FARNELL ORDER
CODE : 308-122

EPSON

Micro Dot Printer

M-150II

Specification

STANDARD	
Rev. No.	A
Notes	

Copied Date	, ,
Copied by	

Points You Must Observe To Assure Product Safety

In order to assure the safe operation of this product, carefully observe the specifications as well as the notes provided below.

Seiko Epson Corporation will not bear any responsibility for any damage or injuries arising from use of this product that is not in accordance with the specifications and the notes provided below.

Notes on Printer Control

● The conditions setting forth the maximum time power can be applied (and the maximum current that can be applied) to electronic components such as the motor and magnets must be observed.

If the maximum time power can be applied (or the maximum current that can be applied) is exceeded, the components mentioned above could overheat and start a fire or begin to smoke.

● Always include protective circuitry governing the length of time power is applied and the amount of current that is applied when designing the drive and control circuits for the motor, magnets, etc.

If protective circuitry is not included, misoperation of the printer control circuits could cause the components mentioned above to overheat and begin to smoke or burn.

Notes on Handling

● Because the print head can become very hot, it must not be exposed in such a way that it can be touched.

Touching the print head could cause burns.

● When equipping the printer with a manual paper cutter or an automatic paper cutter, the case must be designed so that the blade is not exposed.

Touching moving parts could cause a laceration or other injury.

● The case must be designed so that movable parts such as gears, etc., are not exposed.

Touching moving parts could cause a laceration or other injury.

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Summary

M-150II is the mechanical dot printer, whose Print Head consists of 4 Print Solenoids laying horizontally and moves for 24 dots horizontally.   Print Head which moves horizontally prints unidirectionally as each Print Solenoid of it is energized in order.

When Print Head return, paper is fed for 1 pitch automatically.   By repetition of this dot line printing and paper feed desired Print Format can be obtained.

It is characterized by the following features:

1. Clear dot printing
2. Small-side, Light weight (69 g) and Super thin thickness (12.8 mm)
3. 44.5 mm width normal paper
4. Ni-Cd Battery Drive
5. Low price

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1. GENERAL SPECIFCATIONS

1.1 Printing Method

Impact Dot Matrix Printer

1.2 Printing Format

1) Number of Total Dot: Max. 96 dots/1 dot line

2) Number of Column: Max. 16 columns
(In case of 5 × 7 dot matrix and 1 dot column space)

1.3 Print Speed

1) 1 Dot Line: Approximately 100 ms (continuous printing, 4.5 VDC, 25°C)

2) 5 × 7 dot Matrix: Approximately 1 l/s (continuous printing, 4.5 VDC, 25°C)
(3 dots line space)

1.4 Character Size

1) Dot Space :   Horizontal   0.35 mm
                           Vertical   0.35 mm

2) 5 × 7 Dot Matrix: 1.8 (W) × 2.5 (H) mm

1.5 Paper

44.5 mm width woodfree paper

1.6 Paper Feed

Paper is fed automatically per dot line.   With a manual feed knob (option).

1.7 Inking

Ribbon Cassette
Ribbon is fed automatically during Motor revolution.

1.8 Motor

1) Terminal Voltage: 4.5 +0.5/–0.7 VDC

2) Mean Current: Approximately 0.17 A (4.5 VDC, 25°C)

1.9 Timing Detector

Tachometer–Generator (directly connected with motor)

1.10 Reset Detector

Reed-Switch

1.11 Print Solenoid

                           4 columns / sol. × 4 pcs. of solenoids

1) Terminal Voltage: 4.5 +0.5/–1.2 VDC

                           NOTE: Print Solenoid terminal voltage and Motor terminal voltage
                                  should satisfy the voltage relationship which is shown in item
                                  2.8.1.)

2) Ohmic Resistance: $1.5 \, \Omega \pm 0.15 \, \Omega$ (at 25°C)

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1.12 Connection

1) Printer side:	P.C. Board with 2.54 mm pitch copper leaf pattern that is fixed on printer frame.
2) Circuit side:	Cable or Lead wires

1.13 Ambient Temperature Operating

0 to 50°C

1.14 Reliability

MCBF 5×10^5 limes

1.15 Dimensions

73.2 (W) × 42.6 (D) × 12.8 (H) mm

1.16 Weight

Approximately 60 g

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2. DETAIL SPECIFICATIONS

2.1 Print Format

Print Head consists of 4 Print Solenoids (A. B. C. D) which are laid horizontally. Print Head moves to right direction from left side on stand-by condition. Moving amount of Print Head is 24 dots per Print Solenoid. One dot line is formed by energizing Print Solenoid one by one as Print Head is moving. Number of total dots per dot line is 96 dots (24 dots × 4 Print Solenoids)

