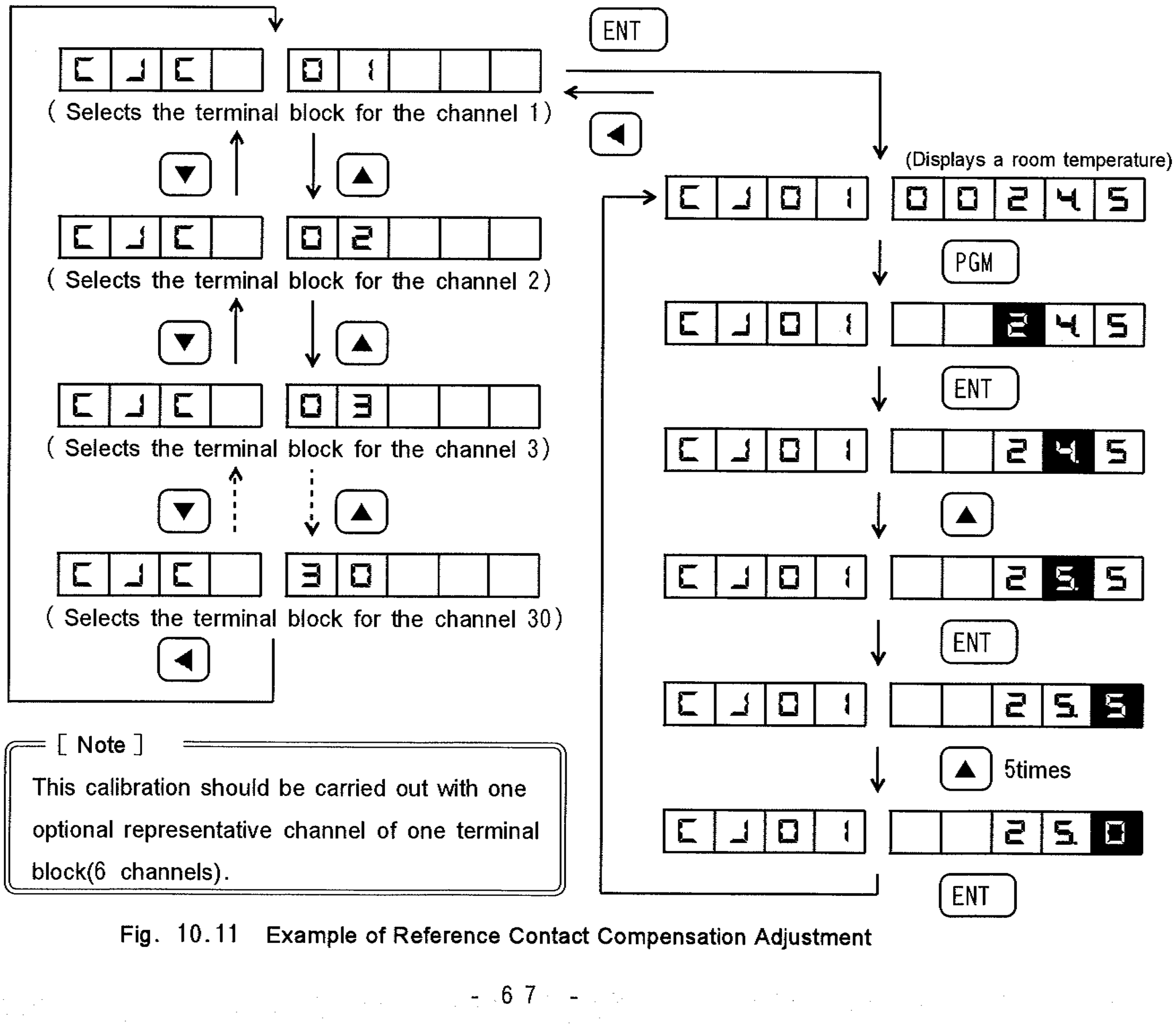
Fig. 10.10 Connections for Cold junction Compensation Adjustment

Calibration

< Setting Example >

When an input is connected to the channel 1, and a thermocouple input display value (measured value at 0°C input) is -0.5°C and a room temperature display value is 24.5°C.

① Confirm in advance a measured value (-0.5°C in this setting example) when 0.000mV ±2μV is applied to the channel 1 by the voltage generator.
② Add to the room temperature the difference (0.5°C) from a true value. [0－ (-0.5) =0.5°C]
③ Calibrate other input terminal blocks in the same manner.



[Note]

This calibration should be carried out with one optional representative channel of one terminal block(6 channels).

Fig. 10.11 Example of Reference Contact Compensation Adjustment

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When you want to correct an input, set the parameters shown in the following formula.

Conversion value (mV) = Input value (mV) × A + B

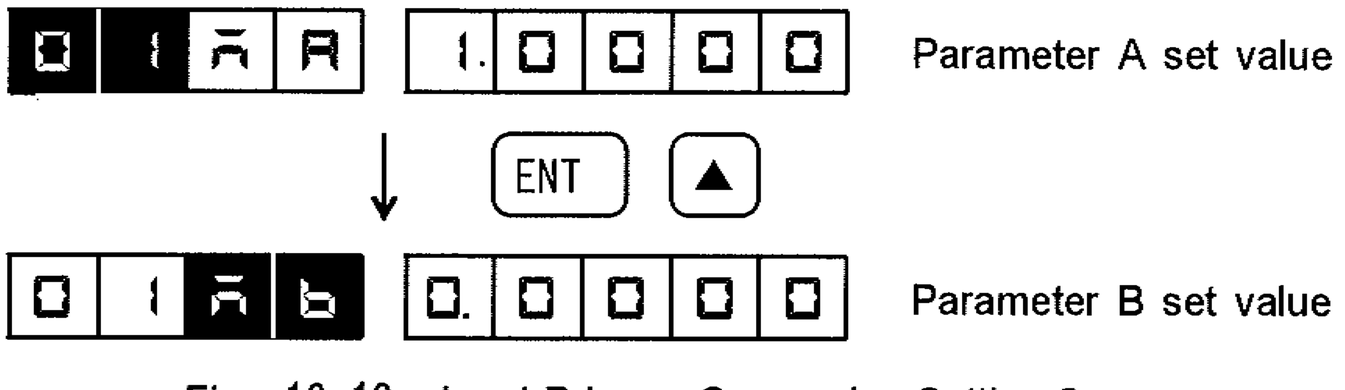


Fig. 10.12 Input Primary Conversion Setting Screen

[Note]

Assuming the input value is mV, calculate and set the parameters A and B.

