Developer's Guide

TM-L90

Issued date	, ,
Issued by	

English

EPSON

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Caution

Danger of explosion if battery is incorrectly replaced. Replace only with the battery that EPSON supplies. Dispose of used batteries according to laws or regulations of your country or region.

ESC/POS**ⁱ** Proprietary Command System

EPSON took the initiative by introducing ESC/POS, a proprietary POS printer command system including patented commands and enabling versatile POS system construction with high scalability. Compatible with all types of EPSON POS printers and displays, this proprietary control system also offers the flexibility to easily make future upgrades. Its popularity is worldwide.

Revision Table

Rev.	Page	Description
Rev. A	all page	Newly authorized

For Safety

Key to Symbols

The symbols in this manual are identified by their level of importance, as defined below. Read the following carefully before handling the product.

⚠ *WARNING:*

You must follow warnings carefully to avoid serious bodily injury.

⚠ *CAUTION:*

Provides information that must be observed to prevent damage to the equipment or loss of data.

❏ *Possibility of sustaining physical injuries.*

❏ *Possibility of causing physical damages.*

❏ *Possibility of causing information loss.*

✎ *Note:*
Provides important information and useful tips on handling the equipment.

Warnings

⚠ WARNING:

Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise. Continued use may lead to fire or electric shock. Immediately unplug the equipment.

Only disassemble this product as described in this manual. Do not make modifications to the unit. Tampering with this product may result in injury, fire, or electric shock.

Do not set this product or handle cables during a thunderstorm in order to avoid risk of electric shock.

Be sure to use the specified power source. Connection to an improper power source may cause fire or shock.

Never insert or disconnect the power plug with wet hands. Doing so may result in severe shock.

Do not allow foreign matter to fall into the equipment. Penetration by foreign objects may lead to fire or electric shock.

If water or other liquid spills into this equipment, turn off the power supply switch and unplug the power cord immediately. Continued usage may lead to fire or electric shock.

Do not place multiple loads on power outlet. Overloading the outlet may lead to fire. Always supply power directly from a standard domestic power outlet.

Handle the power cord with care. Improper handling may lead to fire or electric shock.

- *Do not modify or attempt to repair the cord.*

- *Do not place any heavy object on top of the cord.*

- *Avoid excessive bending, twisting and pulling.*

- *Do not place the cord near heating equipment.*

- *Check that the plug is clean before plugging it in.*

- *Be sure to push the plug all the way in.*

Cautions

⚠ *CAUTION:*

Do not connect cables in ways other than those mentioned in this manual. Different connections may cause equipment damage and burning.

Be sure to set this equipment on a firm, stable horizontal surface. Product may break or cause injury if it falls.

Do not use in locations subject to high humidity or dust levels. Excessive humidity and dust may cause equipment damage, fire or shock.

Do not place heavy objects on top of this equipment. Never stand or lean on this equipment. Equipment may fall or collapse, causing breakage and possible injury.

To ensure safety, unplug this equipment prior to leaving it unused for an extended period.

Parts on the circuit board may become hot during operation. Therefore, wait approximately 10 minutes after turning the power off before touching them.

To avoid injury, take care not to insert fingers or any part of the hand in the paper roll opening where the emergency cutter is installed.

Do not open the paper roll cover without taking the necessary precautions, as this can result in injury from the auto cutter fixed blade.

Modular Connector

Use the modular connectors specifically designed for the cash drawer for this product. Do not connect these connectors to an ordinary telephone line.

About This Manual

Aim of the Manual

This manual was created to provide all information necessary for system planning, design, installation and application of the printer for designers and developers of POS system.

Manual Content

The manual is made up of the following sections:

Chapter 1   Product Overview

Chapter 2   Setup

Chapter 3   Description of Functions

Chapter 4   Application Development Information

Appendix A   Interfaces and Connectors

Appendix B   Option and Consumable Products

Appendix C   Character Code Table

Appendix D   Connection of Cable and Option

Appendix E   Glossary of Terms

Related Documentation

Documents related to the TM-L90 are listed below.

Name of document	Description
TM-L90 User's Manual	Provides information to enable POS operators to use the TM-L90 safely and correctly.
TM-L90 Service Manual	Describes maintenance, inspection and repair procedures.
ESC/POS Application Programming Guide	Provides detailed ESC/POS command information.

CONTENTS

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Chapter 1

Product Overview

Product Structure

Models

❏ Product name: TM-L90 series (with serial interface)
                                     TM-L90P series (with parallel interface)

❏ Printing   Thermal line

Accessories

❏ Printer

❏ Label paper roll

❏ Power switch cover

❏ Control panel label used for horizontal installation

❏ Paper roll spacer

❏ Paper exit guide for horizontal installation

❏ Screw for installation of the paper roll spacer

❏ Hexagonal lock screws (2 pieces) (only for the serial interface)

❏ External power supply unit (model: PS-175, PS-180)(*1)

❏ Usage Precautions for the PS-180 Power Unit (*2)

(*1) For the model packed with the power supply unit. The packed power supply differs depending on the model.

(*2) May not be included with the printer

Options

- ❏ Affixing velcro tapes (model : DF-10)
- ❏ Wall handling bracket (model : WH-10)
- ❏ Power supply: EPSON PS-170, PS-180 (PS-180 is power saving type)
- ❏ UB series interface board (excludes UB-P02)

Product name	Specifications	Remarks
UB-P02II	IEEE1284	Parallel
UB-S01	RS-232	Serial
UB-S02	RS-485	Serial
UB-S09	9 pin	Serial
UB-U01	USB	Downstream hub provided
UB-U02	USB	Downstream hub not provided
UB-E01	Ethernet	

- ❏ Paper roll spacer

Consumables

- ❏ Thermal paper roll

Part Names and Basic Operation

Part Names
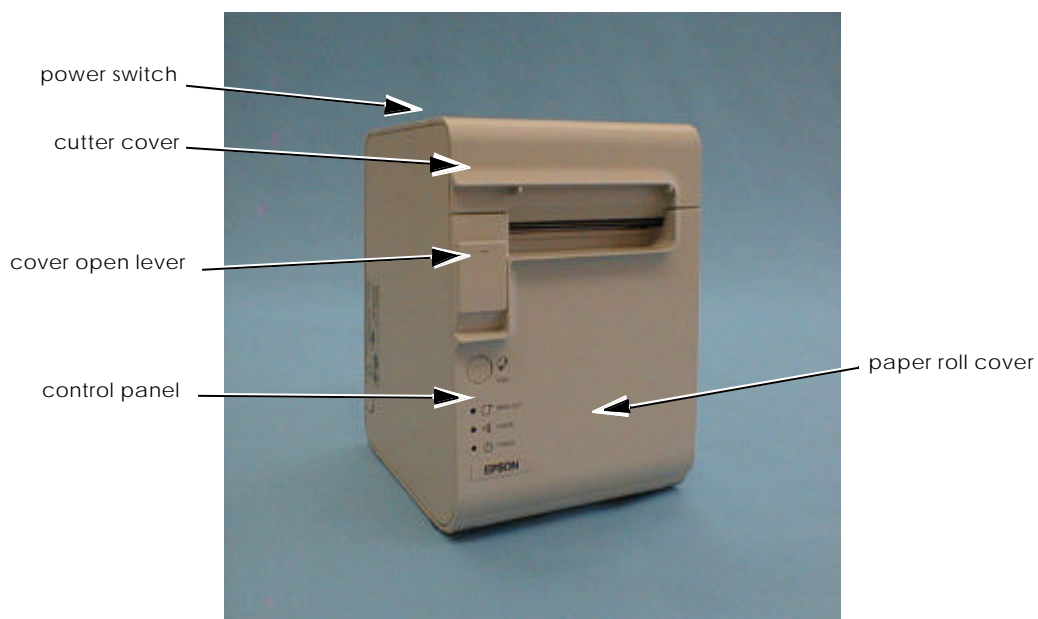
Connectors

Remove the bottom of the cover as shown in the illustration below. All cables are connected to the connector panel located on the lower rear side of the printer.

power   drawer kick-out   interface
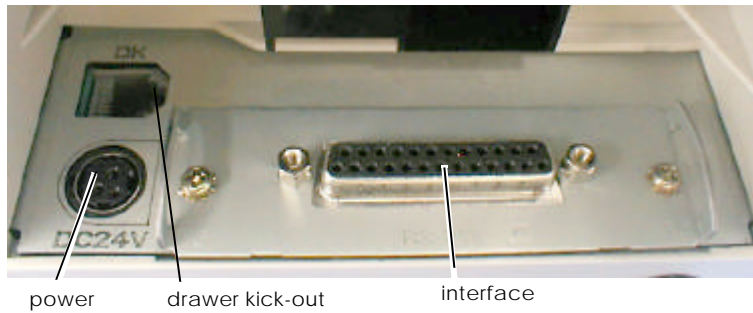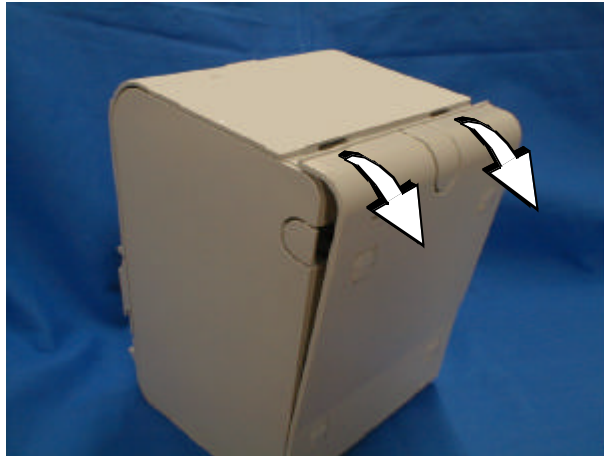
Control Panel
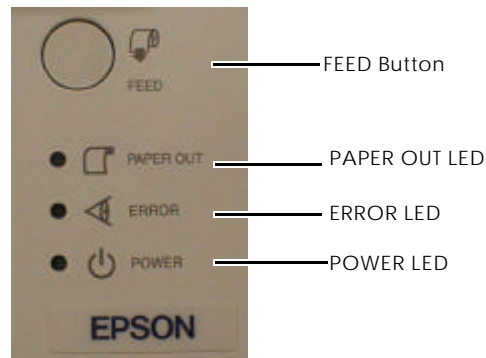
LED

POWER LED

❏ Lights when the power supply is ON.
❏ Off when the power supply is turned OFF.
❏ Flashes during excution of each operation.

ERROR LED

❏ Lights when offline.
❏ Off when normal condition.
❏ Flashes when an error occurs.

PAPER OUT LED

❏ Lights when there is no more paper roll or there is little remaining.
❏ Off when there is a sufficient amount of paper roll remaining.
❏ Flashes when a self test is in progress or when the printer waits for the macro execution switch to go on.

Buttons

FEED Button

Pressing the FEED button feeds the paper roll.

Power Switch

The power switch is located on the top left of the printer.
Turn on the power by holding down the POWER button 1 second or longer. Turn off the power by holding down the POWER button 3 seconds or longer.
The power switch can be disabled by DIP switch operation. (see page 2-9)

✎ *Note:*
Make sure to check whether the AC adapter is connected to the power supply, before turning on the power switch of the printer.

See Chapter 3 for details of power switch functions.

Printer Setup Details

Installing Horizontally or Vertically

You can install the printer vertically (with the paper exit at the front) or horizontally (with the paper exit on top) either on by hanging it on a wall (using the optional hanging bracket set, WH-10) or a flat surface. Both the vertical and horizontal positions are shown below.

When you install the printer horizontally, attach the control panel label as shown in the illustrations below.

✎ *Note:*
To hang the printer on the wall, see the Wall Hanging Bracket Set Installation Manual provided with the WH-10 for instructions.

Adjusting Paper Roll Near-End Detect Position

Below are two situations when paper roll N.E. detector adjustment is required.

❏ To adjust the location of detection to suit the diameter of the paper roll core used.

❏ To adjust the amount of remaining paper desired.

✎ *Note:*

Paper roll centers are manufactured according to various specifications, making impossible to accurately detect the remaining volume of paper.

This printer is designed to use paper rolls of 43 different widths. The paper roll near-end detect adjustment function is provided for all 43 paper widths.

1. Open the paper roll cover.

2. Remove the paper roll.

3. Loosen the detector adjustment screw using a coin or similar tool.

Detector
adjustment
screw
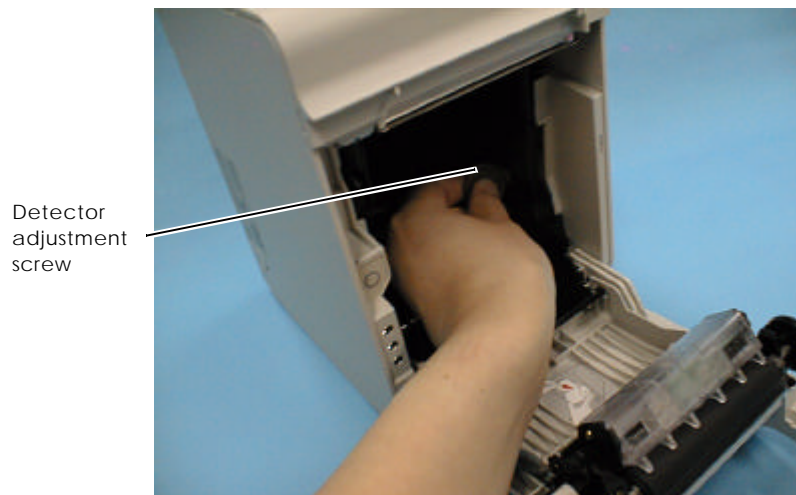
Loosening Detector Adjustment Screw

✎ ***Note:***

Rotate the paper roll near-end sensor position to detect the paper near-end correctly when the printer is placed horizontally.
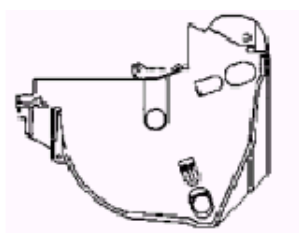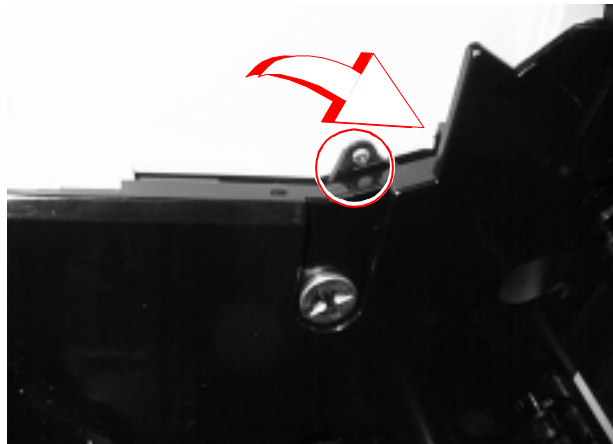
Position Plate #1 in horizontal
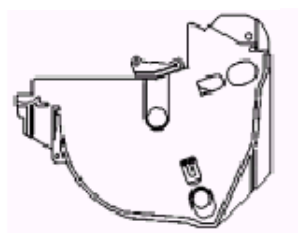
Position Plate #2 in horizontal
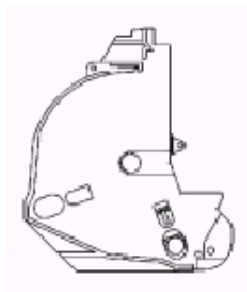
Position Plate #1 in vertical
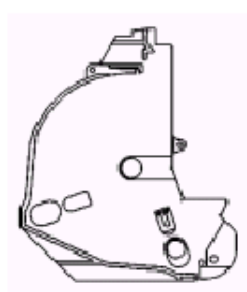
Position Plate #1 in vertical

