Specs / Instructions for CAT# PRNT-4 Panasonic# EPT-1014LW2

1. General

The EPT-1000 series printer is a serial type thermal printer with a head having a single vertical row of dots. A printing character is composed of dot matrix generated by shifting the thermal head in the horizontal direction, and graphics, characters, symbols and others can be printed out.

o Two types of this series are available; "H-series" with two step motors are for a graphic mode printing at a higher speed and "L-series" with a single one at lower cost.

o You can choose the most suitable printer among our standard models, according to your applications.

o The three types of 58mm, 80mm, 112mm in paper width are avarlable for both types of H-series and L-series.

L type: o suitable for character printing.
   o Capable of graphic printing without controling the paper feeding pitche.
   o Quiet printing by step motor.
   o Economical type.

H type: o Suitable for graphic printing.
   o capable of bi-directional printing.
   o Capable of logical seek printing.
   o Extremely clear printing by fine feeding of the paper.
   o High speed printing.

2. Features

2-1) Series line-up
   ・Applicable to paper sizes of 58mm, 80mm, 112mm
   ・Interfaces for driving the printers are also prepared.

2-2) ・High speed printing
   ・A high speed of 70cps is realized in the small size serial printers.
   ・Logical seek(the shortest distance printing) action makes the actual printing time very short.

2-3) Pulse motor drive
   ・Pulse motor drining makes the printer compact, light weight and quiet.

2-4) Suitable for graphic printing, due to a wide rang of paper feeding pitch.

3. Applications

Measuring equipment. Analysis equipment
Medical equipment
CRT hard copy devices
Communication data terminal unit
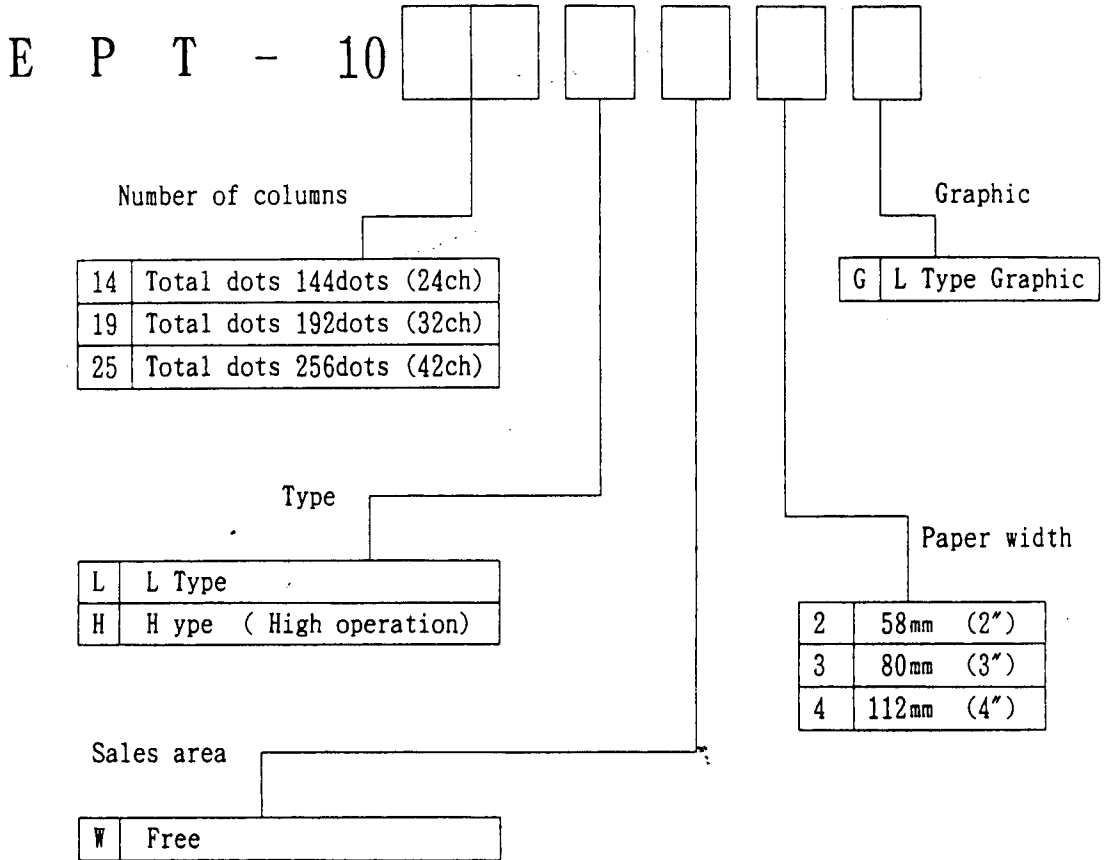Various handy devices
POS

4. Constitution of type or model number

Type \ Paper width \ ITEM		58 mm	80 mm	112 mm
L type	Character	ANK 24 columns EPT-1014LW2	ANK 32 columns EPT-1019LW3	ANK 42 columns EPT-1025LW4
L type	Graphic	Total dots 144 dots EPT-1014LW2G	Total dots 192 dots EPL-1019LW3G	Total dots 256 dots EPT-1025LW4G
H type		Total dots 144 dots EPT-1014HW2	Total dots 192 dots EPT-1019HW3	Total dots 256 dots EPT-1025HW4

* ☐ Model numder
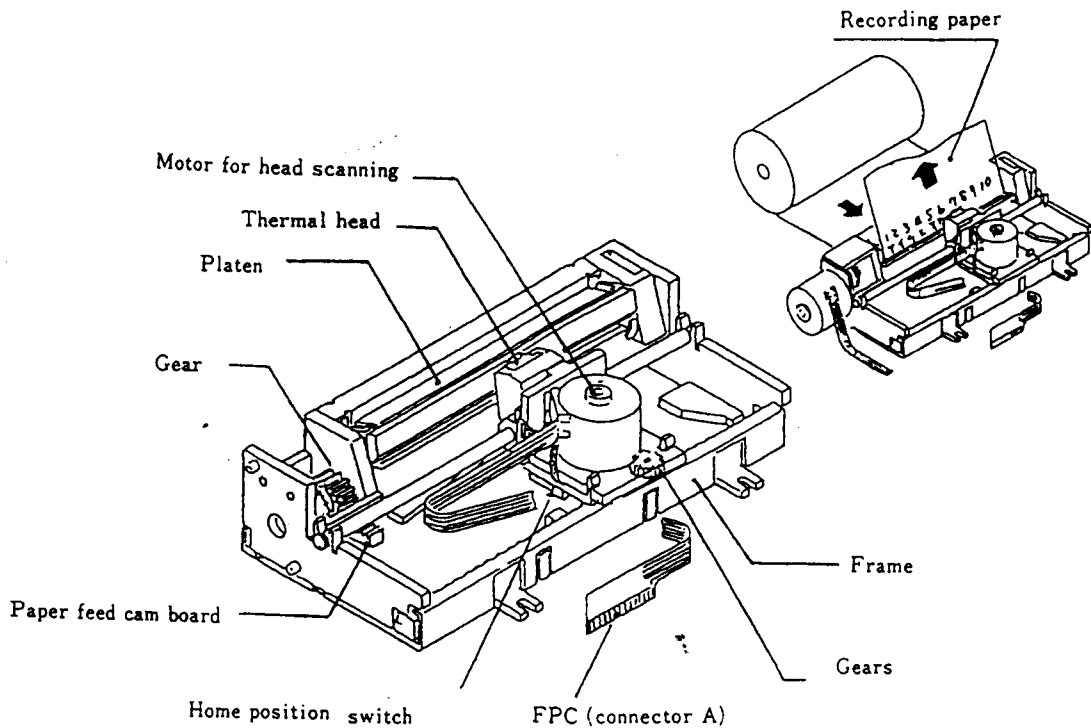
5. Selection of printer model