Setting Example

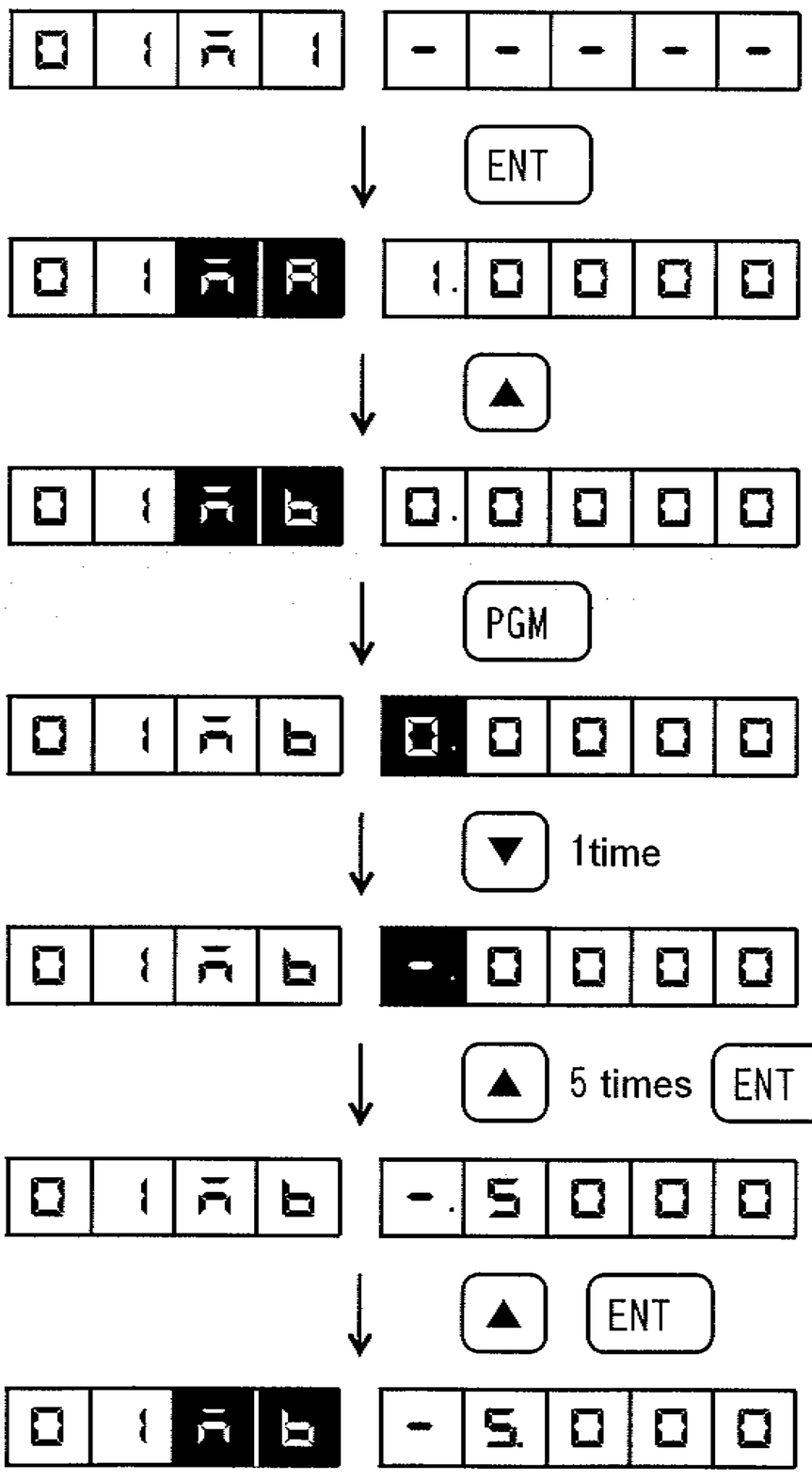
Correcting a +5mV offset voltage input for the channel 1.

① Obtain the parameters A and B. A conversion value will be 0mV because an offset voltage is cancelled.

Therefore; 0 (mV) = 5 × A + B

A = 1 B = −5

② Set the parameters A and B.



[Reference]

Initial values for A and B are A = 1.000 and B 0.000.

[Notes]

1. When this function is not used, set A = 1.000 and B 0.000.
2. Note that there is an offset voltage to a reference input at the time of scale test upon inspection.

[Notes]

" ■ " denotes a blinking LED.

Fig. 10.13 Input Primary Conversion Setting Example

When input wiring is blocked by the mounting panel and does not reach at the time of scale test, use this tie port.

Using the Tie Port

Rear View of Recorder

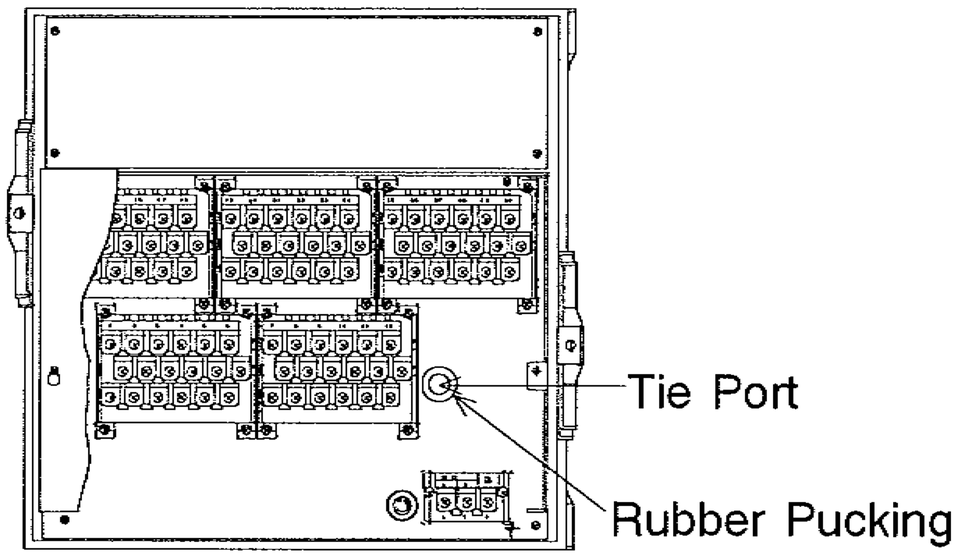


Fig. 10.14 Tie Port Position

Side View of Recorder

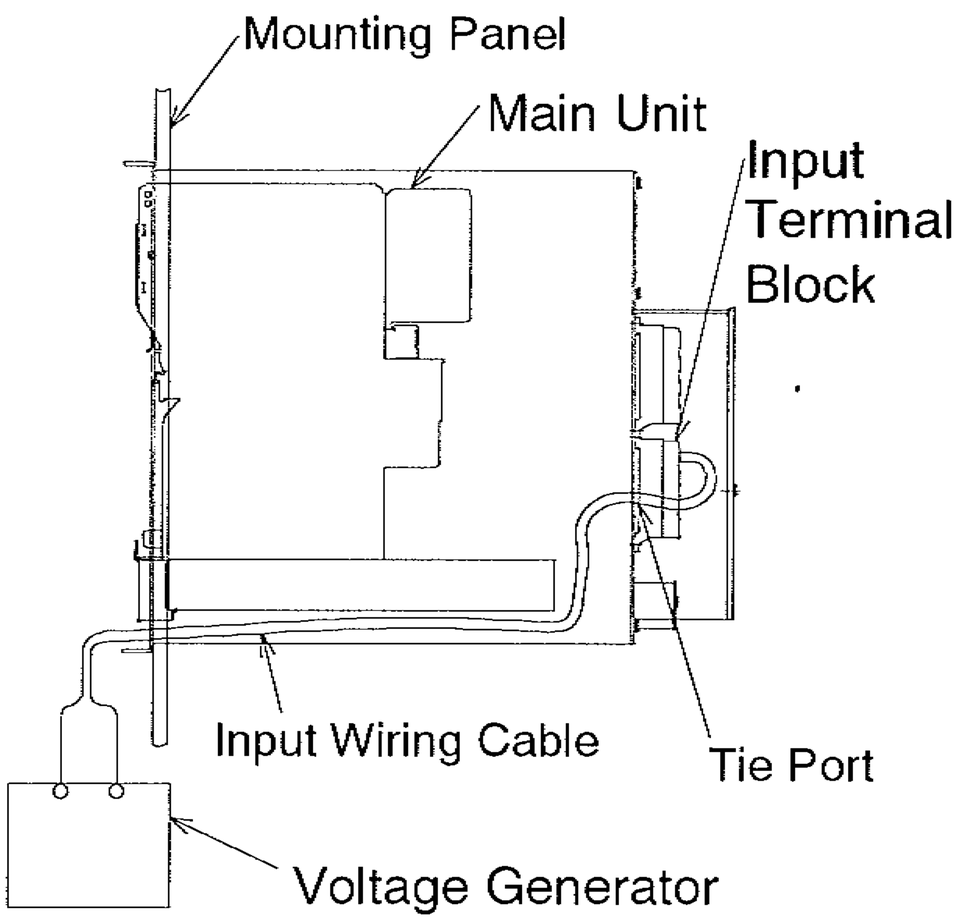


Fig. 10.15 Drawing out the Input Wiring Cable

① Turn off the power switch.