Standard position of one dot line
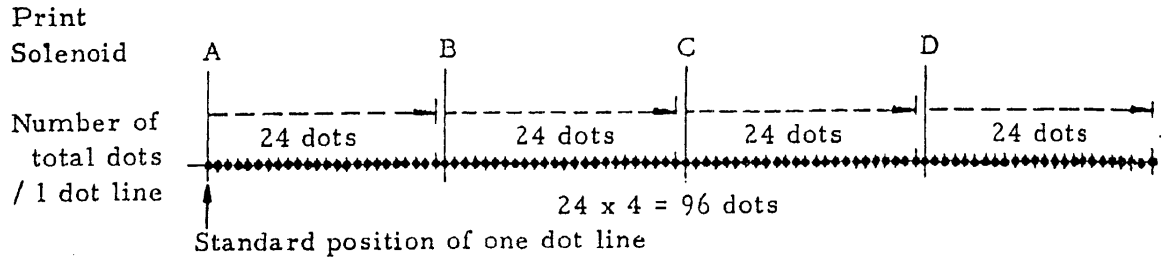
1) 5 × 7 Dot Matrix

Divide 24 dots which one Print Solenoid is printable into four equal parts. And 6 dots in one part are used as one column; That is 5 dots for printing and one dot for column space. Accordingly one dot line is formed of 96 dots which are divided into 16 parts and 5 × 7 dot matrix character can be got by repeating 7 times in the direction of paper feed. Number of columns is 16.

$$(5+1) \times 16 = 96 \text{ dots/1 dot line}$$
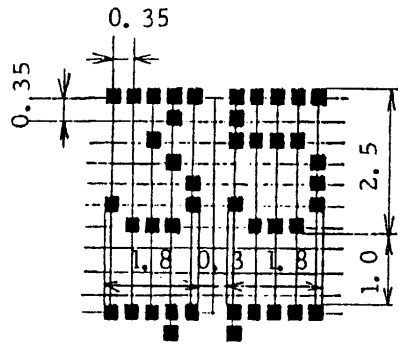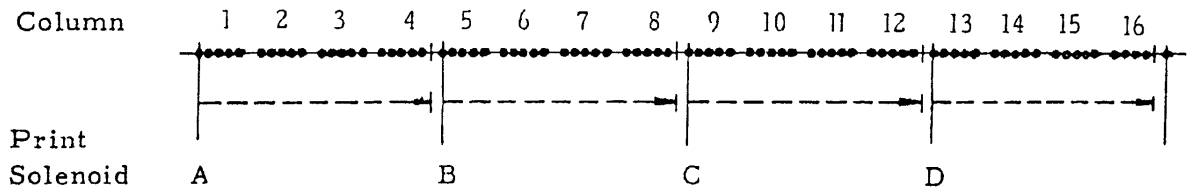
Line space 3 dots

Column space 1 dot

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2.2 Paper Feed

1) One dot line Feed: Paper is fed automatically for 0.35 mm (one pitch) when Print Head is returned to left from right side.

2) Space Feed: Line space feed is done by feeding one dot line continuously.

3) Paper Free Mechanism: Paper can be pulled out forward when the printer is in the halted state.

4) Manual Paper Feed Knob: Option

2.3 Ribbon Cassette

1) Color: Purple or Black

2) Dimensions: Approximately 74 (W) × 25 (D) × 7 (H) mm

3) Life: Purple Approximately 1×10^4 lines (4.5 VDC 25°C continuous printing)
Black Approximately 7×10^3 lines (4.5 VDC 25°C continuous printing)
(Life test is done with print mode in Attached Table 1.)

4) Parts number: EPSON ERC-05

2.4 Paper

1) Kind: Woodfree paper

2) Width: 44.5 ± 0.5 mm

3) Diameter: Max. ϕ50 mm

4) Thickness: Approximately 0.07 mm

5) Basis weight: 52.3 g/m² (141 b/ 500 sheet /17" × 22")

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2.5 Timing Detector

Timing Detector is tachometer-generator that is directly connected with motor. Detector generates 168 output signals per dot line; 96 output signals correspond to dot position of Print Head and 72 output signals correspond to Print Head return. These output signals are arranged in a pulse wave form on the customer side, and are used as Timing Pulse.

1) Timing Pulse: Timing Pulses should be obtained for threshold level to be 0 ± 0.1 V of Timing Detector output signal.

