SERVICE MANUAL

9-pin Serial Impact Dot Matrix Printer

EPSON LX-300+

COLOR IMAGING EPSON

EPSON®

SEDM997003

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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) Personal injury and 2) damage to equipment.

Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by a WARNING heading.

Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NOWORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of LX-300+. The instructions and procedures included in here are intended for the experienced repair technicians, and close attention should be given to the precautions on the preceding page. Chapters are organized as follows:

CHAPTER 1. PRODUCT DESCRIPTIONS

Provides a general overview and specifications of the product.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of electrical and mechanical operations of the product.

CHAPTER 3. TROUBLESHOOTING

Provides the step-by-step procedures for troubleshooting.

CHAPTER 4. DISASSEMBLY AND ASSEMBLY

Describes the step-by-step procedures for disassembling and assembling the product.

CHAPTER 5. ADJUSTMENT

Provides adjusting procedures.

CHAPTER 6. MAINTENANCE

Provides preventive maintenance procedures.

APPENDIX

Provides the following addition information for reference:
- Connector Summary
- Parts List
- Exploded Diagrams
- Component Layout
- Circuit Schematics

Revision Status

Revision	Date of Issue	Description
A	May 11, 2000	First Release

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Chapter 2 Operating Principles

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CHAPTER

1

PRODUCT DESCRIPTION

1.1 Features

EPSON LX-300+ is a 9-pin serial impact dot matrix printer. The major features of this printer are as follows:

- ☐ Printing speed: High speed draft 300 cps at 10 cpi
  Draft 225 cps at 10 cpi
  NLQ 56 cps at 10 cpi
- ☐ Feeding method: Friction feed (rear)
  Push tractor feed (rear)
  Push and Pull tractor feed (rear)
  Pull tractor feed (rear, bottom)
- ☐ Feeder: Rear push tractor, CSF single-bin (Option),
  Pull tractor (Option) and Roll paper holder (Option)
- ☐ Paper/ Media: Single sheet, Continuous paper, Multi part paper,
  Envelope, Label and Roll paper
- ☐ Fonts: 2NLQ and 1 Draft Bitmap typefaces
  8 Barcode fonts
- ☐ Character tables: Standard version 13 tables
  NLSP version 38 tables
- ☐ Input buffer: 8 Kbytes
- ☐ Acoustic noise: 49 dB(A) (ISO 7779 pattern)
- ☐ Reliability: Total print volume 12 million lines
  (except printhead)
  MTBF 6000 POH (25% Duty)
  Printhead life 200 million strokes/ wire
  Ribbon life 3 million characters
- ☐ Interface: Bi-directional parallel interface
  (IEEE-1284 nibble mode supported)
  Serial I/F
- ☐ Control code: ESC/P and IBM 2380 Plus emulation
- ☐ Copy capability: 1 original + 4 copies
- ☐ Control panel functions:Font, Pause, Tear off, LF/FF, Load/ Eject, Micro Adjust, Self test, Data dump and the default settings

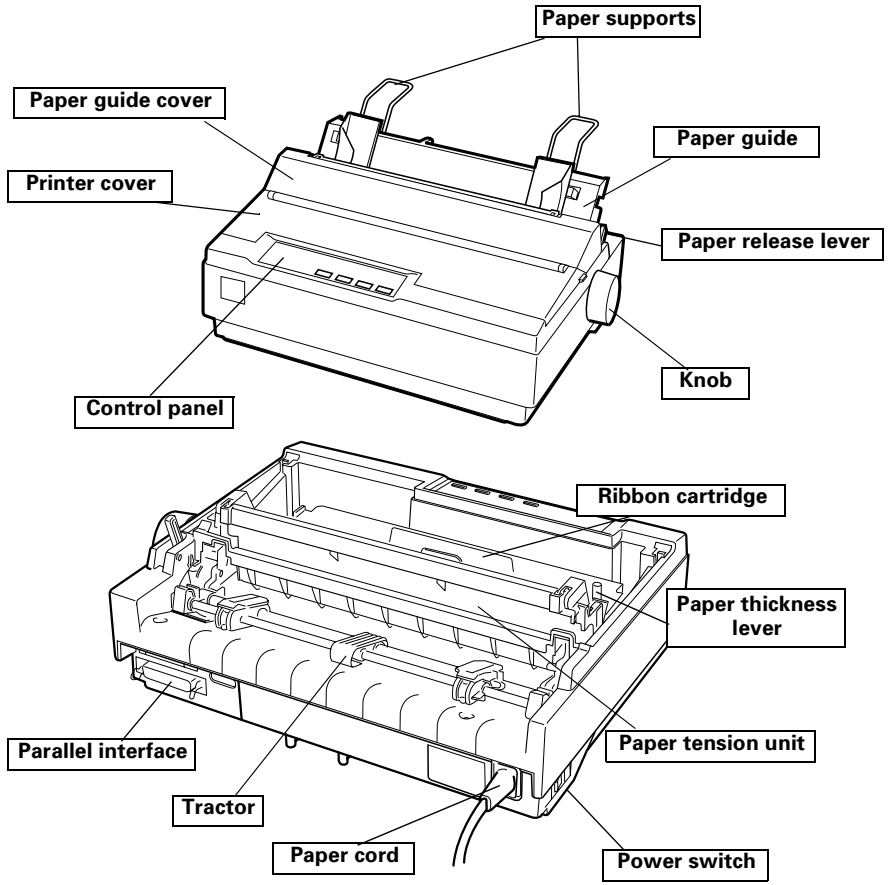


Figure 1-1. EPSON LX-300+ Printer Parts

1.2 Printing Specification

1.2.1 Printing Specification

- ☐ Print method: Impact dot matrix
- ☐ Number of pins: 9 pins
- ☐ Print pin arrangement: 9x1
- ☐ Print pin diameter: 0.29 mm (0.0114 inch)
- ☐ Color (Option): Black, Magenta, Cyan, Yellow
- ☐ Print direction: Bi-direction with logic seeking
- ☐ Print speed and printable columns:

Table 1-1. Print Speed and Printable Columns

Printing mode	Character pitch (cpi)	Printable columns	Printing speed (cps)
High speed draft	10	80	300
	12	96	337
	15	120	337
High speed draft condensed	17	137	321
	20	160	300
Draft	10	8-	225
	12	96	270
	15	120	225
Draft condensed	17	137	191
	20	160	225
Draft emphasized	10	80	112

Table 1-1. Print Speed and Printable Columns

Printing mode	Character pitch (cpi)	Printable columns	Printing speed (cps)
NLQ	10	80	56
	12	96	67
	15	120	56
	17	137	47
	20	160	56