② Take out the main unit. (See Page 58)

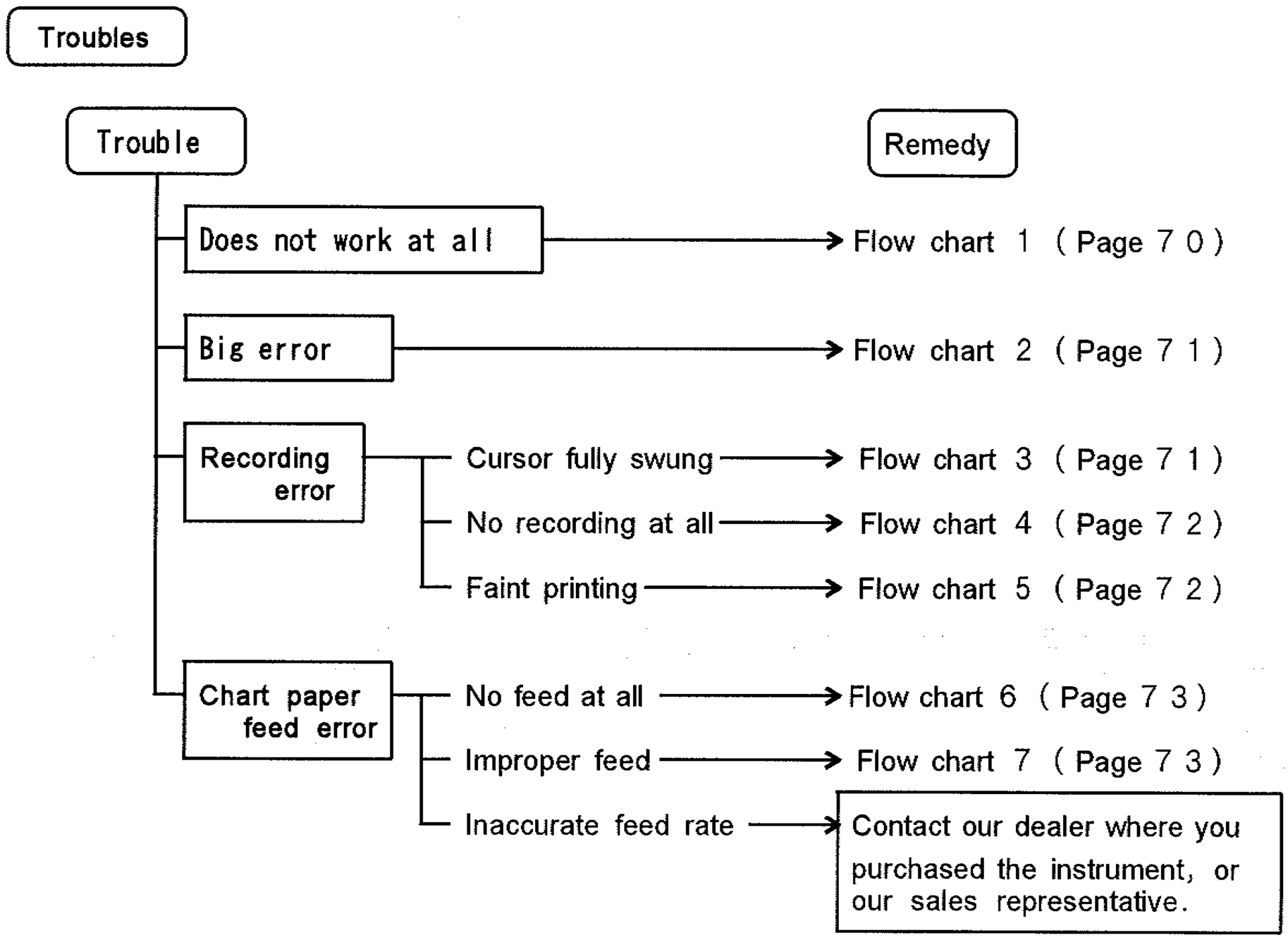
③ Remove the rubber packing shown in Fig. 10.14.

④ Use an input wiring cable which is 2m or longer. Wire it to the terminal of the input channel you want to adjust.

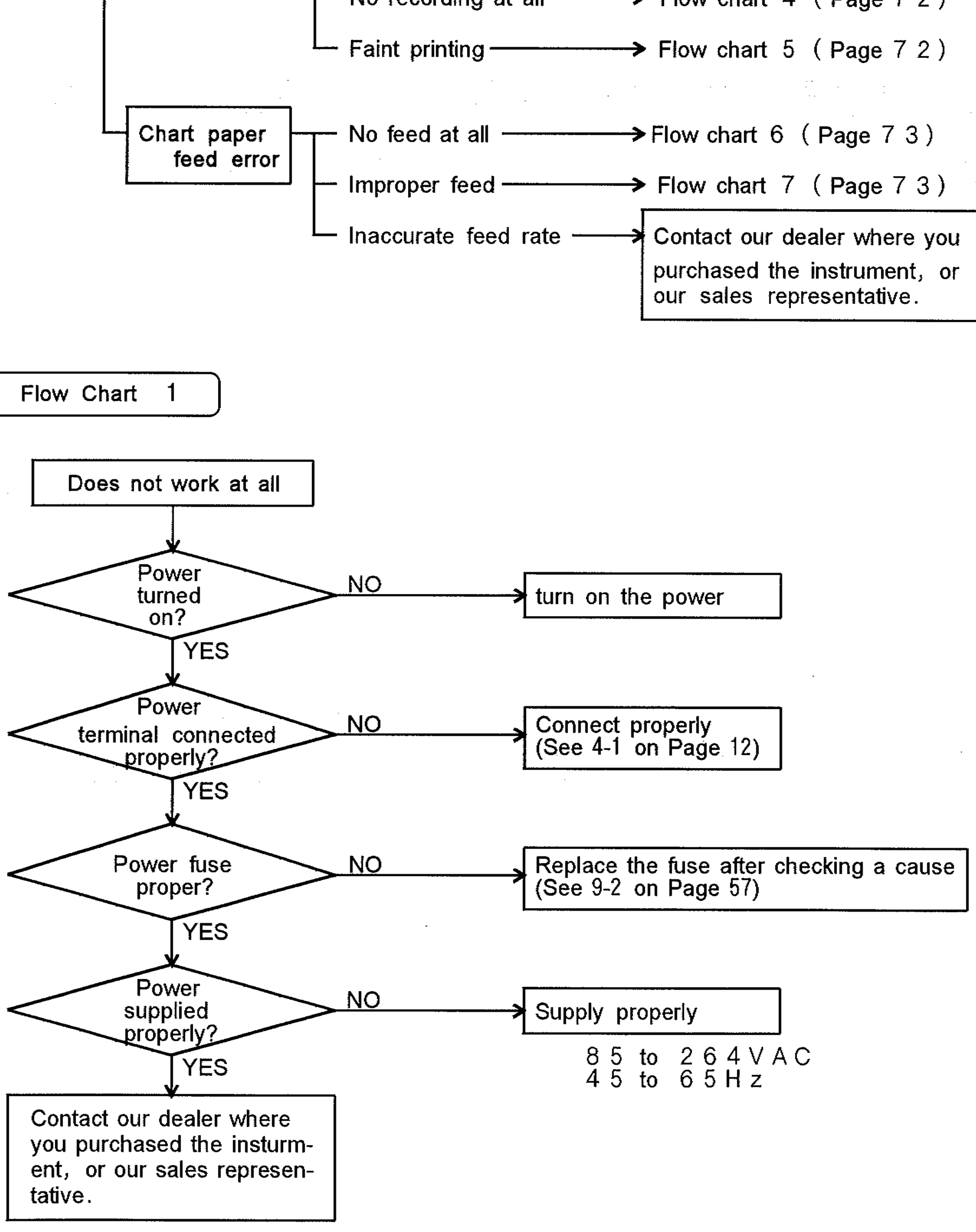
⑤ With the input wiring cable pull downward through the tie port, connect the flat cable to the main unit, and put the main unit back into the case.

⑥ Connect the voltage generator, etc. to make necessary adjustment/confirmation.