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E P T  -  10 □ □    □    □    □    □
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Number of columns

14	Total dots 144dots (24ch)
19	Total dots 192dots (32ch)
25	Total dots 256dots (42ch)

Graphic

| G | L Type Graphic |

Type

| L | L Type |
| H | H ype (High operation) |

Paper width

2	58mm (2″)
3	80mm (3″)
4	112mm (4″)

Sales area

| W | Free |

< For example >

EPT-1025LW4G   :   Paper width 112mm
                     L type
                     Graphic

6. Printer outside construction

L type

- Motor for head scanning
- Thermal head
- Platen
- Gear
- Paper feed cam board
- Home position switch
- FPC (connector A)
- Frame
- Gears
- Recording paper

7. Printer operating principle

7-1) L type

The printer is composed of frame, pulse motor for head scanning, thermal head, home position switch, paper feed cam plate, FPC, platen, rubber roller shaft, and gears, and designed to print on recording paper.

(1) Head scanning

The rotation of the pulse motor is transmitted to the motor pinion, idler gears A, B and finally to the rack, and the laterally reciprocating head scanning is aehieved by the rotations (normal, reverse) of the pulse motor.

(2) Print timing

To be printed in synchronism with the steps of the pulse motor.

(3) Paper feed

When the head carriage comes back to home position from right to left, a specified amount of paper is fed mechanically by the paper feed cam.

(4) Print start

When turning on the power, after the home position is detected by home position switch (OFF to ON), printing is started in the head scanning direction from left to right.

(5) Loading recording paper

By paper feed operation, the recording paper is inserted mechanically.

8. Printer Specifications (L type)

Item \ Type		L type EPT-1014LW2 58mm +0/-0.8	EPT-1019LW3 80mm +0/-0.8	EPT-1025LW4 112mm +0/-0.8	Remarks
Printing method		Serial and thermal type			
Printing direction		Left→Right			
Head	Character Graphic	Vertical 8 dots			
Character	Character	7 × 5 dots			Vertical x Horizontal
	Graphic	8 × 5 dots max			
Character size		2.3 × 1.5 mm (At vertical 7 dots)			
Total number of dots		144 dots	192 dots	256 dots	
Number of character per line		24 columns	32 columns	42 columns	Space:1 dot
Printing speed		70 cps/1.2L /sec	70cps/0.9L /sec	70 cps/0.6L /sec	
Vertical dot pitch		P=0.33 ± 0.05 mm			Dot center
Horizontal dot pitch		P=0.314 ± 0.08 mm			
Paper feed pitch	Character	P=3.96 ± 0.2 mm			
	Graphic	P=0.264 ± 0.2 mm			
Printing mis-alignment		0.2 mm max			
Character incline		0.15 mm max			
Paper feed method		Friction (Paper feed force 30gf mm rated 5V)			
Running noise		65db max			Measured at one meter
Operating voltage		5 ± 0.25V D.C			At FPC terminal
Weight		65g	85g	105g	
External dimensions (WxDxH)		85.5x42.5x20.6	107.5x42.5x20.6	139.6x42.5x20.6	Without FPC

9. Environmental Characteristics

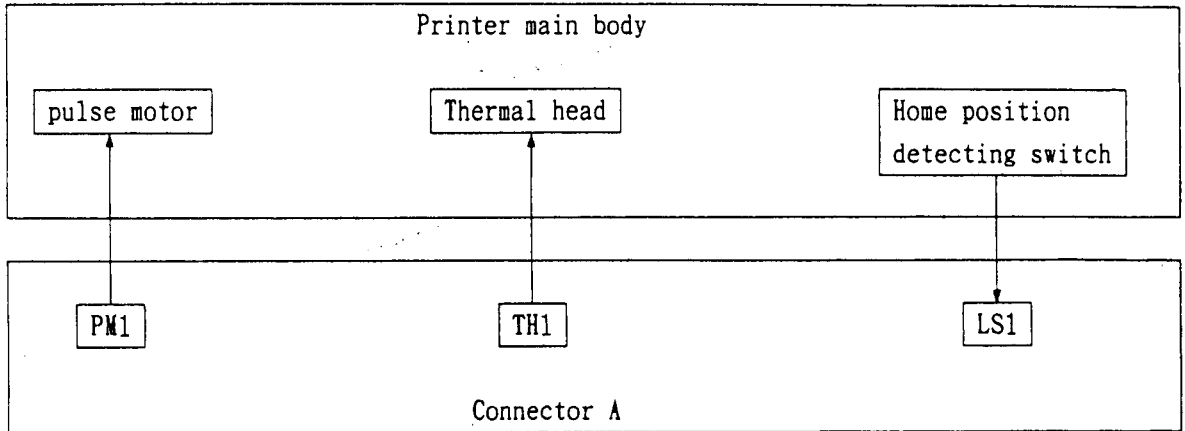| Item	Conditions	Remarks
Operating temperature	0 ~ 50 ℃	The printer shall be operated for 1 hour after holding for 1 hour under the left condition. The operation shall benormal. (Printing quality excluded.) (Without dewing)
Operating humidity	5 ~ 85% RH(0 ~ 40℃) 5 ~ 65% RH(40 ~ 50℃)	
Storage temperature	-20 ~ 60℃	After storaging for 72 hours under the left condition and for 2 hours at normal temperature, the operation shall be normal (Without dewing)
Storage humidity	5 ~ 90% RH	
Vibration resistance	Amplitude : 1.5 mm Frequency : 10~55Hz Cycle : 1 minute Directions:X, Y, Z, each for 1 hour	After testing under the left condition, the operation shall be normal.
Impact resistance	Waveform : Half sine wave, 30G, 11msec Directions : X, Y, Z, X′, Y′, Z′ once each	After testing under the left condition, the operation shall be normal.
Life	Mechanism : MCTF 500,000 Lines (Without head life)	Printing ratio 15%, at room temperature and humisity.