NOTE: *When the power supply voltage drops to the lower limit, the printer stops printing and then starts printing the rest on the line more slowly than before.*

- ☐ Resolution:

Table 1-2. Resolution

Printing mode	Horizontal density (dpi)	Vertical density (dpi)	Adjacent dot print
High speed draft	90	72	No
Draft	120	72	No
Draft condensed	240	72	No
Draft emphasized	120	72	Yes
NLQ	240	144	No
Bit image	60, 72, 80, 90 or 120	72	Yes
	120 or 240	72	No

- ☐ Control code: ESC/P and IBM 2380 Plus emulation (Refer to 1.5 "Control codes")

- Character tables:
  - Standard version (13 character table)

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC860 (Portuguese)
PC863 (Canadian-French)	PC865 (Nordic)
PC861 (Icelandic)	BRASCII
Abicomp	Roman 8
ISO Latin 1	PC858
ISO 8859-15	

  - NLSP version (38 character tables)

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC437 Greek
PC853 (Turkish)	PC855 (Cyrillic)
PC852 (East Europe)	PC857 (Turkish)
PC866 (Russian)	
PC869 (Greek)	MAZOWIA (Poland)
Code MJK (CSFR)	ISO 8859-7 (Latin / Greek)
ISO Latin 1T (Turkish)	Bulgaria (Bulgarian)
PC 774 (LST 1283:1993)	Estonia (Estonia)
ISO 8859-2	PC 866 LAT. (Latvian)
PC 866 UKR (Ukrania)	PC860 (Portuguese)
PC 861 (Icelandic)	PC865 (Nordic)
PC APTEC (Arabic)	PC708 (Arabic)
PC 720 (Arabic)	PCAR864 (Arabic)
PC863 (Canadian-French)	Abicomp
BRASCII	Roman 8
ISO Latin 1	Hebrew 7*1
Hebrew 8*1	PC862 (Hebrew)*1
PC858	IAO8859-15
PC771 (Lithuania)	

NOTE: **1: This item is not displayed on a default setting mode. Do not describe this in the manual.*

- International character sets: 13 countries

U.S.A	France	Germany
U.K.	Denmark 1	Sweden
Italy	Spain 1	Japan
Norway	Denmark 2	Spain 2
Latin America		

NOTE: *The international and legal characters are the following 12 codes;*
23H, 24H, 40H, 5BH, 5CH, 5DH, 5EH, 60H, 7BH, 7CH, 7DH, 7EH.

- Typeface
  - Bit map fonts:

EPSON Draft	10cpi, 12cpi, 15cpi
EPSON Roman	10cpi, 12cpi, 15cpi, Proportional
EPSON Sans serif	10cpi, 12cpi, 15cpi, Proportional
EPSON OCR-B	10cpi*1

NOTE: **1: Do not describe in manual.*

- Bar codes

EAN-13	EAN-8	Interleaved 2 of 5
UPC-A	UPC-E	Code 39
Code 128	POSTNET	Coda bar (NW-7)*1
Industrial 2 of 5 *1	Matrix 2 of 5 *1	

NOTE: **1: Do not describe in manual.*

☐ Character tables and typefaces:

Table 1-3. Character Tables and Typefaces

	Character table		Bitmap font
Standard version	Italic table PC 437 (US, Standard Europe)		EPSON Draft EPSON Roman EPSON Sans serif EPSON OCR-B
	PC 850 (Multilingual) PC 860 (Portuguese) PC 863(Canadian-French) PC 865 (Nordic) PC 861 (Icelandic)	BRASCII Abicomp Roman 8 ISO Latin 1 PC 858 ISO 8859-15	EPSON Draft EPSON Roman EPSON Sans serif

Table 1-3. Character Tables and Typefaces

	Character table		Bitmap font
NLSP version	Italic table PC 437(US, Standard Europe)		EPSON Draft EPSON Roman EPSON Sans serif EPSON OCR-B
	PC 860(Portuguese) PC 865(Nordic) BRASCII Roman 8 PC437 (Greek) PC 855 (Cyrillic) PC 857 (Turkish) PC 869 (Greek) Code MJK (CSFR) ISO Latin 1T (Turkish) PC774 (LST 1283: 1993) 1SO 8859-2 PC 866 UKR (Ukrania) PC 708 (Arabic) PCAR864 (Arabic) Hebrew 8*1 PC 858 PC771 (Lithuania)	PC 850 (Multilingual) PC 861 (Icelandic) PC863 (Canadian-French) Abicomp ISOLatin1 PC 853 (Turkish) PC 852 (East Europe) PC 866 (Russian) MAZOWIA (Poland) ISO 8859-7 (Latin/ Greek) Bulgaria (Bulgarian) Estonia (Estonia) PC 866 LAT. (Latvian) PC APTEC (Arabic) PC 720 (Arabic) Hebrew7*1 PC862 (Hebrew)*1 ISO 8859-15	EPSON Draft EPSON Roman EPSON Sans serif

NOTE: *ESC R command is effective on all the character tables.*

NOTE: **1: These items are not displayed in the default setting mode. Do not describe in the manual.*

1.2.2 Paper Feeding

- ☐ Feeding method: Friction feed (rear)
  Push tractor feed (rear)
  Push and Pull tractor feed (rear)
  Pull tractor feed (rear, bottom)
- ☐ Feeder: Rear push tractor, CSF single-bin (Option),
  Pull tractor (Option) and Roll paper holder (Option)
- ☐ Paper path:

Manual insertion	Rear in, top out
CSF	Rear in, top out
Push Tractor	Rear in, top out
Pull Tractor	Rear or bottom in, top out

- ☐ Line spacing: 4.23mm (1/6 inch) or programmable
  in increments of 0.118mm (1/216 inch)
- ☐ Feed speed:

4.23mm (1/6 inch feed)	88msec
Continuous feed	0.76MPS (m/sec) [3.0 IPS (inches/sec)]

- ☐ Input Data Buffer: 8 Kbyte
- ☐ Release lever:
  The release lever must be set according to the following table;

Table 1-4. Release Lever

Lever position	Paper path/ Feeder	Paper/ Media
Friction	Manual insertion (rear)	Cut sheet (Single sheet and Multi part) Envelop
	CSF single-bin	Cut sheet (Single sheet)
	Roll paper holder feed (rear)	Roll paper

Table 1-4. Release Lever

Lever position	Paper path/ Feeder	Paper/ Media
Tractor	Push tractor feed (rear)	Continuous paper (Single sheet and Multi part)
	Push and Pull tractor feed (rear)	Continuous paper (Single sheet and Multi part)
	Pull tractor feed (rear)	Continuous paper (Single sheet and Multi part)
	Pull tractor feed (bottom)	Continuous paper (Single sheet and Multi part) Labels

- ☐ Paper thickness lever:
  The paper thickness lever must be set at the proper position as shown below.