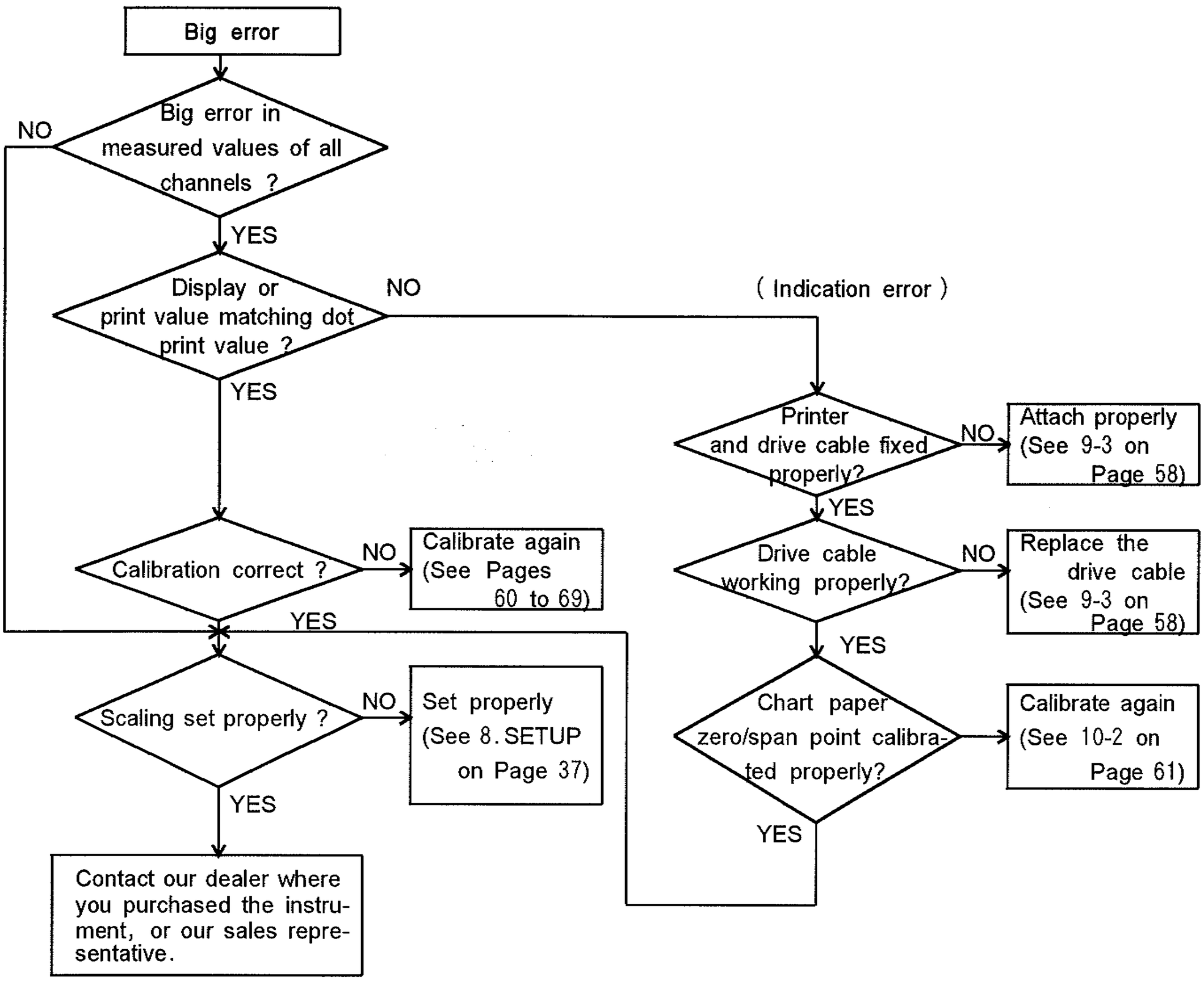
⑦ After completion, disconnect the wiring in the reverse procedure and plug the tie port with a rubber packing.


Troubles
Trouble
Remedy
Does not work at all
Flow chart 1 (Page 70)
Big error
Flow chart 2 (Page 71)
Recording error
Cursor fully swung
Flow chart 3 (Page 71)
No recording at all
Flow chart 4 (Page 72)
Faint printing
Flow chart 5 (Page 72)
Chart paper feed error
No feed at all
Flow chart 6 (Page 73)
Improper feed
Flow chart 7 (Page 73)
Inaccurate feed rate
Contact our dealer where you purchased the instrument, or our sales representative.

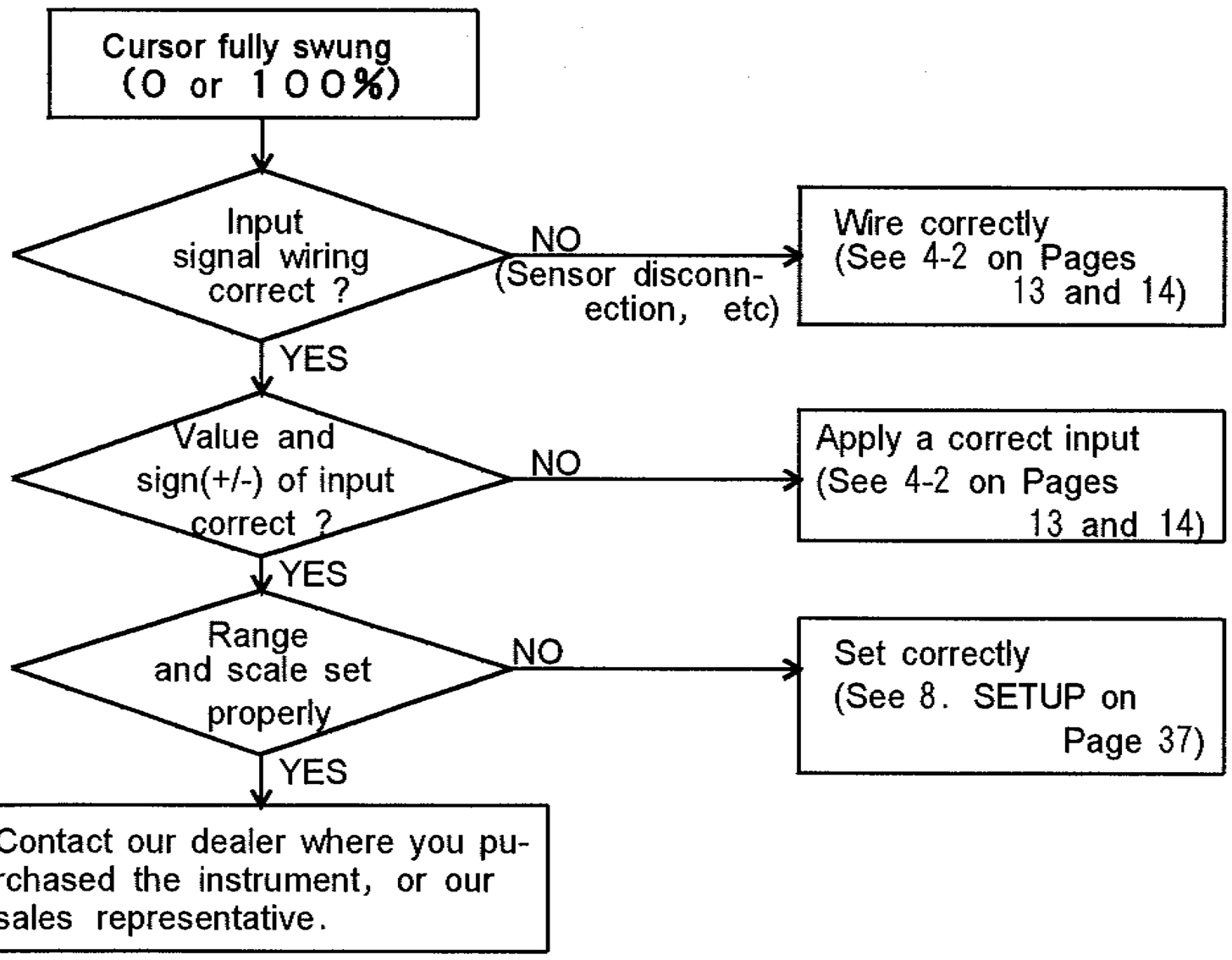
Flow Chart 1


Does not work at all
Power turned on?
NO
turn on the power
YES
Power terminal connected properly?
NO
Connect properly (See 4-1 on Page 12)
YES
Power fuse proper?
NO
Replace the fuse after checking a cause (See 9-2 on Page 57)
YES
Power supplied properly?
NO
Supply properly
85 to 264VAC
45 to 65Hz
YES
Contact our dealer where you purchased the insturment, or our sales representative.

