No. INE-143

AA SERIES

MULTIFUNCTION HYBRID RECORDERS

INSTRUCTIONS

CHINO

⚠ CAUTIONS FOR SAFE USE

1. Mount the recorder in an instrument panel

This recorder is a modular unit. Be sure to take measures to prevent the user from touching the terminals by mounting in an instrument panel.

2. If the recorder has the control and alarm outputs...

Take safety measures against output failures due to operation errors, malfunctions and sensor abnormalities before use.

3. Warning marks used in this instrument

Electric shock warnings as shown on the left are provided in positions where there is the danger of hazardous voltage on teminals, fuse, socket, etc.
Use extreme caution when installing or seruvicing your instrument.

4. Safety Notice for this instrument

For safe use of the instrument, please read the following Safety Notice.

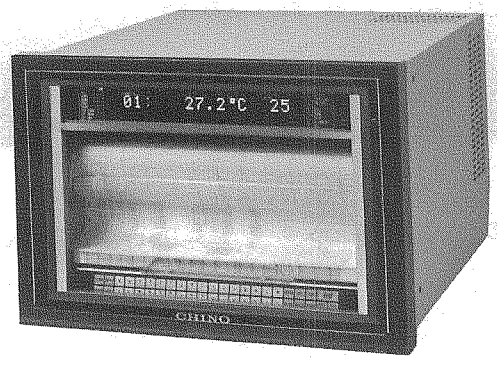
Safety Notice

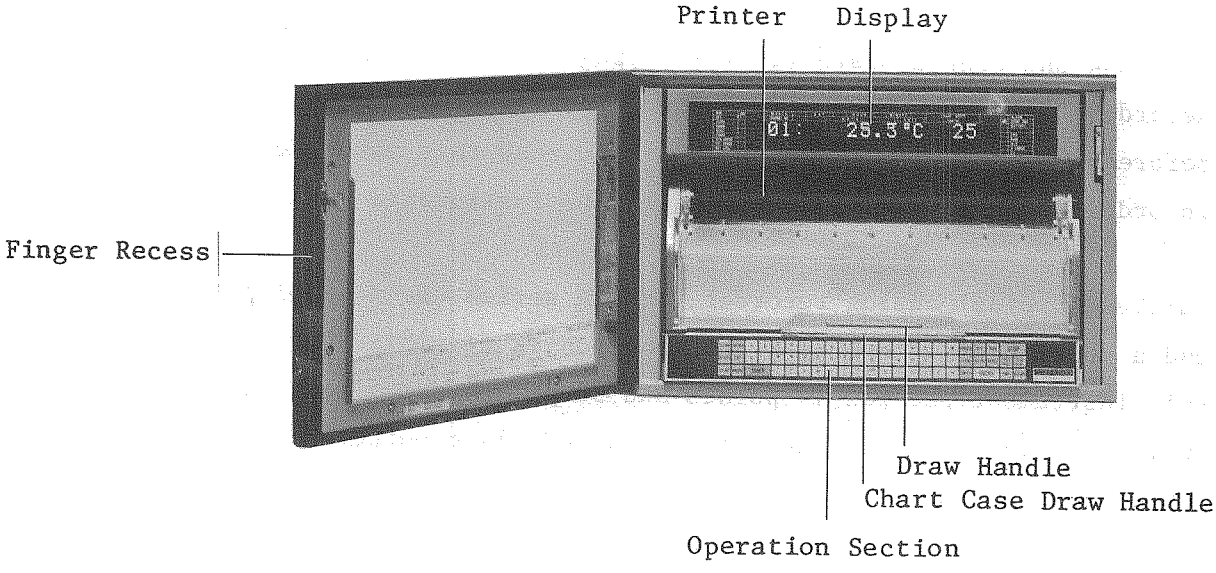
1 Install a switch and fuse	: To prevent the possibility of electric shocks and to facilitate countermeasures in an emergency, install a switch and fuse in the power supply circuit.
2 Replacement of wires, protecitve grounding and fuse	: These should be replaced by a qualified instrumentation engineer, who should ensure that the parts used meet the specifications of the instrument.
3 Be sure to attach terminal covers	: After installation and wiring of this instrument, cover terminals provided with terminal covers to prevent electric chocks.
4 Operating environment	: Do not operate or store this instrument in a place where there is a flammable gas or vapor. Use it within the operating environmental range specified in the Instruction Manual.
5 In the case of a problem, first switch the power OFF	: When the instrument produces an abnormal smell or any other abnormal phenomena including smoke and high temperatures, immediately turn the power OFF then consult your local dealer.

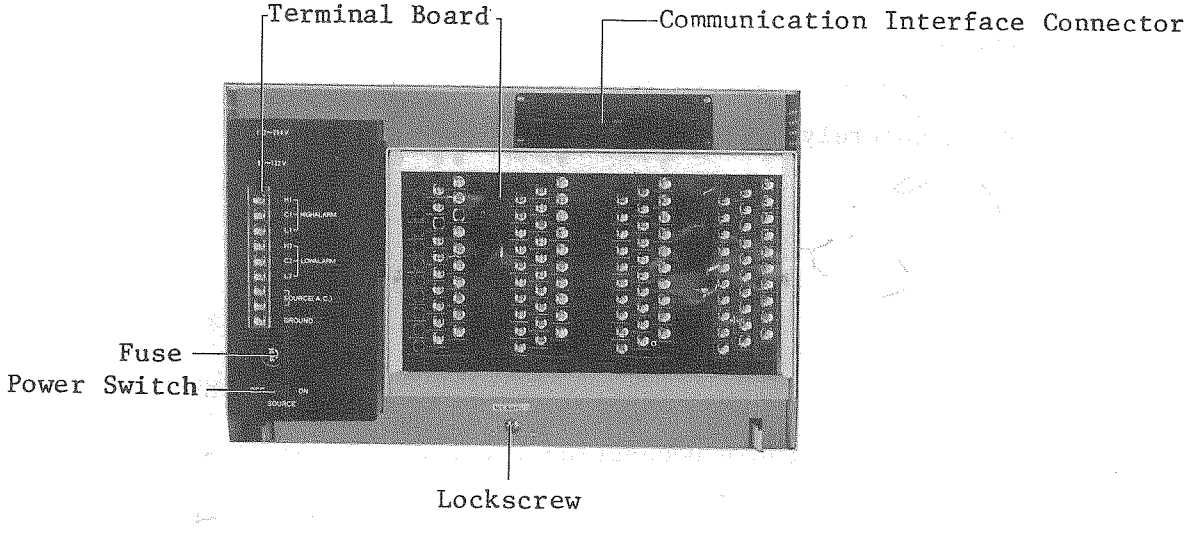
NOTES
1. Make sure that this Instruction Manual is delivered to the user.
2. Keep the Instruction Manual near the instrument until it is finally disposed of.

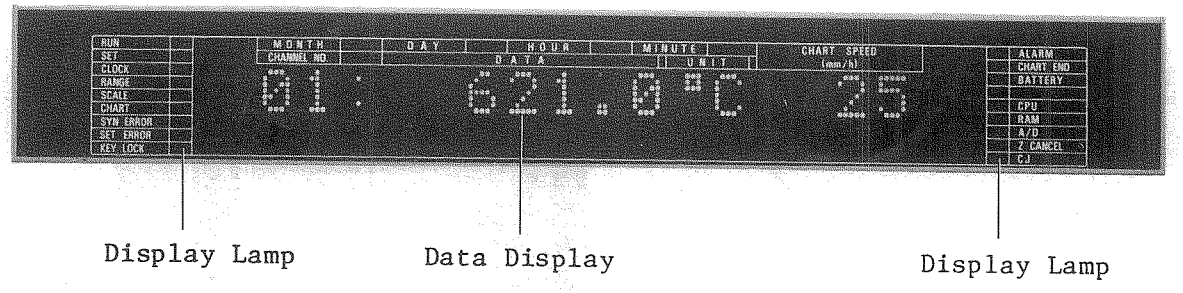
We thank and congratulate you for buying the Multifunction Hybrid Recorder; "AA series a sophisticated, yet easy to use instrument". Before use, however, we suggest that you read this manual carefully in order to familiarize yourself with the instrument.

Unlike a typical analog recorder, the AA series use a 16-bits CPU and a multifunction Hybrid recorder which is flexible. At high speed this instrument records 15 points and 30 points per 5 sec. It is equipped with multirange specification and alarm output. Also, it has optional functions for setting operational designations by speech and a GP-IB or RS232C communication interface. Various parameter settings and operations are done on the front keyboard. The essential steps needed to operate it, are described in the "How to operate" section on pages 6 to 13.
It is very important to read this section. Also, before operation, make absolutely sure you read the following.