Table 1-5. Paper Thickness Lever

Lever position	Paper thickness (inch)		Paper thickness (mm)
	Minimum	Maximum	
0	(0.0024)	(0.0071)	over 0.06 up to 0.18
1	(0.0071)	(0.0102)	over 0.18 up to 0.26
2	(0.0102)	(0.0130)	over 0.26 up to 0.33
3	(0.0130)	(0.0154)	over 0.33 up to 0.39
4	(0.0154)	(0.0205)	over 0.39 up to 0.52

1.2.3 Electrical Specification

- 120 V version
  - Rated voltage: AC 120V
  - Input voltage range: AC 99 to 132 V
  - Rated frequency range: 50 to 60 Hz
  - Input frequency range: 49.5 to 60.5 Hz
  - Rated current: 0.6A (max. 1.4A)
  - Power consumption: approx. 23W (ISO/IEC 10561 Letter pattern)
  - Insulation resistance: 10MΩ min. (between AC line and chassis, DC 500V)
  - Dielectric strength: AC 1000 Vrms. 1 min. or AC 1200 Vrms. 1 sec. (between AC line and chassis)
- 230 V version
  - Rated voltage range: AC 220 to 240 V
  - Input voltage range: AC 198 to 264 V
  - Rated frequency range: 50 to 60 Hz
  - Input frequency range: 49.5 to 60.5 Hz
  - Rated current: 0.3 A (max. 0.7A)
  - Power consumption: approx. 23W (ISO/IEC10561 Letter pattern)
  - Insulation resistance: 10MΩ min. (between AC line and chassis, DC 500V)
  - Dielectric strength: AC 1500 Vrms. 1 min. (between AC line and chassis)

1.2.4 Environmental Condition

- Temperature: 5 to 35 °C (operating*1)
  15 to 25 °C (operating*1,*2)
  -30 to 60 °C (non-operating)
- Humidity: 10 to 80% RH (operating*1)
  30 to 60% RH (operating*1,*2)
  0 to 85% RH (non-operating)
- Resistance to shock: 1 G, within 1ms (operating)
  2 G, within 2ms (non-operating*3)
- Resistance to vibration: 0.25 G, 10 to 55 Hz (operating)
  0.50 G, 10 to 55 Hz (non-operating*3)

**1: without condensation*
**2: during printing on multi part paper, envelop, card, or label*
**3: without shipment container*

1.2.5 Reliability

- Total print volume: 12 million lines (except printhead)
- MTBF: 6000 POH
- Printhead life: 400 million strokes / wire (Black)
  100 million strokes / wire (Color)

1.2.6 Ribbon Cartridge

- Type: Fabric
  Color: Black
  Ribbon life: 3 million characters (Draft 10 cpi, 14 dots/character)
- Type: Fabric
  Color: Black, Magenta, Cyan and Yellow
  Ribbon life:
  - Black 1 million characters (Draft 10 cpi, 14 dots/character)
  - Magenta 0.7 million characters (Draft 10 cpi, 14 dots/character)
  - Cyan 0.7 million characters (Draft 10 cpi, 14 dots/character)

- Yellow 0.5 million characters (Draft 10 cpi, 14 dots/character)

1.2.7 Safety Approvals

☐ 120 V version

- Safety standards: UL1950
  CSA C22.2 No. 950
- EMI: FCC part15 subpart B class B
  CSA C108.8 class B

☐ 230 V version

- Safety standards: EN60950 (VDE)
- EMI: EN55022 (CISPR pub.22) class B
  AS/NZS 3548 class B

1.2.8 CE Marking

230 V version and UPS version

- Low voltage directive 73/23/EEC: EN60950
- EMC Directive 89/336/EEC: EN55022 class B
  EN61000-3-2
  EN61000-3-3
  EN50082-1
  IEC801-2
  IEC801-3
  IEC801-4

1.2.9 Acoustic noise:

Level: 49 dB(A) (ISO 7779 pattern)