2) Output Waveform

Timing Detector
out-put signal
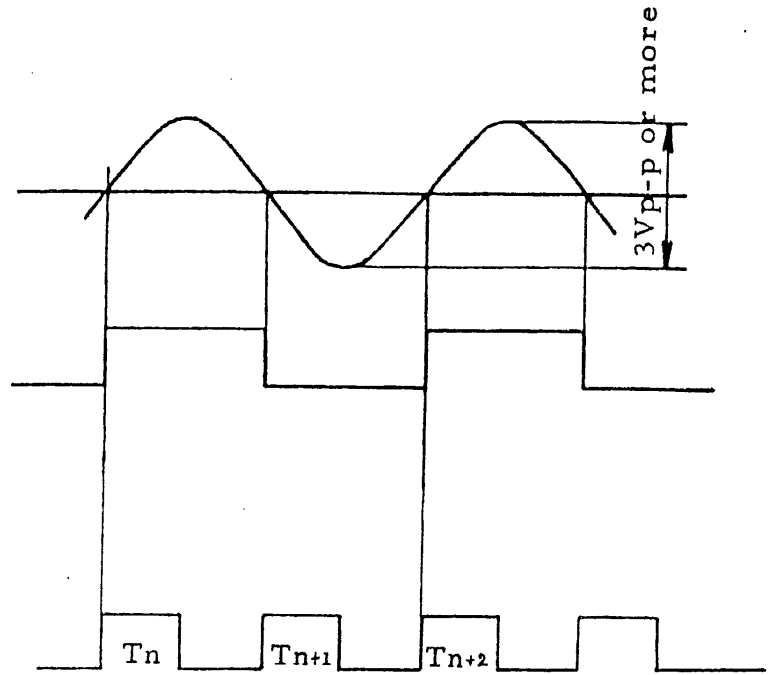
3VP-P or more

Timing Pulse

Tn   Tn+1   Tn+2

☐ denotes the signal to be generated by the customer side.

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2.6 Reset Detector

Reset Detector has Lead-switch that makes at each time of dot lines. Reset Detector output signal is used as Reset Signal which denotes standard position of dot position at each time of print cycles.

1) Rating:

Voltage	2.85 – 20 VDC
Current	20 µA – 1 mA
Instantaneous power	5 mW or less (Resistance load)

2) Pulse waveform, phase

Reset Signal

more than 55 µs

MAX.2.5ms (Note 2)

TYP.0.6ms

MIN.0.2ms

Timing Pulse

T_1 T_2

NOTES
1. ☐ denotes the signal to be generated by the customer side.

2. During motor steady driving (except for period from motor starting to generation of Reset signal R_1)

2.7 Motor

1) Driving and Stopping

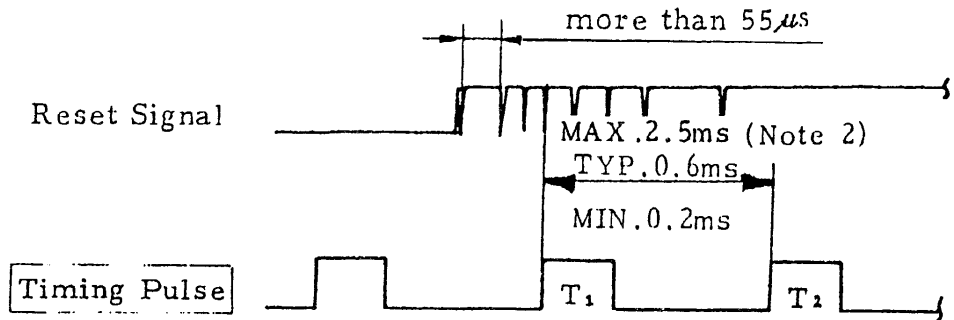The motor is in the halted state when the printer is in the stand-by state (i.e., non-printing condition). Application of electric brake to quickly stop the motor must be performed by interrupting Motor Drive signal within 0.5 ms after the leading edge of Reset signal R_n (R_n is R_{10} in case of 5 × 7 dot matrix and 3 dots line space.), and applying the Motor stop signal more than 100 ms, and short-circuiting a cross the Motor terminals with a transistor.

2) Stopping at abnormality

Motor driving signal is cut off before the interval of timing pulse (T_n - T_{n+1}) is performed more than 1 second.

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3) Terminal Voltage: 4.5 +0.5/–0.7 VDC

4) Current

    a) Peak Current: Approximately 0.8 A (4.5 VDC, 25°C)
                           (Worst case 1.2 A or less)

    b) Mean Current: Approximately 0.17 A (4.5 VDC, 25°C)