Adjustment Positions

4. Adjust position by moving the N.E. detector holder up and down slightly.
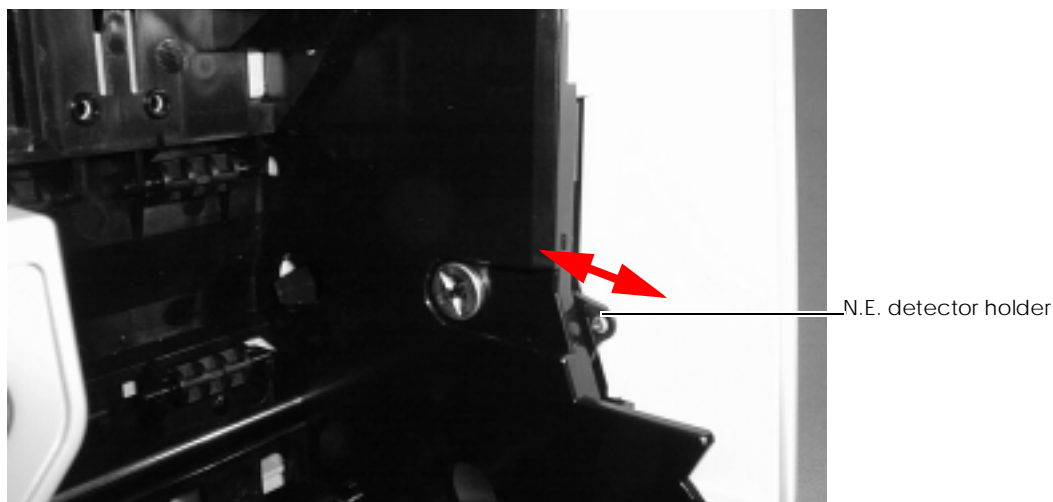
N.E. detector holder

N.E. Detector Holder

Adjustment Position Number	Specified Thermal Paper Dimension of A
#1	Approximately 36 mm {1.42"}
#2	Approximately 41 mm {1.61"}

5. Tighten the adjustor screw using a coin or similar tool.

6. Move the N.E. detect lever by hand (finger) to confirm that it moves freely.

Check that the N.E. detect lever
is operating properly.
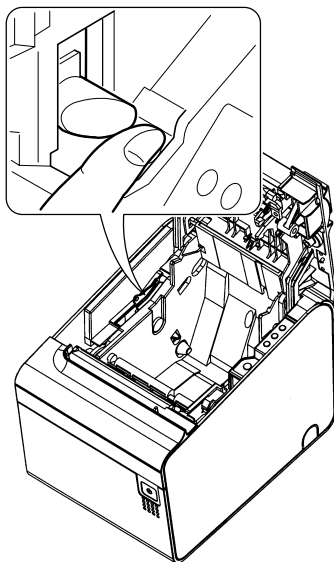
7. Load the paper roll.

8. Close the paper roll cover.

Installing or Replacing a Paper Roll

⚠ *WARNING:*

Do not touch the emergency cutter with your hands when mounting or replacing paper roll. You can be injured because the emergency cutter is sharp.

When you use TM-L90 horizontally, peel off the backing sheet of the paper exit guide and attach it as shown below to prevent cut paper from falling inside the printer after paper is cut by the autocutter.

⚠ *CAUTION:*

If you use roll paper with a core that is smaller than the specifications (inside diameter of at least 25.4 mm and outside diameter of at least 31.4 mm), be sure not to attach the paper exit guide. Otherwise a paper jam might occur.

paper exit guide
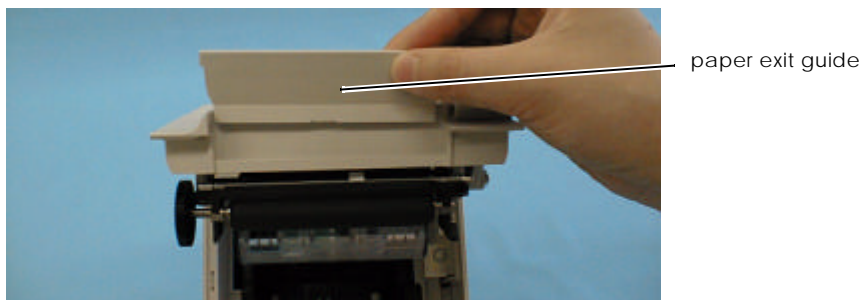
✎ *Note:*
Be sure to use paper rolls that meet the specifications.

1. Open the paper roll cover, using the cover open lever.

2. Insert a paper roll and pull out a small amount of paper, aligning the paper with the guide, as shown below.
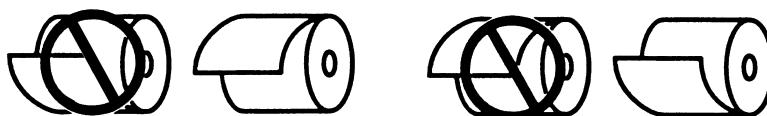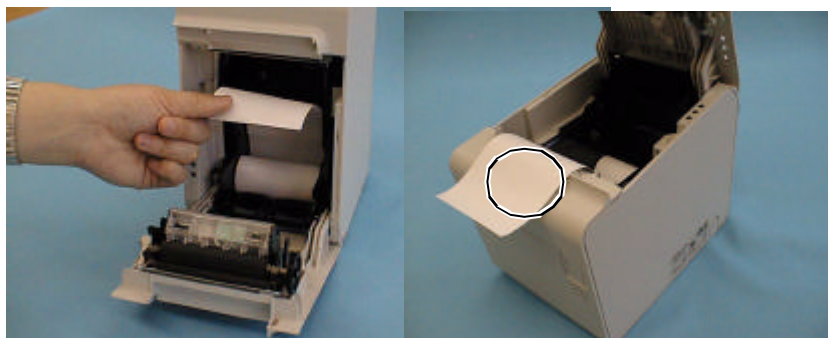
3. Close the paper roll cover; then tear off the paper roll.

⚠ *WARNING:*

Do not leave your finger deep inside the paper roll cover and close it because you can get your finger caught inside.

Troubleshooting of Autocutter

The autocutter is jammed or the paper roll cover will not open

1. Turn off the power supply. To remove the cover, use a tool such as a screwdriver, and insert it into one of the slots indicated by a circle in the illustration below and push the cover upward.

2. Remove the cutter cover.

cutter cover
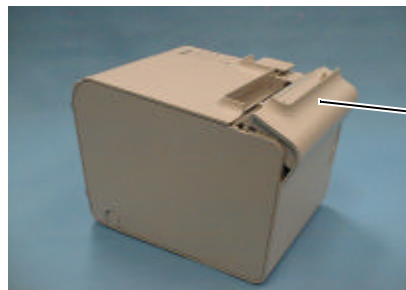
3. Use a ballpoint pen or tweezers to turn the knob in the direction indicated by the arrow until you see a triangle in the window.

window

arrow

knob
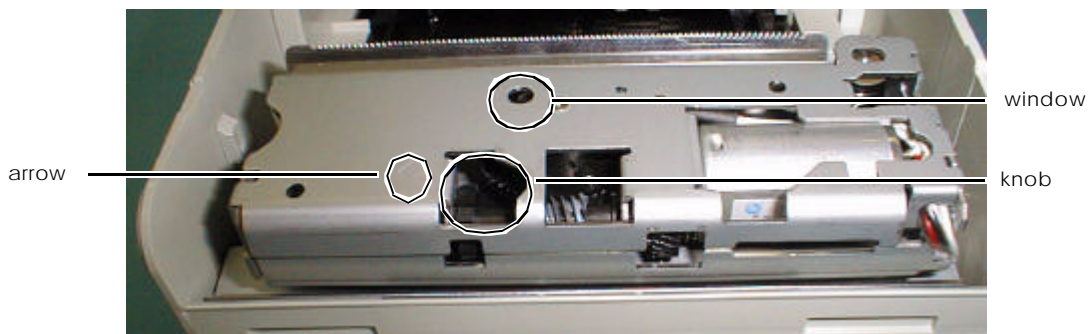
Print Head Cleaning

⚠ *CAUTION:*

The print head becomes very hot just after printing and is very dangerous. Be sure to allow the print head to cool down (after printing) before cleaning it. Also, be sure to turn off the printer power before cleaning the print head.

Paper dust on the heating elements may lower the print quality. In this case, clean the print head as follows.

1. Turn off the power and open the paper roll cover.

2. Clean the thermal elements of the print head using a cotton swab moistened with alcohol solvent (ethanol, methanol, IPA).
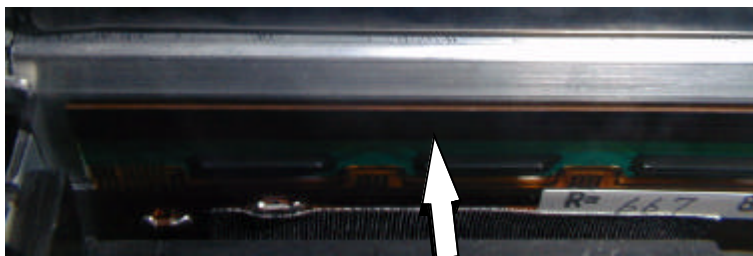
Print Head

⚠ *CAUTION:*

Do not touch the print head thermal elements.
Do not scratch the print head.

3. Insert a paper roll and close the print head.

✎ *Note:*
Depending on the paper roll used, paper dust may stick to the platen roller and paper roll end sensor. To remove the paper dust, clean the platen roller and paper roll end sensor with a cotton swab moistened with water.

EPSON recommends cleaning of the thermal head periodically (generally every three months) to maintain receipt print quality.

Shipping Procedures

Perform the following measures before shipping the printer.

1. Hold down the POWER switch 3 seconds or more or turn off the printer from the host computer.

2. Check that the POWER LED is off.

3. Remove the power supply connectors.

4. Pack the printer.

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Product Specifications

Print method	Thermal line, 8 dots/mm × 8 dots/mm (203 dpi × 203 dpi)
Print width	80mm (factory setting) or 38 to 70 mm can be set using a paper roll spacer
Cutting method	Separated cutter blade system
Cut type	Users can choose from the following two types. ❏ Full cut (cuts paper completely) (default setting) ❏ Partial cut (one point left uncut) is also available as a dealer option. (Set by changing the position of the autocutter unit.)
Possible thickness to be cut with a manual cutter	100 μm or less
Character sets	95 alphanumeric, 37 international characters, 128 × 11 graphic
Interface (compatible)	RS-232C / Bi-directional parallel Dealer option: RS-485, USB, 10Base-T I/F
Buffer	Receive buffer: 4KB/45bytes
	User-defined buffer Downloaded bit image: Approximately 12KB (common for all models) User-defined characters: Approximately 11KB (for ANK/Multilingual model) Approximately 15KB (for Japanese model)
	Macro buffer: 2KB
	Non-volatile graphics data buffer: 0 bytes through 384KB
	User NV memory: 1KB through 192KB
	Page mode area: 106KB
D.K.D. function	2 drives
Power Supply	Power supplied by AC adapter PS-170, PS-180 (option)
Operating Voltage	+24 VDC ± 7%
Current consumption	<High speed printing> Approximately 1.7 A (Character font A α-N, capital letters, 36-character rolling pattern, 42-column printing) <Standby> Approximately 0.1 A
Temperature	Operating: 5 to 45 °C {41 to 113 °F} Storage: –10 to 50 °C {14 to 122 °F}
Humidity	10 to 90%
Weight (mass)	Approximately 1.9 kg {4.19 lb}

✎ *Note:*
Install a paper exit guide which is packed in the box with the printer when the autocutter is used with a full cut, positioning the printer horizontally. Since if the printer is installed horizontally without the paper exit guide and the autocutter full cut is used, a cut sheet may be dropped in the paper path and it may cause a double-cut, paper jam, or autocutter error. However, if the printer is installed vertically or if the autocutter is used with a partial cut, the paper exit guide does not have to be used.

After cutting, paper must be fed approximately 1 mm {16/406"} or more, then be stopped. Because, if it is not, paper may be jammed in the autocutter unit. To prevent dot displacement after cutting, it is recommended to feed paper for approximately 1 mm {16/406"} or more before printing.

Partial cut or full cut is not controlled by a software command.

If a die cut label is used, do not cut the label paper, because the label adhesive bonds to the autocutter blade, causing a cutting problem. Cut the mounting paper between labels.

The manual cutter which is installed in the autocutter unit is assumed to cut the receipt (paper thickness: approximately 75 mm) manually.

If the paper whose thickness is 100 mm or more is cut with the manual cutter, make sure to cut paper so that the paper is not out of alignment.

The cutting type (partial cut or full cut) must be selected before the printer is first used. If the cutting type is changed from partial cut to full cut after the printer has been used, the printer may not be reliable because the wear-out level of the cutter blade differs.

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Print Specifications

Item	Specifications
Printing method	Thermal line printing
Dot density	0.125 mm/dot x 0.125 mm/dot (203 dpi x 203 dpi) (dpi: dots per 25.4 mm {1"})
Printing direction	Unidirectional with friction feed
Paper width	72 mm {2.83"}, 576 dot positions (when the paper width is 80 mm)
Maximum printable area	72 mm {2.83"}, 576 dot positions (when the paper width is 80 mm)
Characters per line	48 (using font A when the paper width is 80 mm) (Default setting is font A.)
Print Speed	<Normal printing> (default setting) 120 mm/s {4.72"} maximum <High speed printing> (selected with the memory switch) 150 mm/s {5.91"} maximum (The high speed printing is selected when the specified paper is used.) <Ladder bar code, two-dimensional code printing> 90 mm/s {2.76"} maximum <Two-color printing mode> 50 mm/s {3.94"} maximum
Carriage return width	3.75 mm {0.15"} Programmable by control command.

✎ *Note:*

The print speed listed above is the values when the printer prints with the default print density level at 24 V and 25 °C. The print speed may be changed automatically with the condition of the supply voltage or the head temperature.

Printing speed may be slower depending on the data transmission speed and the combination of control commands.

The from two to four-divided energizing mode can be selected with the memory switch or transmit GS (K. If the low capacity of the power supply is used, the printer can print with setting the from two to four-divided energizing mode.

Low transmission speed may cause intermittent printing. It is recommended to transmit data to the printer as quickly as possible. (Example: 19200 bps at least for printing with Font A) (bps: bits per second)

Reliability

Life	When printing labels (face stock) with the ENTLA series (in monochrome mode)	1,000,000 labels issued (When the length of the label in the paper feeding direction is 25.4 mm {1"} through 63.5 mm {2.5"}. The value above corresponds to approximately 30 km to 70 km {18.64 to 43.5 miles} of running length. When printing labels whose length exceeds 63.5 mm, the label-issuing life is 70 km {43.5 miles} of running length.)
	When issuing receipts (thickness type) of the ENTPE series (in monochrome mode)	10,000,000 lines printed (3.75 mm {0.15"} for one line) (When the value above is calculated, the printer uses 15-line feeding and 10-line printing repeatedly with a 145 µm paper thickness. The value above corresponds to approximately 60 km {37.28 miles} of running length.)
	When printing receipts with the ENTPD series (in monochrome mode)	20,000,000 lines printed (3.75 mm {0.15"} for one line) (When the value above is calculated, the printer uses 15-line feeding and 10-line printing repeatedly with 75 µm of paper thickness. The value above corresponds to approximately 120 km {74.57 miles} of running length.)
	When printing labels (face stock) with the ENTLB series (in two-color mode)	500,000 labels issued (When the length of the label in the paper feed direction is 25.4 mm {1"} through 63.5 mm {2.5"}. The value above corresponds to approximately 15 km to 35 km {9.32 to 21.75 miles} of running length.)
	When printing receipts with the ENTPC series (in two-color mode)	10,000,000 lines printed (3.75 mm {0.15"} for one line) (When the value above is calculated, the printer uses 15-line feeding and 10-line printing repeatedly. The value above corresponds to approximately 60 km {37.28 miles} of running length.)
	Thermal head	150 million pulses
	Autocutter	When cutting receipts: 2,000,000 cuts (except for KF50, when the paper thickness is less than 75 µm) 1,200,000 cuts (for KF50 (KANZAN)) 1,000,000 cuts (when the paper thickness is more than 75 mm and less than 145 mm) When cutting labels: 1,000,000 cuts
MTBF		360,000 hours (when printing receipts with the ENTPD series in monochrome) (Failure is defined as a random failure occurring during the random failure period.)
MCBF		70,000,000 lines printed (when printing receipts with the ENTPD series in monochrome) (This is an average failure interval based on failures relating to wear out and random failures up to the life of 20,000,000 lines printed.)