1.2.10 Printable Area

☐ Cut sheets

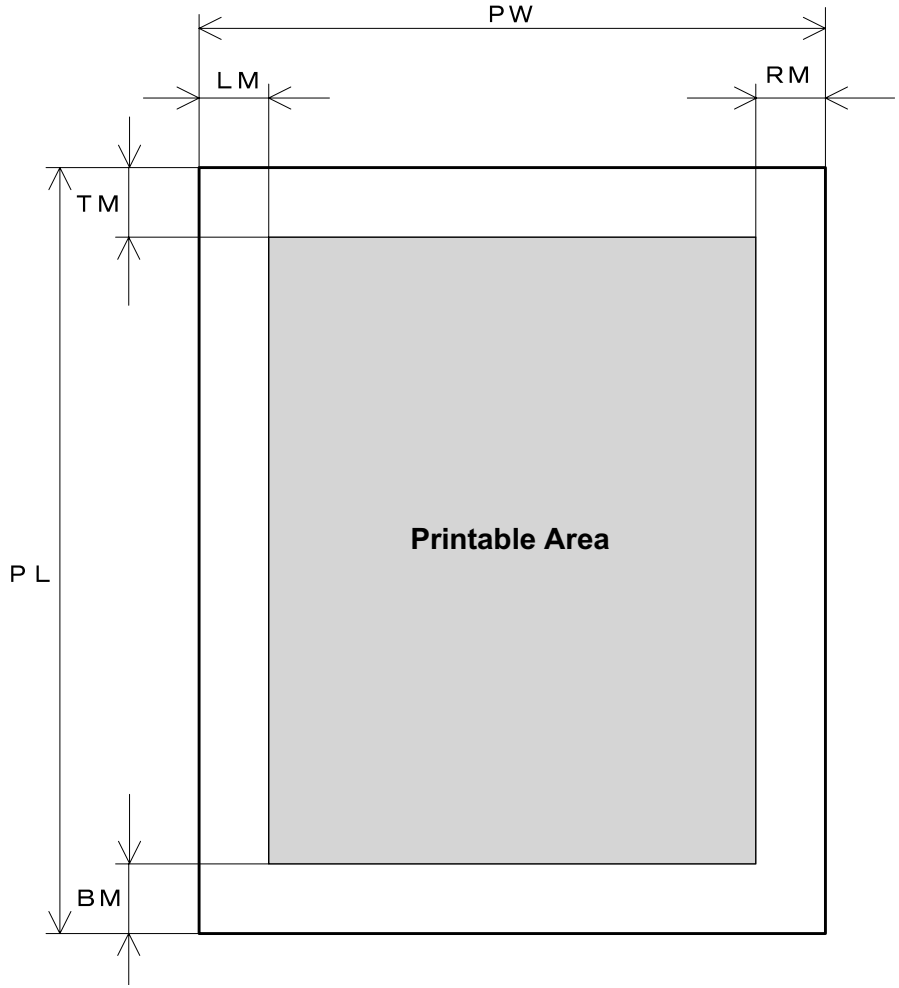


Figure 1-2. Printable Area for Cut Sheet

Table 1-6. Printable Area for Cut Sheet

	Single Sheet	Multi Part
PW (Width)	Refer to 1.7 "Paper Specifications"	Refer to 1.7 "Paper Specifications"
PL (Length)	Refer to 1.7 "Paper Specifications"	Refer to 1.7 "Paper Specifications"
LM (Left Margin)	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more
RM (Right Margin)	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more
TM (Top Margin)	4.2 mm or more	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Envelop

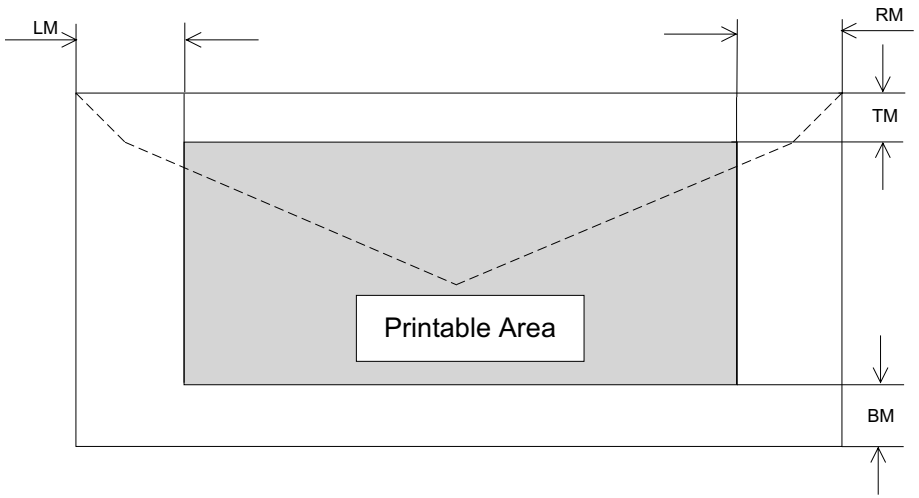


Figure 1-3. Printable Area for Envelop

Table 1-7. Printable Area for Envelop

	Envelope Printable Area
PW (Width)	Refer to 1.7 "Paper Specifications"
PL (Length)	Refer to 1.7 "Paper Specifications"
LM (Left Margin)	3 mm or more
RM (Right Margin)	3 mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Continuous paper

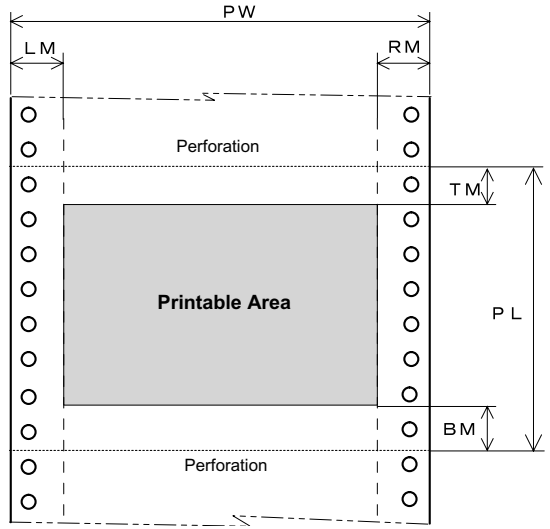


Figure 1-4. Printable Area for Continuous Paper

Table 1-8. Printable Area for Continuous Paper

	Continuous Paper
PW (Width)	Refer to 1.7 "Paper Specifications"
PL (Length)	Refer to 1.7 "Paper Specifications"
LM (Left Margin)	When PW<=254mm: 13 mm or more When PW=254 mm: 24mm or more
RM (Right Margin)	When PW<=254mm: 13 mm or more When PW=254 mm: 24mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Roll paper

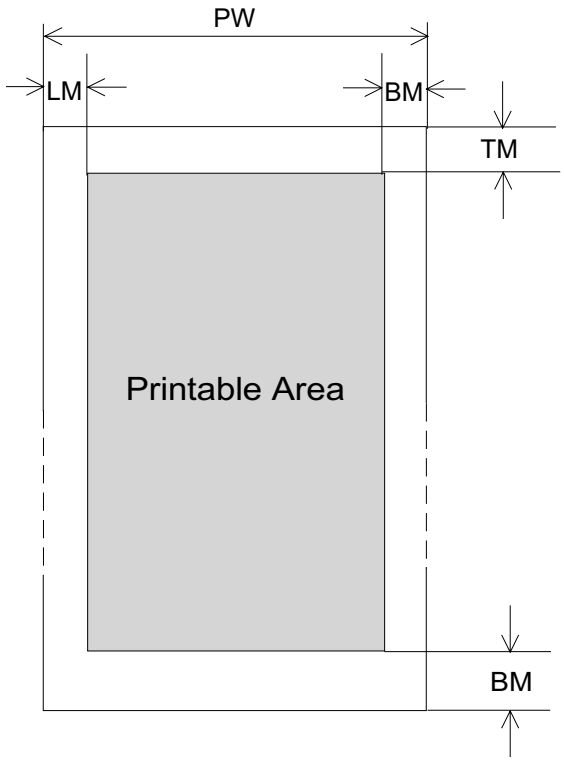


Figure 1-5. Printable Area for Roll Paper

Table 1-9. Printable Area for Roll Paper

	Continuous Paper
PW (Width)	Refer to 1.7 "Paper Specifications"
PL (Length)	Refer to 1.7 "Paper Specifications"
LM (Left Margin)	3 mm or more
RM (Right Margin)	3 mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

1.3 Interface Specifications

LX-300+ provides bi-directional 8 bit parallel interface and serial interface. Optional interface board is not supported on this model.