    c) Current wave form
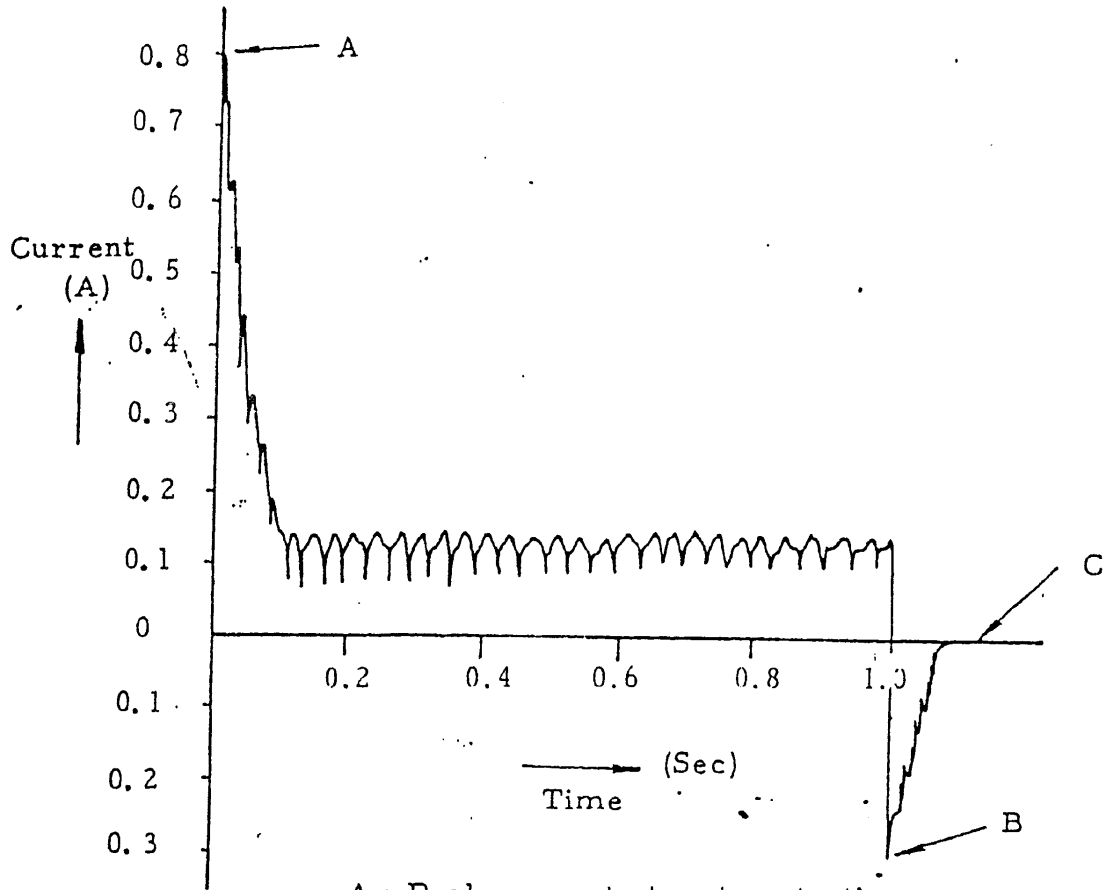
A : Peak current at motor starting
B : Current at motor stopped
C : Halted state

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2.8 Print Solenoid

Dot Print is done by energizing Print Solenoid.

1) Terminal Voltage: 4.5 +0.5/−1.2 VDC

Print Solenoid terminal voltage and Motor terminal voltage should satisfy the voltage relationship of the extent of an oblique line in the following figure.

Motor terminal voltage(V)

2) Ohmic Resistance: $1.5\,\Omega \pm 0.15\,\Omega$ (at 25°C)

3) Current: 3 A / Print Solenoid (Peak current)

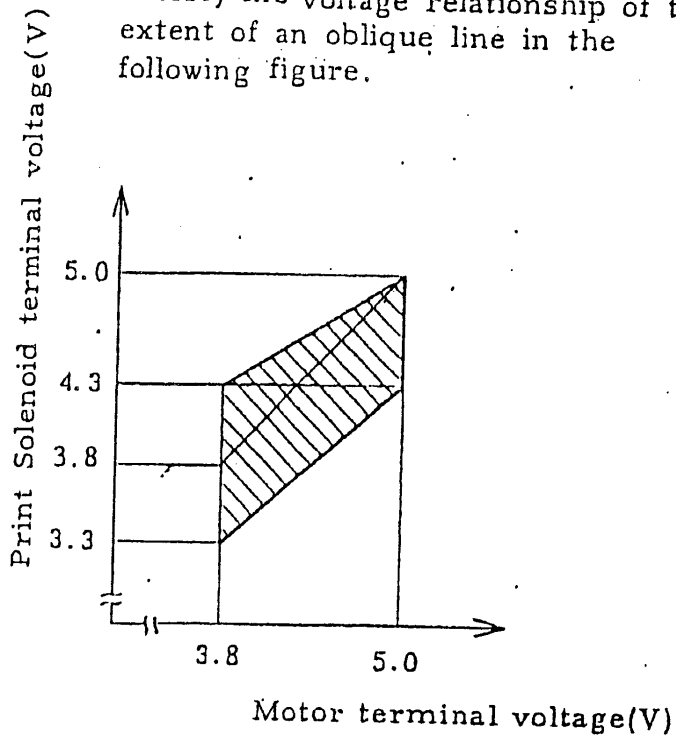4) Pulse Width: Form the leading edge of Timing signal Tn to the leading edge of Timing signal Tn+1 (See following figure)

5) Watt consumption: 3 mj/dot

6) Energizing Duty: 1/4

7) Continuous Energizing: One Print Solenoid can be energized continuously by 400 dot lines (24 × 400 = 9600 dots).   But it is necessary to take non-printing time longer than continuous energizing time.