Vibration resistance		When packed:	Frequency:	5 to 55 Hz
			Acceleration:	Approximately 19.6 m/s^2 {2 G}
			Sweep:	10 minutes (half cycle)
			Duration:	1 hour
			Directions:	x, y, and z
		No external or internal damage should be found after the vibration test, and the unit should operate normally.		
Impact resistance		When packed:	Package:	EPSON standard package
			Height:	60 cm {23.62"}
			Directions:	1 corner, 3 edges, and 6 surfaces
		No external or internal damage should be found after the drop test, and the unit should operate normally.		
		When unpacked:	Height:	5 cm {1.97"}
			Directions:	Lift one edge and release it (for all 4 edges).
		When the printer is not printing, no external or internal damage should be found after the drop test.		
Acoustic noise (operating)		Approximately 53 dB (ANSI bystander position) NOTE: The value as shown above is measured when the EPSON evaluation printing pattern is used. This value may be different, depending on the paper to be printed, the print duty, or the print conditions, such as the print speed or the print density.		

Character specifications

Character Specifications

Item		Specifications
Character type	Alphanumeric	95 characters
	International	37 types
	Extended graphics	128 characters ✕ 11 pages (including 1 blank page)
Character configuration		See "Character Configurations and Dimensions" table. (Default is Font A.)
Character dimensions		See "Character Configurations and Dimensions" table. (Spaces between characters not included.)

Character Configurations and Dimensions for ANK / Multilingual Model

	Standard	Double-height	Double-width	Double-width / Double-height
	W ✕ H (mm)	W ✕ H (mm)	W ✕ H (mm)	W ✕ H (mm)
Font A 12 ✕ 24	1.50 ✕ 3.0	1.50 ✕ 6.0	3.0 ✕ 3.0	3.0 ✕ 6.0
Font B 9 ✕ 17	1.13 ✕ 2.13	1.13 ✕ 4.25	2.25 ✕ 2.13	2.25 ✕ 4.25
Kanji 24 ✕ 24	3.0 ✕ 3.0	3.0 ✕ 6.0	6.0 ✕ 3.0	6.0 ✕ 6.0
Thai characters 12 ✕ 72	1.50 ✕ 9.0	1.50 ✕ 18.0	3.0 ✕ 9.0	3.0 ✕ 18.0
Thai characters 9 ✕ 51	1.13 ✕ 6.38	1.13 ✕ 12.75	2.25 ✕ 6.38	2.25 ✕ 12.75

The actual print character is smaller than the size shown in the Table above, because the above size includes spaces in the font.

Characters can be scaled up to 64 times as large as the standard size.

Character size not including the horizontal spacing in the standard scale is as follows:
Font A (12 ✕ 24):   1.25 (W) ✕ 3.0 (H) mm
Font B (9 ✕ 17):   0.88 (W) ✕ 2.13 (H) mm
(ANK = alphanumeric)

Character Configurations and Dimensions for Japanese Kanji Model

	Standard	Double-height	Double-width	Double-width / Double-height
	W ✕ H (mm)	W ✕ H (mm)	W ✕ H (mm)	W ✕ H (mm)
Font A 12 ✕ 24	1.50 ✕ 3.0	1.50 ✕ 6.0	3.0 ✕ 3.0	3.0 ✕ 6.0
Font B 10 ✕ 24	1.25 ✕ 3.0	1.25 ✕ 6.0	2.5 ✕ 3.0	2.5 ✕ 6.0
Font C 8 ✕ 16	1.0 ✕ 2.0	1.0 ✕ 4.0	2.0 ✕ 2.0	2.0 ✕ 4.0
Kanji 24 ✕ 24	3.0 ✕ 3.0	3.0 ✕ 6.0	6.0 ✕ 3.0	6.0 ✕ 6.0
Kanji 20 ✕ 24	2.5 ✕ 3.0	2.5 ✕ 6.0	5.0 ✕ 3.0	5.0 ✕ 6.0
Kanji 16 ✕ 16	2.0 ✕ 2.0	2.0 ✕ 4.0	4.0 ✕ 2.0	4.0 ✕ 4.0

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Product Specifications and Its Supporting Characters

Product Specifications	Supported Characters	
ANK model	Alphanumeric Extended graphics International characters	---
Multilingual model (Simplified Chinese)		Simplified Chinese character
Multilingual model (Traditional Chinese)		Traditional Chinese characters
Multilingual model (Thai)		Thai characters
Multilingual model (Korean)		Korean characters
Japanese model		Japanese characters, Special font

Paper Feed Specifications

Item	Specifications
Paper feed method	Friction feed
Paper feed direction	Single-direction
Paper feed increment	Min. approx. 0.071 mm (1/360 inch)
Continuous feed speed	Approx. 150 mm/s (approximately 5.9 inches/s) at 35.4 lps (with 1/6 inch carriage return)

lps: lines per second

Paper Specifications

See "Paper specification" in Appendix B.

Printing Area

Thermal Paper

<table>
<tr><td align="center"><Paper width 80 mm model></td><td align="center"><Paper width 70 mm model></td></tr>
</table>

```
<Paper width 80 mm model>                    <Paper width 70 mm model>

   79.5 ± 0.5 mm                                69.5 ± 0.5 mm
   0.125 mm         576dot                      0.125 mm         514dot
   ■ ■ ■ ■ ■ - - - - - - ■ ■ ■                 ■ ■ ■ ■ ■ - - - - - ■ ■
   2.65 mm              4.85 mm                  2.65mm              2.6mm
   72 mm(dot#1 ~ #576).                          64.25 mm(dot#1 ~ #514)


<Paper width 60 mm model>                    <Paper width 58 mm model>

   59.5 ± 0.5 mm                                57.5 ± 0.5 mm
   0.125 mm         434dot                      0.125 mm         418dot
   ■ ■ ■ ■ - - - - - - ■ ■                     ■ ■ ■ ■ ■ - - - - - ■ ■
   2.65 mm              2.6 mm                   2.65 mm             2.6mm
   54.25 mm(dot#1 ~ #434)                        52.25 mm(dot#1 ~ #418)
```
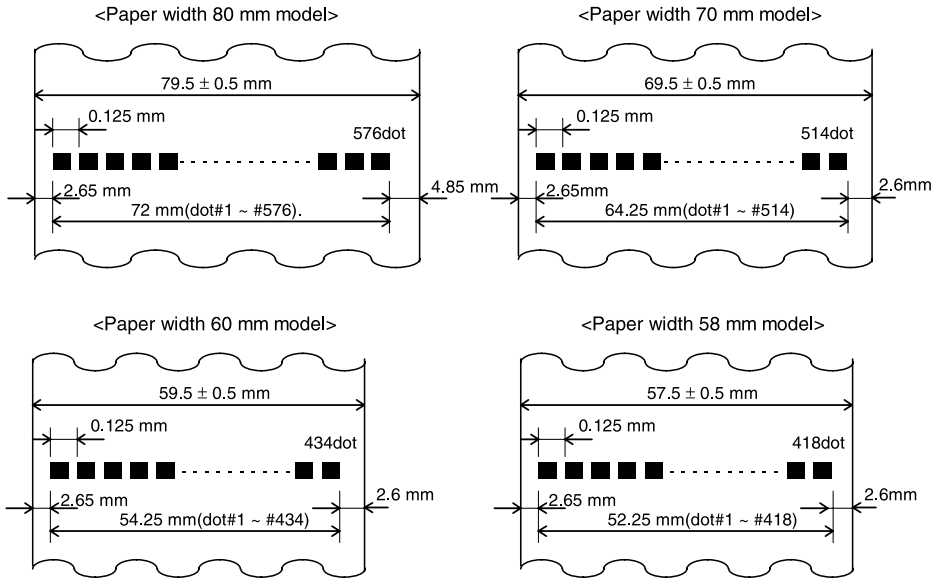
Printable Area (For Thermal Paper)

✎ ***Note:***

The printable area may be out of alignment by 2 mm {0.08"} maximum (left or right), due to the paper position or tolerance of parts. Therefore, the print area must be set in the range of more than 2 mm from the edges of the paper. To make the margin for both sides safely, it is recommended to set a margin of 2.6 mm {0.1"} or more, as shown in figure above.

Paper Width and Printable Area

Paper width (mm)	(80)	(70)	(65)	(60)	(58)	(50)	(45)	(38)
Printable area (mm)	72	64	59	54	52	44	39	32
Left margin (mm)	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
Right margin (mm)	4.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
Positioning dot number	1–576	1–512	1–472	1–432	1–416	1–352	1–312	1–256
Total number of dots	576	512	472	432	416	352	312	256

Numeric values used above table are center values in designing. Only paper width is for nominal dimension. The values in parentheses are the maximum value for the paper tolerance.

Label

Take margin of 2.8 mm or more from the paper end in both left and right side for the printable area of label.
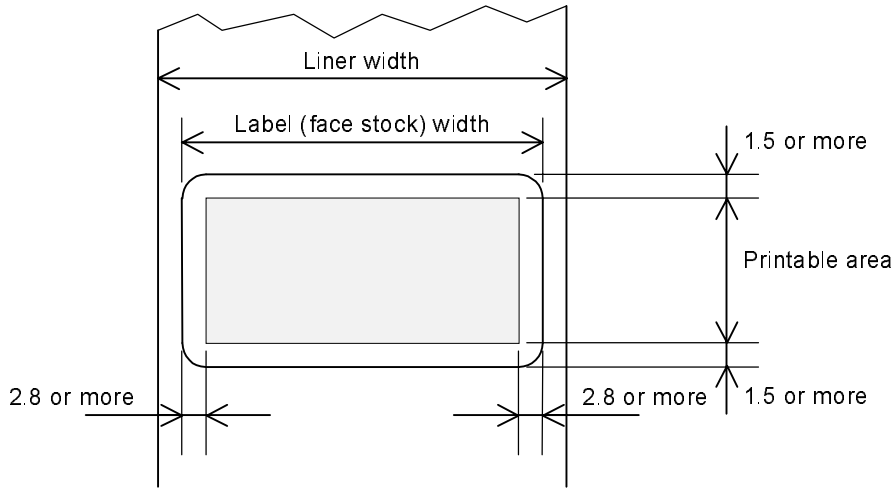
Printable Area (for Label)

✎ *Note:*
If the margins are not set, the printing may be off the label due to paper misalignment or the part tolerance.

Liner width (mm)	(80)	(70)	(60)	(50)	(45)	(38)
Label (face stock) width (mm)	76	66	56	46	41	34
Printable area (mm)	70	60	50	40	35	28
Left margin (mm)	2.9	2.9	2.9	2.9	2.9	2.9
Right margin (mm)	3.1	3.1	3.1	3.1	3.1	3.1
Positioning dot number	17 – 576	17 – 496	17 – 416	17 – 336	17 – 296	17 – 240
Total number of dots	560	480	400	320	280	224

The label must be positioned in the center of the liner. Numeric values used above table are center values in designing. Only paper width is for nominal dimension. The values in parenthesis are the maximum value for the paper tolerance.

Printing Position Verses Cutter Position

The printing position in relation to cutter position is shown in the figure below.

Manual-cutter position

Auto-cutter blade position

Center of the print dotline

29

14

Paper feed direction

[Units: mm (All the numeric values are typical.)]
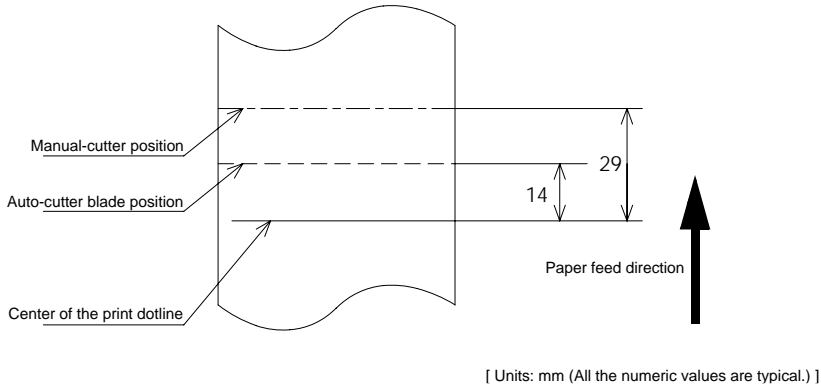
Printing Position Versus Cutter Position

✎ *Note:*
The values in the figure are central values. Slackness and differences in paper type can result in differences developing between central values and cutter paper cut position. It is important to allow for a certain margin of error when setting cutter paper cut position.

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Overview of External Dimensions

❑ Height: 203 mm

❑ Width: 140 mm

❑ Depth: 148 mm

❑ Weight: Approx. 1.9 kgs (without paper roll)

Materials for external:94V-0   [Units:mm]
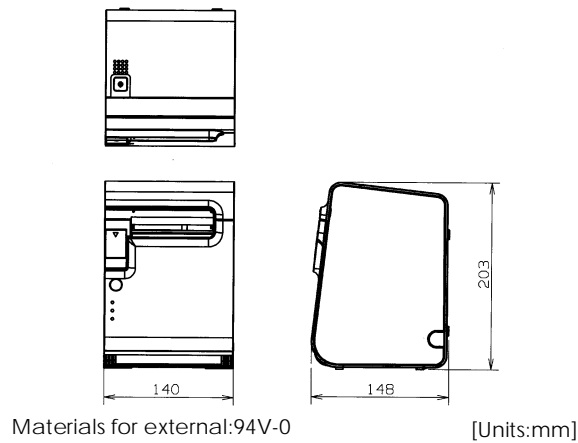
External Appearance

Chapter 2

Setup

Installation Procedures

Precaution For Installation

- Install the printer in a location where it will be positioned horizontally when in operation.

- Avoid locations susceptible to dust and other foreign matter.

- Make sure to avoid bumping. Otherwise exposing the printer to strong impact during operation.

- Avoid resting the printer on the power supply or other cables or other objects.

- Consider vibration during paper cutting and drawer usage. Take measure to prevent the printer from moving.

Operating specifications

Item		Specifications
Temperature	When printing	15 to 45 °C {41 to 113 °F}
	During storage	-10 to 50 °C {14 to 122 °F} (except for paper)
Humidity	When printing	10 to 90% RH
	During storage	10 to 90% RH (except for paper)
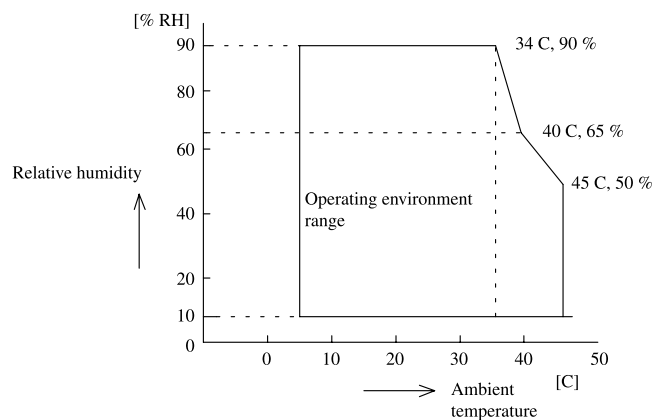
Connection Form and Cables

Serial Connection

When the TM printer is connected to host PC with serial interface, following connection forms are possible:

- Stand alone

- Y-connection

- Pass-through connection

Connections of available serial cross cables are as follows:

Type A

D-Sub 25P(TM)			D-Sub 9P(PC)	
Pin No	Signal		Signal	Pin No
1	FG		DCD	1
2	TXD		TXD	3
3	RXD		RXD	2
20	DTR		DTR	4
6	DSR		DSR	6
4	RTS		RTS	7
5	CTS		CTS	8
7	GD		GD	5
25	RESET		RI/RESET	9

Type B

D-Sub 25P(TM)			D-Sub 9P(PC)	
Pin No	Signal		Signal	Pin No
1	FG		DCD	1
2	TXD		TXD	3
3	RXD		RXD	2
20	DTR		DTR	4
6	DSR		DSR	6
4	RTS		RTS	7
5	CTS		CTS	8
7	GD		GD	5
25	RESET		RI/RESET	9

It depends on the operation method and the handshake for the TM printer which types of cable should be used. You can operate the TM printer by Windows driver, OPOS or ESC/POS commands. Xon/Xoff, DTR/DSR or RTS/CTS are available as handshake control. See tables in following sections for the type cable for each connection.