10. Recording paper

Item	L type	H type	Remark
Recommended paper type	Jujo paper : TF50KS-E2	Jujo paper : TF50KS-E2	Matsushita number 58(2″):EUY-SUB046 80(3″):EUY-SUB047 112(4″):EUY-SUB048
Paper length	30 m	30 m	
Roll width	55 mm max.	55 mm max.	
Core inner diameter	12 mm	12 mm	
Paper thickness	65 μm	65 μm	
End mark	Red color to be marked at 50 cm from roll end		
Storage characteristic	3 years min, at under 30℃ and 60℃% RH (Stoage in a cool and dark place)		

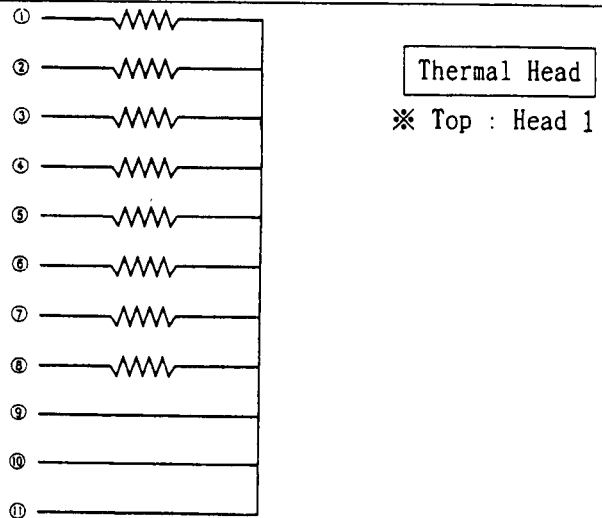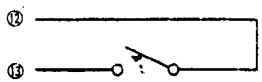## 11. Composition of printer

11-1) L type

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┌─────────────────────────────────────────────────────────────────────────┐
│                         Printer main body                                 │
│  ┌──────────────┐        ┌──────────────┐      ┌─────────────────┐        │
│  │ pulse motor  │        │ Thermal head │      │ Home position   │        │
│  │              │        │              │      │ detecting switch│        │
│  └──────▲───────┘        └──────▲───────┘      └────────┬────────┘        │
└─────────┼───────────────────────┼───────────────────────┼────────────────┘
          │                       │                        │
┌─────────┼───────────────────────┼───────────────────────▼────────────────┐
│     ┌───┴───┐               ┌───┴───┐                ┌───────┐            │
│     │  PM1  │               │  TH1  │                │  LS1  │            │
│     └───────┘               └───────┘                └───────┘            │
│                            Connector A                                    │
└─────────────────────────────────────────────────────────────────────────┘
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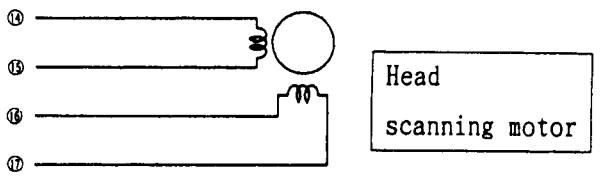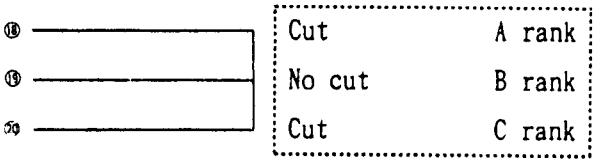
○ The printer is composed as shown above, and the arrows indicate the signal direction.

○ Paper feeding and head scanning are driver by the pulse motor.

○ The home position detecting switch is used for detecting of home position to initialize printing.
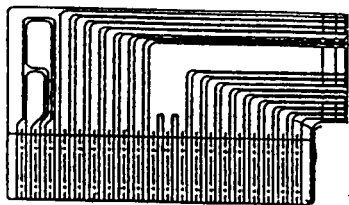
Division	Symbol	Function	corresponding connector type number	Pin configuration
Connector A	PM1	Pulse motor	Molex (reference)	P. 11
	TH1	Thermal head	* 52045-2010	
	LSI	Home position detecting switch	20 terminals 1.25 mm pitch	

* International procurement number : 520452010

11-3) Connector

Connector Number		Symbol	Description	Terminal Number
A	TH1	H 1	Head 1	① Thermal Head
			Head 2	②
			Head 3	③ ※ Top : Head 1
			Head 4	④
			Head 5	⑤
			Head 6	⑥
			Head 7	⑦
		(H 8)	(Head 8)	⑧
		HCOM	Head common	⑨
		HCOM	Head common	⑩
		HCOM	Head common	⑪
	LSI	SW1	Home posotion SW	⑫
		SW2		⑬
	PM1	M 4	Motor 4	⑭ Head scanning motor
		M 2	Motor 2	⑮
		M 1	Motor 1	⑯
		M 3	Motor 3	⑰
	TH1	H R	Head rank	⑱ Cut A rank
		H R	Head rank	⑲ No cut B rank
		H R	Head rank	㊿ Cut C rank
B	(PM2)	MP 1	Motor 1	① Paper feed motor (Only for H type)
		MP 3	Motor 3	②
		MP 2	Motor 2	③
		MP 4	Motor 4	④

11-4) Configuration for terminal number

Connector A

20 ←——————→ 1

12. Motor specifications

12-1) Head scanning specifications

By normal and reverse rotations of the head scanning pulse
motor, the head can be reciprocally moved.
The pulse motor is driven by 2-2 phase excitation, at 840 PPS.
The drive system is bipolar driving, that is, one pulse to head
corresponds to two steps of pulse motor.

Excitation method	No. of steps	No. of dots	Two-step moving distance
2-2 phases	2	1	0.314

12-2) Paper feed specifications

L type

The fixed amount of paper feed is driven structurally by the head scanning
pulse motor. Therefore, the paper feed amount cannot be varied. By one
reciprocating motion of the head carriage, the paper is fed forward by one
line. The paper feed amount is 3.96mm for character specs.

2.64mm for graphic specs.

However, it must be noted that the paper feed is not driven structurally
unless the head moving distance is more than 250 steps from the home
position ofter switch is activated from OFF to ON.

12-3) Pulse motor characteristics

Paper feed motor is not provided in L type.

Item	L type	H type	Remarks
Type	Permanent magnet type	Permanent magnet type	
Number of phases	4	4	
Excitation method	2-2 phases	Head scanning 2-2 phases	Bipolar drive
		paper feed 1-2 phases	
Winding resistance/phase	15 ohms ± 10%	15 ohms ± 10%	
Rated voltage	5V ± 0.5V	5V ± 0.5V	Terminal voltage
Current consumption max.	400mA	400mA	
Average current Consumotion/Phase	220mA	220mA	
Drive Frequency — Head scanning motor	840 PPS	840 PPS (2-2 phases)	o Paper feed motor is not provided in L type.
Drive Frequency — paper feed motor		500 PPS (1-2 phases)	

Connection configuration

Head scanning motor
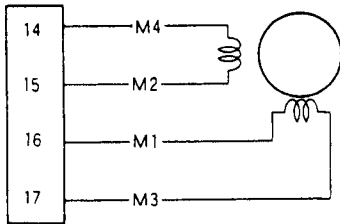
Connector A

Paper feed motor (H type alone)
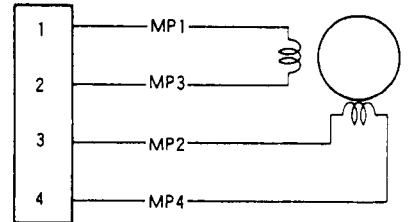
Connector B

12-4) Drive circuit

Drive the stopped phase (M1, M3 or M2, M4) for the specified period shown below re-starting the motor.
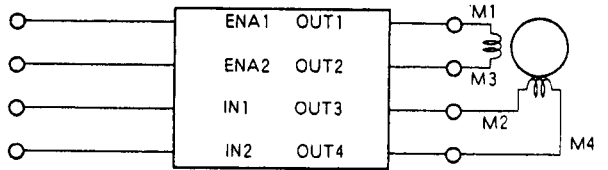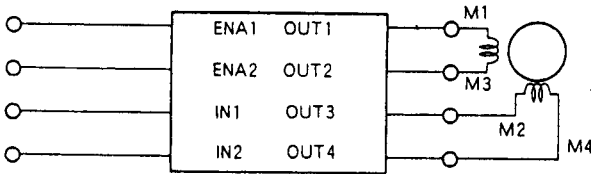
Carriage : Typ, 5 msec

aperfeed : Typ, 5 msee

Bipolar drive : Driver is Sanyo LB1633M.