8) Spark Killer: Prepared by the customer side refer the M-150II designer's guide.

9) Protection of solenoid at abnormality:

      Energizing pulse to solenoid should be cut off less than 1 sec.

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Timing Pulse

Print Solenoid A
Print Pulse

Print Solenoid B
Print Pulse

Print Solenoid C
Print Pulse

Print Solenoid D
Print Pulse

Current wave
Print Solenoid A

MIN. 0.2ms
Max. 2.5ms (Note 3)
TYP. 0.6ms
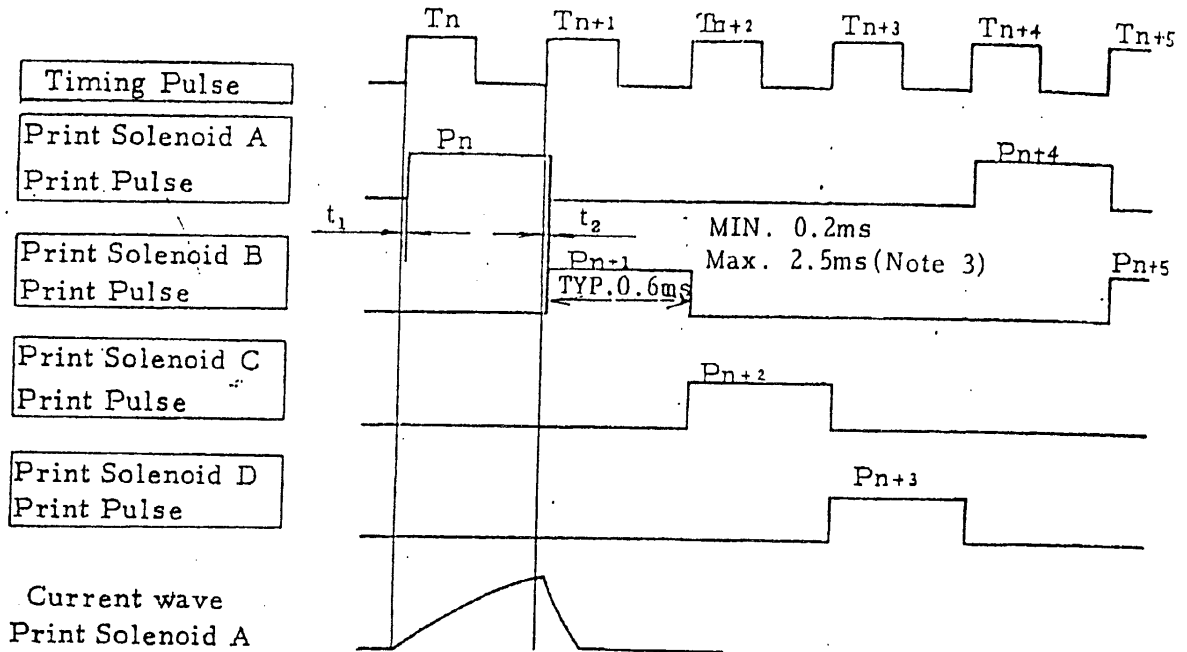
denotes the signal to be generated by the customer side.

NOTES:
1. $t1 = t2 \leq 50 \mu s$

2. In case of printing 5×7 matrix character, Print Solenoid A is energized with Print Pulse Pn which has Pulse width of Timing signal Tn to Tn+1, and next Print Solenoid B is energized with Print Pulse Pn+1 which has Pulse width of Timing signal Tn+1 to Tn+2. In the same way Print Solenoid C is energized with Print Pulse Pn+2, Print Solenoid D is energized with Print Pulse Pn+3, and the Print Solenoid A is energized with Print Pulse Pn+4 again. As upper mentioned four Print Solenoids should be energized according to the order of Print Solenoid A, B, C, D.

3. Max. 2.5 ms:
During motor steady driving (except for period from motor starting to generation of Reset signal R1)
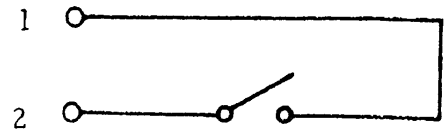
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2.9 Terminal Assignment

Connection	Terminal No.
Reset Detector	1
//	2
Motor (-)	3
// (+)	4
Print Solenoid common	5
Print Solenoid (D)	6
// (C)	7
// (B)	8
// (A)	9
Timing Detector	10
//	11
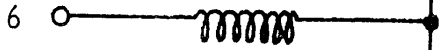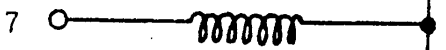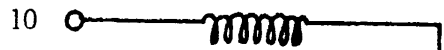
NOTE: Terminal numbers are 1, 2, ... 11 from left side of cupper leaf patern of P.C. Board. (See 2.11 Overall Dimensions)