Flow Chart 2



Flow Chart 3



DESCRIPTION	CHG.No.	DATE	DR.	CHK.	APP'D.
	2 3	8/9/96	Kawa	Hoso	Ada

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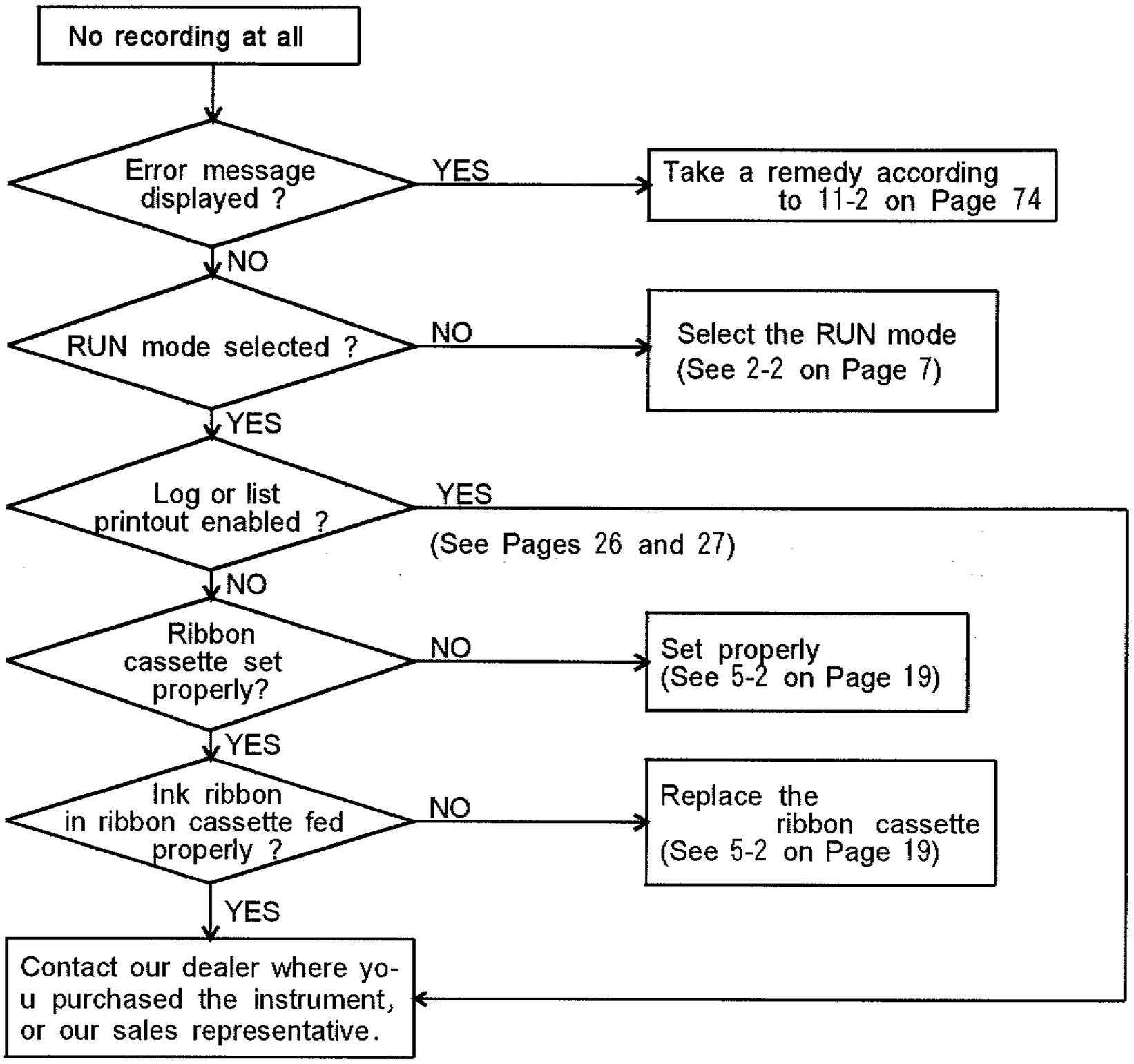
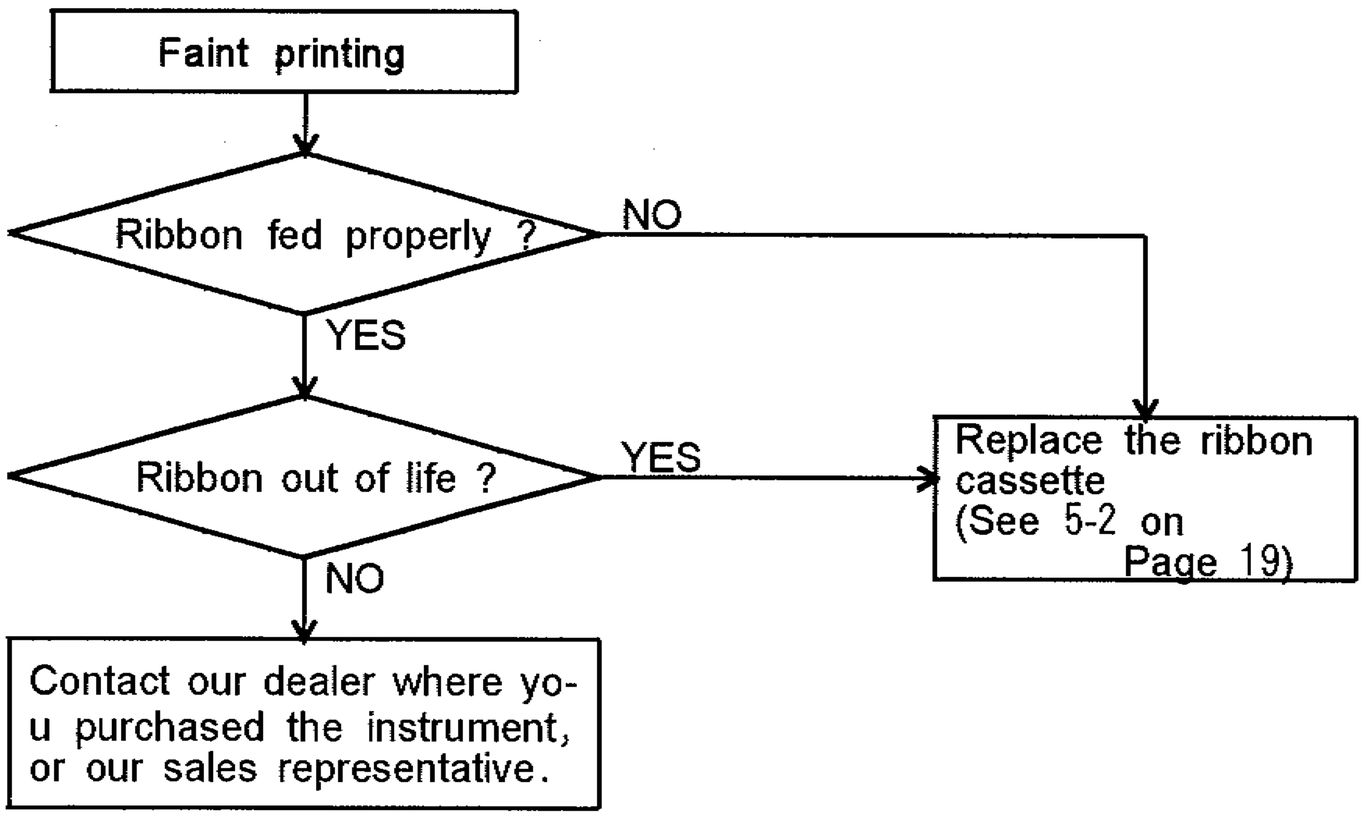
Flow Chart 4