See Appendix D for details of cable connection procedure.

Stand alone

Both TM printer and DM-D are connected to host PC via serial port.

Application control TM side control setting		Xon/Xoff (except OPOS)	DTR/DSR (DOS, OPOS, Visual C)	RTS/CTS (DOS, Windows driver, Visual C, Visual Basic MSComm)
Xon/Xoff	1	Type A or B	—	—
	2	DM-D500: A,B OtherDM-D: not available	—	—
DTR/DSR	1	—	Type A or B	Type B
	2	—	Type A or B	Type B

Y-connection

TM printer is connected to host PC via serial port and DM-D is connected to TM printer via modular connector.
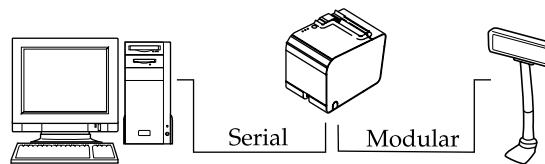
Application control TM side control setting	Xon/Xoff (except OPOS)	DTR/DSR (DOS, OPOS, Visual C)	RTS/CTS (DOS, Windows driver, Visual C, Visual Basic MSComm)
Xon/Xoff	Not available	—	—
DTR/DSR	—	Type B (*)	Type B

(*) Due to between TM and DM is RTS/CTS control.

✎ *Note:*
Need UB-S09 when you use modular connector.

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Pass-through Connections

TM printer is connected to DM-D via serial port and DM-D is connected to host PC via serial port.

Application TM side control control setting		Xon/Xoff (except OPOS)	DTR/DSR (DOS, OPOS, Visual C)	RTS/CTS (DOS, Windows driver, Visual C, Visual Basic MSComm)
Xon/Xoff		Not available	—	—
DTR/DSR	1	—	Type A or B	Type B
	2	—	Type A or B	Type A or B

Parallel Connection

TM printer is connected to host PC via parallel port mounting parallel interface board (UB - P02II). DM-D is connected to host PC via serial port.

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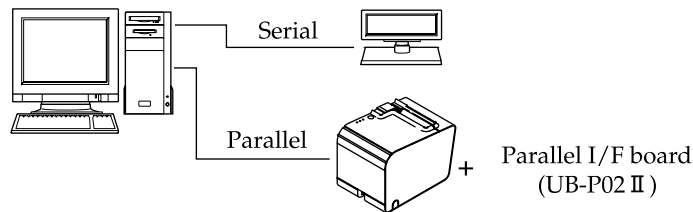
USB

TM printer can be connected to host PC via USB connector and other TM printers can be connected to the first printers via USB.

⚠ *WARNING:*

DM-Ds are connected to TM printers via modular connectors. Be sure to use modular connectors of USB I/F board not TM.
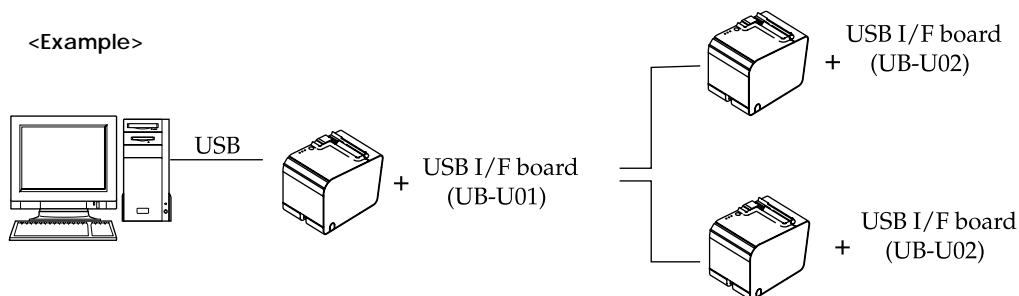
Ethernet

TM printers are connected to network via Hub using ethernet cable.
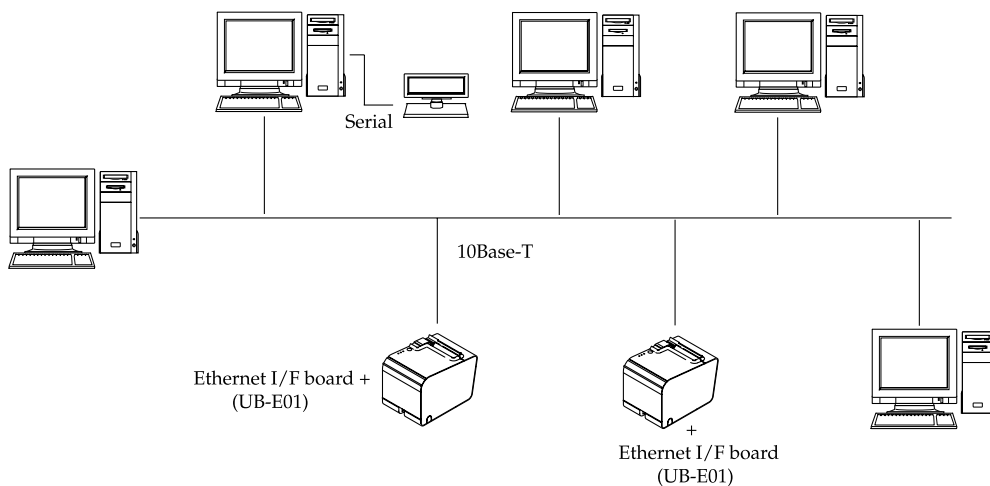
✎ *Note:*
If the TM printer is connected to the host PC via the ethernet interface, a DM-D cannot be connected to the TM printer.

Printer Setup and Initial Settings

Setup Flow

This section describes the initial setting of the printer available for an application. The initial setting can be set up mechanically, by using DIP switches, or memory switches.

- Mechanism

Autocutter (See page 2-12)
• Full cut/ Partial cut
Note: Disabling or enabling of the autocutter can be set by Msw 2-2.

Adjust Near End Detector (See page 1-6)
• 36 and 41 (mm)

Paper Roll Width (See page 2-14)
• 38/39....79/80 (mm)
Note: Memory switch (customized value) also needs to be set at the same time.
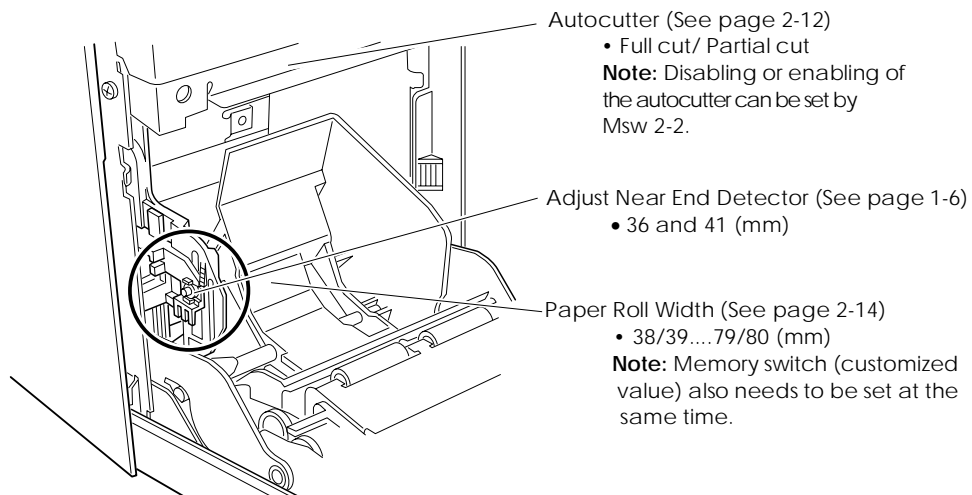
- Dip Switch (see page 2-9)
  A single set of Dip switches is located in the inside of the paper roll cover.
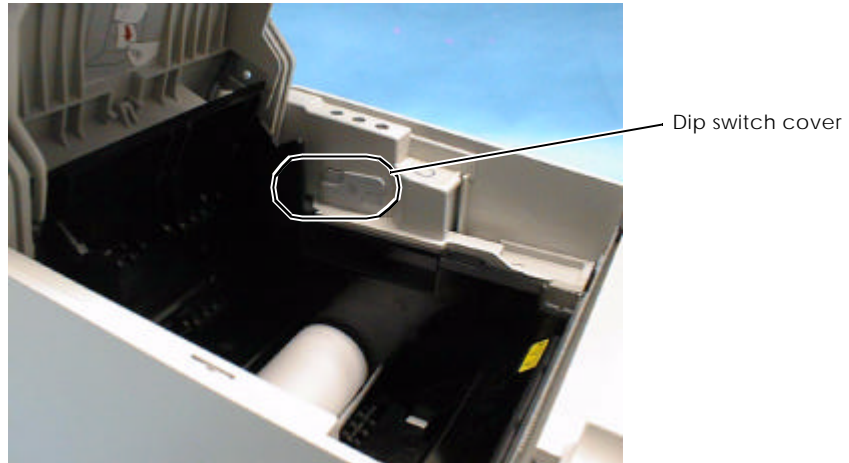
Dip switch cover

When you set the Dip switch, remove the Dip switch cover.

Dip switches

- Memory Switch
  MSW1,2 and 8 (see page 2-10)
  Customized value (see page 2-11)
  Serial communication conditions (see page 2-11)

TM Setup Items (Summary)

Items of TM setup are shown below, refer to below table about setting items and adequate switches.

| Item | Description | Setting method | | | Setting Memory switch |
		Mechanic	DiP switch	Memory switch	
Autocutter	Setting cut type	Yes (See page 2-12 for full/ partial cut)	--	Memory switch (Msw 2-2) for disability	command **GS (E**, or panel operation
Paper width	When change paper width	Yes (See page 2-14)	--	Memory switch (Customized value)	command **GS (E**
Paper roll near-end adjusting	Adjusting detector of near end paper roll	Yes (See page 1-6)	--	--	--
Enable/disable power switch (*)	Power switch can be invalidated.	--	DIP switch 1-1	--	--
Select for serial communication condition	Serial communication settings can be made either by DIP switch or memory switch. If DIP switch 2 is on, the DIP switch setting is read; if DIP switch 2 is off, the memory switch setting is read. When the printer is turned on, either setting should be read can be selected.	--	DIP switch 1-2	--	--
Set for serial communication condition	Handshake, Bit length, presence of Parity check, Parity select, Baud rate select.	--	DIP switches 1-3 to 1-8	Memory switch (Serial communication)	command **GS (E**, or panel operation
Operation when starting	Use only when you must shift to the memory rewriting mode. It is not used normally.	--	DIP switch 2	--	--
Send power on notification	Transmit data of 3 bytes when it is on.	--	--	Memory switch (Msw 1-1)	command **GS (E**
Select receive buffer capacity(*)	Select capacity of receive buffer large or small.	--	--	Memory switch (Msw 1-2)	command **GS (E**, or panel operation
Conditions for Busy Status (*)	Select condition for Busy.	--	--	Memory switch (Msw 1-3)	command **GS (E**, or panel operation
Data processing when reception error occurs	Select print "?" or ignored.	--	--	Memory switch (Msw 1-4)	command **GS (E**, or panel operation

Automatic line feed	When CR, select automatic line feed is disabled or enabled.	--	--	Memory switch (Msw 1-5)	command **GS (E**, or panel operation
Select error of paper roll cover open during printing	Select automatic recovery error or recoverable error.	--	--	Memory switch (Msw 8-8)	command **GS (E**
#6 pin signal select for reset	Serial interface reset	--	--	Memory switch (Msw 1-7)	command **GS (E**, or panel operation
#25 pin signal select for reset	Serial interface reset	--	--	Memory switch (Msw 1-8)	command **GS (E**, or panel operation

(*) Refer to Chapter 3 about function description.

Definitions of Dip Switch and Memory Switch Settings

Dip switch settings

Switch No.	Function	ON	OFF
1	Enable/disable Power switch.	Switches power supply On/Off using commands. (Power supply switch is disabled.)	Power supply switch is used to switch power On/Off.
2	Select for serial communication condition.	Set using Dip switch	Set using memory switches.
3	Handshake	XON/XOFF	DTR/DSR
4	Bit length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity type	Even	Odd
7	Baud rate (bps)	7 8 ON ON :2400 OFF ON :4800 ON OFF :9600 OFF OFF :19200	
8			

bps: Indicates the number of bits transferred per second.

DIP switches 2 to 8 are for seiral communication. Not used in parallel communication.

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Memory switch functions

This printer unit has the following memory switches in non-volatile memory.

- Msw 1, Msw 2, Msw 8
- Customized values
- Serial communication conditions

These settings can be set by **GS (E** . Refer to Application Programming Guide for details of the command.
Some settings of Msw 2 and Msw 8 can be set by the switch operation. (Refer to page 3-15)

MSW1

Bit	Function	0 (OFF)	1 (ON)
1	Send power on notification.	Yes	No
2	Select receive buffer capacity.	Large (4Kbyte)	Small (45byte)
3	Conditions for Busy status.	Receive buffer full or offline	Receive buffer full
4	Data processing when reception error occurs.	Substitute with '?'	Ignored
5	Automatic line feed	Invalid	Valid
6	Revseved	Fixed to off	—
7	#6 pin signal select for reset	Not used	Used
8	#25 pin signal select for reset	Not used	Used

MSW1-7, 1-8 are effective only when serial interface is used.

MSW2

Bit	Function	0 (OFF)	1 (ON)
1	Reserved	—	Fixed to 1 (One) (do not change settings)
2	Autocutter operation	Disabled	Enabled
3 - 8	Reserved	—	

MSW8

Bit	Function	Value	
		0 (OFF)	1 (ON)
1 - 5	Reserved	—	
6	Feeding paper to the print starting position at power on	Enabled	Disabled
7	Reserved	—	
8	Printer cover open during operating	Errors that automatically recover	Errors that can possible recover

If the print starting position is not set when power is turned on, the printing position of the first sheet may shift, or a paper layout error may occur.

Customized value

Item	Value
Selection of the User NV memory capacity	1 KB 64 KB 128 KB 192 KB
Selecton of the NV graphics memory capacity	None 64 KB 128 KB 192 KB 256 KB 320 KB 384 KB
Selection of the paper width	38 mm, 39 mm, ... 79 mm, 80 mm (43 kinds in increment of 1 mm)
Selection of the print control	One-part energizing Two-part energizing Three-part energizing Four-part energizing
Selection of the print density	x 0.7 x 0.75 x 0.8 x 0.85 x 0.9 x 0.95 x 1.0 x 1.05 x 1.1 x 1.15 x 1.2 x 1.25 x 1.3 x 1.35 x 1.4
Selection of the print color	Single color Two colors
Selection of the print speed	Print speed level 1 (max. 26 mm/s) Print speed level 2 Print speed level 3 Print speed level 4 Print speed level 5 Print speed level 6 (max. 120mm/s) Print speed level 7 Print speed level 8 Print speed level 9 (max. 150 mm/s)

✎ *Note:*

The maximum print speed is given only in a one-part energizing mode. However, if the print duty is high even through the one-part energizing mode is selected, it may be changed to two-part energizing mode automatically.