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2.10 Time Chart

1) Time Chart Diagram (5 × 7 Dot Matrix, 3 dots line space)
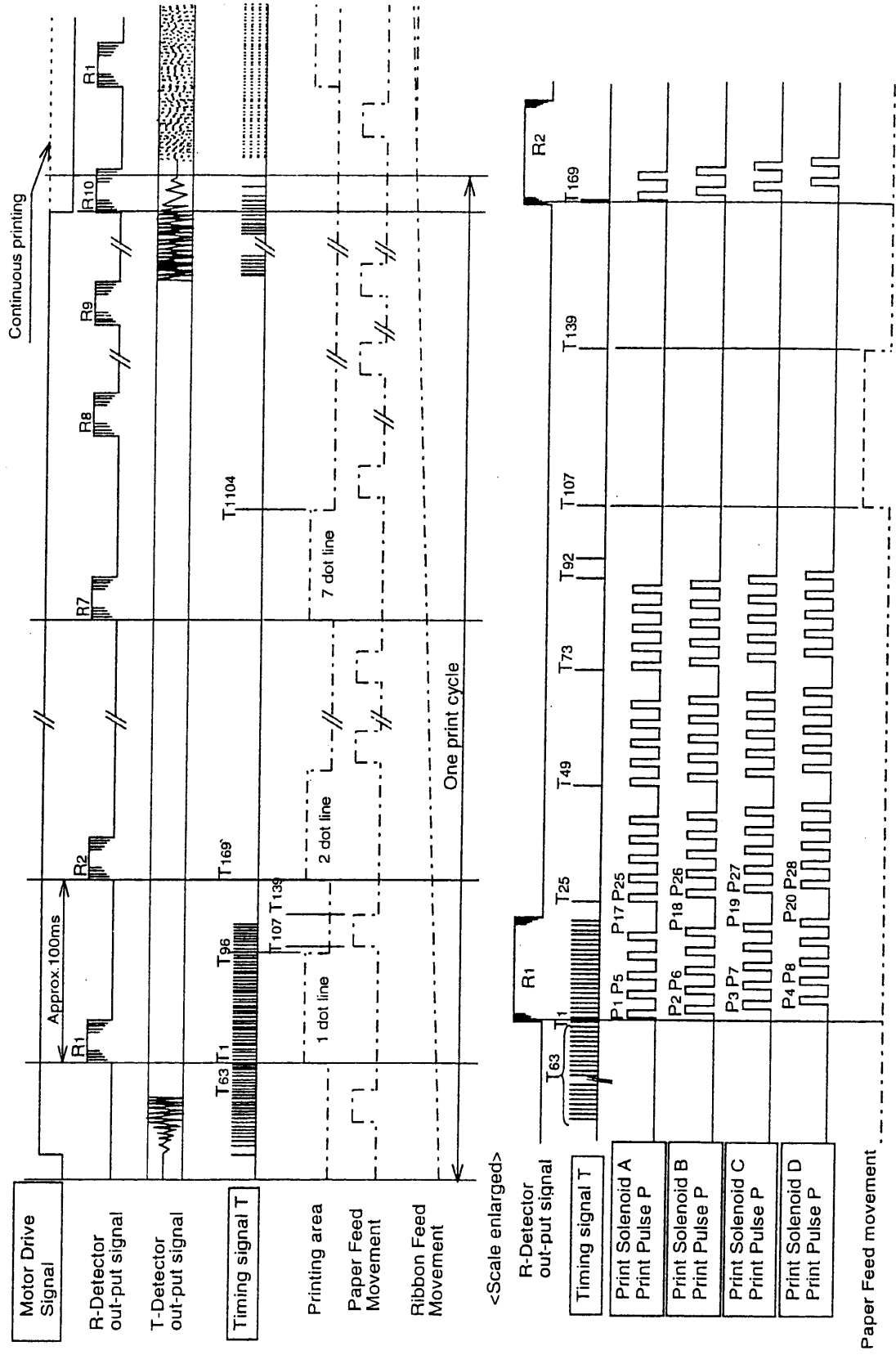
NOTE: ☐ denotes the signal to be generated by the customer side.

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Paper guide

Paper Entrance

Paper Exit

4.5

10.6

10.6 (Character position)
line space 3 dots

Manual Paper Feed Knob

Ribbon Feed Roller

Ribbon Cassette

Center of rear setting hole

2.8

23.1

25.4

2.54 (Pitch)

1.6 (Pattern width)