Flow Chart 5



REV.	DATE	DR.	CHK.	APP'D.	DESCRIPTION	CHG.No.
1	8/9/96	kuwa	Hbro	Oda		2 3

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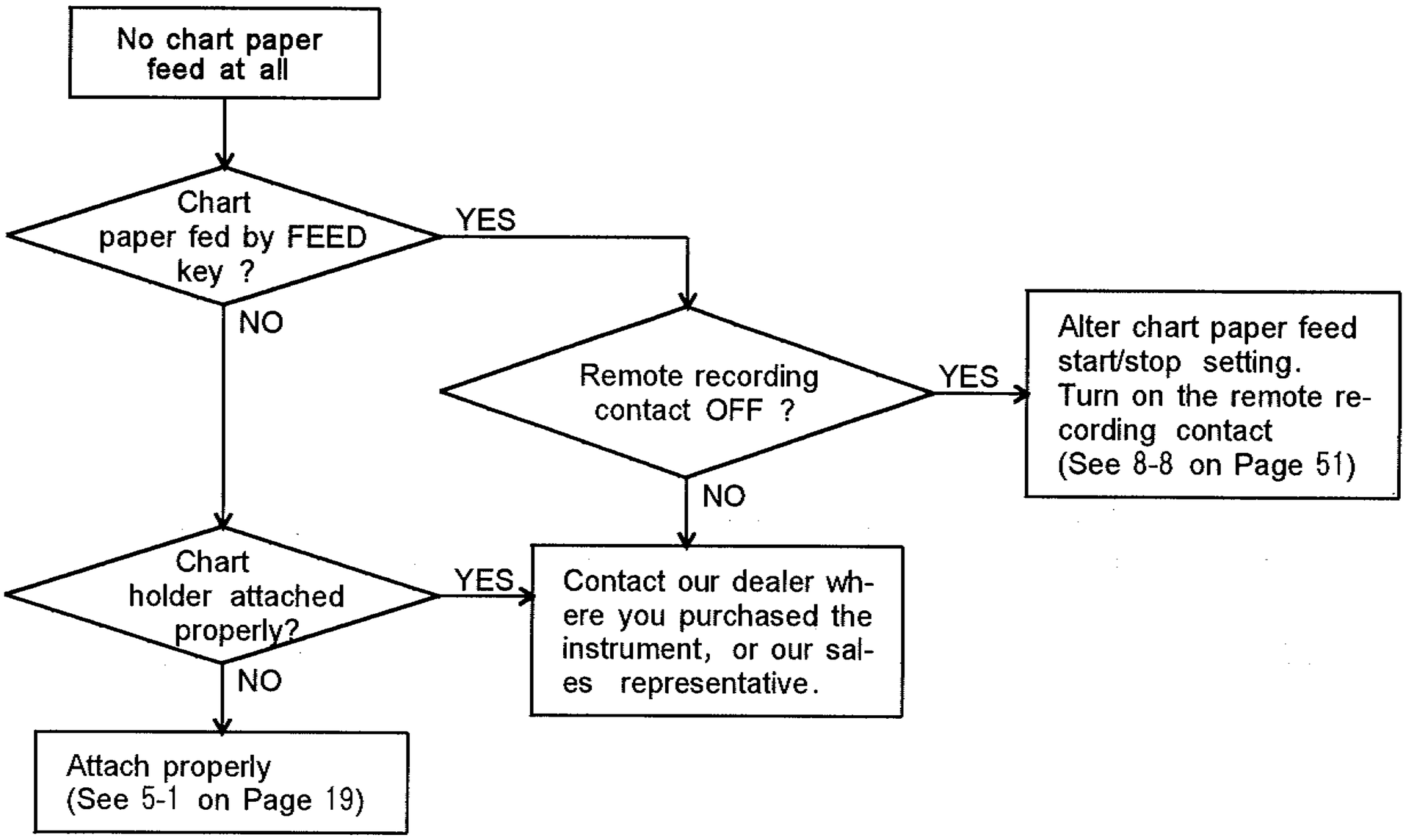
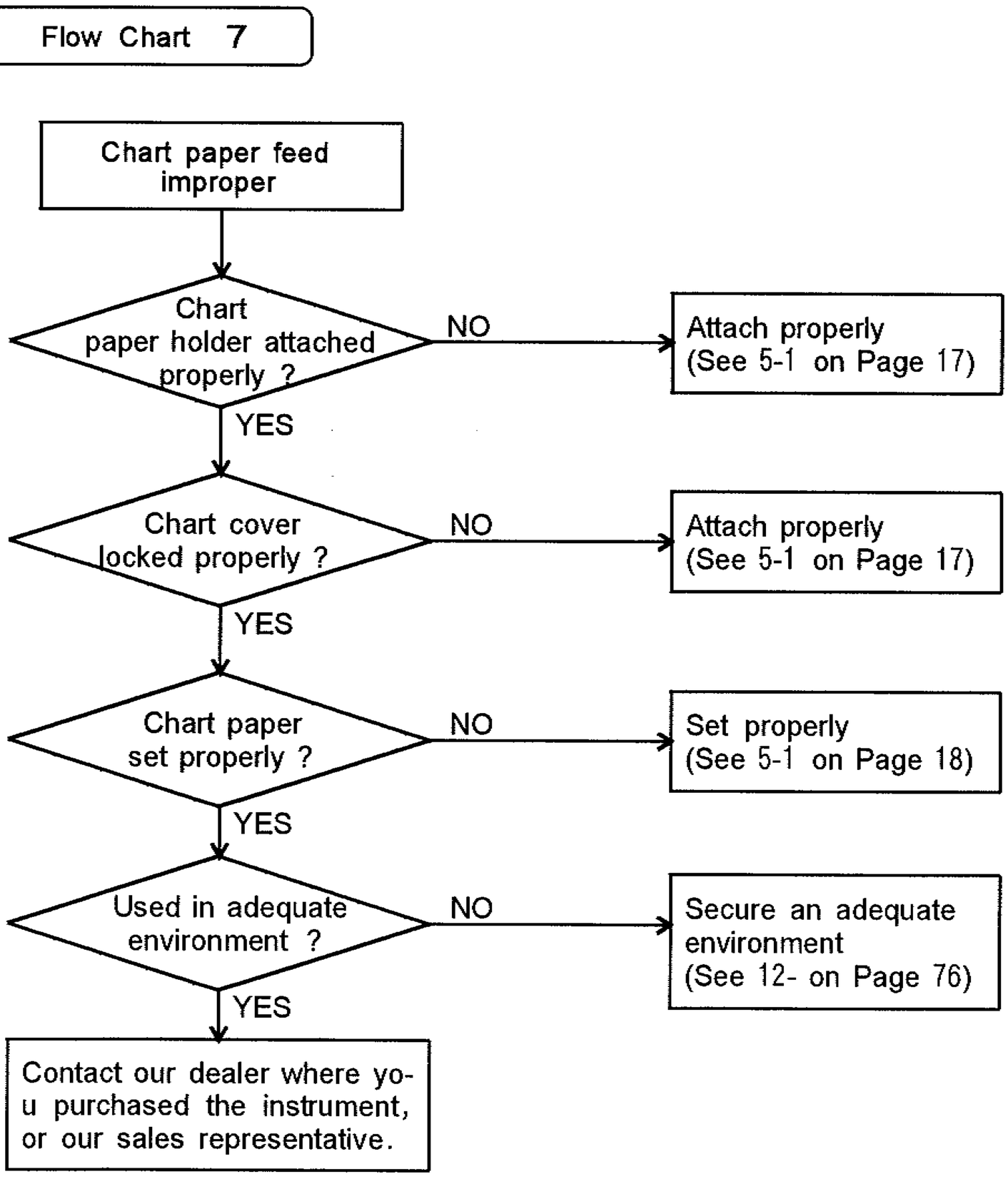
Flow Chart 6



Flow Chart 7



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1	96/4/16	Kawa	Hase	Oda		2 3

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This instrument always makes a self diagnosis on the items listed in Table 11-1 below. When an error is found in the self diagnostic results, a relevant error number is displayed.