a. Head scanning motor

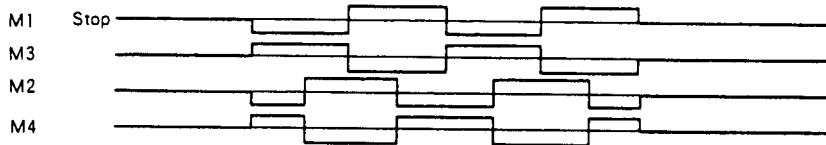| ENA1 | OUT1 |
ENA2	OUT2
IN1	OUT3
IN2	OUT4

M1
M3
M2
M4

b. Paper feed motor(H type)

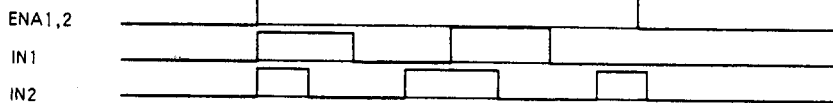| ENA1 | OUT1 |
ENA2	OUT2
IN1	OUT3
IN2	OUT4

M1
M3
M2
M4

Excitation (head scanning)

①Drive timing forward rotation (2-2 phases excitation)-direction going away from home position
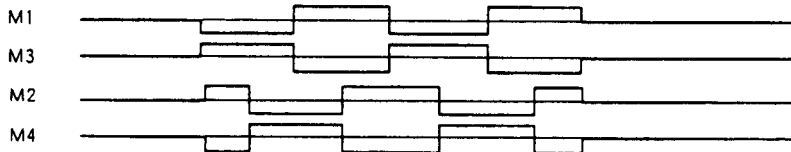
Motor operation

(Left to right)

M1 Stop
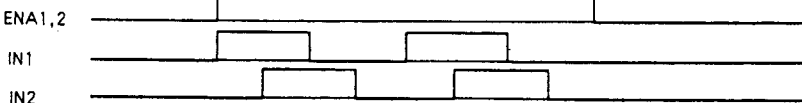M3
M2
M4

IC input

ENA1,2
IN1
IN2

②Drive timing reverse rotation (2-2 phases excitation)-direction approaching toward home position

Motor operation

(Right to left)

M1
M3
M2
M4

IC input

ENA1,2
IN1
IN2

The thermal head is arranged in a vertical row, in which rated energy is applied
corresponding to the rank of the head resistance.
Add 2200 µF capacitor between the terminals of the power source for the
head driving circuit, in order to reduce ripple voltage.

13-1) L type specifications

Item	Specifications		Remarks
Dot arrangement	Vertical one row		
Number of dots	7 dots(character)	8 dots(graphic)	
Dimensions of the heating elements			
Head resistance	Rank A 19.6-17.6Ω Rank B 18.1-15.9Ω Rank C 16.4-14.4Ω		No punch for rank B Rear view of FPC
Applied voltage	5.0 ± 0.5 VD·C		○ At the terminal ○ Ripple smoothing capacitor(2200 µF) is added between power source terminals
Peak current	380 mA		per dot
Pulse frequency	2.38ms		
Head life	10 pulses		* 1

* 1 Normal rotation
        Normal temperature : 25˚ ± 5℃
        Normal humidity   : 60± 15%
        Rated energy   : 1.7 mj
        Printing ratio   : 33 %

13-3) Head application energy

Applied voltage (v)	L 5.0 ± 0.5	H 5.0 ± 0.5	Voltage between terminals
Rated energy	1.7mJ	1.7mJ	Jujo paper TF50KS-E2 Ambient temp. 25℃
Max. energy	2.6mJ	2.6mJ	

In the case of maximum energy, the head life is reduced to 3×10^7 pulses.
If the supply voltage and ambient temperature fluctuate, control as follows.

(1) Voltage control
   To keep constant energy to the head, if the voltage is higher than
   the rated voltage, control so that the pulse width may be smaller, and if otherwise,
   larger. Application energy E is given in the following equation.

$$E = \frac{V}{R} \times Ph$$

   Where R : Head resistance
       V : Applied voltage
       Ph : Applied pulse width

(2) Head control
   THe applied energy to head is controlled by the following parameters.
   ① Ambient temperature
   ② Head rank
   ③ History control (refer to detailed explanation)

   (Detailed explanation)
   ① Ambient temperature

Temperature	Application energy
0℃	2.13mJ
5℃	2.04mJ
25℃	1.7mJ
40℃	1.45mJ
50℃	1.28mJ

$$Et = Eo \left(1 + \frac{to - t}{100}\right)$$

Et : Applied energy(mJ)
Eo : Rated energy(1.7mJ)
to : Rated temperature(25℃)
t : Ambient temperautre(℃)

② Head rank

The applied energy is adjusted corresponding to the resistance rank of the head. The rank is marked on FPC as punching.
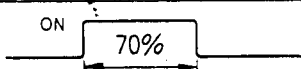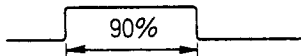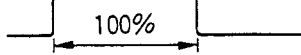
Pulse width $\qquad$ $T=R \cdot E/V^2$

Rank	Punching position	Resistance (ohms)	Applied pulse width (at 25°C, V=5V)
A	See page 18 or 19	18.6(19.6 - 17.6)	1.265 msec
B		17.0(18.1 - 15.9)	1.156 msec
C		15.4(16.4 - 14.4)	1.047 msec

③ Head history control specification
Algorithm
This is the applied energy quantity, assuming the start of printing to be 100%. The amount of applied energy is decided as per space(s) between energized dots before and present one as shown below. (reference)

Space control	Printing pattern	Ratio of pulse width
0	■■	ON ⎡ 70% ⎤
1	■□■	90%
2	■□□■	100%

— Present energized dots
— Energized dot one column before
— Energized dot two columns before
— Energized dot three columns before
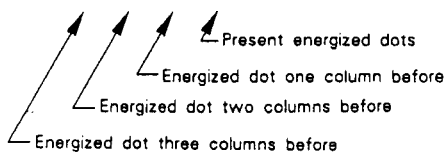
14. Home position switch

This switch is for detection of home position of the thermal head.
When initializing, the switch signal changes from OFF to ON, or from
ON to OFF by the movement of the head carriage.
Use this switch only for initializing.