B zone

The indispensable corner position
when Ribbon cassette is removed

The indispensable corner position
Ribbon cassette is removed

PUSH

Ribbon Cassette remove See A

Paper Exit

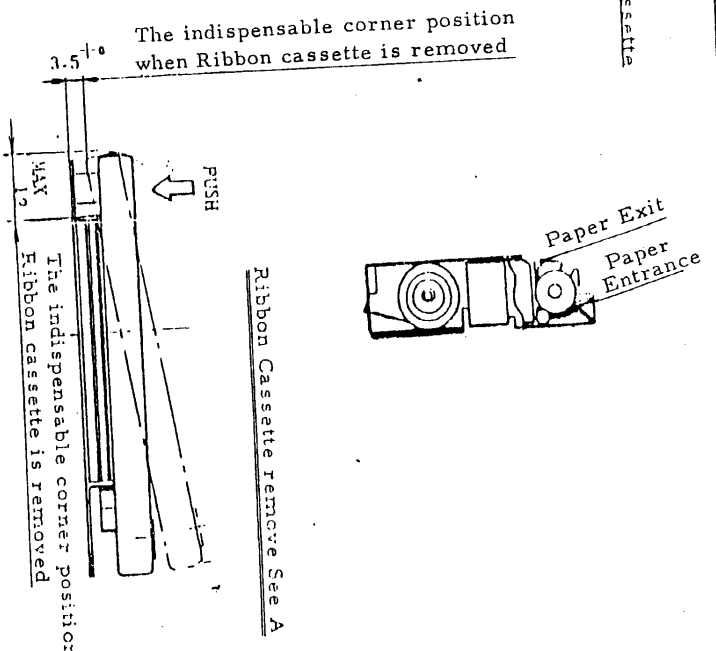Paper Entrance
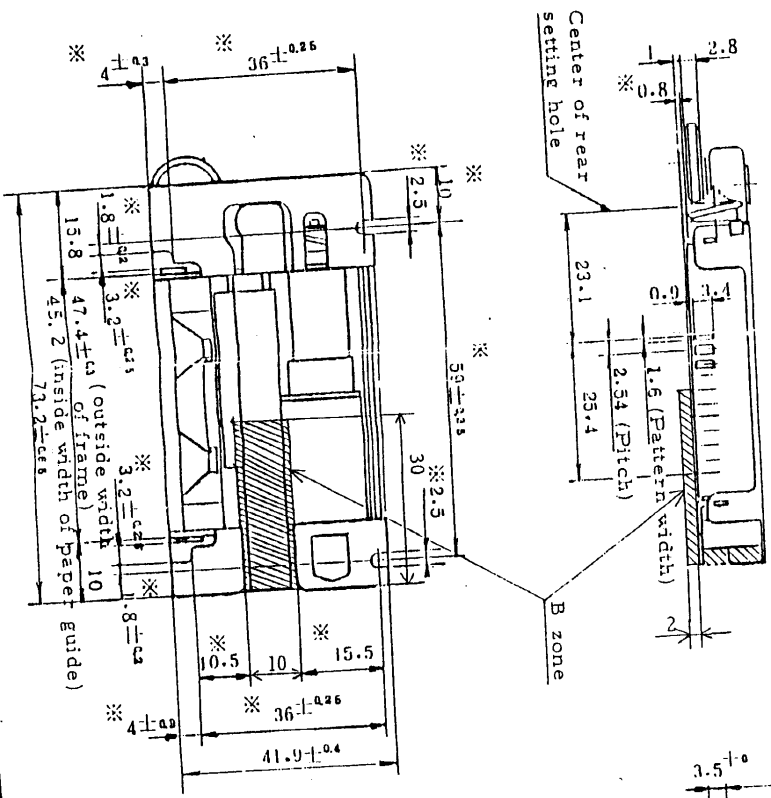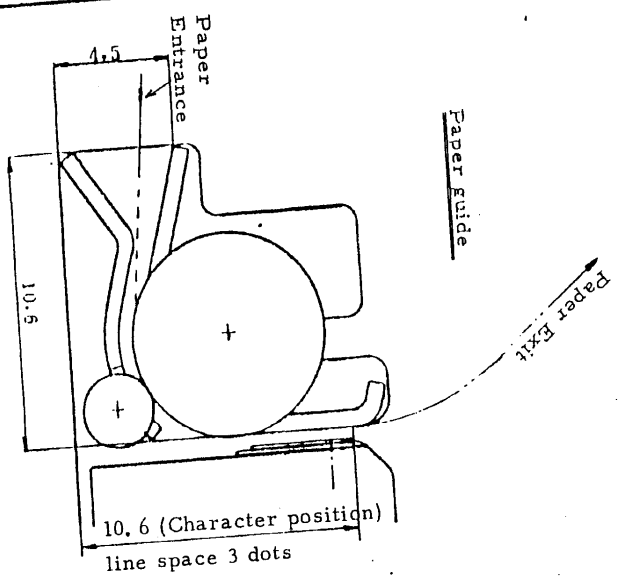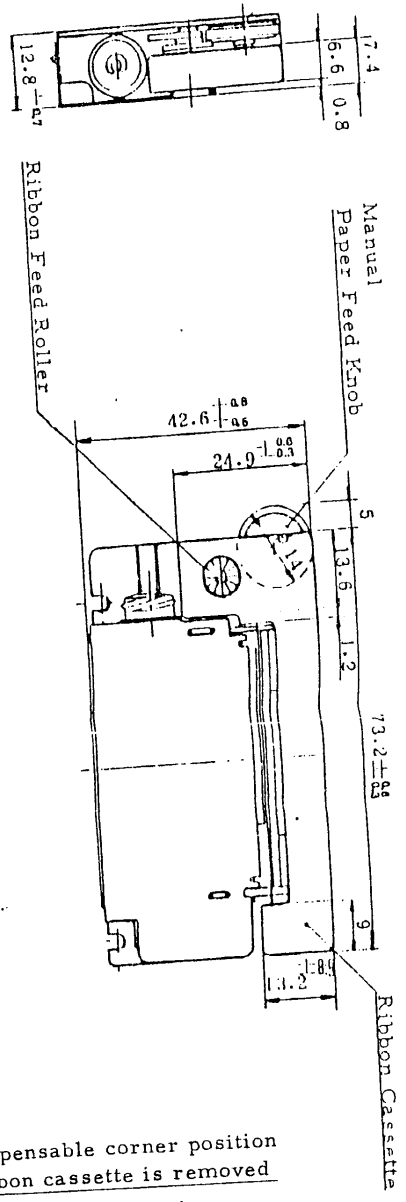
Note :
1. Mark※ denotes the dimension
   setting hole.
2. Set the center of paper holder
   of printer frame.
3. In order to prevent paper fee
   trouble, the inside dimension
   holder should not be over the
   width plus 2.0mm" and the p
   holder should not press the h
   of paper.
4. Roll-in protection device and
   cutter are designed on calcu
   side.
5. The calculator case should be
   any projection of said case c
   B zone (30 x 10 x2).