1.3.1 Parallel Interface (Forward Channel)

- ☐ Transmission mode: 8 bit parallel
  IEEE-1284 compatibility mode
- ☐ Adaptable connector: 57-30360 (Amphenol) or equivalent
- ☐ Synchronization: -STROBE pulse
- ☐ Handshaking: BUSY and -ACKLG signals
- ☐ Signal level: TTL compatible
  (IEEE-1284 level 1 device)

Table 1-10. Parameter

Parameter	Minimum	Maximum	Condition
V_{OH}*	--	5.5V	
V_{OL}*	-0.5V	--	
I_{OH}*	--	0.32mA	V_{OH}=2.4V
I_{OL}*	--	12mA	V_{OL}=2.4V
C_O	--	50pF	
V_{IH}	--	2.0V	
V_{IL}	0.8V	--	
I_{IH}	--	0.32mA	V_{IH}=2.0V
I_{IL}	--	12mA	V_{IL}=0.8V
C_I	--	50pF	

** Logic-H signal is 2.0V or lower when the printer is off and the signal is 3.0V or higher when the printer is on. The receiver has impedance which is equivalent to 7.5 kΩ.*

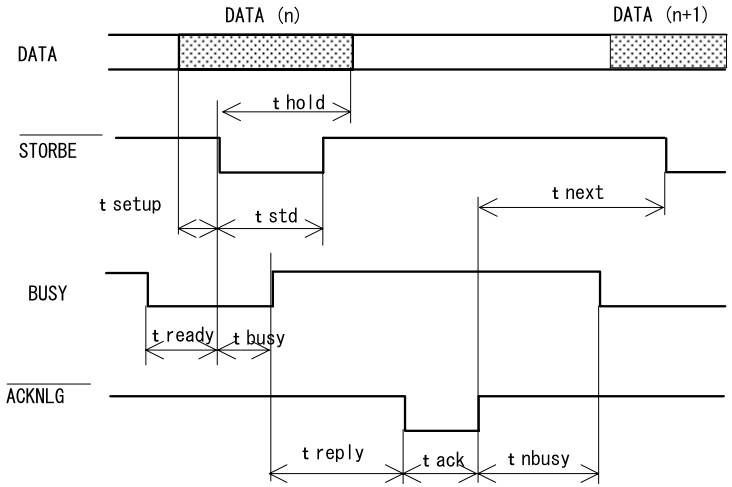


Figure 1-6. Data Transmitting Timing

Table 1-11. Maximum & Minimum Timings for Data Transmission

Parameter	Minimum	Maximum
t_{setup}	500 nsec	--
t_{hold}	500 nsec	--
t_{stb}	500 nsec	--
t_{ready}	0	--
t_{busy}	--	500 nsec
t_{reply}	--	--
t^{ack}	500 nsec	10 us
t_{nbusy}	0	--
t_{next}	0	--
t_{tout}*	--	120 nsec
t_{tin}**	--	200 nsec

** Rise and fall time of output signals*
*** Rise and fall time of input signals.*

- BUSY signal is active (HIGH level) under the conditions below:
  - In the process of receiving data
  - In the condition of being input buffer full
  - In the condition of being -INT signal active (low level)
  - During hardware initialization
  - In the condition of being -ERROR or PE signal is active (low level, high level, respectively)
  - In the self test mode
  - In the adjustment mode
  - In the default-setting mode
- -ERROR signal is active (low level) under the conditions below:
  - In the condition of a paper-out error
  - In the condition of a release lever error
- PE signal is active (high level) under the condition below:
  - In the condition of a paper-out error

Table 1-12. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	-STROBE	19	In	Strobe pulse. Input data is latched at falling edge of the signal.
2	DATA1	20	In	Parallel input data to the printer. bit0:LSB
3	DATA2	21	In	bit1
4	DATA3	22	In	bit2
5	DATA4	23	In	bit3
6	DATA5	24	In	bit4
7	DATA6	25	In	bit5
8	DATA7	26	In	bit6
9	DATA8	27	In	bit7:MSB
10	-ACKNLG	28	Out	This signal (negative pulse) indicates that the printer has received data and is ready to accept next one.
11	BUSY	29	Out	This signal's high level means that the print is not ready to accept data.
12	PE	28	Out	This signal's high level means that the printer is in a state of paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	-AFXT	30	In	Not used.
31	-INIT	30	In	This signal's negative pulse initializes printer.
32	-ERROR	29	Out	This signal's low level means the printer is in a state of error.
36	-SLIN	30	In	Not used.
18	Logic H	--	Out	This line is pulled up to +5V through 3.9 kΩ resister.
35	+5V	--	Out	This line is pulled up tp +5V through 1.0 kΩ resister.
17	Chassis	--	--	Chassis GND.
16, 33, 19-30	GND	--	--	Signal GND.
15, 34	NC	--	--	Not connected.

NOTE: *In/Out shows the direction of signal flow from the printer's point of view.*

1.3.2 Parallel Interface (Reverse Channel)

- ☐ Transmission mode: IEEE-1284 nibble mode
- ☐ Adaptable connector: See 1.3.1 "Parallel Interface (Forward Channel)"
- ☐ Synchronization: Refer to the IEEE-1284 specification
- ☐ Handshaking: Refer to the IEEE-1284 specification
- ☐ Signal level: IEEE-1284 level 1 device
  See 1.3.1 "Parallel Interface (Forward Channel)"
- ☐ Data transmission timing: Refer to the IEEE-1284 specification
- ☐ Extensibility request: The printer responds to the extensibility request affirmatively, when the request is 00H or 004H, which means;

  00H: Request for nibble mode of reverse channel transfer
  04H: Request device ID in nibble mode of reverse channel transfer

- ☐ Device ID: The printer sends following device ID string when it is requested.
  - ■ When IEEE1284.4 is enabled;

Table 1-13.

```
[00H][4EH]
MFG: EPSON;
CMD: ESCPL2,PRPXL24,BDC,D4;
MDL: LX-300+;
CLS: PRINTER;
DES: EPSON[SP]LX-300+;
```

  - ■ When IEEE1284.4 is disabled;

Table 1-14.

```
[00H][4BH]
MFG: EPSON;
CMD: ESCPL2,PRPXL24,BDC;
MDL: LX-300+;
CLS: PRINTER;
DES: EPSON[SP]LX-300+;
```

Table 1-15. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	HostClk	19	In	Host clock signal.
2	DATA1	20	In	Parallel input data to the printer. bit0:LSB
3	DATA2	21	In	bit1
4	DATA3	22	In	bit2
5	DATA4	23	In	bit3
6	DATA5	24	In	bit4
7	DATA6	25	In	bit5
8	DATA7	26	In	bit6
9	DATA8	27	In	bit7:MSB
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy/ DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq/ DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag/ DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host busy signal.
31	-INIT	30	In	Not used.
32	-DataAvail/ DataBit-0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	--	Out	This line is pulled up to +5V through 3.9 kΩ resister.