> Specifications for switch
> o Switch   : Mechanical switch
> o Contact resistance : less than 100 ohms (measuring current 20mA)
>   0.7 ~ 2 mA Typical
> o Current   : less than 0.1A (DC 5V)
> o Chattering time   : less than 5 msec

15. Operation sequence

(Table-1)
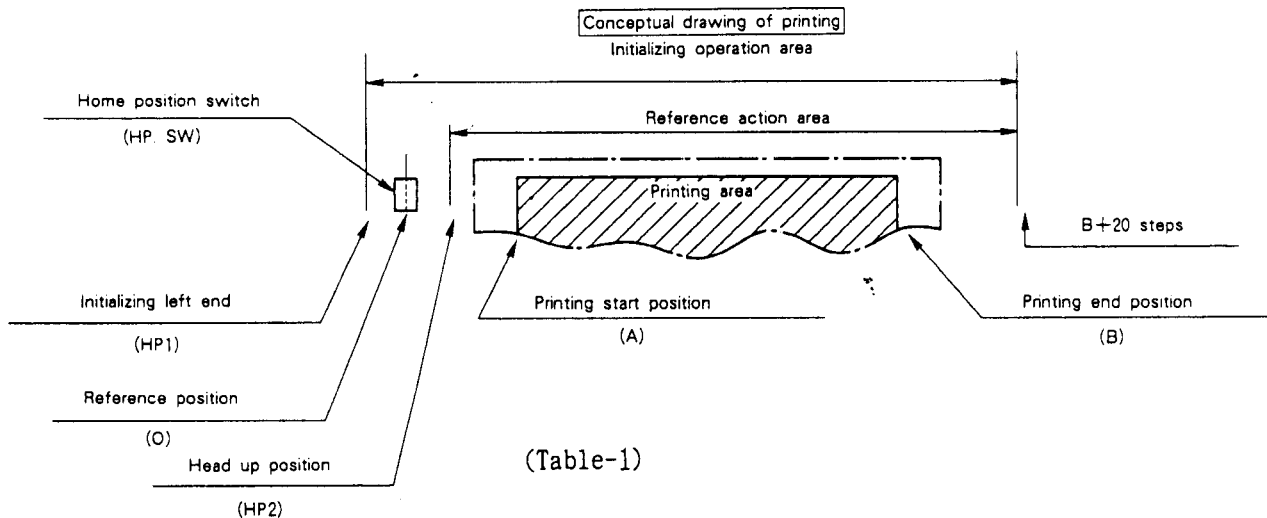
When turning on the power source, contral to move the head, and search
for the home position.
The home position switch is turned on or off only at this time,
and usually the head stops at the head up position (HP2).
Printing area is in the range of A to B.

Reference position (O)
The timing when the home position switch is changed from ON to OFF is
the reference position.

Initializing left end (HP1)
Move the carriage further away from the reference position (O) in order to
assure the action of home position. The number of steps from the reference
position (O) is shown on the next page. This position is used only for initializing,
and thereafter the carriage stops at the head up position (HP2).

Head up position (HP2)

Move five (5) steps from left to right from the reference position (0) and
set the head up position. This is the head stopping position in usual printing action.

Print starting position (A)

This is the print starting position after setting down the head. The values differ in
order to keeplateral balance to the paper, depending on the paper size, and total
number of dots. (see Table-2)

Print ending position (B)

The maximum step numbers are shown in table-2. At the end of printing, it is
further moved by 20 steps. (See Table-1)

(Table-2)

List of step numbers from reference position (0)

(-):From right to left
(+):From left to right

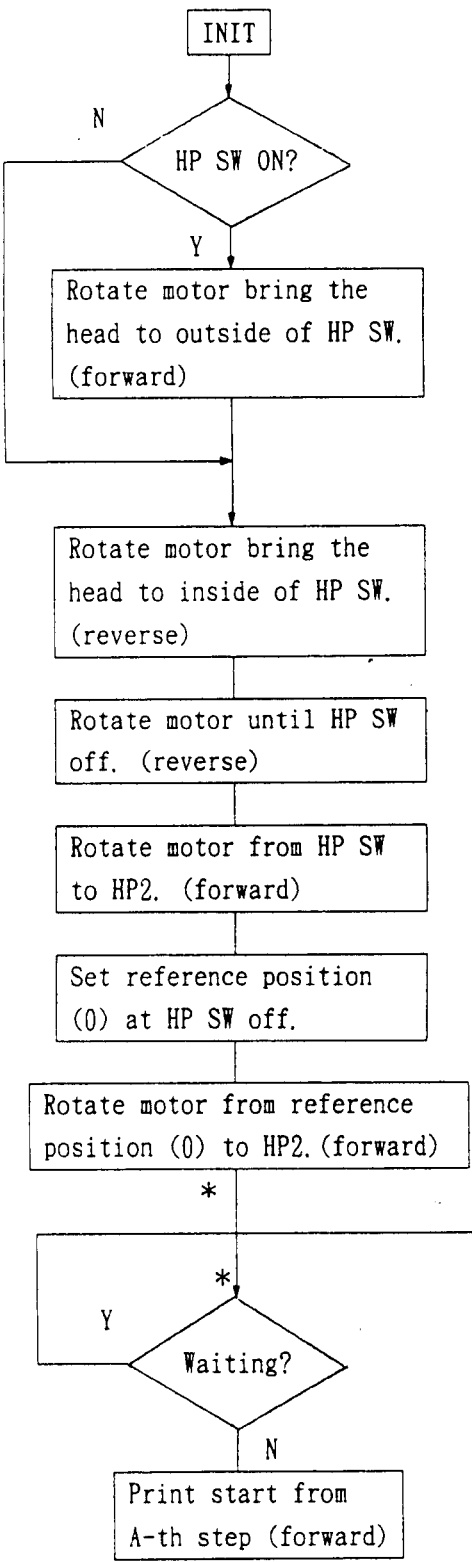| Printer	HP1	HP2	A	B	Remarks
58mm size, 144 dots	-3	5	45	45+144×2	(2")
80mm size, 192 dots	-3	5	68	68+192×2	(3")
112mm size, 256 dots	-3	5	107	107+256×2	(4")

Note 1. The head is returned always to the head up position (HP2) for every line
at the graphic mode printing.

Note 2. After finishing printing, return the head to the head up position (HP2).
For example, if there is no data input for more than 0.5 second after.
printing action, the head is to be returned to the head up position (HP2).

Note 3. Searching home position when initializing, it is regarded as abnormal, if the
operation of the home position switch from OFF to ON (ON to OFF) is not
detected even if counting the number (min. 500) of the drive steps of the
head scanning motor.

Note 4. At the bilateral printing (H type character printing), a mechanical deviation
occurs between the forward and backward printing. It is required to correct
the deviation.

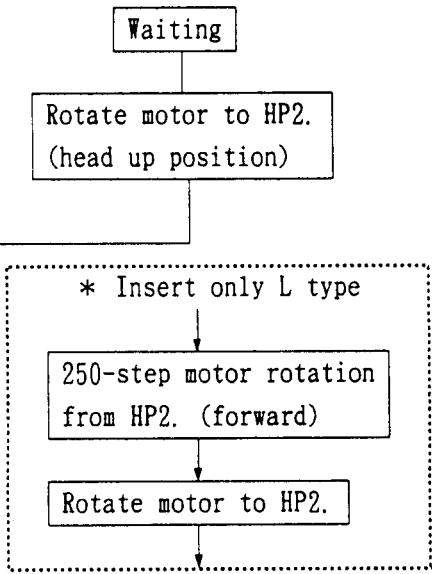Correction value: α =2 steps

15-1) Initializing (INIT)