Print Solenoid A is energized with Print Pulse P1 of Timing Pulse T1 to T2, and the left-upper-most dot of first column character is printed. Next Print Solenoid B is energized with Print Pulse P2 of Timing Pulse T2 to T3, and the left-upper-most dot line of 5th column characters is printed. Upper-mentioned control is done in order, and Print Solenoid D is energized with Print Pulse P92 of Timing Pulse T92 to T93, and the right-upper-most dot of 16th column characters is printed.

Column space of 4th, 8th, 12th and 16th column are kept one dot, and Print Head is returned to home position between Timing signal T96 and T168. And paper is fed automatically one dot. Upper-mentioned movement is done continuously through 7 dot lines, and Print Solenoid D is energized with Print Pulse P1100 of Timing Pulse T1100 to T1101, and the right-down-most dot of 16th column characters is printed. And printing of 5 × 7 dot matrix character has completed. Next, to keep 3 dots line space, paper is fed in 3 dots line; that is 8, 9, and 10 dot line, and one print cycle has completed at Timing signal T1680.

3) Discrimination of R1 and R signal

After the motor is started by applying Motor Drive Signal, Timing Signal should be counted. The Reset Signal after 63 times of Timing Signal counting should be set as R1 signal. After R1 signal is set, the Reset Signal from R2 to Rn is set as same as R1 signal is set. Initial setting to confirm that Print Head is set at the stand-by state is completed by detecting R1 signal. Timing signal T1 that shows standard dot position of each one print cycle is determined by detecting R1 signal.

4) Continuous printing or continuous Paper feed

It is performed by applying Motor Drive Signal continuously without interrupting Motor Drive Signal.

5) Reset Signal

Reset Signal does not sometimes make at stand-by state.

NOTES: 1. More than 63 Timing Pulses are generated between Motor starting and generation of R1 signal.
   2. Term of energizing Print Solenoid prohibitted
       1) From Motor starting to the leading edge of R1 signal (from Motor starting to regular revolution)
       2) From Timing Signal T97+168n to T168+168n (n = 0~10, 5 × 7 dot matrix, 3 dots line space)
   3. Print Solenoid Print Pulse should not be energized and interrupted with electric noise.
   4. After the Reset Signal R1 is confirmed per each one print cycle, count of Timing Signal should be cleared per each one print cycle.

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Attached Table 1   Print Mode

```
0123456789:;<=>?
123456789:;<=>?@
23456789:;<=>?@A
3456789:;<=>?@AB
456789:;<=>?@ABC
56789:;<=>?@ABCD
6789:;<=>?@ABCDE
789:;<=>?@ABCDEF
89:;<=>?@ABCDEFG
9:;<=>?@ABCDEFGH
:;<=>?@ABCDEFGHI
;<=>?@ABCDEFGHIJ
<=>?@ABCDEFGHIJK
=>?@ABCDEFGHIJKL
>?@ABCDEFGHIJKLM
?@ABCDEFGHIJKLMN
@ABCDEFGHIJKLMNO
ABCDEFGHIJKLMNOP
BCDEFGHIJKLMNOPQ
CDEFGHIJKLMNOPQR
DEFGHIJKLMNOPQRS
EFGHIJKLMNOPQRST
FGHIJKLMNOPQRSTU
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