Printer
Display
Finger Recess
Draw Handle
Chart Case Draw Handle
Operation Section


Terminal Board
Communication Interface Connector
Fuse
Power Switch
Lockscrew


RUN
SET
CLOCK
RANGE
SCALE
CHART
SYN ERROR
SET ERROR
KEY LOCK
MONTH
DAY
HOUR
MINUTE
CHART SPEED
CHANNEL NO
DATA
UNIT
ALARM
CHART END
BATTERY
CPU
RAM
A/D
Z CANCEL
CJ
Display Lamp
Data Display
Display Lamp

- To open the door, pull out the finger recess forward.

- To draw out the case, loosen the shipping lockscrew from the back and pull out the draw handle (rectangular hole on back of the draw handle), so that the case comes out forward. If a chart is attached, put your fingers under the chart.

- To draw out the chart case, pull the chart case draw handle forward so that only the chart is drawn forward.

- The operation section has 66 keys for setting various parameters and for controlling the operation (For details, read the following page).

- The LOCKSCREW secures the case for shipping and thus prevents it from getting loose. To use, loosen the lockscrew with a phillips screwdriver. And to reship tighten the screw again.

- The snap type POWER SWITCH turns the power on and off.

- A 5-AMP POWER FUSE is housed in the holder.

- The TERMINAL BOARD includes the input, power, ground, and alarm terminals.

- The COMMUNICATION INTERFACE CONNECTOR (attached as an option), connects the communication interface unit. A cable connector, also attached to the communication interface unit, connects with the external CPU.

- The DATA DISPLAY area digitally displays (16 digits) measurement data for various parameters. In normal operation, measurement data on the left (input number, measurement value, the higher of 2 digits of the unit, and chart feed speed), or the time (date, hour, minutes, and chart feed speed) are displayed. Here when the time is set, data saved according to the key operation appears on display. And the cursor

(▼ mark) turns on and off for the data display setting.

• The DISPLAY LAMP indicates the following:

1) RUN-Lights during normal operation. Five display lamps such as the following, light up at the preset time and turn on and off to indicate the set sequence.

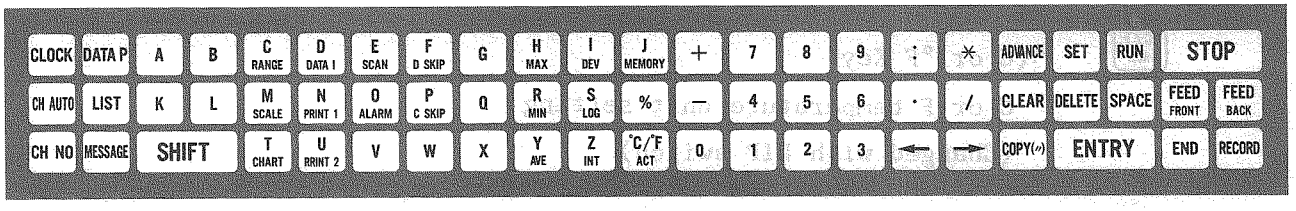
Also, these light up when the corresponding key is depressed.

SET —— Receiving status for setting
CLOCK —— Date · Time
RANGE —— Range setting
SCALE —— Scale setting
CHART —— Chart feed speed
SYN ERROR—— Light up when the setting format is abnormal.
SET ERROR—— Setting format is normal, but it lights up for impossible contents of setting.
KEY LOCK —— Lightning for the locking of setting key

This equipment has a self check function, the 8 lamps on the right side will light up when the following abnormalities occur.

ALARM —— Alarm occurrence
CHART END—— Paper end
BATTERY —— Battery voltage abnormal
CPU —— CPU abnormal
RAM —— RAM abnormal
A/D —— A/D abnormal
Z CANCEL —— Zero-cancel abnormal
CJ —— CJ (Temperature compensation junction) abnormal

KEY OPERATIONAL PART



CLOCK (Clock key)

Date · Time set

CH AUTO (Channel Auto Key)

Multipoint successively displays channel data.

CH NO (Channel Number Key)

Successively displays channel data.

DATA P (Data Print Key)

Prints data at required time.

LIST (List Key)

Sets parameter prints.

MESSAGE (Message Key)

Sets message print.

SHIFT (Shift Key)

Assembled with another key. Hitting this key, simultaneously with another (red) key, enables key operation for setting various alphabetic parameters at a lower step.

A ~ Z INT (Alphabetic key)

26 alphabetic keys. Sets unit message print.

(Percent Key)

% unit setting

(C or °F Key)

C or F temperature unit setting

(Changed with DIP switch)

(Range Key)

Sorts input, and measuring range setting.

(Scale Key)

Sets scale.

(Chart Key)

Sets chart speed.

(Data Interval Key)

Sets the print format and digital print intervals.

(Print 1 Key)

Sets regular print (Print 1) to left margin of chart.

(Print 2 Key)

Sets regular print (Print 2) on analog chart.

(Scan Key)

Sets input received frequency.

(Alarm Key)

Alarm setting

(Dot Skip Key)

Sets channel, not in analog dotting.

(Character Skip Key)

Sets channel, not in digital dotting.

(Maximum Key) *

Sets operation maximum value.

(Minimum Key) *

Sets operation minimum value.

(Average Key) *

Sets operation average value.

(Deviation Key) *

Sets operation deviation.

(Loging Key) *

Sets report

(Integral Key) *

Sets operational integration.

(Memory Key) *

Sets memory record.

(Act Key) *

Sets active record.

Note) * means optional function.

Numeric Key ( ~  .  . )

Numeric parameter setting

Column Key

Sets for auto-range. auto-scale

Period Key

Decimal point

Asterisk Key

Sets continuous input number, fixed range and fixed scale.

Slash Key

Sets discontinuous input number.

 and  Key

Moves cursor location (▼ mark) left and right.

Advance Key

Displays in advance for parameter check.

Clear Key

Displays blank (Deletes setting data).

Copy Key

Sets same contents.

(Set Key)

Saves or modifies a parameter.

(Run Key)

Starts running and releases stop status.

(Delete Key)

Deletes cursor location letter for parameter modification.

(Space Key)

Provides letter intervals for parameter modification.

(Entry Key)

Saves parameter.

(Stop Key)

Stops program running.

(Feed Front Key)

Speeds up chart feed forward when depressed.

(Feed Back Key)

Speeds up chart feed in reverse when depressed.

(End Key)

Sets parameter and modification end.

(Record Key)

Stops recording when depressed and restarts when depressed again.

OPERATION

When operating this instrument some items have to be set precisely, but some others need to be set only arbitrarily, if required. The items which need to be understood before operation are discussed here. For instructions on how to set the instrument properly for activation, refer to the chapter called 「convenient function to know」 in the latter part of this manual. This instrument comes in two types one with a speech designation (optional function) and another one without it. This manual explains the setting for the instrument in its initial condition without speech designation.

Operational presets

1. Power ON

   Set power switch to ON (Power switch on backside) so that the [SET] lamp turns on and off. When the battery switch is ON, and the setting is finished, the [RUN] lamp will turn on and off.
   To operat, depress the [RUN] key.

2. Setting

   Depress the [SET] key so that the [SET] lamp lights up to indicate normal status. Simultaneously, the [CLOCK] lamp will turn on and off.

Date, time setting

(1) Depress [CLOCK] key so that the [CLOCK] lamp turns on. Set the date, time. (Year, Month, Day, Hour, Minutes are 2 digits each. For example for January set [0] [1] .)

Ex) '86, 1, 21, 13:05

Key operational procedure

8	6	·	0	1	·	2	1	·	1	3	:	0	5	ENTRY

Display

8 6 . 0 1 . 2 1 . 1 3 : 0 5

The setting data is displayed successively according to key operation.

After confirming the display depress [ENTRY] key. (Hereafter, it's the same.) If the setting is correct, a receiving tone will be heard and the [CLOCK] lamp will turn off. Simultaneously the [RANGE] lamp will turn on and off.

(Attention) If no display appears, the setting is faulty. In case of faults, depress [CLEAR] key (Display will turn blank) and repeat the setting. The location where the cursor (▼ mark) keeps turning on and off must be set for setting easier.