Move the head to the home position, set the reference position at 0, and then
move the head waiting position HP2 (head up position).
INIT is processed only when the power is turned on. When data is not received
(data is not delivered for 0.5 second after printing), the head is moved to the
waiting position.

```
                    ┌──────┐
                    │ INIT │
                    └──────┘
                        │
  N           ╱◇╲
 ┌───────────◇ HP SW ON? ◇
 │            ╲◇╱
 │               │ Y
 │   ┌──────────────────────┐        Check if the head is inside of home
 │   │ Rotate motor bring the│        position or not, if it is inside, set
 │   │ head to outside of HP SW.│     it once outside, and then put it inside again
 │   │ (forward)            │
 │   └──────────────────────┘
 │               │
 └──────────────▶│
   ┌──────────────────────┐
   │ Rotate motor bring the│
   │ head to inside of HP SW.│
   │ (reverse)            │
   └──────────────────────┘
               │
   ┌──────────────────────┐        HP SW : Home position switch
   │ Rotate motor until HP SW│      HP2   : Head up position
   │ off. (reverse)       │
   └──────────────────────┘
               │
   ┌──────────────────────┐
   │ Rotate motor from HP SW│
   │ to HP2. (forward)    │
   └──────────────────────┘
               │
   ┌──────────────────────┐
   │ Set reference position│      ┌──────────┐
   │ (0) at HP SW off.    │      │ Waiting  │
   └──────────────────────┘      └──────────┘
               │                      │
   ┌──────────────────────┐    ┌──────────────────────┐
   │ Rotate motor from reference│ │ Rotate motor to HP2. │
   │ position (0) to HP2.(forward)│ │ (head up position)  │
   └──────────────────────┘    └──────────────────────┘
          │ *                        │
          │         *                │   ┌ * Insert only L type ─────┐
  Y      ╱◇╲                         │   │          │                │
 ┌──────◇ Waiting? ◇                 │   │ ┌──────────────────────┐   │
 │       ╲◇╱                         │   │ │ 250-step motor rotation│  │
 │          │ N                      │   │ │ from HP2. (forward)  │   │
 │   ┌──────────────────────┐        │   │ └──────────────────────┘   │
 │   │ Print start from      │       │   │          │                │
 │   │ A-th step (forward)  │        │   │ ┌──────────────────────┐   │
 │   └──────────────────────┘        │   │ │ Rotate motor to HP2. │   │
 │                                   │   │ └──────────────────────┘   │
 │                                   │   └────────────│───────────────┘
```

┌───┐
│ * Rotate paper feed motor for 20steps to improve paper   │
│   feed precision.   │
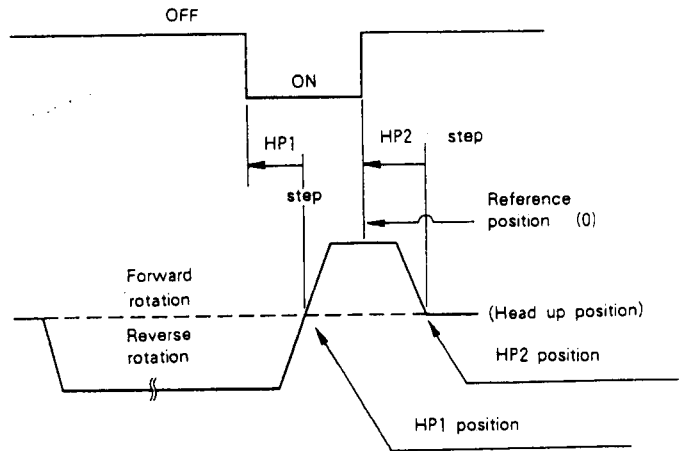└───┘

(16-1)Initializing action

In case the head is located outside home position, when power is turning on.
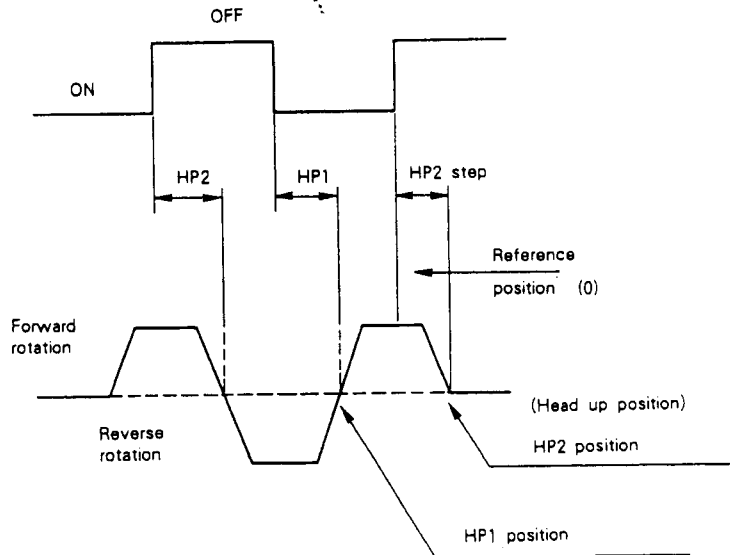
Home position switch
(HP SW)

OFF

ON

HP1

HP2   step

step
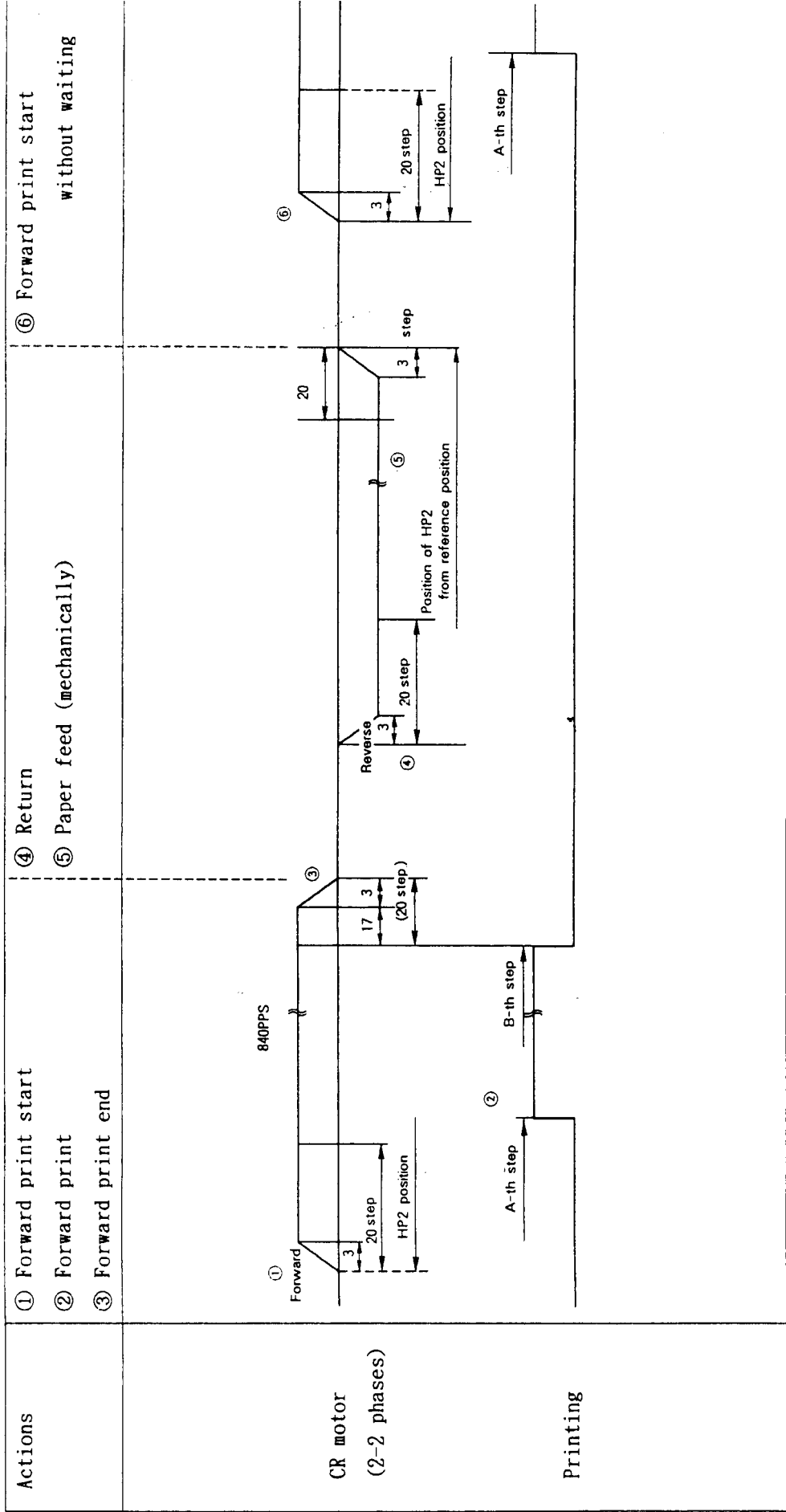
Reference
position   (0)

Head scanning motor
(2-2 phases)

Forward
rotation

Reverse
rotation

(Head up position)

HP2 position

HP1 position

In case the head is located inside home position, when power is turnig on.