Four-part energizing mode can reduce power consumption.

The print width can be set for 43 kinds with 1 mm pitch in the range from 38 mm to 80 mm. However, it cannot be set in the range from 71 mm to 79 mm.

Serial transmission conditions

Item	Selection
Baud rate	115200 bps 9600 bps 57600 bps 4800 bps 38400 bps 2400 bps 19200 bps
Parity	None/ Odd/ Even
Flow control	DTR/DSR control XON/XOFF control
Data length	7-bit/8-bit

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Setting Autocutter Type

Users may choose between "Partial Cut" and "Full Cut" by adjusting the cutter unit to the desired dowel position. The steps below show the setting of the cut type.

✎ *Note:*
To disable the autocutter, change the memory switch setting (Msw 2-2).

When the cutting type is changed from partial cut to full cut, the cutter unit and the fixed blade must be replaced with a new one since the ends of the blade are worn even though they have not been used.

The Partial Cut and Full Cut methods cannot be selected using switches or software commands.

Setting procedure

1. Turn off the power supply and open the paper roll cover.

2. Push the body case outward (in the direction of 2 arrows) and remove the cutter cover.

cutter cover
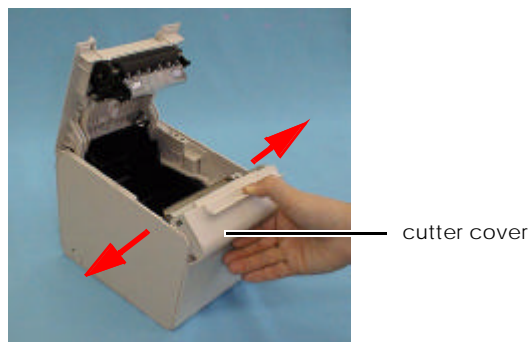
3. Remove the single screw retaining the cutter unit and loose a screw which is indicated by a circle in the illustration below.

screw

Loose a screw

Cutter unit

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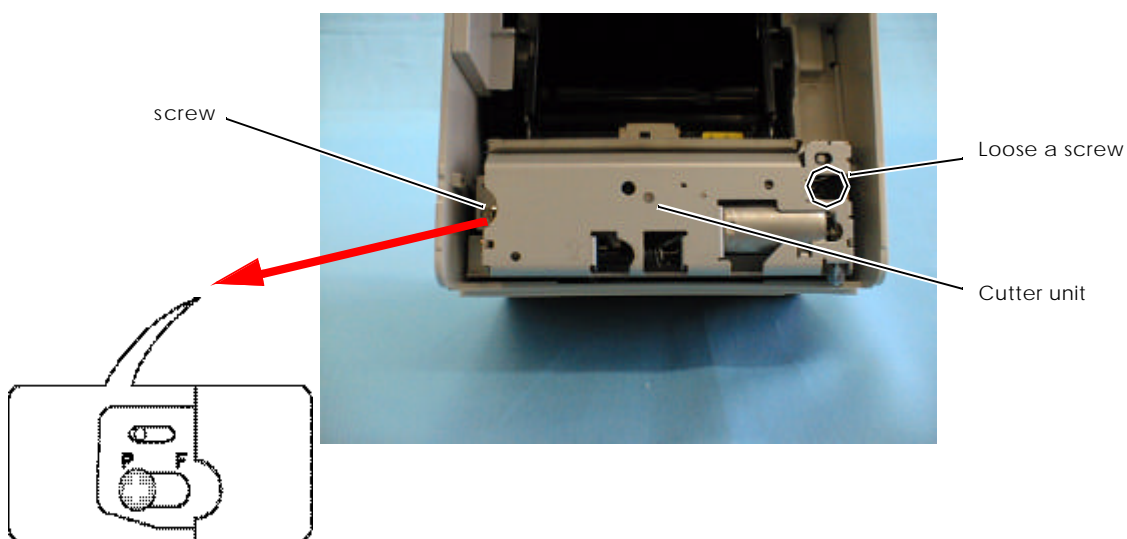
4. Lift the top of the cutter unit upwards towards you and remove from the dowel.
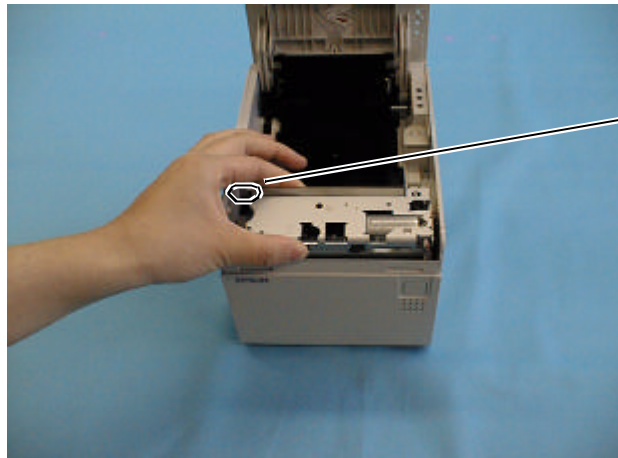
Removed from the dowel.

5. Moving the cutter unit in a lateral direction, shift to the dowel position of the desired cut method.
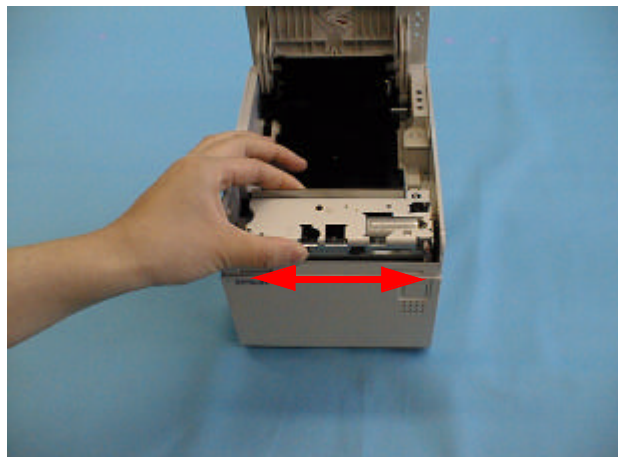
Shift to dowel of desired cut method

6. Secure the cutter unit using the single screw.

7. Install the cutter cover.

8. Close the paper roll cover.

Setting Paper Roll Width

The TM-L90 accommodates 80 mm wide paper rolls with no adjustments. For rolls from 38mm to 70 mm wide you use the spacer included with the printer. (If the rolls are from 61 to 70 mm wide, you break two tabs off the spacer. See the width note below.)

Depending on the width of the paper roll being used in the printer, paper roll guide position setting and memory switch settings may be made.

✎ *Note:*
When the paper width is changed from narrow to wide, the cutter unit and fixed blade must be replaced with a new one since the ends of the blade are worn even though they have not been used.

Setting paper roll guide position

1. Insert the paper roll spacer so that the front edge goes through the notch and down to the shaft, as shown below.
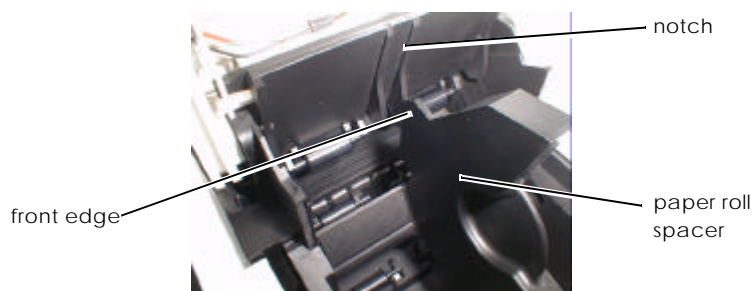
2. Push the paper roll spacer until you feel it click onto the shaft.

✎ *Note:*
Check that the paper roll spacer slides smoothly to the left and right.

3. Slide the paper roll spacer to the appropriate width, as shown below. You can use the measurement printed inside the printer, aligning the inside edge of the spacer with the desired measurement.
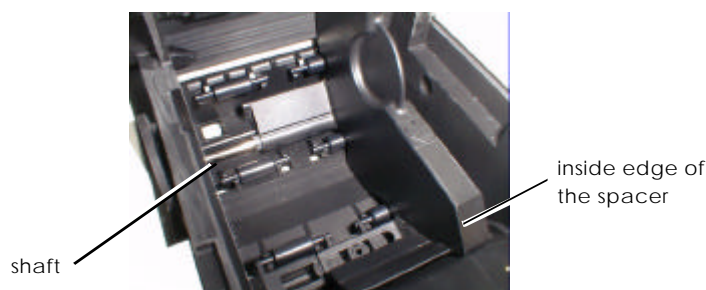
✎ *Note:*

When you want to set the paper roll width from 61mm to 70mm, break off by hand the two tabs of the spacer shown in the illustration below. (You can still also use widths from 38 mm to 60 mm with the spacer with the tabs broken off.)
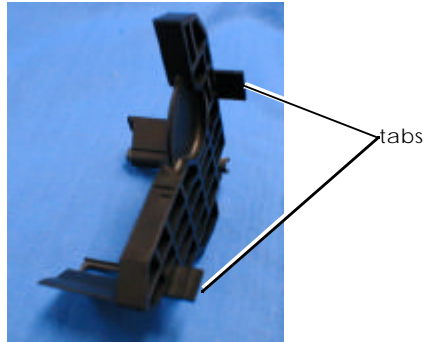
4. Insert the screw included with the spacer into the hole indicated below and tighten it. (Even if you can see two holes, this is the only one to put the screw in.)
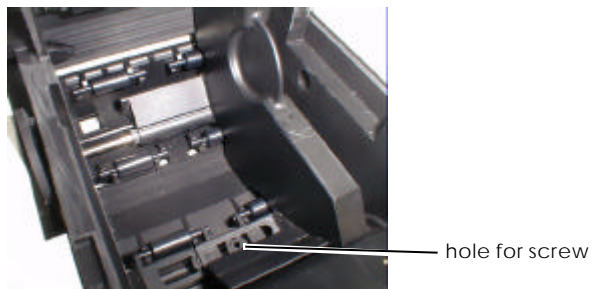
Chapter 3

Description of Functions

Switch and Button

FEED Button

The FEED button can be disabled with **ESC c 5** command. When it is disabled, the FEED button cannot function.

The printer feeds paper based on the line spacing set by the **ESC 2** or **ESC 3** command. However, paper feeding using the FEED button cannot be performed under the following conditions:

- When the paper roll cover is opened.
- During cleaning.
- During self test printing, pressing the FEED button stops the self test temporarily and pressing again and restarts the self test.
- When the FEED button has a defined function in a macro definition command.

Power Supply Switch

Turning the power on and off using this switch is the normal operation. You can enable or disable power supply this switch using DIP SW1-1.

Power supply switch enabled

When the TM is turned off:
The TM is powered ON when the power supply switch is pressed more than 1 second.

When the TM is turned on:
The TM is powered OFF when the power supply switch is pressed more than 3 seconds. If for some reason pressing the power switch even more than 10 seconds does not turn the power off, the TM executes a forced power off.

Power supply switch disabled

When the power supply switch is disabled, the circuit is the same condition as always having the power supply switch on. Therefore if power is supplied from the system, the TM is on, and if power is not supplied by the system, the TM is forced off. In this condition, printer is powered off without power off process(*) therefore execute the software power off process from command in system. (use **DLE DC 4**)
When the power switch is set disabled, power off through command process is not main power off and power LED is blinking.
And if the power switch is disabled and an unrecoverable error occurs, press the power supply switch more than 3 seconds to reset the TM only. This is true for both recoverable and unrecoverable errors.

* Power off process :TM stores the latest TM condition and locks the head carriage before power down.

Power switch cover

> If the power supply switch is disabled, the power switch cover is not necessary. However you can prevent tampering and improve the appearance by installing the cover. When you want to reset TM only, push the power supply switch through hole of the power switch cover.

User operation and TM operation

	Power supply switch enabled	Power supply switch disabled
When you want to power on TM	Press the power supply switch more than 1 second.	Power on the system power supply. Turn on the power breaker or outlet.
When you want to power off TM	Press the power supply switch more than 3 seconds.	Execute the software power off process using a software command and wait until the power LED starts blinking. Then power off the system power supply.
When there is a power outage	The TM is powered off.	The TM is powered off.
When the power outage is over	TM remains power off. Press power supply switch more than 1 sec to turn the printer on.	TM is powered on.
There is an unrecoverable error	Press the power supply switch more than 3 sec to turn the power off; then turn the power on again.	Press the power supply switch over 3 sec to reset TM.

Power off control by the host

> The power can be turned off using **DLE DC4** (*n* = 2). When using the printer with the power switch disabled (DIP switch 1-1 on), be sure to turn off the printer using the command before turning off the host. Power off operation varies depending on DIP switch settings as follows:

> When the power switch is enabled:
> The TM is powered OFF after processing the command.

> When the power switch is disabled:
> The POWER LED blinks after processing the command and the printer waits for the system power to be turned off. See the following procedure. Refer to page 3-4 about blinking pattern of POWER LED.

❏ Power off procedure

1. Transmit the last printing command (LF, ESC d , etc.).

2. Transmit GS (D *pL pH m a b* (*pL* = 3, *pH* = 0, *m* = 20, *a* = 2, *b* = 1).

3. Transmit GS r *n* (*n* = 1).

4. Wait for transmission of paper detector status from printer by GS r *n*.

5. Transmit DLE DC4 *n a b* (*n* = 2, *a* = 1, *b* = 8).

6. Wait for transmission of power supply off status.

✎ *Note:*
Within 10 seconds after transmitting DLE DC4 n a b, power supply off procedure is carried out and power supply off status is transmitted.

7. If power supply off status is not confirmed, wait 10 seconds or more after transmitting DLE DC4 *n a b*.

✎ *Note:*
Process varies according to interface.

Interface	Countermeasure
Serial interface	Status is transmitted regardless of the state of host.
Parallel interface	Carry out negotiation as soon as transmitting DLE DC4 *n a b* so that status from printer can be received.

8. At this time, internal process is being carried out in the printer by software.

9. After processing;
   a. When the power switch is enabled, the printer turns off.
   b. When the power switch is disabled, the POWER LED blinks and the printer is in the waiting sate.

   After confirming that, turn off the power breaker or the outlet.

✎ *Note:*
Do not reset the printer during the period before turning off the power supply of the printer and after transmitting DLE DC4 (n=2) command.

Panel LED

Power (POWER) LED

Item		Specifications
LED color		Green
On states	On	Power is supplied
	Off	Power is not supplied
	Flashing with short intervals *1	Execution in progress
	Flashing with long intervals *1	Powering down

*1: Power (POWER) LED flashes according to the following patterns.

Execution in Progress   Approx.160 ms

End of power-off sequence   Approx.160 ms
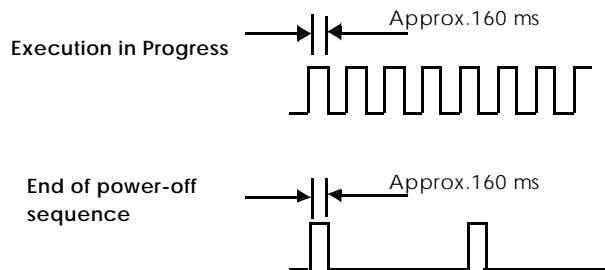
No Paper Roll (PAPER OUT) LED

Item		Specifications
LED color		Red
ON states	On	Paper roll near end (only small amount of paper left on roll) or paper end (no paper left) detected
	Off	Plenty of paper left on roll
	Blinking	Self test standby state or more standby state when the macro execution command is used.

Error (ERROR) LED

Item		Specifications
LED color		Red
On states	On	Off line (excludes paper feed using PAPER FEED button and self test)
	Off	Normal operation/off line
	Flashing	Error status

✎ *Note:*
When unrecoverable error occurs, turn off the power supply immediately.