Table 1-15. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
35	+5V	--	Out	This line is pulled up tp +5V through 1.0 kΩ resister.
17	Chassis	--	--	Chassis GND.
16, 33, 19-30	GND	--	--	Signal GND.
15, 34	NC	--	--	Not connected.

** In/Out shows the direction of signal flow from the printer's point of view.*

1.3.3 Serial Interface

- ☐ Synchronization: Asynchronous
- ☐ Signal level: EIA-232D
  MARK (logical 1): -3V to -25V
  SPACE (logical 0): +3V to +25V
- ☐ Word length: Start bit: 1 bit
  Data bit: 8 bit
  Parity bit: Odd, Even, Non, Ignore
  Stop bit: 1 bit or more
- ☐ Baud rate: 300, 600, 1200, 2400, 4800, 9600 or 19200 bps
- ☐ Handshaking: DTR signal and XON/XOFF
  DTR=MAEK, XOFF:indicates that the printer cannot receive data.
  DTR=MARK, XON: indicates that the printer is ready to receive data.

NOTE: *The DTR signal is MARK and XOFF code (DC3, 13H) is transmitted when the rest of the input buffer becomes 256 bytes. The DTR signal is SPACE and XON code (DC1, 11H) is transmitted when the rest of the input buffer is regained 256 byte.*

- ☐ Error handling: Parity error is only detected. Overrun error and framing error are ignored.
- ☐ Connector: 25 pin subminiature D-shell connector (female)

Table 1-16. Connector Pin Assignment and Signals

Pin No.	Signal Name	In/Out	Functional Description
2	TXD	Out	Transmit data.
20	DTR	Out	Indicates that the printer is ready to receive data or not.
11	REV	Out	Connected directly to the DTR signal.
4	RTS	Out	Request to send. Always SPACE level when the printer is powered on. Pulled up to +12V via 4.7KΩ resistor.
3	RXD	In	Receive data.
7	Signal GND	--	Signal GND
1	Chassis GND	--	Chassis GND
other	NC	--	Not used. Not connected.

** In/Out shows the direction of signal flow from the printer's point of view.*

1.3.4 Interface Selection

The printer has 2 interfaces; the parallel interface and serial interface. These interfaces are selected manually by Default Setting or selected automatically.

- Manual Selection
  One of 2 interfaces can be selected by Default setting.
- Automatic Selection
  The automatic interface selection is enabled by Default Setting. In this automatic interface selection mode, the printer is initialized to the idle state scanning which interface receives data when it is powered on. Then the interface that receives data first is selected. When the host stops data transfer and the printer is in stand-by state for the seconds specified by Default Setting, the printer is returned to the idle state. As long as the host sends data or the printer interface is in busy state, the selected interface is let as it is.
- Interface State and Interface Selection
  When the parallel interface is not selected, the interface gets into a busy state. When the serial interface is not selected, the interface sends XOFF and sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface got into a ready state, the serial interface sends XON and sets the DTR SPACE. Caution that the interrupt signal such as a -INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.5 Prevention Hosts from Data Transfer Time-out

Generally, hosts abandons data transfer to peripherals when a peripheral is in busy state for dozens of seconds continuously. To prevent hosts from this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slowdown is started when the rest of the input buffer becomes several hundreds of bytes. At last, when the input buffer is full, the printer is in busy state continuously.

1.3.6 IEEE1284.4 protocol

The packet protocol described by IEEE1284.4 is supported on the parallel I/F. Two function modes of IEEE1284.4 protocol, “Off” and “Auto” are available, and one of them is selected according to the value of Default setting. (See 1.4.2.3 "Default Setting")

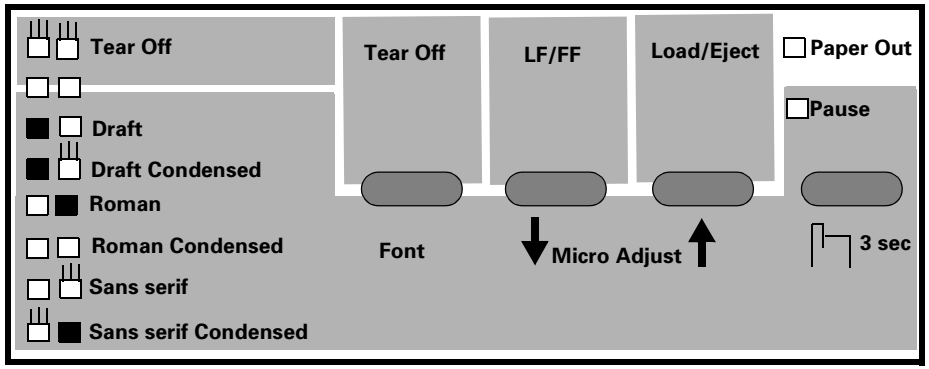
- Auto:
  Communication is carried out in the conventional mode until a magic string (1284.4 synchronous commands) is received. By receiving a magic string, communication in IEEE1284.4 packet mode is started.
- Off:
  Communication is carried out in the conventional mode. A magic string (284.4 synchronous commands) is discarded.

NOTE: *The packet protocol of IEEE1284.4 allows a device to carry on multiple exchanges or conversations which contain data and/or control information with another device at the same time across a single point-to-point link.*
The protocol is not, however, a device control language. It does provide basic transport-level flow control and multiplexing services.
The multiplexed logical channels are independent of each and blocking of one has no effect on the others. The protocol operates over IEEE1284.

1.4 Operation

1.4.1 Control Panel

4 switches and 4 LEDs are on the panel as shown below.



□: LED On ⚇ : LED Blinks ■ : LED Off

Figure 1-7. Control Panel

1.4.1.1 Switches

□ Operation in normal mode
In normal mode, pressing panel switches executes following function;

Table 1-17. Operation in Normal Mode

Switch	Function
Pause	-Alternates printing and non-printing status. -Enables Micro Adjustment function and Font selection, holding it down for 3 seconds.
Load/Eject	-Loads or ejects paper. -Execute micro feed forward, when this function is enabled.
LF/FF	-Executes line feed, pressing it shortly. -Executes form feed, holding it down for a few seconds. -Executes micro feed backward, when this function is enabled.
Tear Off	-Advances continuous paper to the Tear-off position. -Select font, when this function is enabled.