• Input sort

Direct current voltage input

NO	Input sort	NO	Input sort
01	20 mV	05	2V
02	50 mV	06	5V
03	200 mV	07	20V
04	500 mV	08	50V

Thermocouple

NO	Input sort
11	K
12	E
13	J
14	T
15	R
16	S
17	B
18	PR 5 - 20
19	PR 20 - 40
20	W. W Re 5 - 26
21	W. W Re 26
22	Ni - NiMo
23	Nicrosil - Nisil
24	AuFe - Cr

Thermal resistance

NO	Input sort
31	JPt 100
32	Pt 100
33	Pt - Co

Range setting

(2) Depress the [SHIFT] key simultaneously with the [C RANGE] key.

The [RANGE] lump will then turn on and off.

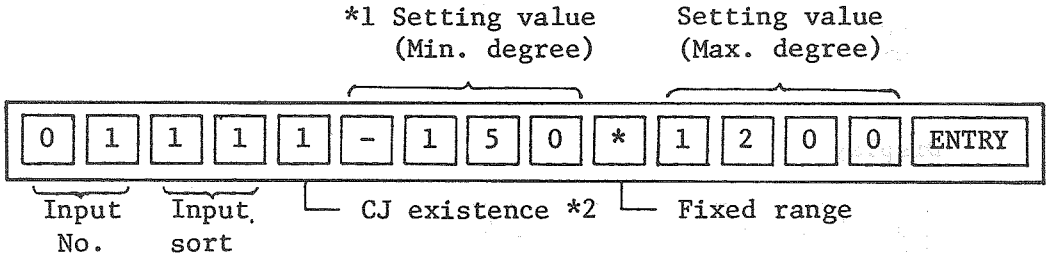
The range setting consists of a fixed range and auto range with a parameter used to determine the measuring range. In the fixed range, the measuring range is fixed according to the measured range (Ex. 0 to 100C). And in the auto range when a 0 to 100C range is set and the measuring value exceeds 100C, the measuring range changes at 100 to 200C automatically.

The setting procedure is input number, input sort (2-digit code number in the following page), CJ existence (Temperature compensation junction range) and minimum calibrations.

The [*] key for fixed range and the [:] key for auto range are used to set the graduation or span at a maximum value.
The input number where the range is not set, can be recorded in analog form and printed in digital also. The input number used must be set to a precise range.

Ex 1) For fixed range

Input number No.1, Input sort, K Thermocouple CJ lamp -150 to 1200 C key operational procedure.



*1 Value including decimal point is 5 digits.

*2 CJ internal: 1 CJ external: 0

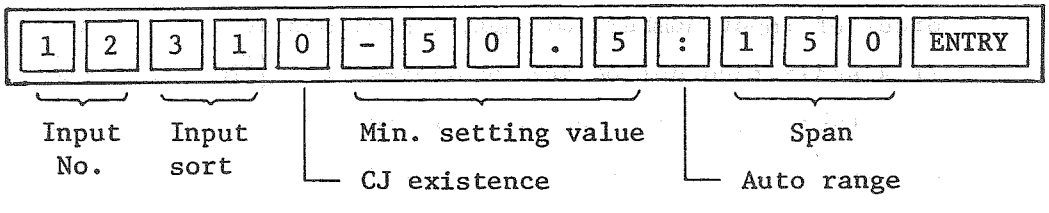
Display

0 1 1 1 1 - 1 5 0 * 1 2 0 0

Ex 2) For auto range

Input number No.12 Input sort JPt 100Ω, Min value -50.5C, 150C SPAN

Key operational procedure



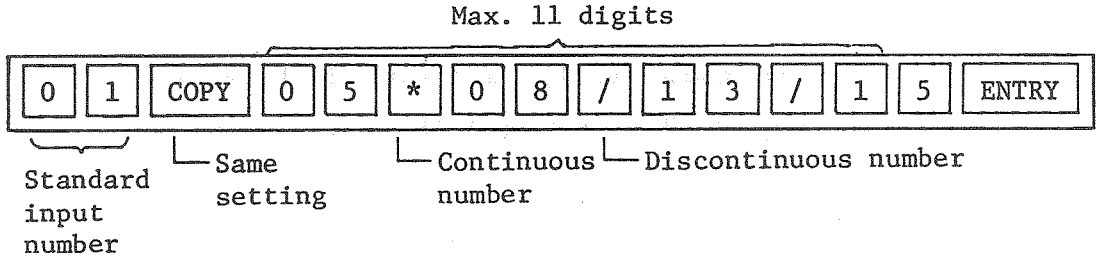
Display

1 2 3 1 0 - 5 0 . 5 : 1 5 0

Ex 3) For same setting

The setting contents of input No.1 (reference number) and that of No.5 to No.8 are the same. No.13 and No.15 also has the same reference number as No.1.

Key operational procedure



Display

0 1 " 0 5 * 0·8 / 1 3 / 1 5

Repeat the operation above and set the range to all the input numbers, then depress the [END] key. The [RANGE] lamp will then turn off and simulteneously the [SCALE] lamp will turn on and off.

Scale setting

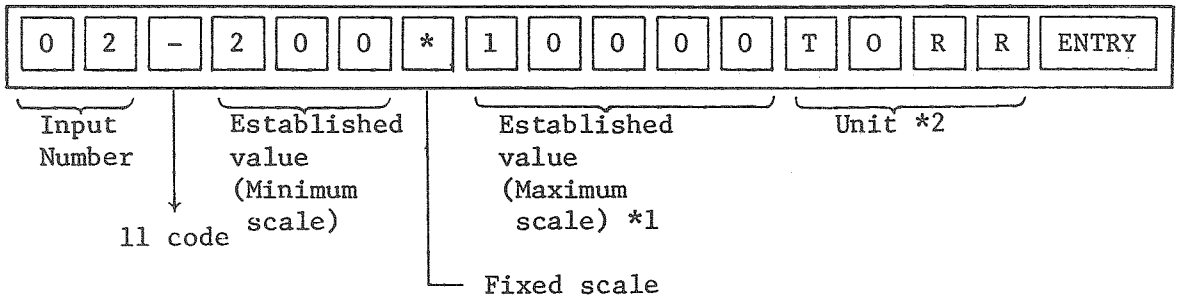
(3) Depress the [SHIFT] key and [M SCALE] key simultaneously. The [SCALE] lamp will then light.

For scale setting, a fixed scale and an auto scale are used with parameters to determine the scale according to the degree plate, such as range setting. The operation procedure is set up in the order of input number, minimum scale, maximum scale, and unit span. If a scale reed not be set up depress the [END] KEY (not necessary to establish, if its thermocouple input, thermal resistance input are the same as the range estabilished.

Example 1) Fixed scale

Input number No.2 - 200 to 10,000 TORR

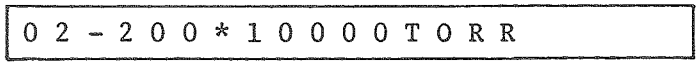
Key operating Procedure



*1 Established value is 5 digits including decimal point

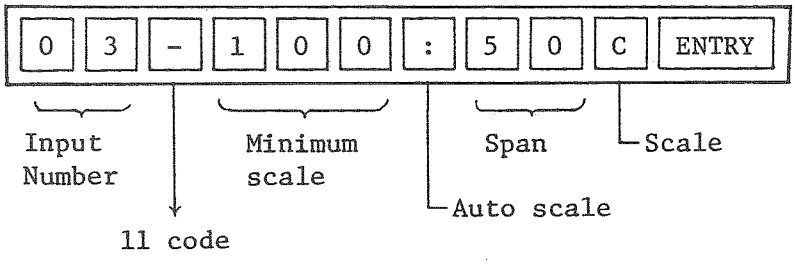
*2 Unit maximum is 5 letters.

Indication

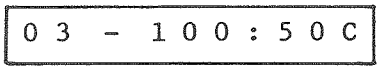


Example 2) Automatic scale

Input Number No.3 Minimum scale - 100C, 50 C span



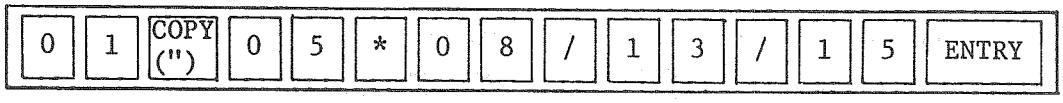
Indication



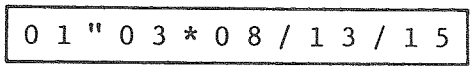
Example 3) Identity Establishment

The establish (contents of Input Number/ (Standard Input Number) are identical for that of No.5 ∿ 8, No.13, No.15.

Key operation Procedure



Indication



Repeat the same operation, establish the scale to the necessary input number, and depress [END] key.
Turn off [SCALE] lamp, so that simultaneously, the [CHART] lamp turns on and off.