Error Codes

There are three types of error possible: Automatically Recoverable Errors, which can be corrected without any action by the user, Recoverable Errors, which can be corrected by the action of a user, and Unrecoverable Errors, which cannot be corrected by a user.

They are automatically corrected when the temperature of the head returns to normal or when the cover is closed.

Automatically recoverable errors

Although normal printer operation is no longer possible when automatically recoverable errors occur, they do not represent printer failure. They are easily corrected through use of the printer's controls.

✎ *Note:*
Print head temperature error is not an abnormality.

Automatically recoverable errors

Error name	Type of error	Error LED Flash code	Recovery measure
		⊢→‖←⊣ Approx.320 ms	
Paper roll cover open error (when the recoverable error is selected) (*1)	Printing on the paper roll is not performed correctly due to a cover-open	⊓⊔⊓⊔⊓⊔⊓⊔	Recovers automatically when the cover is closed.
Print head temperature error (*2)	The temperature of the print head is extremely high.	⊓⊔⊓⊔⊓⊔⊓⊔	Recovers automatically when the print head cools.
Paper layout error (*3)	Cannot detect the label or the black mark	⊓⊔⊓⊔⊓⊔⊓⊔	Recovers automatically when the label on black mark is loaded correctly.

✎ *Note:*
*1: The printer cover open error operation can be selected with the memory switch.

*2: If an abnormal temperature is detected, the printer generates a CPU execution error as an unrecoverable error.
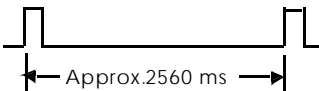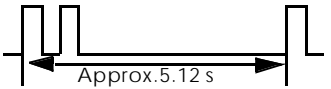
*3: In the condition that types of paper is selected as the label or the paper with black mark and power on or cover closed, the printer generates the paper layout error if the paper is not loaded correctly. If use different paper layout which is set NV memory (refer to page 4-1), set again by memory switch setting mode (refer to page 3-13), GS (A (Function 64) or GS (E.

Recoverable errors

Although normal printer operation is no longer possible when recoverable errors occur, they do not represent printer failure. They are easily corrected through user actions and/or the use of ESC/POS® commands.

Recoverable Errors

Error name	Type of error	Error LED flash code	Recovery measure
		Approx.160 ms	
Paper roll cover open Paper roll cover open error	Printing on the paper roll is not performed correctly due to a cover-open		Recovers by DLE ENQ 1 or DLE ENQ 2 when the cover is closed.
Autocutter error	The autocutter does not work correctly.	Approx.2560 ms	Recovers by DLE ENQ 1 or DLE ENQ 2.
Paper layout error (*3)	Cannot detect the label or the black mark	Approx.5.12 s	
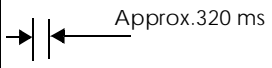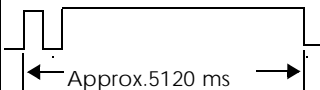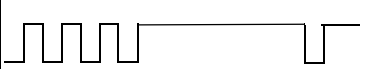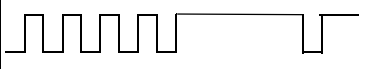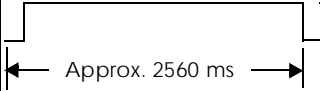
✎ *Note:*
1: The printer cover open error operation can be selected with the memory switch.
2: When an autocutter error occurs causing by jamming paper, turn the power off and remove the jammed paper, then turn the power on again.
3: When a paper layout error occurs causing by jamming paper white printing, turn the power off and remove the jammed paper, then turn the power on again.

The **DLE ENQ1** and **DLE ENQ2** commands are enabled only when a recoverable error (excluding automatically recoverable errors) occurs. In the event of a recoverable error, correct the condition that is the cause of the error and transfer the **DLE ENQ1** or **DLE ENQ2** command to recover from the error without having to power down the printer.

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Unrecoverable errors

Normal printer operation is no longer possible when unrecoverable errors occur. These errors mean that the printer requires servicing and repair.

Unrecoverable Errors

Error name	Type of error	Error LED Flash code	Recovery measure
		Approx.320 ms	
R/W error in memory or gate array	After R/W checking, the printer does not work correctly.	Approx.5120 ms	Impossible to recover.
High voltage error	The power supply voltage is extremely high.		Impossible to recover.
Low voltage error	The power supply voltage is extremely low.		Impossible to recover.
CPU execution error	The CPU executes an incorrect address or I/F board is not connected.		Impossible to recover.
Internal circuit connection error	Internal circuits are not connected correctly.	Approx. 2560 ms	Impossible to recover.
UIB error	An abnormall operation occurs in UIB.		Impossible to recover.

✎ *Note:*

When unrecoverable error occurs, turn off the power supply immediately.
If the power supply function is disabled, press the power supply switch more than 3 seconds to reset the printer.

Sensors

Paper sensors

The printer has two paper sensors.

Paper roll near-end sensor

The near-end sensor is located on the roll paper supply device. It detects the near-end of the paper roll by detecting the paper roll diameter. You can adjust the sensor . See page 1-6 for details for adjustment.

When it detects a paper near end, it either stops or continues printing, depending on the ESC c4 setting. The PAPER OUT LED lights.

When printing stop is enabled by the ESC c4, the sensor detects a paper near end and the printer automatically goes offline after printing the current line. To restart printing, load new paper and set the printer back online by closing the printer cover. The printer starts initializing and continues printing data stored in the print buffer.

Paper roll end sensor

The paper end sensor is located in the paper path. It detects the presence of paper from the paper roll in the paper path of the printer mechanism.
When there is no paper in the paper path (paper end status), the PAPER OUT LED indicator lights.

When the sensor detects a paper end, black mark or label paper, printing stops even if it is in the middle of one transaction; therefore, it is recommended to use the roll paper near end sensor and use the paper end sensor as a supplement.

Printer cover sensor

Paper roll cover open sensor

The cover-open sensor monitors the paper roll cover. When the sensor detects a cover open while printing, the printer stops printing immediately and automatically goes offline depending on the setting of the memory switch 8-8 as follows:

❏ OFF(default) :   Automatic recovery error. The ERROR LED blinks. When the printer cover is closed, the error LED goes off and the printer goes online and starts printing at the beginning of the line it was printing when the cover was opened.

❏ ON :   Recoverable error. The ERROR LED blinks. Even if the cover is closed, the error LED still blinks. You need to transmit the DLE ENQ command to recover.

When the printer recovers, it feeds paper to take up the slack, and starts printing from the beginning of the line where an error occurred. In this case, double printing and printing position shift may occur. It is recommended to set the memory switch 8-8 to ON and clear the buffers by DLE ENQ 2 and resend the print data.
Whether the cover is open or not does not affect the status reported by the paper roll end sensor.

Offline

This printer is not equipped with an online/offline switch. The printer goes offline under the following conditions.

- Between when the power is turned on (including reset using the interface) and when the printer is ready to receive data.

- During the self test.

- When the paper roll cover is open.

- During paper feeding using the FEED button.

- When the printer stops printing due to a paper-end (in cases when an empty paper supply is detected by either paper roll end detector or the paper roll near-end detector with a printing halt feature set by ESC c 4).

- When an error has occurred.

- During macro executing standby status.

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Busy state

Selecting conditions that invoke a BUSY State

The conditions that invoke a BUSY conditions are selected with memory switch Msw 1-3 as follows.

Printer status		Memory switch Msw 1-3 state	
		ON	OFF
Offline	During the period from when the power is turned on (including resetting using the interface) to when the printer is ready to receive data.	BUSY	BUSY
	During the self test.	BUSY	BUSY
	When the cover is open.	—	BUSY
	During paper feeding using the paper feed button.	—	BUSY
	When the printer stops printing due to a paper-end. (only when the paper roll is not present)	—	BUSY
	When an error has occurred.	—	BUSY
When the receive buffer becomes full.		BUSY	BUSY

Notes on setting memory switch Msw1-3 to ON

1. The printer mechanism stops but does not become busy when: an error has occurred, the cover is open, printing stops due to a paper-end, or paper is fed using the paper feed button.

2. When setting memory switch 1-3 to ON to enable handshaking with the printer, be sure to check the printer status using the **GS a** command and the ASB function. In this setting, the default value of n for **GS a** command n is 2. The printer automatically transmits the printer status, depending on online/offline changes.

3. When using **DLE EOT** and **DLE ENQ** and **DLE DC4**, be sure that the receive buffer does not become full.

   • When using a host that cannot transmit data when the printer is busy:
     If an error has occurred, **DLE EOT** and **DLE ENQ** and **DLE DC4** cannot be used when the printer is busy due to a receive buffer-full state.

   • When using a host that can transmit data when the printer is busy:
     When the receive buffer becomes full while transmitting bit-image data if **DLE EOT** or **DLE ENQ** and **DLE DC4** is used while sending the bit-image data is processed as bit-image data. Data transmitted when the receive buffer is full may be lost.

     Example: Check the printer status using **GS I** or **GS r** after transmitting each line of data and use the 4K byte receive buffer. Transmit one line of data so that the receive buffer does not become full.

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Receive buffer

The capacity of the receive buffer is set using memory switch Msw1-2. A receive buffer full means that the receive buffer is in the following condition. The printer ignores the data received when the remaining space in the receive buffer is 0 bytes..

Memory switch Msw1-2	Receive buffer capacity	Buffer full definition
ON	45 bytes	When the remaining space in the receive buffer drops to 128 bytes, the printer status becomes "buffer full" and it remains "buffer full" until the space in the receive buffer increases to 256 bytes.
OFF	4 Kbytes	

Operating Mode (Panel Switch Operation)

Self Test Mode

In self test mode, following items are checked and printed out:

- Control circuit functions
- Printer mechanisms
- Print quality
- Control software ROM version
- DIP switch settings
- Memory switch setting
- Paper layout setting

Use the following procedure to start a self test.

1. First, open the paper roll cover, then close the paper roll cover while presssing and holding down the FEED button until ERROR LED blinks. The printer prints out the various printer states.

2. When all printer states have been printed, make sure that the following message is displayed and the PAPER OUT LED blinks.

    "If you want to continue SELF-TEST printing, please press FEED button."

    The printer is now in the self test wait mode.

3. To start a test print, press the FEED button when the printer is in the self test wait mode.

4. Make sure that the following message is displayed.

     "*** completed ***"

The printer will now be initialized and return to normal operating mode.

Hexadecimal Dump Mode

In hexadecimal dump mode, the data transmitted from the host computer in hexadecimal numbers and in its corresponding characters are printed.

Use the following procedure to output a hexadecimal dump.

1. With the paper roll cover open, press and hold down the FEED button to turn on the printer.

2. Close the paper roll cover.

    Data received after this is printed in hexadecimal numbers and their corresponding characters.

3. When printing stops, turn off the power or press the FEED button three times or perform a reset.

Memory Switch Setting Mode

The following items are spcified in the Memory Switch Setting mode:

❏ Autocutter operation

❏ Serial communication condition

- Transmission speed
- Parity
- Handshaking
- Data length

❏ Interface setting

- Select receive buffer capacity
- Conditiuin for BUSY status
- Data processing when reception error occurs

❏ Automatic line feed

❏ Interface reset signal

- #6 pin: Selection of reset signal
- #25 pin: Selection of reset signal

✎ *Note:*
All new settings will be lost if the power supply is turned off during the Memory Switch Settings mode. Be sure to follow the proper procedure and turn the power off at the correct time.

Starting the Memory Switch Setting mode

Use the following procedure to start a memory switch setting mode.

1. Open the paper roll cover.

2. Turn the power on while pressing the paper feed button (located inside the printer).

3. Press the FEED button (located inside the printer) twice while POWER, ERROR and PAPER OUT LED are blinking.

4. Close the cover.

   The printer is now in the memory switch setting wait mode.

5. Press the FEED button. The printer prints the enable settings of the memory switch and instructions.

6. Follow the instructions to process the mode.

Ending Memory Switch Setting mode

Once the setting is performed, the contents of the setting are stored, then the printer executes the initialization. When initialization is finished, the printer returns to normal operating mode.

Paper FEED button
(inside the printer)
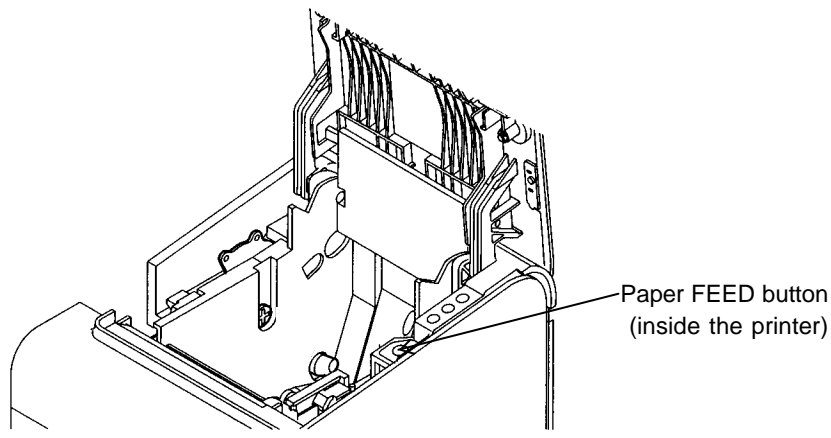
Auto-setting Mode for Paper Layout

Auto-setting mode function of paper layout

This function is to measure the paper layout settings of the paper inserted automatically and store them in the NV memory.

Starting the auto-setting mode

1. Open the cover

2. Turn the power on while holding down the FEED button (located inside the printer) until the ERROR LED is on.

3. Stop pressing the FEED button (located inside the printer) when the ERROR LED is on.

4. Press the FEED button (located inside the printer) six times, and then close the cover.

✎ *Note:*
If labels (with black marks) are used, the auto-setting mode for the paper layout may become error. To prevent this, it is recommended to set the memory switch by command. Refer to Function 49 of the **GS (E** *command for details.*

Ending the auto-setting mode

Once the setting is performed, the auto-setting mode is ended.

Operating procedure

The procedures used for this process are described below.

Entering Memory Switch Settings Mode

1. Open the paper roll cover and turn the power on while pressing the paper feed button (located inside the printer).
2. Press the paper feed button (located inside the printer) twice while POWER, ERROR and PAPER OUT LED are blinking.
3. Close the cover.

printing the current setting and setting guidance.

Selecting Item to Set

Open the paper roll cover.
Press the FEED button (located inside the printer) the number of times required to select the desired item; then close the paper roll cover.
Pressing the Paper feed button 0 times, or 8 or more times will terminate this procedure.

❑ 1 time : Auto cutter
❑ 2 times: Paper/Print Density
❑ 3 times: Basic Serial Interface Settings
❑ 4 times: Advanced Interface Settings
❑ 5 times: Type Of Paper
❑ 6 times: Interface Reset Signal
❑ 7 times: Paper Width

❑ 0 times:
❑ 8 or more times: Unused

Selecting Individual Settings

Open the paper roll cover.
Press the FEED button the number of times required to select the setting for each item; then close the paper roll cover.

Auto cutter (page 3-16)

Basic Serial Interface
  Baud Rate Setup (page 3-16)
  Data Length, Handshake or Parity (page 3-17)

Advanced Interface Setting (page 3-16)

Automatic Line Feed (page 3-18)

Interface reset signal (page 3-18)

Ending Memory Switch Settings Mode

The printer prints new setting and save the setting to the non-volatility memory. Then software reset and become normal printable status. Set the power supply to OFF.

Selecting individual settings

❏ Auto Cutter

Press the FEED button the number of times required to select the desired Auto cutter setting.

Press FEED button	Setting to select
0 times:	No change
1 time:	Installed
2 times:	Not Installed
3 or more times:	No Change

❏ Basic Serial Interface Setting

To select Transmission Conditions, first choose "Serial Interface Settings"; then select "Data Length, Handshake or Parity."