Self Diagnostic Items

Table 11.1 List of Self Diagnostic Items

ERROR No.	Diagnosis	Remedy
1	Printer servo error. The printer head cannot move to an optional position.	1) Set the drive cable properly. (See 9-3 on Page 58)
2	Printer zero position error. The printer's zero point position cannot be detected.	2) Set the ribbon cassette properly. (See 5-2 on Page 19)
3	Printer ribbon position error. The printer's ribbon position cannot be detected.	3) Attach the printer's connector properly. (See 9-3 on Page 58)
5	Communication disconnected between the main CPU card and printer CPU card	Contact our dealer where you purchased the instrument, or our sales representative.
6	Printer CPU card command error	
8	ADC card error	
12	ADC card calibration value error	
16	ADC card unvolatile memory error	
19	Channels 1-6 terminal block calibration value data error	
20	Channels 7-12 terminal block calibration value data error	
21	Channels 13-18 terminal block calibration value data error	
22	Channels 19-24 terminal block calibration value data error	
23	Channels 25-30 terminal block calibration value data error	
24	Channels 1-6 terminal block unvolatile memory error	
25	Channels 7-12 terminal block unvolatile memory error	
26	Channels 13-18 terminal block unvolatile memory error	
27	Channels 19-24 terminal block unvolatile memory error	
28	Channels 25-30 terminal block unvolatile memory error	
37	Multipoint type recorder indication calibration value error	
38	Unvolatile memory write error	
39	Unvolatile memory data error	
41	Clock IC error	
42	Watchdog timer error	
43	Software error	

Error Display

- When the display is in the AUTO mode, (□AUTO) an error message is displayed.
- When multiple errors are encountered, their error numbers are automatically displayed sequentially.

[Note]

While an error is being displayed, an alarm is not indicated.

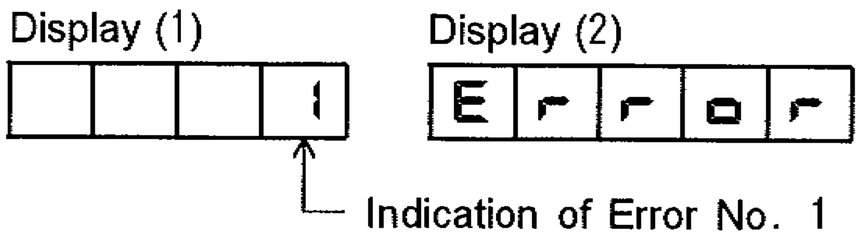

Fig. 11.1 Display for Error 1

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Error Output (FAIL)

When an error occurs, it is output as follows.

① In case of standard specification
When an error occurs, an error output(FAIL) is activated.

② In case of POWER-OFF specification (Option)
When an error occurs, an error out put(FAIL) is deactivated.

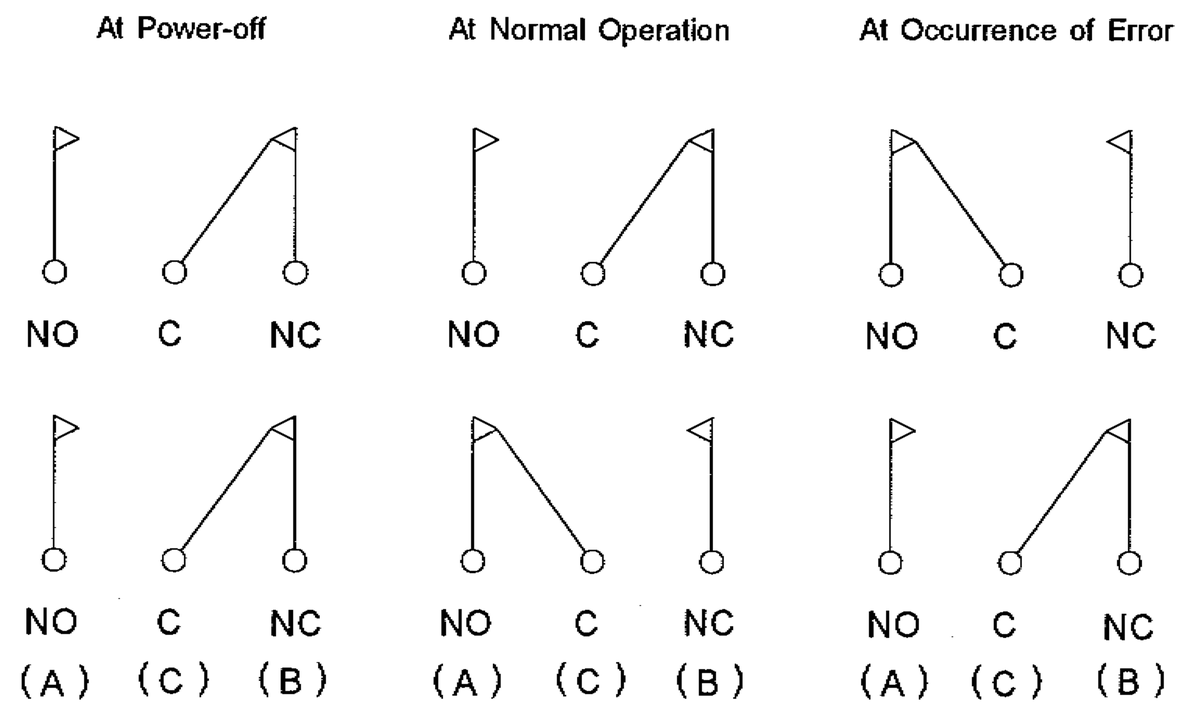

Fig. 11.2 Error Output Operation

[Note]
An error output is made only to the relay No.8.
An individual alarm output is ignored.

12. SPECIFICATIONS

12－1 Common Specifications

● Type of Input

DC voltage : 4mVDC min, 20 VDC max
Thermocouple : K, T, J, E, B, S, R, G, C, N,
PR40-20, PL II, Au-Fe, U, L
Resistive temperature detector :
Pt100, JPt100, Pt50
Cu 10Ω at 0°C
Cu 10Ω at 25°C
DC current : 4 to 20mA DC

● Performance/Characteristics

Recording accuracy : ±0.5% max
Dead band : Within 0.2%
Input impedance :
10M Ω min in mV, TC input
(without open input protection),
200K Ω min in mV, TC input
(with open input protection),
1M Ω min in voltage input,
100Ω (shunt resistance : external) in mA input.
Source resistance :
10K Ω max in mV, TC input
(without open input protection),
200Ω max in mV, TC input
(with open input protection),
1K Ω max in Voltage input,
10Ω max (per line) in Resistive temperature detector input.
Normal mode reduction ratio :
60dB min (50/60±0.5Hz)
Common mode reduction ratio :
140dB min (50/60±0.5Hz)
Isolation resistance : 0.5kV DC 20M Ω min between the each terminal and grounding terminal
Dielectric strength : 1.5kV AC for 1 minute between the power terminal and grounding terminal
0.5kV AC 1 minute between the input terminal and grounding terminal
Vibration resistance : 10 to 60Hz, 1m/s^2 max
Shock resistance : 2m/s^2 max
Clock precision : ±50 ppm (Monthly error: ±130 seconds)
Chart feed accuracy : ±0.1% max

● Structure

Case structure : Dust-proof
Mounting : Panel mount
Allowable backward inclination : 30°
Material : Case --- Steel plate
Door frame --- Resin (Polycarbonate)
Color : Case --- Metallic silver
Door frame --- Black

● Power Input

Rated supply voltage range : 100 to 240 V AC
Working supply voltage range : 85 to 264 V AC
Electric wave frequency : 45 to 65 Hz
Instantaneous poewr failure : Operates up to 50ms
Power consumption :

	100VAC (*)	240VAC (*)	Max. power consumption
30-dot recorder	About 20 VA	About 30 VA	About 65 VA

*) No option at balancing time

● Normal Operating Conditions

Ambient temperature : 0 to 40 °C (UL Listing)
0 to 50 °C (Others)
Ambient humidity : 35 to 80 % RH (UL Listing)
35 to 85 % RH (Othres)

● Alarm (Relay output is optional)

Alarm types : 4 types/channel (H, HH, L, LL)
Drives : 1 relay drive/alarm set value
Alarm output : 250 V AC, 3 A max. (resistance load)
125 V DC, 0.5 A max. (resistance load)
30 V DC, 3 A max. (resistance load)
125 V DC, 0.1 A max. (induction load)
L/R =40ms max.
Hysteresis width : 0.5±0.2%
Setting accuracy : ±0.5%

● Electromagnetic compatibility (EMC)

Emissions EN55011
Immunity EN50082-2
Electrical safety IEC1010 Installation category II;
Pollution degree 2
UL3101-1