Chart feed speed setting

(4) Depress [SHIFT] KEY + [T CHART] KEY. The [CHART] lamp will turn on and off.
Establish the chart feed speed. The establish area in 1 to 9999 mm/h. This can be set up in steps optionally.
For example, for 30 mm/h, establish [3] [0] [ENTRY] .
The [CHART] lamp will turn off and simultaneously, the [RUN] lamp will turn on and off.

Operation

After the date · time, range, scale and chart feed speed have been set, the [RUN] lamp will turn on and off, and the instrument will be operable.

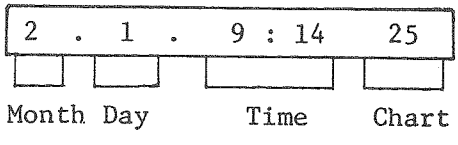
****
* Depress the [RUN] key. The [RUN] lamp will then turn on and off *
* and the operation will start. *
****

In normal operation, analog data for each channel is dotted and recorded on the chart and simultaneously digital data with data internal for linking the chart feed speed is printed at the regular time. For the regular time format PRINT 1 printed the left margin of the chart and PRINT 2 on the analog record. For the display during operation, there is a time display (Month, Day, Hour, Minute and chart feed speed) and a measuring data display (Input number, measured data and chart feed speed). Also, for measuring data display, there are two multiple points for successive display by changing channels every 5 sec, and one point sequential display for the designated channel only. Initially, the display mode is the time display. Printing is normally done at PRINT 1.

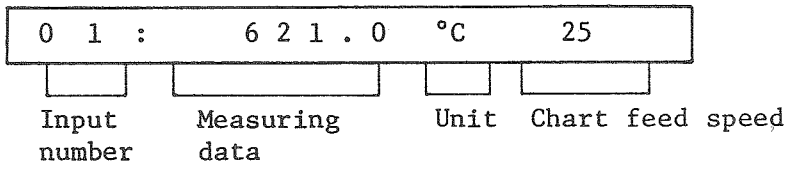
Display mode designation

During operation, when the display mode key (one of [CLOCK] [CH AUTO] [CH NO] key) is depressed, the following mode is designated. Designate a display mode.

(1) Depress [CLOCK] key to display the following time.



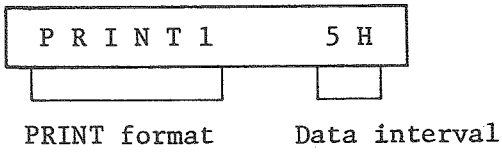
(2) Depress [CH AUTO] key to enable multiple successive display. (Successive data displayed according to input number)



(3) Depress [CH NO] key and set input number; then depress [ENTRY] key. This is a one-point sequential display for the designated input number.

Print format designation

Depress [SHIFT] key simultaneously, with [D DATA] key. The following display setting, print format modification and data interval will appear.



(Chart feed speed: 25 mm/h)

When the PRINT 1 format is displayed with the operation above, it will become the setting status after the [SET] key is depressed.

For PRINT 1

Chart speed mm/h	Data interval h
10	12
11	11
12, 13	10
14	9
15, 16	8
17 ∿ 19	7
20 ∿ 23	6
24 ∿ 29	5
30 ∿ 39	4
40 ∿ 59	3
60 ∿ 119	2
120 over	1

For PRINT 2

Chart speed mm/h	Data interval h
10	3
11 ∿ 21	2
21 over	1

Depress the [SHIFT] key simultaneously with the [U PRINT2] key. When the [ENTRY] key is depressed, the print will be PRINT 2 format. To change from PRINT 2 to PRINT 1, depress [M PRINT1] key instead of [U PRINT2] key. To change PRINT 1 ⇄ PRINT 2, move the cursor to the modified location (place for 1 or 2) and set a new number (2 or 1), then depress the [ENTRY] key.

The data interval is determined according to the table below, because it prints 30 points in digital form and it links with the chart speed. Other intervals than those on the table can also be set.

To set the data interval, move the cursor to the data interval display location (One character space is needed), then set a new number following PRINT 1 or PRINT 2 and depress the [ENTER] key. Be sure to set a time number lower than the interval number, according to the chart speed of the table. A higher time number is not acceptable. Following is the setting standard:

For PRINT 1 Data interval > $\frac{111.8}{\text{Chart speed}}$ [h]

For PRINT 2 Data interval > $\frac{21.6}{\text{Chart speed}}$ [h]

Momentary data print

Depress the [DATA P] key to enable momentary data printing after interrupting the analog recording.

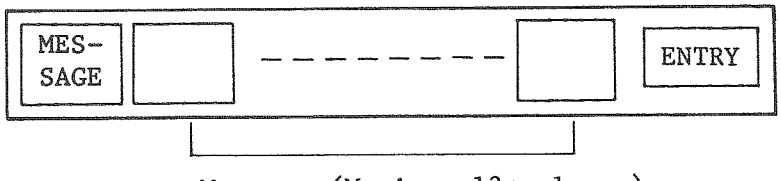
List print

Depress the [LIST] key to enable parameter print setting after interrupting the analog recording.

Message print

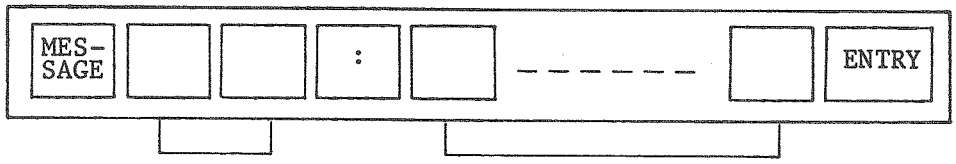
Depress the [MESSAGE] key to move the time print (Hour, Minute) to the right margin of the chart and to allow a maximum of 13-colums message print (using alphabetic and numeric key) also an the right side. When an input number is designated first for message, at the next dotting, message printing starts and simultaneously the message mark is recorded on the designated recording.

(1) Key operational procedure (Input number designated)



Message (Maximum 13 columns)

(2) Key operational procedure (Input number designated)



Stop and restart

Depress [STOP] key to turn off the [RUN] lamp at the end of operation. Here the output remains at the previous value and stops.
To restart, depress [RUN] key.
When the [RECORD] key is depressed only the recording stops ([RUN] lamp lighted). To restart the recording, depress the key again.

Chart fast feed

Depress [FEED FRONT] key to fast feed the chart. While the [FEED BACK] key is depressed, the chart is fed fast in reverse. (In the reverse feeding, the chart length is 50 mm at maximum)

Setting contents modification

Depress [SET] key to modify the setting contents during operation. The [SET] lamp does not light when the [SET] key is depressed ruing. The cursor (▼ mark) in the data display area indicates modification or addition status. After the modification, proceed to display mode by depressing display mode key (One of [CLOCK] [CH AUTO] [CH NO] keys).

Date, Time modification

Example) 86, 2, 20, 13:50

(1)	Depress [CH AUTO] key.
(2)	Depress [SET] key.
(3)	Depress [CLOCK] key.
(4)	[8] [6] [.] [0] [2] [.] [2] [0] [.] [1] [3] [:] [5] [0]
(5)	Depress [ENTRY] key (Clock starts).

If the setting is unacceptable depress [END] key and repeat the operation. If the power is interrupted, the other setting will not be deleted when the back up battery tales effect, but the clock will stop during power stoppage. Reset the clock after power recovery, so that the clock starts again (it will start from the time of power stoppage). Also, when the lamp switch is set to OFF, the same procedure as above applies.

OUTLINE

(Example) When No.1 to No.30 is already established: Change the range from No.12 to No.20. Thermocouple with CJ 0*1200°C → JPt 100Ω 0*200°C

KEY OPERATION PROCEDURE	DATA INDICATION
(1) Depress [SHIFT] + [C RANGE] KEY.	011110*1200
(2) Depress [ADVANCE] KEY as No.12 range designation	121110*1200
(3) Depress [SET]	
(4) Depress [→] [←] KEY to set sursor to transit position.	121110*1200 ▼
(5) Depress [3] [1] [0] [0] [*] [2] [0] [0] [DELETE] or [3] [1] [0] [→] [→] [2] [0] [→] [DELETE] .	123100*200
(6) Depress [ENTRY] KEY to enable transit only for No.12, as below.	
(7) Depress [CLEAR] [1] [2] [COPY(")] [1] [3] [*] [2] [0] [ENTRY]	
(8) Depress [END] .	

The procedure above completes the setting, to confirm the established contents, depress the [ADVANCE] key after [SHIFT] [C RANGE] , to input the number orderly on the data indication and to confirm the contents indicated.