Press the FEED button the number of times required to select the desired "Serial interface setting" used with Transmission Conditions.

Press FEED button	Setting to select
0 times:	No change
1 time:	115200 bps
2 times:	57600 bps
3 times:	38400 bps
4 times:	19200 bps
5 times:	9600 bps
6 times:	4800 bps
7 times:	2400 bps
8 or more times:	No Change

bps: Indicates the number of transmitted bits per second (bps).

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❏ Data Length, Handshake or Parity

Press the FEED button the number of times required to select the desired "Data length, Handshake or Parity" setting used with Transmission Conditions.

Press FEED button	Setting to select		
	Data Length	Handshake	Parity
0 times:	No Setting is selected		
1 time:	8 bits	DTR/DSR control	No parity
2 times:			Even
3 times:			Odd
4 times:		XON/XOFF control	No parity
5 times:			Even
6 times:			Odd
7 times:	7 bits	DTR/DSR control	No parity
8 times:			Even
9 times:			Odd
10 times:		XON/XOFF control	No parity
11 times:			Even
12 times:			Odd
13 or more times:	Unused		

❏ Transmission Related Conditions

Press the FEED button the number of times required to select the desired "Receive buffer size, Receive error sequence or Busy condition" setting used with Transmission Related Conditions.

Press FEED button	Setting to select		
	Receive buffer size	Receive error sequence	BUSY condition
0 times:	No Setting is selected		
1 time:	Large	Change to '?'	Receive buffer full or overrun
2 times:			Receive buffer full
3 times:		Ignore	Receive buffer full or overrun
4 times:			Receive buffer full
5 times:	Small	Change to '?'	Receive buffer full or overrun
6 times:			Receive buffer full
7 times:		Ignore	Receive buffer full or overrun
8 times:			Receive buffer full
9 or more times:	Unused		

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❏ Automatic Line Feed (CR command function)

Press the FEED button the number of times required to select the desired Auto carriage return setting.

Press FEED button	Setting to select
0 times:	No Change
1 time:	Enabled
2 times:	Disabled
3 or more times:	No Change

❏ Interface Reset Signal

Pins #25 and #6 on the RS-232 I/F circuit board unit (UB-S01/02) are used to input the reset signal. This item is used to "Enable (acknowledge)" or "Disable (not acknowledge)" input of the reset signal from one of these pins. Press the FEED button the number of times required to select the desired Interface reset signal setting.

Press FEED button	Setting to select	
	Pin #25	Pin #6
0 times:	No Setting is selected	
1 time:	Disable	Disable
2 times:		Enable
3 times:	Enable	Disable
4 times:		Enable
5 times:	Disable	Disable
6 times:		Enable
7 times:	Enable	Disable
8 times:		Enable
9 or more times:	Unused	

Chapter 4

Application Development Information

Development Environment

The following three methods are available for developing applications for a TM printer.

❏ EPSON OPOS ADK
EPSON OPOS ADK uses OCX controls customized for POS application development.

❏ EPSON Advanced Windows Driver
Using Windows driver, printing from applications is available as other general printers.

❏ ESC/POS commands
Using ESC/POS commands, TM printer can be controlled directly.

Power Supply Off with POS Command

Turning the power on and off with the front switch is disabled when DIP switch 1-1 is set to on. In this case, a POS command is used to turn the power off. See page 3-2.

Paper Layout

By storing paper type (label paper, receipt paper, receipt paper with black mark and label paper with black mark) and vertical layout (label length, distance between black marks) to NV (non volatile) memory, you can decrease wasteful paper feed and shortening of time for initializing (power on, cover close, recover from error). This setting is called "paper layout setting". Set "paper layout setting" as needed.

Case 1: When you use a specific kind of paper continuously

The initialization time shortens when "paper layout setting" is done, and improve ease of usage. There are three kinds of methods of "paper layout setting".

❏ Setting method 1:

Automatically setting is done only by TM-L90 operation. (Refer to page 3-14) Except label paper with black mark.

❏ Setting method 2:

Automatically setting is done by transmitting "**GS (A**". Except label paper with black mark.

✎ *Note:*
If "paper layout setting" is stored in NV memory in advanced, need to transmit GS (E (Function 48) with state of inserting stored paper.

1. Set paper which you will set "paper layout setting" and close a cover.

2. Turn on the printer.

3. Host transmit GS (A pL pH n m (pL=2, pH=0, n=0, m=64) and the paper is fed. Then "*paper layout setting*" is done.

❏ Setting method 3:

Transmit "GS (E"and set all setting item.

✎ *Note:*
If "paper layout setting" is stored in NV memory in advanced, need to transmit GS (E (Function 48) with state of inserting stored papaer.

Follow this method when use label paper with black mark or set custom setting.

And after setting "paper layout setting" using setting method 1 or 2, you can change a part of parameter using setting method 3 (It is impossible to change paper type only). Refer to GS (E (Function 49) of ESC/POS Application Programming Guide.

	Advantage	Demerit	Application	Manual setting parameter
Setting method 1	Setting enable only printer	Custom setting is disable	Receipt papaer, label papaer, receipt papaer with black mark	As necessary, printing area (2 item) (Set using GS (E (Function 49))
Setting method 2	Not need to input many parameter	Custom setting is disable	Receipt papaer, label papaer, receipt papaer with black mark	As necessary, printing area (two item) (Set using GS (E (Function 49))
Setting method 3	Custom seting is enable such as rewinding or start printing position	Need to input many parameter	Label papaer with black mark When set custom setting	Paper type, distance between marks, mark length, paper wide, printing area (8 items)

✎ *Note:*
If insert different size paper which is stored in NV memory, paper layout error may occur.

Case 2: When you use various kinds of paper frequently

It is easier usage for no use of "Paper layout setting". (Default setting)
When initializing, printer set paper setting (Setting is not stored in NV memory) each times therefore it takes time. However paper layout error does not occur if insert different size paper each time.

✎ *Note:*

If use various kinds of paper frequently and stored "paper layout setting" in NV memory in advanced, need to transmit GS (E (Function 48) "Clear of paper layout setting" with stored paper is inserted.

It is impossible to use label paper with black mark.

Setting of paper width

For TM-L90, 38 mm ~ 70 mm or 80mm paper width is available. If set automatically paper layout, the paper is not auto set. Therefore set paper width using customize value by GS (E (Function 5). If set paper width and done auto paper layout, printing area is set automatically according to paper width and paper type. Transmit GS (E (Function 49) when customize printing area.

Print density

Recommend to set print density according to paper type for adequate print quality and ensuring reliability.
If set exceeded density, it may lead to printer head dirt and blank dot printing. Refer to below table about original paper member and density level. Set print density using customize value by GS (E (Function 5).
And if use GS (E (Function 49), you can change print density while printing without changing customer value.

Original paper numbr and density level

Roll Paper No.	Original Paper No.	Density Level
	P350	✖ 0.9
	KF50	✖ 0.95
ENTPC series ENTPD series	TF60KS-E, TF50KS-E, PD750R	✖ 1.0
ENTPE series	PD160R, TF11KS-ET	✖ 1.05
ENTLA series ENTLB series		✖ 1.3

Print speed

Default setting is Normal printing (120 mm/s maximum). The High - speed printing (150 mm/s maximum) is selectable when the specified paper is selected. Refer to "Print Specifications" on page1-15. Set print speed using customize value by **GS (E** (Function 5).

Paper to use for high speed

If any one of the following types of thermal paper is used, the customized value setting can be used to set the maximum print speed to 150 mm/s {5.91"/s} (level 9):

- ENTLA series
- TF60KS-E
- PD160R
- F50KS-E
- P350
- KF50

Head divided control

If the low capacity of the power supply is used, transmit **GS (E** (Function 5) and specify 2-4 head divided control. Then you can eliminate the power supply for dots and save current consumption. (The deafault setting is 1 head divided control which supply power to all dots at a time.)
Print speed is getting slow If you increase the number of division.
And if use **GS (K** (Function 97), you can change head divided control while printing. You can keep print speed if use divided printing only for the part of logo print or high density print.

✎ *Note:*
Refer to ESC/POS Application Programming Guide about how to use command. Make sure to use in combination with Function 1 and 2, when use each function of GS (E.

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Barcode Printing

You can print barcodes, using the GS k command, for any of the following types of barcodes:
 UPC-A, UPC-E
 JAN 8 (EAN 8), JAN 13 (EAN 13)
 CODE 39
 ITF (Interleaved 2 of 5)
 CODABAR (NW-7)
 CODE 93
 CODE 128

Barcode size is specified by GS h for the height, GS w for the width. HRI character related commands are GS H for the position , GS f for font selection.

2 Color Printing

Color selection can be made by commands ESC r, GS (L and GS (N. Functions of those commands are as follows:

GS (N
Used with character data. It affects on each character. The character color can be specified for character by character.

GS (L
Affects on the graphics data defined by the GS (L.

Printer Status

To get the printer status, the following commands are available.

	Printer status
ASB (Auto Status Back)	GS a
Real time status	DLE EOT
Status	GS r

For reference, differences between those 3 states kinds are :

- ASB :
  When processed as a normal command, the printer automatically transmits a status message whenever the status changes. It is always necessary to check the ASB status.

- Real time status:
  When the printer receives this command, it responds with the specified printer status. Reporting the printer status takes priority over any normal print data. The printer also stores the code string of the command in the receive buffer as a part of the bit-image data.

- Status:
  The printer transmits a specified printer status in the same way that it processes normal print data.

> [!NOTE] Confidential

NV Memory

The flash ROM of the printer can be roughly divided into 3 parts.

- Firmware program area

- NV memory area for product information. User cannot edit.

- NV memory area that user can access.

The following items are in the NV memory that the user can access.

a) Memory switches
   (Msw1, Msw2, Msw8, Customize value such as the paper width, Serial communication conditions.) : using command GS (E

b) User NV memory : using command GS (C

c) NV graphics memory : using command GS (L, GS 8L

d) User defined code page (Page 255 (space page)) : using command GS (E

e) Area of command default values specified by users : using command GS (M

Changing those values, you can customize your printer.
Note the following when writing to and erasing to NV memory.

❏ The following restrictions apply when performing nonvolatile memory operations (including data store and delete).

- The paper feed switch must not be used to feed paper.

- The real time command must not be executed.

- The ASB status will not be sent, even when the ASB function is set to enable.

❏ The printer will sometimes enter the Busy state when data is being written to nonvolatile memory. It is important not to send data from the host computer while the printer is in the Busy state as it will be incapable of processing any received data.

❏ Frequent use of the functions for defining data to and deleting data from nonvolatile memory can damage the memory. As a rule, in using the various commands (certain functions of the GS (C, GS (E, GS (L, GS (M and the GS g 0 commands), avoid writing to nonvolatile memory more than a 10 times per day.

Customizing Printer

You can customize your TM printer by changing memory switches and the command default value and saving the data onto the NV (nonvolatile) memory. Refer to the command GS (E, GS (M in next section.

Printer initial setting up

Printer initial setting up can be made by memory switches and character code page. Relevant command is GS (E. See page 2-10 about details of memory switch definitions .

Changing command default values

You can customize your TM by changing the command default value and save the data onto the nonvolatile memory.
Relevant command is the **GS (M** and there are some sub-functions shown below:

Function 1 : Saves the setting values in the work area to the archive area.

Function 2 : Loads the values to the work area.
   when parameter m = 0 : Loads the firmware default value to the work area.
   when parameter m = 1 : Loads the stored values in the archive area to the work area.

Function 3 : Selects or cancels the auto-load process for the values stored in the archive area.
   when parameter m = 0 : Cancel the auto-load process. The firmware default value is loaded to the work area when the printer is initialized.
   when parameter m = 1 : Specify the auto-load process. The values stored in the archive area is loaded to the work area when the printer is initialized.
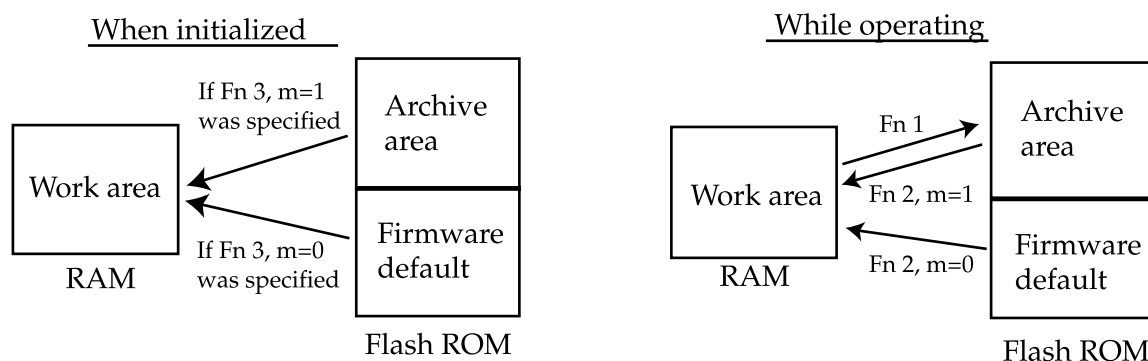
These functions affect status commands, character related commands, barcode related commands, print position related commands and so on.

Using the NV Memory

There is free area in NV memory for user can use. You can use this free area as memo, write other character information or multipurpose. The data is enabled if you turn off the power. Use **GS (C** when you read and write.

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Graphics Printing

Graphics printing is supported by the following commands.

- NV graphics command **GS (L, GS 8L**

You can use other command shown below which traditional model has. However we recommend to use **GS (L, GS 8L**.

- Download bit image command **GS *, GS /**

- Raster bit image command **GS v0**

- Normal bit image command **ESC ***

A main characteristic is as follows.

NV graphics **GS (L, GS 8L**	Comprehensive command of NV bit image, down load bit image and other conventional bitmap image function. For the TM-L90, two color graphics printing is available. Recommend to use this command. When executing this command, definition data of NV bit image and download bit image are deleted.
Download bit image **GS *, GS /**	Read bit image date temporarily from memory and print. There is size limitation. Data is cleared by reset or power off, but if you print bit image many times data are downloaded one time. After that high speed printing is available. However only one bit image can register.
Raster bit image **GS V 0**	Normal bit image specify each columnar 8 bit data, but high speed printer which has thermal printing mechanism become poor performance. Then specify data horizontally and improve printing speed.
Bit image **ESC ***	Normal bit image printing method. There is no size limitation, but need to send data every time. The printer which has thermal printing mechanism have to storage each line data and slow speed printing.

Differences Between GS (L and GS 8 L

❏ All commands possess the same functions for "Graphics data processing."

❏ Specifications (conventions) concerning function code (**fn**) are identical, while only the parameters (**pL, pH, p1, p2, p3** and **p4**) used to specify the parameter values from **m** on differ.

Command	Description
GS (L	Parameter value is 2 bytes less than that for **GS 8 L**. Used to fix the parameter value. Used when sending data divided into blocks.
GS 8 L	Possesses powerful range of expression. Used for batch transfer of large volumes of data.

- Make sure to use **GS 8 L** when the parameter value exceeds 65535 bytes for functions 67 and 112.

"GS (" commands group

For an extended use in the future, the GS (command group has been constructed so that various parameters can be specified. Here is an explanation of a basic rule for specifying parameters of the commands.

GS (x pL pH[d1 d2 d3...dk]

❏ For x, a character such as "A", "B", or "C" of the command name is put.

❏ *pL*, *pH* specify the number of bytes after *pH [d1 d2 d3...dk]*.

❏ Any value up to FFH (255 in decimal) can be out for *pL* and *pH*.

❏ The number of bytes can be calculated by $pL + pH \times 256$; therefore, up to 65535 bytes can be specified. However, the maximum number of bytes will differ depending on the command or function specified. Refer to each command description for details.

❏ For the data following *d1*, there are different cases: a value to be specified will be already defined, a different value will be defined for each function, or it will not be necessary to specify a value. When you input a value, follow the rule of specifying parameters for each command.