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12. SPECIFICATIONS

12－2 Specifications of Multipoint Type Recorder

①Measurement range

Range Code	Measurement Range	Type	Unit	Max. resolution	digital Display Accuracy	Analog Indication Accuracy	
000	-10.0 - +10.0	mV		10μV	±(0.2%	±0.5%	
001	-50.0 - +50.0	mV		10μV	+1digit)		
002	-200.0 - +200.0	mV		100μV	Note 1		
003	-1.0 - +1.0	V		1mV			
004	-5.0 - +5.0	V		1mV			
005	-20.0 - +20.0	V		10mV			
006	0.0 - +5.0	V		1mV			
007	+1.0 - +5.0	V		1mV			
008	4.0 - 20.0	mA		0.01mA			
009							
010	0.0 - 1450.0	R	℃	0.1℃			
011	0.0 - 1760.0	R	℃	0.1℃			
012	0.0 - 1760.0	S	℃	0.1℃			
013	0.0 - 1830.0	B	℃	0.1℃	Note 2		
014	0.0 - 100.0	K	℃	0.1℃			
015	0.0 - 700.0	K	℃	0.1℃			
016	0.0 - 900.0	K	℃	0.1℃			
017	-200.0 - 100.0	K	℃	0.1℃			
018	-200.0 - 400.0	K	℃	0.1℃			
019	-200.0 - 650.0	K	℃	0.1℃			
020	-200.0 - 1370.0	K	℃	0.1℃			
021	0.0 - 1000.0	K	℃	0.1℃			
022	0.0 - 150.0	E	℃	0.1℃			
023	0.0 - 400.0	E	℃	0.1℃			
024	-200.0 - 500.0	E	℃	0.1℃			
025	-200.0 - 600.0	E	℃	0.1℃			
026	-200.0 - 900.0	E	℃	0.1℃			
027	-200.0 - 250.0	E	℃	0.1℃			
028	-200.0 - 400.0	E	℃	0.1℃			
029	-200.0 - 700.0	E	℃	0.1℃			
030	0.0 - 150.0	J	℃	0.1℃			
031	0.0 - 500.0	J	℃	0.1℃			
032	-200.0 - 650.0	J	℃	0.1℃			
033	-200.0 - 300.0	J	℃	0.1℃			
034	-200.0 - 500.0	J	℃	0.1℃			
035	-200.0 - 900.0	J	℃	0.1℃			
036	-200.0 - 750.0	J	℃	0.1℃			
037	0.0 - 150.0	T	℃	0.1℃			
038	0.0 - 400.0	T	℃	0.1℃			
039	-200.0 - 350.0	T	℃	0.1℃			
040	-200.0 - 400.0	T	℃	0.1℃			
041	0.0 - 2320.0	G	℃	0.1℃			
042	0.0 - 2320.0	C	℃	0.1℃			
043	0.0 - 900.0	N	℃	0.1℃			
044	0.0 - 1260.0	N	℃	0.1℃			
045	0.0 - 1880.0	PR4020	℃	0.1℃	Note 3		
046	-200.0 - 400.0	U	℃	0.1℃	Note 4		
047	-200.0 - 900.0	L	℃	0.1℃	Note 4		
048	0.0 - 300.0	Au-Fe	K	0.1K	Note 5		
049	-50.0 - 100.0	JPt100	℃	0.1℃			
050	-200.0 - 600.0	JPt100	℃	0.1℃			
051	-50.0 - 100.0	Pt100	℃	0.1℃			
052	-200.0 - 600.0	Pt100	℃	0.1℃			
053	-50.0 - 100.0	JPt50	℃	0.1℃			
054	-100.0 - 250.0	JPt50	℃	0.1℃			
055	-200.0 - 550.0	JPt50	℃	0.1℃			
056	-50.0 - 200.0	Cu 10Ω at 25℃	℃	0.1℃	Note 6		
057	-50.0 - 200.0	Cu 10Ω at 0℃	℃	0.1℃	Note 6		
058	0.0 - 1360.0	PLII	℃	0.1℃			
059							
060							

Terminal Block Reference Contact Compensation Acuracy
R, S, B, PR40-20 : ±1℃
K, E, J, T, G, C, N : ±0.5℃

Note 1. ±(0.3%+1digit)for up to 3-fold expansion ranges, and ±(0.3%+1digit)for up to 4-fold expansion rages in cases of the voltage ranges with range code 000 to 007.
Note 2. Accuracy is not compensated within a range of 0 to less than 400℃.
Note 3. ±2% for 0 to 300℃, and ±1% for 300 to 800℃.
Note 4. ±(0.3%+1digit) for 0 to 200℃.
Note 5. ±(0.5%+1digit)
Note 6. ±(0.8%+1digit)

Analog indication accuracy in Note 2 through Note 6 shall be digital display accuracy ±0.3%.

②Multipoint type recorder specifications

Block	Item	Specifications
Input Unit	Measuring point	6, 12, 24, 30
	Input Sampling	5s／CH,
Record／Printer	Recording method	Wire dot (6-color ink ribbon)
	Printing method	
	Recording width	180mm
	Dot print Interv	5s／CH,
	Chart paper	Length : 23m, Width : 210mm Folding width : 60mm
	Chart speed	1 to 1, 800mm／h
	Recording color	No.1, 7, 13, 19, 25 (Purple) No.2, 8, 14, 20, 26 (Red) No.3, 9, 15, 21, 27 (Black) No.4, 10, 16, 22, 28 (Green) No.5, 11, 17, 23, 29 (Blue) No.6, 12, 18, 24, 30 (Brown)
	Data print color	Purple (red)
Outer dimension (W×H×D)		288×288×340
Weight		15.0kg ro less

③Standard functions

Item	Description
Analog indication	Indicates a measured value with the scale plate and cursor. In the MANUAl mode, the recorder is available as a single-point indicator with 0. 5 second take-in cycle.
Analog recording	Makes analog recording with 6-color ink ribbon.
Engineering unit indication	Engineering unit is indicated on the scale plate.
Digital display	Indicates channel no.,process variable,data, chart speed,alarm setpoint on the indicator 1 & 2.
Logging print	Prints each channels's procees variable,engineering unit on the chart paper in selective printing mode of synchronous logging & recording mode or end mode for analog recording.
Date print	Prints year and date at a programmed time.
Time print	Prints time at a programed interval.
List print	Prints type of input,range,engineering unit alarm setpoint,date,time,chart speed,scaling and logging print status on the chart paper.
Dot print skip	Skips recording of an unused channel.
Programming	Chart speed,alarm setpoint,logging print interval,skip,date and time can be programmed.
Memory backup	·Protects the clock function, using built-in lithium batteries. The battery life is 10 years(total power-off period of the instrument: 5years) ·Data is stored in the non-volatile memory.
Key lock	Locks the keys automatically if they are not operated for 3 minutes in the user mode.
Alarm	Capable of setting 4 types of alarms per channel.
Chart speed	capable of setting the chart speed.
Time indicator	Indicates year,month,day,hour,minute,Adjust for leap year automatically.
Self diagnostic	Indicates 'ERROR',and outputs when faulty.

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④ Standard setting functions

Function	Description
Open input protection (Burnout)	Swings the cursor fully toward 100 % or 0 % when an input is disconnected. Either up or down can be specified for each channel. (DC voltage of ± 50mV max, thermocouple input)
Zone recording (Track recording)	Capable of specifying a recording area for each channel ro record by tracks.
Alarm on print	Prints an alarm reset time, reset channel, alarm setting number, and alarm type in red when it occurs.
Alarm recover on print	Prints an alarm reset time, reset channel, alarm setting number, and alarm type when it is reset.
Alarm hysteresis width	Sets an alarm hysteresis width optionally. (standard: 0.5 % FS)

● Remote Functions by DI

Function	Description
Chart paper feed start/stop	Charts when set to ON and stops when set to OFF
Chart speed switching	1st when the contact is turned to ON and 2nd when turned to OFF
External logging print	Prints out when the contact is turned to ON

● Internal Alarm : 8 relays

● Optional Communication Unit

Function	Description
Communication Unit	RS－232C
	RS－422A

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