Example 2) No.1 to No.10 already established:
Add the No.11- to No.20- range (T type Thermocouple, CJ, 0 to 150 C) to the others.

Key operation procedure

(1) Depress [SHIFT] KEY + [C RANGE] KEY together
(2) Depress [SET] KEY.
(3) Depress [ENTRY] KEY until designation sign is blank. Here all numbers above No.10 will be blank.
(4) Depress [1] [1] [1] [4] [1] [0] [*] [1] [5] [0] [ENTRY]
(5) Depress [1] [1] [COPY(")] [1] [2] [*] [2] [0] [ENTRY]
(6) Depress [END] KEY.

As in the following three pages, the designation is displayed, if the contents have been set up in the files, and the old ones then turn to new ones.

The scale value is set up by range up to a maximum of five digits; including decimal point, but with the exception of ± code.

Modification of scaling

(Example 1) When No.1 to No.30 is already established: Change the range from No.12 to No.20 0 to 100% → 0 to 2000 Kg.

KEY OPERATION PROCEDURE	DATA INDICATION
(1) Depress [SHIFT] KEY + [M SCALE] KEY together	010 * 100%
(2) Depress [ADVANCE] KEY for designated scale No.12	120 * 100%
(3) Depress [SET] KEY	Cursor turn on and off (▼ mark)
(4) Depress [→] [←]	120 * 100%
(5) Depress [2] [0] [0] [0] [K] [G] or [2] [→] [→] [0] [K] [G]	120 * 2000 Kg
(6) Depress [ENTRY] KEY	
(7) Depress [CLEAR] [1] [2] [COPY(")] [1] [3] [*] [2] [0]	
(8) Depress [END] KEY	

All the changes are made as above. To confirm the set up contents, depress the [ADVANCE] key, proceed to input the number orderly on the data indicator and check the contents indicated. The unit can be set in five letters (Automatic supply, however applies to four letters).

UNIT ESTABLISHMENT	UNIT RECORD	UNIT DESIGNATION
5 letters (exam.) KG/MZ	5 letters KG/MZ	(the upper) 2 letters KG

Example 2) When No.1 to NO.10 is already established:
Add the scale (0 to 100%) of No.11 to No.20 to another one.

Key operation procedure

(1) Depress [SHIFT] KEY + [N SCALE] KEY together

(2) Depress [SET] KEY

(3) Depress [ENTRY] KEY until designation sign turns blank.
Here next No.106 will be blank.

(4) Depress
[1] [1] [0] [*] [1] [0] [0] [%] [ENTRY]

(5) Depress
[1] [1] [COPY(")] [1] [2] [*] [2] [0] [ENTRY]

(6) Depress [END] KEY.

The scale value can be established by scale at a maximum of five digits except the ± code.

Chart feed modificationspeed

(Example) 50 mm/h

(1) Depress [SHIFT] + [T CHART] KEY together
(2) Depress [SET] KEY
(3) Depress [5] [0] [ENTRY]

CONVENIENT FUNCTIONS

Parameter replacement

Depress the desired parameter key to replace the old setting. Then, depress the [SET] key so that the cursor (▼ mark) turns on and off, to turn to receiving status. With the [→] [←] key, the cursor can be moved to the location desired to modify and to set new contents. But to replace the date and time, depress [SET] key, then depress [CLOCK] key. (If the [CLOCK] key is first depressed data will not appear). To delete, depress [DELETE] key. Then, after setting, depress [ENTRY] key. For range deletion, scale ---- parameter self, depress [CLEAR] key, then depress [ENTRY] key.
The date, time, range, scale, and chart feed speed replacement are described in pages 11 to 13 Setting Contents Modification.
Likewise, the data interval replacement is described in page 10.
All the other parameter replacements are discussed here.

1. Measuring frequency

   The measuring frequency, when not particularly designated is set up according to the table below which corresponds to the chart speed. Setting the speed-up also possible. The measuring frequency cannot be set, for a chart speed of 240 mm/h or over.

   - Set in units of "seconds" (Decimal point "second" is not acceptable).

   - Set at a measuring frequency higher than that indicated in the table below; linking the chart speed.

   - The lowest frequency of the setting is:

3 sec/range setting 30 points
1 set/smaller range setting

Chart speed mm/h	Range setting 30 points	Range setting 15 points	Range setting 10 points	Range setting 1 point
1	720	360	240	24
5	144	72	36	3.6
10	72	36	18	1.8
20	36	18	12	1.2
25	28.8	14.4	9.6	0.96
50	14.4	7.2	4.8	0.48
100	7.2	3.6	2.4	0.24
200	3.6	1.8	1.2	0.12
400	2.5	1.25	0.83	0.08
〃	〃	〃	〃	〃
9999	2.5	1.25	0.83	0.08

Key operational procedure

(1) Depress [SHIFT] key + [E SCAN] key.
(2) Depress [SET] key.
(3) Set numeric value in units of a "second".
(4) Depress [ENTRY] key.

If the chart speech is modified, the measuring frequency will link with the chart speed automatically. To set the measuring frequency arbitrarily, for returning to the speed linked with the chart speed, depress the [SHIFT] [C] [SET] [ENTRY] keys.

2. Dotting skip

A channel which does not record analog data can be set.
Here the channel which does not designate the setting will be skipped automatically. However, if necessary, set it.

Ex.) In case dot No.6, No.8, No.16 to 24 have not depressed.

Key operational procedure

(1) Depress [SHIFT] key + [F / D SKIP] key,

(2) Depress [SET] key.

(3) Depress

[0] [6] [/] [0] [8] [/] [1] [6] [*] [2] [4] [ENTRY]

Maximum 14 columns

3. Print skip

Channel which does not in print in digital can be set.
Depress the [SHIFT] key and the [P / SKIP] simultaneously, to set the print skip with the same operational procedure such as in the dotting skip.

Parameter confirmation and modification

To confirm a parameter, depress the appropriate parameter key.
The setting value concerned with the data will then appear on display.
If there are many parameters (Ex. range, scale...), advance with [ADVANCE] key.

1. Parameter modification during running status

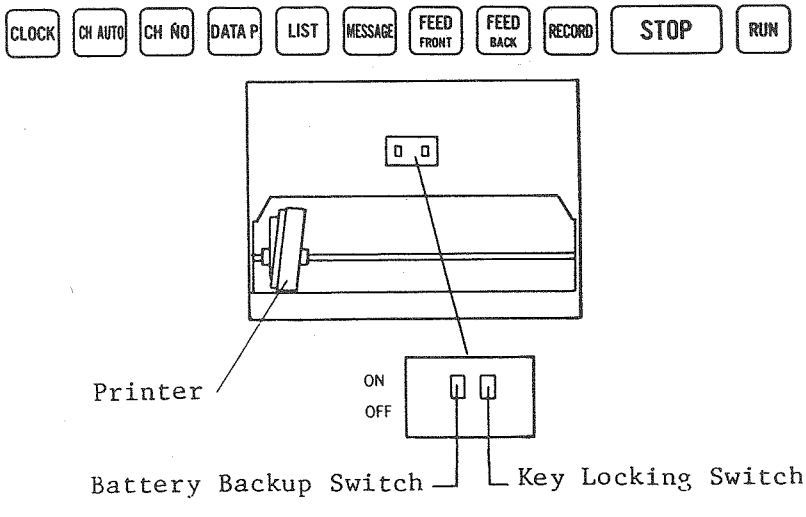
   When modifying in parameter confirmation, depress [CLEAR] key, and [SET] key, then repeat setting or moving cursor (▼ mark) to the modified location to modify it. After completing the setting, depress [END] key.

2. Parameter modification after stopping

   Depress [STOP] key. The [RUN] lamp will then turn off, the output will keep its previous value and the operation will stop.
   Depress the [SET] key and hit the desired parameter key to modify it. After finishing the setting, depress the [END] key, the display mode key, and the [RUN] key.

Do not delete setting contents

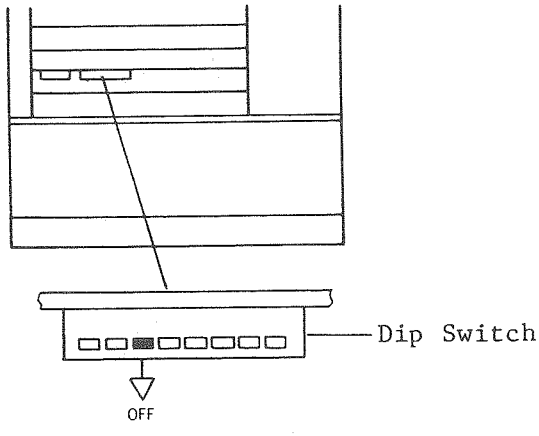
1. The power switches off when the battery backup switch is left released, the setting contents will be deleted or modified to the initial value. And important setting contents might be changed by other people. Therefore, use the key locking switch to lock the setting contents. The key locking switch is located at the side where the case has been drawn out (Below).