Home position switch
(HP SW)

ON

OFF

HP2   HP1   HP2 step

Reference
position   (0)

Head scanning motor
(2-2 phases)

Forward
rotation

Reverse
rotation

(Head up position)

HP2 position

HP1 position

③ L type : Full space printing

Actions	① Forward print start	④ Return
	② Forward print	⑤ Paper feed (mechanically)
	③ Forward print end	⑥ Forward print start without waiting

| CR motor (2-2 phases) | |
| Printing | |

840PPS

Forward
① 3 20 step HP2 position

② A-th step

B-th step

③ 17 3 (20 step)

Reverse
④ 3 20 step Position of HP2 from reference position

⑤ 20 3 step

⑥ 3 20 step HP2 position

A-th step

When starting carriage motor, slow up in 3 steps.   (0 PPS → 200 → 600 → 840)

When starting carriage motor, slow down in 3 steps. (840 PPS → 600 → 200 → 0)

17. Mounting of printer

(17-1) At tach ment pitch

To the printer, use four mounting holes shown in
the drawing below. Mount on a flat plane by using M2 screws.
When installing, be careful not to stress the main body by
the excessive force.
Running noise and strain can be reduced with vibration-
absorbing rubber.

① L type

(U n i t : mm)

Product number	P 1	P 2	L
E P T − 1 0 1 4 L W 2 □	6 9. 7	4 7. 9	8 5. 5
E P T − 1 0 1 9 L W 3 □	9 1. 9	7 0. 1	1 0 7. 5
E P T − 1 0 2 5 L W 4 □	1 2 4. 2	1 0 2. 4	1 3 9. 6
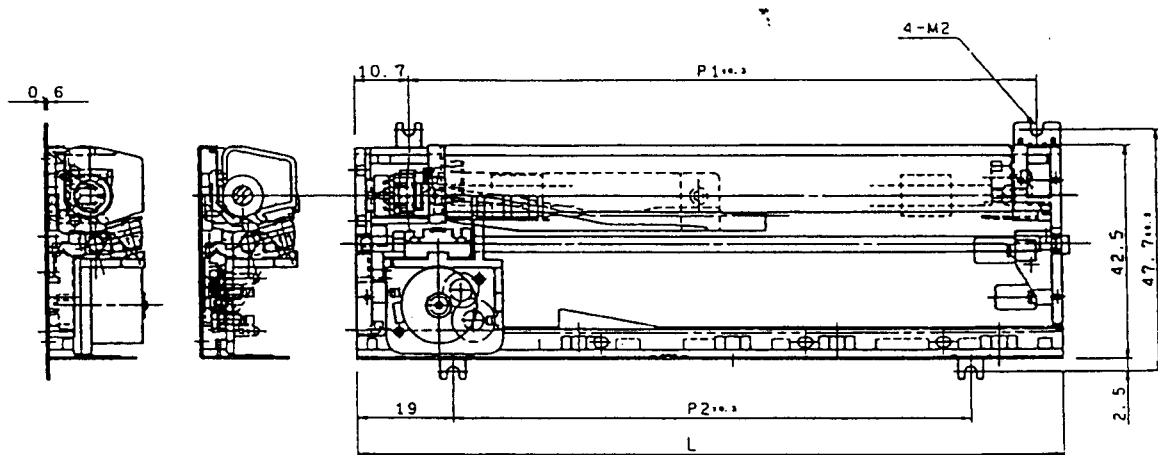
(17-2) Printer mounting method and recording paper position

① Printer installation method

(1) There are four mounting holes, as shown in the drawing on Pages 31 and 32 .
    Mount the printer on a flat surface with M2 screws .

(2) Pay attention to the ornamental border on the back of P1, when mounting the printer .

(3) Do not apply excessive force to the printer body .

(4) Using a vibration - proof rubber at the printer mounting part is effective in
    reducing noise .

(5) There are some projections on the back of the printer . Their maximum diameter is
    4mm and height 1mm .

(6) FPC for the carriage protrudes about 2.5mm on the left side of the printer .
    Design so that FPC should not be pressed .

(7) Install the printer horizontal or vertical to the mounting surface .

Horizontal mounting method

Vertcal mounting method
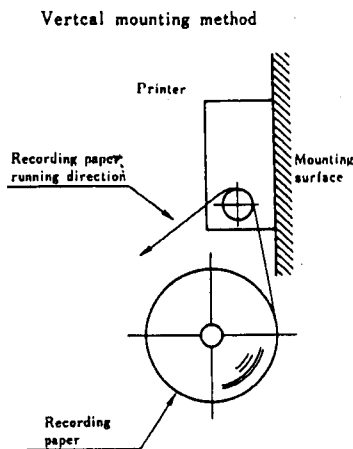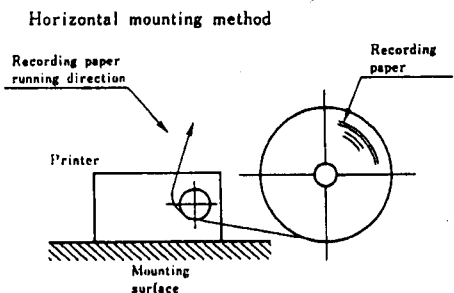
② Recording paper insertion method

When using a roll paper, keep the roll core parallel to the printer .
Especially, in case of L type printer, the roll paper must be held parallel by
a bar . If the roll is held obliquely to the printer, it may cause meandering or
jamming of the paper .
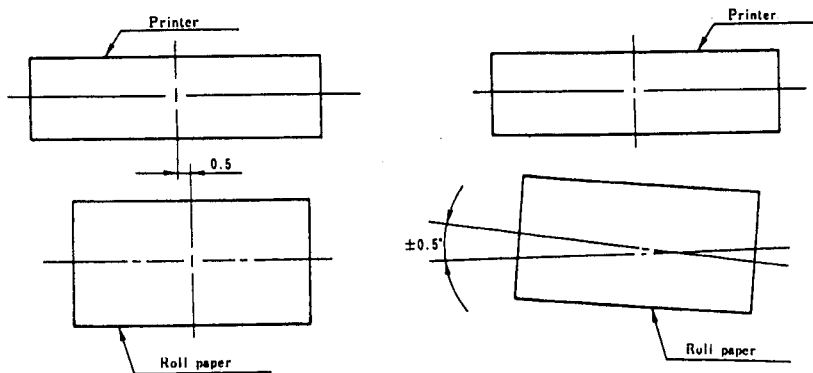
③ Recording paper inlet, outlet dimensions