□ Operation at power on
Turning the printer on while pressing panel switches executes the functions below;

Table 1-18. Operation at Power On

Switch	Function
Load/Eject	NLQ self test
LF/FF	Draft self test
Tear Off	Default setting
Load/Eject & LF/FF	Data dump
Load/Eject & LF/FF & Pause	Clear EEPROM
Tear Off & Load/Eject & LF/FF	Clear EEPROM for Diving Line count for ribbon change timing.
Pause	Bi-d adjustment
The others	Not available

☐ Operation in default setting mode
The following switches are used in default setting mode;

Table 1-19. Operation at Power On

Switch	Function
Tear Off	Changes the setting.
LF/FF	Selects the Menu.
The others	Not available.

1.4.1.2 LED

☐ Indication in normal mode

Table 1-20. Indication in normal mode

LED / Printer Status	Pause*1	Paper Out*2	Font
Pause	On	---	---
Paper out error	On	On	---
Release lever error	On	---	---
Paper eject warning	On	Blink	---
Micro Adjust	Blink	---	---
Tear off	---	---	*3
Font selection	---	---	*3
Fatal error	Blink	Blink	Blink

*1 Pause (Orange)
-It is on when the printer is paused, and it is off when the printer is not paused.
-It blinks when Micro Adjust is enabled.

*2 Paper Out (Red)
-It is on when the printer is in the Paper out status, and it is off when the printer is out of this status.

*3 Font (Green)
-The status of Font selection is displayed by 2 Font LEDs when continuous paper is out of the Tear-off position.
-Both LEDs blink when continuous paper is in the Tear-off position.
■□: Draft
■★: Draft Condensed
□■: Roman
□□: Roman Condensed
□★: Sans serif
★■: Sans serif Condensed
★★: Tear Off
(□: LED On, ■: LED Off, ★: LED Blinks)

1.4.1.3 Buzzer

☐ Paper out error: Beeper sounds (...)*

☐ Release lever operation: Beeper sounds(-----)*

☐ Illegal panel operation: Beeper sounds (.)*

*The description (.) and (-) in the above shows how the beeper sounds.
(.): Beeper sounds approx. 100ms and interval is approx. 100ms.
(-): Beeper sounds approx. 500ms and interval is approx. 100ms.

1.4.2 Functions

1.4.2.1 Usual Operation

- Pause
  -This switch alternates printer activity between printing and non-printing.
  -By holding it down over 3 seconds when the printer is in the stand by state, the Micro Adjust function is enabled. By pressing it again, this function is disabled.
- Load/Eject
  -Pressing it loads out sheet or continuous paper when the printer is out of paper.
  -Pressing it ejects out sheet to the stacker or continuous paper to the paper park.
- LF/FF
  -Pressing it shortly executes line feed.
  -Holding it down for a few seconds executes form feed when continuous paper is used, or ejects cut sheet to the stacker when cut sheet is used.
- Tear Off
  -When continuous paper is used, pressing it moves a page to the Tear-off position. And pressing it again moves a next page to the TOF position.
- Font
  -Pressing it selects one of the following fonts when Micro Adjust is enabled;
  Draft, Draft Condensed, Roman, Roman Condensed, Sans serif, Sans serif Condensed
- Micro Adjust
  -Micro Adjust ↓ / ↑ switches is effective when the Micro Adjust function is enabled by Pause switch.
  -Pressing the Micro Adjust ↓ / ↑ switches executes micro feed backward and forward by 0.118 mm (1/216 inch).
  -The TOF adjustment is enabled in the TOF position after loading, and the Tear-off adjustment is enabled in the Tear-off position.

1.4.2.2 Operation at Power-on

- Self test
  Prints the self test pattern. To cancel it, make printer pause and turn off the power.
- Default setting
  Starts the default setting mode. See 1.4.2.3 "Default Setting".
- Data Dump
  Starts the data dump mode, in which all the input data are printed as hexadecimal numbers and corresponding characters.
- Clear EEPROM
  Resets the printer to the factory default setting, which is not always proper setting for each market demand.
  (i.e. This function is for emergency.)
  Clear Areal EEPROM data except 00H to 1FH.
- Clear EEPROM for Driving Line count for ribbon change timing.
  Resets the diving Line count for ribbon change timing.
- Bi-d adjustment
  Starts the Bi-d adjustment mode. See 1.4.2.4 "Bi-d. Adjustment".
- Demonstration
  Not available.

1.4.2.3 Default Setting

There are some parameters that can be changed by users and will be referred at the time of initialization of the printer.

- Setting mode

1. Enters the Default setting mode.
   The method of selecting language for “Usage of this mode” is printed.
2. Select language for “Usage of this mode” by LF/FF button.
   Font LEDs show the language for “Usage of this mode” that is currently selected.
   This section will be advanced one by one as the button is pressed and the On/Off/Blink/2-Blink of those three LEDs will also be changed according to the selection.

3. Press Tear Off button.
   The current setting and the "Usage of this mode" by selected language will be printed on the paper set in the paper path at that time.
   A print sample is shown in appendix A.
4. Select Menu by Tear Off button.
   Font LEDs show the menu which is selected at that time. The selection will be advanced one by one as the button is pressed and the combination of those three LEDs status of On/Off/Blink/2-Blinks will be changed according to the selection.
5. Select setting value by LF/FF button.
   Tear Off/ Bin LEDs and Paper Out LED show that menu's value by status of On/Off/Blink/2-Blinks. That value can be changed by pressing Tear Off/ Bin button and the LEDs status of On/Off/Blink/2-Blinks will be changed as the button is pressed.
6. When LF/FF button is pressed, the printer memorize the last setting value.
7. Repeat (4) to (6).
   The other items can be changed in the same manner.
   The menu selection will return to the first menu after the last menu selection is over.
8. Turn the printer off.
   The setting is stored into non-volatile memory.