To clear all the setting contents, release the battery backup switch (OFF), then, switch off the power.
If the battery backup switch and the power ON of this instrument, are released, the setting contents will not change even with external power OFF. (Same as power stoppage)
But here the clock will stop.

Parallel operation

In parallel operation in which the same input (Direct Current Voltage, Thermocouple) is used other equipment (e.g. regulator), noise from the other meter could overlap the input signal. This is undesirable. For parallel operation, the burnout detector should be turned off to prevent the abnormal signal from adversely effecting the other meter. Therefore, here the equipment burnout function will not work. The switch for detecting burnout can be operated, after the case is drawn out and the upper print circuit cover is removed with a screw-driver (See figure below).



Switch for Detecting Burnout

Alarm setting

As a standard specification, the upper limit alarm point (H) and the lower limit alarm point (L) are common to each channel. This the same as in an arbitary setting identification alarm (Option spec.), in which alarm relays No.1 to No.60 (For AA015, No.1 to No.30) and the alarm points of each channel are determined. (Common setting by [COPY] key not possible.) When an alarm occurs, an alarm mark appears on the analog record of the channel concerned and the time of the alarm relay is printed on the right margin of the chart. The [ALARM] lamp of the display area then lights up and the connected point signal is output at the alarm terminal.

Ex) Alarm relay No.1 : Lower limit alarm -150C for input number No.2
Alarm relay No.2 : Upper limit alarm 1050C for input number No.24

Key operational procedure

(1)	[SHIFT] key + [0 ALARM] KEY
(2)	[0] [1] [:] [0] [2] [L] [-] [1] [5] [0] [ENTRY]
(3)	[3] [0] [:] [2] [4] [H] [+] [1] [0] [5] [0] [ENTRY]
(4)	Depress [END] key.

Option function setting

When the [SHIFT] key and the optional parameter key concerned is depress the [SET] key various parameter settings of the option function take on receiving status.

1. Maximum value operation

For maximum value operation, there are two types of operation between the same input dottings and several input points.

(Attention) The result of maximum can be recorded for arbitrarily designated channels. But, input to the channel with maximum value operation priority is not recorded. If possible, use a vacant channel. (It is similar to the Minimum, Average, Deviation, Integration operations described later)

Ex 1) For Maximum value recording between dottings of the same input the maximum value between the No.1 dotting is recorded as No.25, and the maximum value of No.2 is recorded as No.2 (Not momentary value of No.2 but the maximum value).

Key operational procedure

(1) [SHIFT] key + [N MAX] key and then hit a [SET] key.
(2) [0] [1] [:] [2] [5] [ENTRY]
(3) [0] [2] [:] [0] [2] [ENTRY]
(4) Depress [END] key.

Ex 2) For maximum value operation between several points; the maximum value of No.6 to No.9, No.12, and No.20 are recorded as No.26.

Key operational procedure

(1) Depress [SHIFT] key + [N / MAX] key, then hit [SET] key.
(2) [0] [6] [*] [0] [9] [/] [1] [2] [/] [2] [0] [/] [2] [6] [ENTRY]
(3) Depress [END] key.

2. Minimum value operation

By depressing [SHIFT] key and [R / MIN] key simultaneously,

the minimum alue between dottings by the same input or the minimum value of several inputs can be set to record the arbitrary channel. Set the contents to minimum in a manner similar to the prescribed operational procedure for maximum value.
(Refer to the previous page (attention))

3. Average value operation

By depressing the [SHIFT] key and [Y / AVF] key simultaneously,

the averate value between dottings of the same input or the average value of several inputs is set to record the arbitrary channel (See the previous page (attention)).

4. Deviation value operation

By depressing the [SHIFT] key and [I / DEV] key simultaneously,

the deviation operation between two inputs is set to record the arbitrary channel (See previous page (attention)).
Also the deviation operation between several inputs is recorded for the normal channel. Set contents of the deviation operation as follows:

Ex. 1) Deviation operation between No.2 and No.9 is recorded as No.26.

Key operational procedure

(1) Simultaneously depress [SHIFT] key + [I DEV] key, then hit [SET] key.
(2) [0] [2] [:] [0] [9] [:] [2] [6] [ENTRY]
(3) Depress [END] key.

Ex. 2) For the No.1 standard, the No.2 to No.5, No.8, and No.12 deviation operation is recorded.

Key operational procedure

(1) Simultaneously Depress [SHIFT] key + [I DEV] key, then hit [SET] key.
(2) [0] [/] [:] [0] [2] [*] [0] [5] [/] [0] [8] [/] [1] [2] [ENTRY]
Max 11 Columns

5. Integration operation

Depress the [SHIFT] key and the [Z INT] key simultaneously. The integrated operation within the designated time for the same channel will be set to record the arbitrary channel (See previous page (attention)).
Set contents of the integrated operation as follows:

Ex.) After the No.1 input is integrated record at every one hour on No.26.

Key operational procedure

(1) Simultaneously depress [SHIFT] key + [Z INT] key, then hit [SET] key.
(2) [0] [1] [/] [0] [1] [H] [0] [0] [M] [:] [2] [6] [ENTRY]
(3) Depress [END] key.

6. Memory recording

If memorized data for the designated channels (Data memory capacity: 12 bit, 700 word) at the necessary time, can record it with on external connected point signal. As requested, the recording will start with an external connected point signal and data before and after the input is enlarged for recording (Chart speed 720 mm/min).
Set contents of the memory as follows:
Here, if the setting is modified during memory recording, be careful not to lose the memory contents.

Ex.) The No.1 input is memorized and 80% of the data memorized volume is used for data before the connected point input and the remaining 20% of it is for the data after the connected point input.

Key operational procedure

(1) Simultaneously depress [SHIFT] key + [I MEMORY] key, then hit [SET] key.
(2) [0] [1] [:] [8] [0] [ENTRY]

7. Action record

The received external connected point signal and the marking are printed onto the arbitrary space (or designated location). The external connected point input connects with a maximum of 5 inputs (A, B, C, D, E).

Ex.) Action record is printed on 20% of the chart without any markings (Without conductive signal).

Key operational procedure

(1) Simultaneously depress [SHIFT] key + [°C/°F ACT] key , then hit [SET] key.
(2) [A] [:] [2] [0] [ENTRY]
(3) Depress [END] key.

8. Daily report print

Data for each one hour the designated channel and the amount for that day (Maximum Minimum Average value for a day) is printed in table form, enabling printing at the designated time.

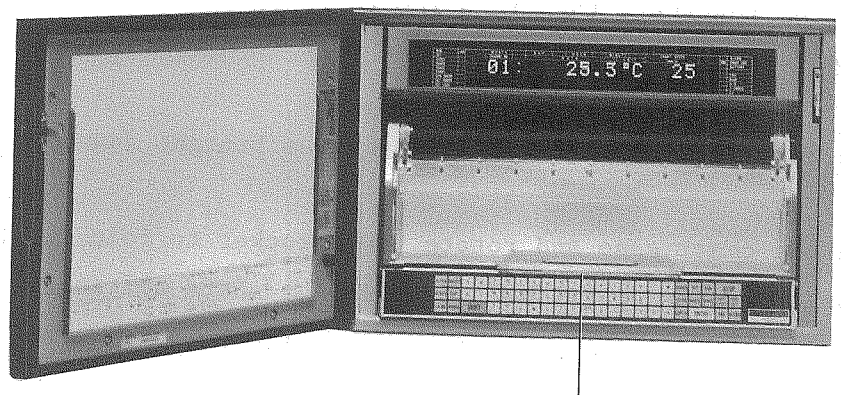
Ex.) Print at 1700 hours for No.1 to No.6, and No.12

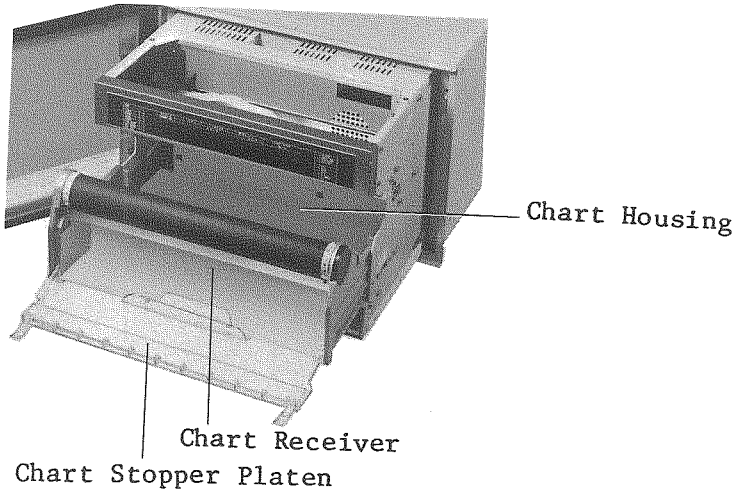
Key operational procedure

(1) Simultaneously depress [SHIFT] key + [S LOG] key, then hit [SET] key.
(2) [0] [1] [*] [0] [6] [/] [1] [2] [:] [1] [7] [ENTRY] Max. 11 columns

CHART SETTING

Set the chart according to the next specified procedure and set the chart lose before using.