(Unit : mm)

Product number	P 1	P 2	L 1	L 2	L 3
EPT-1014□W2□	69.7	47.9	85.5	17.35	58.2
EPT-1019□W3□	91.9	70.1	107.5	17.45	80.2
EPT-1025□W4□	124.2	102.4	139.6	17.55	112.3
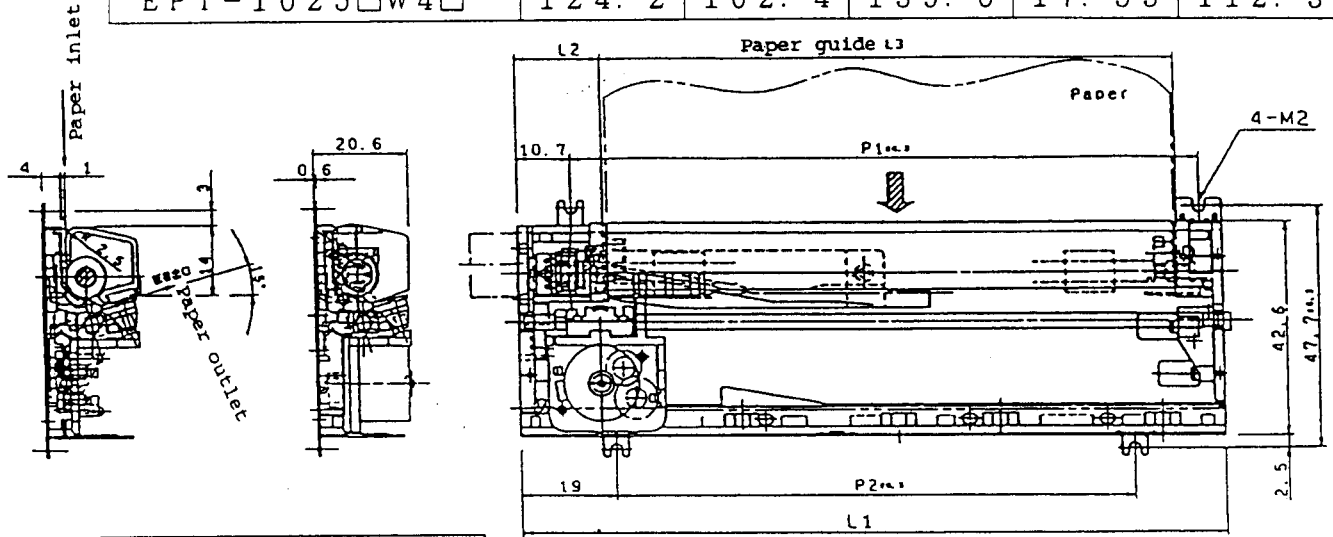
Setting of recording paper

Cut the top end of the recording paper as shown below,
insert straightly into the printer paper inlet until hitting
the platen and platen roller, and drive the paper feed motor.
If paper is inserted in bent or curl, it may be fed in zigzag
motion. In such a case, continue feeding until the paper is
coming out straightly. When the top end of the recording paper
appears, pull the end, and make sure the recording paper is
set squarely.

Top end shape of recording paper
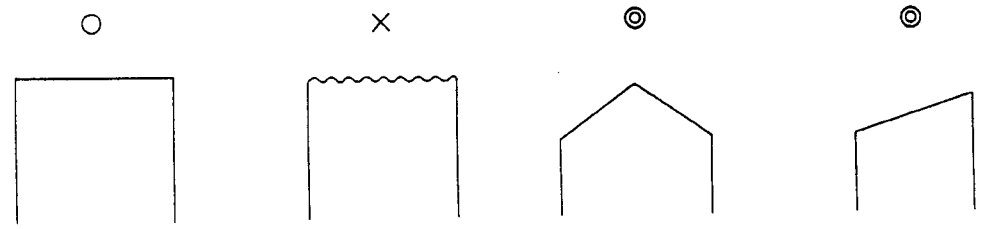
18-1) Power on and off sequence

When power source is turning on or off, abnormal pulse may be
applied to the thermal head and is caused to break down the
head. Therefore, the power source circuit should be designed
properly so that abnormal pulse may not be applied to the
thermal head.

When turning on the power : Logic ON →Thermal head ON.
When cutting off the power : Thermal head OFF→Logic OFF.

18-2) Power source capacity
① Head
The power source capacity of the head depends on the printing
factor as shown below.

Printing factor (%)	Current capacity (A)
100	5.5V (MAX.)/14.45Ω (MIN.)x8(number of elements)=3.0
50	x4(")=1.5
25	x2(")=0.75

② Motor
The motor power source capacity is as follows.
5.5V(MAX.)/(15Ω×0.9)×2 (phases)=0.8 A
As the printer power source capacity,
the sum of the head and motor capacity is required.
    Head current + motor current
  =   3.0A   +   0.8A
  = 3.8A, which is required at peak.
In the ordinary character printing, at the printing
factor of 25%, a capacity of thousands of microfarads
is added for absorption of peak current, and the capacity
(2200μF) may be set to about 0.75 + 0.8 = 1.55 (A).

18-3) Thermal head

Use the thermal head at specified voltage and pulse width.
If used over this range, the printing quality may be poor or the head may be broken.

18-4) Motor locking

When the motor is locked due to some trouble, the circuit must be designed so as to turn off the motor power source.

18-5) Mounting of printer

Keep a space of more than 3 mm between the mounting surface and the printer body.

It must be designed so that the lateral positional deviation between the recording paper holding part and the printer recording paper inlet may be minimum.

The noise will be suppressed when an anti-vibration rubber is inserted to the printer mounting part.

18-6) Electrostatic voltage countermeasures

When a high electrostatic voltage is applied to the printer, the thermal head may be broken. Take proper countermeasures so that static electricity may not be applied to the head terminal.

18-7) Recording paper

If specified paper is not used, it may cause poor print quality or bad effect on head life. Use specified paper only.

When storing the recording paper, it must be noted that it may discolored when exposed to direct sunlight, nonvolatile alcohol (tape glue), ester erasure, or the like, or develop color at high temperature or in the presence of volatile organic solvent.

18-8) Idling When the head is driven without loading with recording paper, the print quality becomes poor. Load with paper before starting operation.
If driven in head up state, the head may be broken. Always print at head down state.

18-9) Waiting action

After ending of printing , return the head always to home position (HP2)
If held at other position than home position(HP2), the platen is pressed down by the thermal head, and it may be deformed to cause uneven printing.

18-10) Dew condensation

If printing in dew condensed state, the thermal head may be broken.
In such a case, dry sufficiently before starting printing operation.

18-11) Dust

The head or gear may be damaged by dust particles. Due attention should be paid to the case designing to avoid such damages.

18-12) FPC

The FPC(flexible cable) is fragile, and it should be handled with care so as to be protected from excessive force.

18-13) Grease application

If a strange noise is made during the head scanning, please apply silicon grease to the slide shaft.

18-14) Change of specification

The specification herein is subject to change without notice for improvement of the equipment.

18-15) Guarantee period

This printer is guaranteed for a period of 15 months after shipping from Matsushita Electronic Components Co. It must be understood that the defects occurring after the guarantee period or troubles caused by the responsibility of customers even within the quarantee period are not free of charge.

19. Interface circuit

(19-1) L-type