Table 1-21. Setting Menu

Item	Setting / Value *2
Page length for tractor	3 inch, 3.5 inch, 4 inch, 5.5 inch, 6 inch, 7 inch, 8 inch, 8.5 inch, 11 inch, 70/6 inch, 12 inch, 14 inch, 17 inch
Skip over perforation	OFF, ON
Auto tear off	OFF, ON
Auto line feed	OFF, ON
Print direction	Bi-d., Uni-d., Auto
Software	ESC/P2, IBM 2390 Plus
0 slash	OFF, ON

Table 1-21. Setting Menu

Item	Setting / Value *2
High speed draft	OFF, ON
I/F mode	Auto, Parallel, Option
Auto I/F wait time	10 seconds, 30 seconds
Parallel I/F bidirectional mode	OFF, ON
Packet mode	Auto, OFF
Auto CR (IBM 2390 Plus)	OFF, ON
A.G.M. (IBM 2390 Plus)	OFF, ON
Character table	Software version Italic, PC437, PC850, PC860, PC863, PC865, PC861, BARASCII, Abicomp, Roman8, ISO Latin 1, PC858, ISO 8859-15
	NLSP version Italic, PC437, PC850, PC437, Greek, PC853, PC855, PC852, PC857, PC864, PC866, PC869, MAZOWIA, Code MJK, ISO 8859-7, ISO Latin 1T, Bulgaria, PC774, Estonia, ISO 8859-2, PC 866 LAT., PC 866UKR, PC APTEC, PC708, PC720, PCAR 864, PC860, PC865, PC861, PC863, BRASCII, Abicomp, Roman8, ISO Latin 1, PC858, ISO 8859-15, PC771
International character set for Italic table	Italic U.S.A., Italic France, Italic Germany, Italic, U.K., Italic Denmark 1, Italic Sweden, Italic Italy, Italic Spain 1
Manual feed wait time	1 second, 1.5 seconds, 2 seconds, 3 seconds
Buzzer	OFF, ON
Auto CR (IBM 2380 Plus)*1	OFF, ON
IBM character table *1	Table2, Table1

NOTE: **1: This setting is effective when IBM 2380 Plus emulation is selected.*

NOTE: *Setting with underline mean the standard factory settings.*

1.4.2.4 Bi-d. Adjustment

Bi-d. adjustment can be adjusted by users. Bi-d. adjustment method is as follows.

1. Turning the printer on while pressing Pause switch. The guide to adjust Bi-d alignment in this mode and the first alignment pattern will be printed.
2. Select the most closely aligned number by pressing LF/FF (↓) and Load/Eject (↑) switches.
   Font LEDs and Pause LED show the pattern number which is selected at that time. The selection is advanced one by one as the switch is pressed, and the combination of On/Off/Blink of those three LEDs is also changed according to the selection.
3. Fix the selected number by pressing Tear Off switch.
   Selected number is fixed and the next alignment pattern is printed.
4. Repeat step 2 to 3 until finishing Bi-d adjustment for NLQ mode.
   Following adjustment is executed.
   - Bi-d. adjustment for high speed draft mode
   - Bi-d. adjustment for draft mode
   - Bi-d. adjustment for NLQ mode
5. Turn the printer off.
   The setting is stored into non-volatile memory.

1.4.3 Errors

- ☐ Paper out error:
  When the printer fails to feed a sheet, it goes a paper out error.
- ☐ Release lever error:
  When release lever position is wrong, it goes a release lever error.
- ☐ Fatal errors:
  Carriage control error and Power supply voltage error.

1.5 Control codes

1.5.1 ESC/P2

Table 1-22. ESC/P2

Classification	Operation	Command
General Operation	Initialize Printer	ESC@
	Unidirectional Printing	ESC U
	CSF Mode Control	ESC EM
Paper feeding	Form Feed	FF
	Line Feed	LF
	Line Spacing	ESC 0, ESC 2, ESC3, ESC A
	Carriage Return	CR
Page format	Page Length	ESC C, ESC C0, ESC (C
	Left / Right Margin	ESC Q, ESC1
	Top / Bottom Margin	ESC N, ESC O, ESC (c
	Define Unit	ESC (U
Print position motion	Horizontal Print Position	ESC$, ESC¥
	Vertical Print Position	ESC (V, ESC (v
	Tab Horizontally	ESC D, HT
	Tab Vertically	ESC B, VT
	Advance paper	ESC J
Font selection	Typeface	ESC k, ESC x, ESC y
	Pitch	ESC P, ESC M, ESC g, ESC p
	Italic Font	ESC 4, ESC 5
	Bold Font	ESC E, ESC F
	Master Select	ESC!

Table 1-22. ESC/P2

Classification	Operation	Command
Font enhancement	Double-Width	ESC W, DC4, SO
	Condensed	DC2, SI
	Double-height	ESC w
	Double-Strike	ESC G, ESC H
	Super-/ Subscript	ESC T, ESC S
	Underline	ESC-
Spacing	Intercharacter Space	ESC Space
Character handling	Character Table	ESC t, ESC (t
	International Character	ESC R
	User-Defined Characters	ESC%, ESC &, ESC:
	Control code selection	ESC1
	Upper Control Codes	ESC6, ESC7
Bit image	8 pin Bit Image	ESC K, ESC L, ESC Y, ESC Z, ESC*
	9 pin Bit Image	ESC ^
Printing color	Select color	ESC r
Bar code	Bar code	ESC (B
Production	EEPOM write, etc.	ESCl

1.5.2 IBM 2390 Plus Emulation

Table 1-23. IBM 2390 Plus emulation

Classification	Operation	Command
General Operation	Nop	NUL, DC3
	Off Line	ESC j
	Buzzer	BEL
	Cancellation	CAN
	Select / Deselect	DC1, ESC Q
	Initialize Printer	ESC [K
	Unidirectional Printing	ESC U
	Select Auto Sheet Feeder	ESC [F
Paper feeding	Form Feed	FF
	Line Feed, Auto Line Feed	LF, ESC5
	Line Spacing	ESC A, ESC 0, ESC 1, ESC 2, ESC3
	Carriage Return	CR
	Reverse Line Feed	ESC]
Page format	Page Length	ESC C, ESC C0
	Left / Right Margin	ESC X
	Skip Over Perforation	ESC N, ESC O
	Set TOF	ESC 4
Print position motion	Horizontal Print Position	ESC d
	Initialize Tab Position	ESC R
	Tab Horizontally	ESC D, HT
	Tab Vertically	ESC B, VT
	Advance paper	ESC J

Table 1-23. IBM 2390 Plus emulation

Classification	Operation	Command
Font selection	Pitch	DC 2, ESC P, ESC:
	Bold Font	ESC E, ESC F
	Master Select	ESC I
	Print Quality	ESC [d
	Select Font and Pitch	ESC [I
Font enhancement	Double-Width	DC4, SO, ESC SO, ESC W
	Enlarge and Life Space	ESC [@
	Condensed	SI, ESC SI
	Double-Strike	ESC G, ESC H
	Super-/ Subscript	ESC T, ESC S
	Underline	ESC -
	Line / Score	ESC_
Spacing	Back Space	BS
	Space	SP
	Define Unit	ESC [¥
Character handling	Character Table	ESC 6, ESC 7, ESC [T
	Print Data as Characters	ESC ^, ESC¥
Bit image	Bit Image	ESC K, ESC L, ESC Y, ESC Z
Bar code	Set up Bar code	ESC [f
	Transfer Bar code	ESC [p
Download	Download	ESC=(only Draft mode)