(1) Prepare the chart.

(2) Draw the chart case forward, pulling out the drew handle of the chart.

(3) Set the cutting edge of the loose chart upward (The sprocket hole must be located on left side). Set it horizontally in its housing. During out will then help pull out the chart platen lock forward, and then bring it downward.

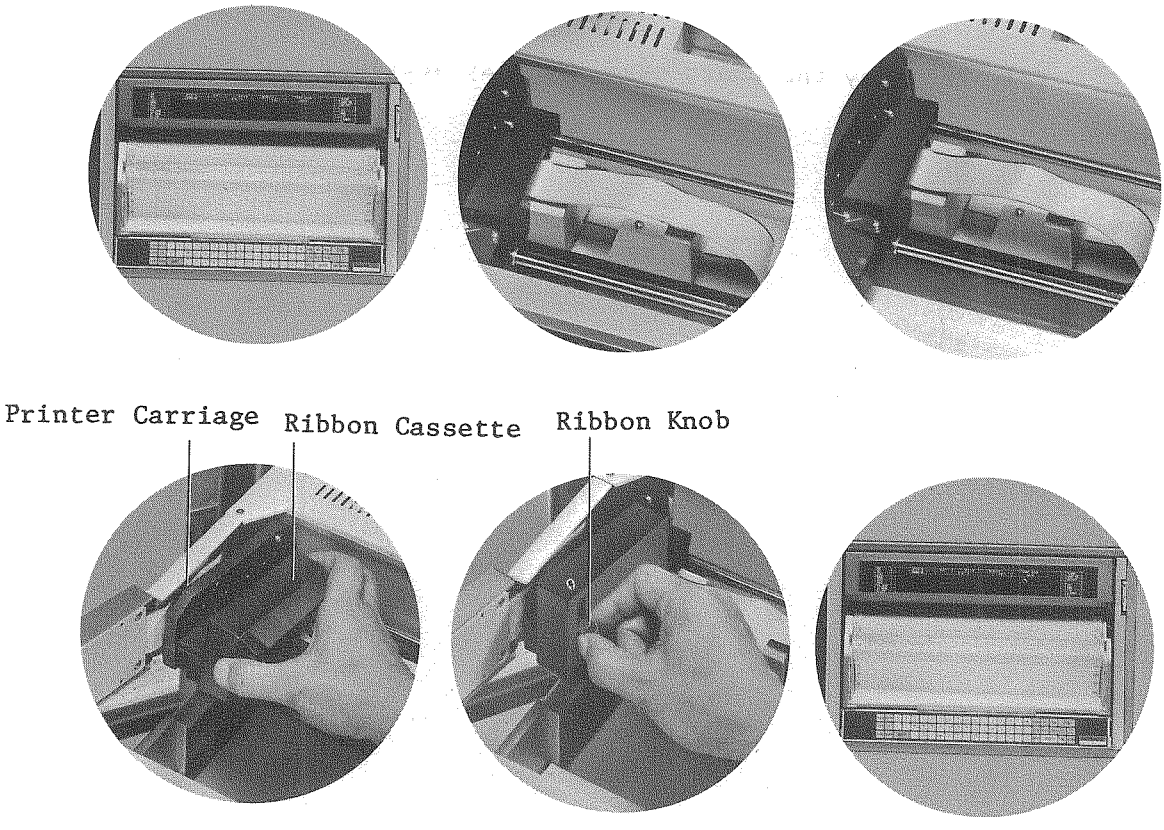
(4) Put the sprocket holes on both sides of the chart and the guide pin of the drum together, then fold two to three pages if the chart in the chart receiver.

(5) Replace the chart stopper platen which was brought down.

(6) Replace the chart case and rotate the sprocket to fold two to eight pages. This operation completes the chart setting.

RIBBON CASSETTE SETTING

Set the ribbon cassette (attached material box) as follows:



(1) Prepare to take out the ribbon cassette from the attached material box. (Loose ribbon about 10 mm)

(2) Pull out the draming knob this side, until the ribbon cassette appears. If paper is already set in, place finger under the paper.

(3) Draw out the right side of the display area to open the left side about 90 degrees.

(4) Pull out the draming knob forward to draw out the chart case.

(5) Fix the printer carriage.

(6) Loose the ribbon place the ribbon cassette into the printer head of the printer carriage by the ribbon guide section.

(7) Turn the ribbon knob, to take the slack out of the ribbon.

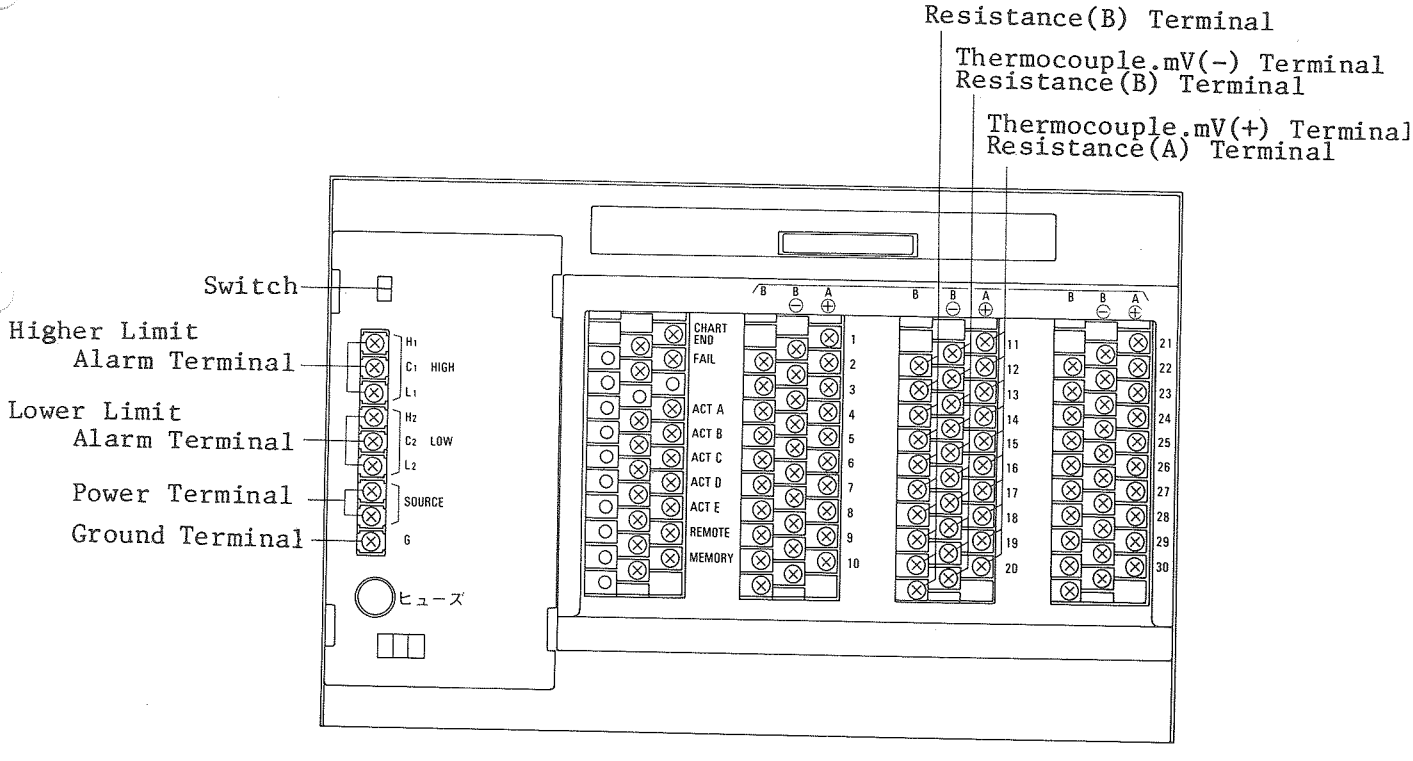
(8) Put away the chart case, display section, and case.

CABLE CONNECTION

1. Before connecting the cable

****
* Be careful when connecting the cable.
* • If the distributing wires of the measuring input circuit cross/or # are parallel with the high voltage circuit, allow a gap of about 30 cm from the high voltage circuit.
* • In connecting the power cord, avoid connecting with highly fluctuated power areas, such as an operating board.
* • Check that all the conductive cables are properly soldered and secured with the terminal screws.
****

• Terminal board diagram



2. Terminal connections

This equipment needs a cable correction for the power terminal, ground terminal, input terminal and alarm terminal. First, the switch off power, then remove the terminal plate cover to connect each terminal. After connecting, reset the terminal plate cover.

- Power terminal and ground terminal connections

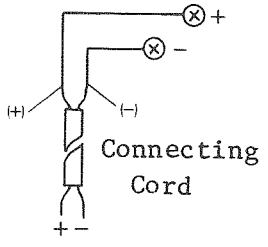
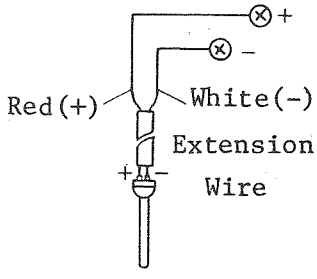
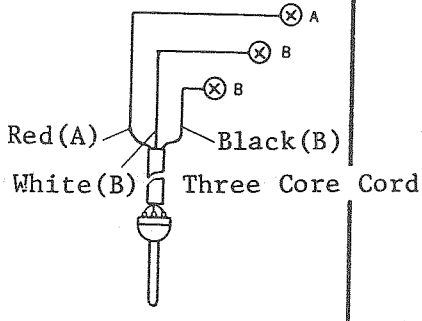
  Connect power cord of 90 to 120V AC or 180 to 240V AC (with changeable switch). The line frequency here is can be for 50 Hz and 60 Hz. Bury the ground terminal of the soldering copper plate in wet ground.

- Input terminal connection

  The input terminal connection differs with each type of input. Connect sensor or lead cable assembled for use with this equipment as follows:
  The input terminal is located in order of (1) to (10), (11) to (20), and (21) to (30) starting from the upper left corner.

CABLE CONNECTION

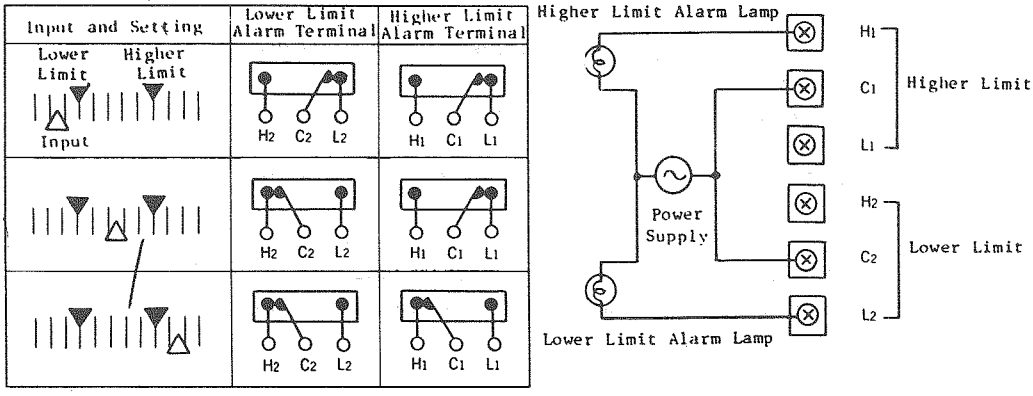
- For direct current voltage input — Connect to ⊕ ⊖ terminal
- For thermocouple input — Connect to ⊕ ⊖ terminal
- For thermal resistance input — Connect to Ⓐ Ⓑ Ⓑ terminal

mV input connection example	Thermocouple input connection example	Thermal resistance input connection example
	 Thermocouple	 Thermal Resistance

- Alarm terminal connection

The ON, OFF conductive signal (without voltage) is output as follows, starting from the higher limit alarm terminal H_1, C_1, L_1 and lower limit alarm terminals H_2, C_2, L_2 (Even if only one channel fails an alarm signal will appear). If necessary, connect the lamp and buzzer as shown below. If an alarm occurs, the display ALARM lamp will light up.

Alarm operation and connection example



Note) Diagram above replaces that of input setting for analog.

- Chart end alarm terminal connection

For the chart end, an ON, OFF conductive signal without voltage appears between the CHART END terminals. If necessary connect a lamp and buzzer ... Here the display [CHART END] lamp lights up.

- FAIL plug connection

This instrument has a self-check function. When the instrument itself or the input is abnormal, an ON, OFF conductive signal appears between the FAIL terminals. If necessary connect a lamp and buzzer .... In an abnormal condition, the [BATTERY], [CPU], [RAM], [A/D], [Z CANCEL], [CJ] of the display area lights up.

CABLE CONNECTION

- *Active record terminal cable connection*

When the active record terminal has an active record, it receives an externally connected signal. Also it is marked on the space (Designated position) of the chart feed (See page 19 item 7).

The externally connected input can be connected to five inputs (A, B, C, D, E). And the active record terminal corresponds to that shown below.

ACT 1: Active Record A
ACT 2: Active Record B
ACT 3: Active Record C
ACT 4: Active Record D
ACT 5: Active Record E

Connected to externally connected point of relay between the active record terminal.

Connected to the remote terminal.

For Remote Control, the record can be remote-controlled by connecting the input terminal to the externally connected point of the relay between remote terminals.

Memory record terminal cable connection. For record memory, record the data for the designated channel. If necessary, this can be recorded with an externally connected signal (See page 19, item 6). Also for record memory, connect the externally connected point of the relay between the memory terminals.

SETTING METHOD

1. Presetting

Avoid using the instrument in the following conditions:

- Dusty, dirty, or gas-filled places:
- Ambient temperatures of, more than 40C or less than 0C.
- Variable ambient/temperature with high relative humidity.
- Near high-tension wires.
- Electric shock areas.

2. Setting

The instrument can be used on a desk top or on an operating board as shown bellow:

(1) Make hole in the panel board by panel cut chart.

(2) Arrange more than two instruments with center line length of 360 mm and width of more than 500 mm and leave spaces in-between.

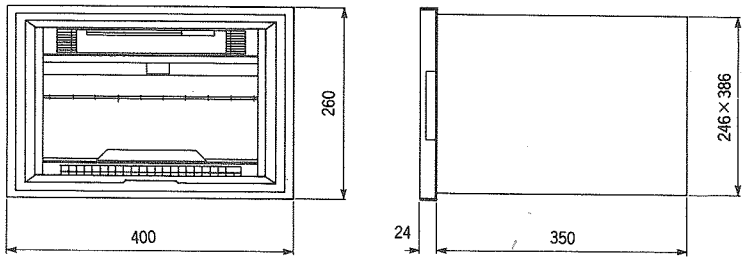
(3) Place the instrument onto the panel cut section.

(4) Screw loosely onto the hols on both side of the case.

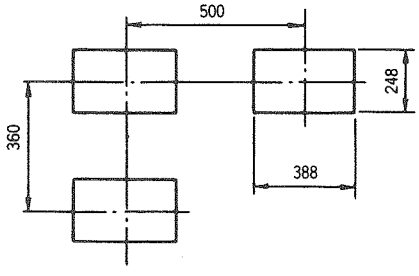
(5) Screw in the setting board from the hole side, then slide the setting board along the groove.

(6) Push the setting board as below, and stick to the operating board. Then, final by fix loose screw to the setting board.

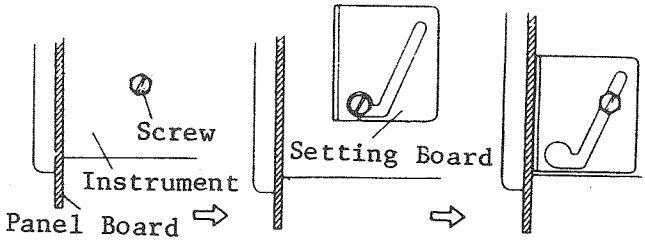
• Survey dimensions



• Panel cut and setting space



• Metal fixing



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