The following shows how to specify parameters with function 1 of the GS (C command.

GS (C pL pH m a b [c1, c2] [d1...dk] *(Edit User NV memory)*

Function 1: stores data in a record specified by *GS (C pL pH m a b c1 c2 d1...dk*

❏ Specified parameters:

   • *m* = 0 (fixed)

   • *a* = 1 or 49 (either is fixed)

   • *b* = 0 (fixed)

   • *c1* = 32 to 126

   • *c2* = 32 to 126

5 bytes have been already specified so far. *c1* and *c2* consist fo any 2 bytes with the ASCII codes from 32 to 126 and they are keys to read or write data.

   • *dk* = 32 to 254

Data are any characters corresponding to ASCII code from 32 to 254.

❏ Example: Key code is "MK" and data is "EPSON"

GS (C	10	0	0	1	0	"MK"	"EPSON"
	pL	pH	m	a	b	c1c2	d1 d2 d3 d4 d5

✎ *Note:*
pL, pH specifies the total number of bytes for the parameters; therefore the total number of bytes is 10 and pL = 10, pH = 0(10 + 0 $\times$ 256 = 10)

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Commands List

Refer to ESC/POS Application Programming Guide for a command reference.

Command	Name
HT	Horizontal tab
LF	Print and line feed
FF	Print data in page mode and change to standard mode
CR	Print and carriage return
CAN	Cancel print data in page mode
DLE EOT	Real-time status transmission
DLE ENQ	Real-time request to printer
DLE DC4	Generate real-time pulse
	Execute power-off sequence
	Clear buffer
ESC FF	Print data in page mode
ESC SP	Set right-side character spacing
ESC !	Select print mode(s)
ESC $	Set absolute print position
ESC %	Select/cancel user-defined character set
ESC &	Define user-defined characters
ESC *	Select bit-image mode
ESC –	Turn underline mode on/off
ESC 2	Select default line spacing
ESC 3	Set line spacing
ESC =	Select peripheral device
ESC ?	Cancel user-defined characters
ESC @	Initialize printer
ESC D	Set horizontal tab positions
ESC E	Turn emphasized mode on/off
ESC G	Turn double-strike mode on/off
ESC J	Print and feed paper
ESC L	Select page mode
ESC M	Select character font
ESC R	Select an international character set
ESC S	Select standard mode
ESC T	Select print direction in page mode
ESC V	Turn 90°clockwise rotation mode on/off
ESC W	Set printing area in page mode
ESC \	Set relative print position
ESC a	Select justification
ESC c 3	Select paper sensor(s) to output paper-end signals
ESC c 4	Select paper sensor(s) to stop printing
ESC c 5	Enable/disable panel buttons
ESC d	Print and feed *n* lines
ESC p	Generate pulse
ESC t	Select character code table
ESC {	Turn upside-down printing mode on/off
FS (L	Select label and black mark control function(s)
	Function 48: Transmits the positioning information of the label or black mark paper.
	Function 65: Feeds paper to the label peeling position.
	Function 66: Feeds paper to the cutting position.
	Function 67: Feeds paper to the print starting position.

Command	Name
GS !	Select character size
GS $	Set absolute vertical print position in page mode
GS (A	Execute test print
GS (C	Edit user NV memory
	Function 0: Deletes the specified record.
	Function 1: Stores data in the specified record.
	Function 2: Sends the data in the specified record
	Function 3: Sends the number of bytes of memory used.
	Function 4: Sends the number of bytes of remaining memory (unused area).
	Function 5: Transmits the key code list identifying the stored data.
	Function 6: Deletes all data in the NV user memory.
GS (D	Enable/disable real-time commands
GS (E	User setup commands
	Function 1: Enables user selection mode.
	Function 2: Terminates user selection mode (by software reset).
	Function 3: Selects memory switch values.
	Function 4: Sends memory switch values.
	Function 5: Enters customized values.
	Function 6: Sends customized values.
	Function 7: Copies user-defined page.
	Function 8: Defines data to character code pages in work area using column format.
	Function 9: Defines data to character code pages in work area using raster format.
	Function 10: Deletes the data from character code pages in work area.
	Function 11: Selects transmission settings for serial interface.
	Function 12: Sends transmission settings for serial interface.
	Function 48: Clear all set values of the paper layout.
	Function 49: Sets the paper layout.
	Function 50: Transmits the paper layout information.
GS (K	Select printing control method
	Function 48: Specifies the print control mode.
	Function 49: Specifies the print density.
	Function 50: Specifies the print speed.
	Function 97: Specifies the number of parts for energizing the head.
GS (L	Set graphics data
	Function 48: Transmits the NV graphics memory capacity.
	Function 50: Prints the graphics data in the print buffer.
	Function 51: Transmits the remaining capacity of the NV graphics memory.
	Function 64: Transmits the defined NV graphics key code list.
	Function 65: Deletes all NV graphics data.
	Function 66: Deletes the specified NV graphics data.
	Function 67: Defines the raster graphics data in the non-volatile memory.
	Function 69: Prints the specified NV graphics data.
	Function 112: Stores the raster graphics data in the print buffer memory.
GS (M	Customize printer control value(s)
	Function 1: Copies the settings stored in the active area to the storage area (save settings).
	Function 2: Copies the settings stored in the storage area to the active area (load settings).
	Function 3: Enables or disables automatic loading of the settings upon initialization.
GS (N	Select character style(s)
	Function 48: Selects character color.

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GS (k	Setup and print symbol
	Function 065: Sets the number of columns of the data area for PDF417.
	Function 066: Sets the number of rows of data area for PDF417.
	Function 067: Sets the module width of one PDF417 symbol to *n* dots.
	Function 068: Sets the module height.
	Function 069: Sets the error correction level for PDF417 symbols.
	Function 070: Specifies or cancels various PDF417 symbol options.
	Function 080: Stores symbol data in the PDF417 symbol storage area.
	Function 081: Prints the PDF417 symbol data in the symbol storage area.
	Function 082: Transmits the size of the symbol data in the symbol storage area.
	Function 165: Specifies the mode for QRCode symbol.
	Function 167: Sets the size of the QRCode symbol module.
	Function 169: Sets the error correction level for QRCode symbol.
	Function 180: Stores symbol data in the QRCode symbol storage area.
	Function 181: Prints the QRCode symbol data in the symbol storage area.
	Function 182: Transmits the size of the symbol data in the symbol storage area.
	Function 265: Specifies the mode for MaxiCode symbol.
	Function 280: Stores symbol data in the MaxiCode symbol storage area.
	Function 281: Prints the MaxiCode symbol data in the symbol storage area.
	Function 282: Transmits the size of the encoded symbol data in the symbol storage area.
GS *	Define downloaded bit image
GS /	Print downloaded bit image
GS :	Start/end macro definition
GS B	Turn white/black reverse printing mode on/off
GS C 0	Select counter print mode
GS C 1	Select count mode (A) (in label mode)
GS C 2	Set counter (in label mode)
GS C ;	Select count mode (B) (in label mode)
GS H	Select printing position of HRI characters
GS I	Transmit printer ID
GS L	Set left margin
GS P	Set horizontal and vertical motion units
GS T	Set print position to the beginning of print line
GS V	Select cut mode and cut paper
GS W	Set printing area width
GS \	Set relative vertical print position in page mode
GS ^	Execute macro
GS a	Enable/disable Automatic Status Back (ASB)
GS b	Turn smoothing mode on/off
GS c	Print counter
GS f	Select font for HRI characters
GS g 0	Initialize maintenance counter
GS g 2	Transmit maintenance counter
GS h	Set bar code height
GS k	Print bar code
GS r	Transmit status
GS v 0	Print raster bit image
GS w	Set bar code width

Kanji Command List

These commands are used only for the Japanese, Simplified Chinese, Traditional Chinese, or Korean model.

Command	Name
FS !	Set print model (s) for Kanji characters
FS &	Select Kanji character mode
FS (A	Select Kanji character style (s)
	Function 48: Select the type of the Kanji font.
FS -	Turn underline mode on/off for Kanji characters
FS .	Cancel Kanji character mode
FS 2	Define user-defined Kanji character
FS C	Select Kanji character code system
FS S	Set left-and right-side Kanji character spacing
FS W	Turn quadruple-size mode on/off for Kanji characters

FAQ List

The questions shown in the list below begin with "Q" and their replies with "A".

1. Look through sentences beginning with "Q" to find information relating to a question or problem.

2. Then follow the instructions described in the "A" sentence below it.

Abnormal Print Results

Q: The printer does not print according to selected program settings.

A: Check the hexadecimal dump to confirm whether data was properly received.

The hexadecimal dump is designed to output received data in its original format. Output the data from the hexadecimal dump and compare it with the sent data.

Confirmation procedure

1. Output the contents of the hexadecimal dump. (Refer to section below "Outputting content of hexadecimal dump. ")

2. Compare that with the sent data.

3. If the data from the hexadecimal dump matches the sent data, proceed to "Corrective Procedure" shown below.

Corrective procedure

Begin by confirming that correct command procedure was followed.
(Refer to the "ESC/POS Application Programming Guide. ")

Outputting content of hexadecimal dump

Use the following procedures to view the contents of the hexadecimal dump.

1. With the paper roll cover in an open state, press and hold the FEED button; then press the Power supply switch.

2. Close the paper roll cover.

The received data will now be printed in both hexadecimal and character formats.

3. When printing completes, power off the printer.

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Q: Print data dropout occurs.

A: Check the handshake process.

Data dropout can occur when the handshake between the host computer and the printer is not performed correctly. This can result in errors related to print buffer capacity.

Confirmation procedure

Use the following steps to check the handshake process.

1. Select a comparatively large volume of data for printing and send it to the printer.

2. Enabled the on-line state by opening the printer cover while the printer is printing.

3. Check the data send operation.

   • If data send terminates: Handshake process is normal

   • If data send continues: Handshake process is abnormal

4. In cases where the handshake process is found to be abnormal, follow the steps listed in Corrective Procedure shown below and re-enter host unit and printer settings so that they match.

Corrective procedure

1. Confirm the serial communication cable.
   Confirm the specification of cable connection. Refer to " Connection Form and Cables" on page 2-2.

2. Confirm serial communication condition.
   Confirm serial communication condition of printer and host.
      serial communication conditions
      • Baud rate
      • Parity
      • Flow control
      • Data length

Confirmation and setting of printer are as follows.

1. Confirm serial communication condition of the printer by self-test (see page 3-11).

2. Confirm the DIP SW 1-2.
   Printer serial communication condition can be set by DIP SW and memory switch. When power on the printer, DIP SW 1-2 select DIP SW setting or memory switch setting as initial communication condition. Selected setting is printed by self-test.

      DIP SW1-2 OFF: Used communication condition set by memory switch.
                   ON: Used communication condition set by DIP SW.

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3. Set communication condition
   When DIP SW1-2 is ON
   > Follow the procedure (see page 2-9) and set.

   When DIP SW1-2 is OFF
   > Follow the serial communication conditions (see page 2-11) and set. You can set either printer panel operation or GS (E.
   > Refer to "Operating Mode (Panel Switch Operation)" page 3-11

Q . Drawer Kick does not operate properly.

A . Drawer specifications differ depending on the manufacturer and the part number.

Refer to page "Drawer kick connector" in Appendix A and confirm connector pin assignments. Make sure that the specifications of the drawer to be used meet the following conditions before connecting it to the drawer kick-out connector. These conditions also apply to any other devices that use the drawer kick-out connector.
Any devices that do not satisfy all the following conditions must not be used.

[Conditions]

- A load must be provided between drawer kick-out connector pins 4 and 2 or between pins 4 and 5. (*1)

- When the drawer open/close signal is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (*2)

- The resistance of the load must be 24 W or more, or the input current must be 1 A or less. (*3)

- Be sure to use drawer kick-out connector pin 4 (24 V power output) to drive the device. Never connect any other power supply to the drawer kick-out connector. (*4)

NOTES:

(*1) Operating the printer with incorrectly installed devices voids the warranty.

(*2) Connecting devices other than the drawer open/close switch voids the warranty.

(*3) If a device with a resistance of less than 24 Ω or an input current of over 1 A is used, the resulting overcurrent may damage the device.

(*4) Connecting a power supply other than that specified voids the warranty.

Q. Unable to recover from recoverable error state even if executing DLE ENQ.

A. When the printer is BUSY state due to recoverable error, you cannot execute command. Check below points.

❏ Set Msw1-3 ON and condition to be BUSY is "When receive buffer full". (Default setting is OFF and condition to be BUSY is "When offline or receive buffer full".)
Refer to "Selecting conditions that invoke a BUSY State" in Chapter 3.

❏ Even if Msw1-3 is set ON, under receive buffer full condition Data cannot receive. Refer to "Notes on setting memory switch Msw1-3 to ON" in Chapter 3.

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Q. Unable to print a part of Page 0 (for example ▮, ▮, ▮*)on Visual Basic.*

A. When programming with Visual Basic, limitations prevent data from 81h through 9Fh and E0h through FEh from being sent as characters. However, you can use the following procedure to send this data.

```
Dim Send_ data(0) As Byte
Send_data(0) = &h81 '1 byte of sending data
MSComm1.Output = Send_data
```

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Appendix A
Interface And Connectors

RS-232 Serial Interface

Interface board specifications (RS-232 standard)

Item		Specifications
Data transfer method		Serial
Synchronization		Asynchronous
Handshake		Select one of the following using Dip switch 3 or the memory switches (switch operation/command "**GS (E**" operation). ❏ DTR/DSR ❏ XON/XOFF
Signal level	MARK	-3 V to -15 V logic "1" /On
	SPACE	+3 V to +15 V logic "0" /Off
Bit length		Select one of the following using Dip switch 4 or the memory switches (switch operation/command "**GS (E**" operation). ❏ 7 bit ❏ 8 bit
Baud rate		Select one of the following using Dip switchs 7/8 or the memory switches (switch operation/command "**GS (E**" operation). ❏ 115200 bps ❏ 57600 bps (cannot be set using the Dip switches) ❏ 38400 bps ❏ 19200 bps ❏ 9600 bps ❏ 4800 bps (cannot be set using the Dip switches) ❏ 2400 bps (cannot be set using the Dip switches) [bps: bits per second]
Parity check		Select one of the following using Dip switch 5 or the memory switches (switch operation/command "**GS (E**" operation). ❏ None ❏ Yes ❏ No
Parity selection		Select one of the following using Dip switch 6 or the memory switches (switch operation/command "**GS (E**" operation). ❏ Even ❏ Odd
Stop bit		1 or more bits However, the stop bit of the transfer data from the printer is fixed at 1 bit.
Connector	Printer side	Dsub-25pin (female) connector

Functions of each connector pin

Pin no.	Signal name	Signal direction	Function
1	FG	–	Frame ground
2	TXD	Output	Transfer data
3	RXD	Input	Reception data
4	RTS	Output	Memory Switch Msw 1-6 OFF: Same as DTR signal (Pin 20) Memory Switch Msw 1-6 ON: Logical product of DTR signals of DM-D and TM (If both are SPACE, the printer can receive data (SPACE).)
6	DSR	Input	This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data, and MARK indicates that the host computer cannot receive data. When DTR/DSR control is selected, the printer transmits data after confirming this signal. When XON/XOFF control is selected, the printer does not check this signal. Changing the memory switch 1-7 setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains MARK for 1 ms or more.
7	SG	–	Signal ground
20	DTR	Output	1) When DTR/DSR control is selected, this signal indicates whether the printer is busy. SPACE indicates that the printer is ready to receive data, and MARK indicates that the printer is busy. The busy condition can be changed by using memory switch 1-3. (Refer to Busy state on page 3-10) 2) When XON/XOFF control is selected: The signal indicates whether the printer is correctly connected and is ready to receive data. SPACE indicates that the printer is ready to receive data. The signal is always SPACE except in the following cases: • During the period from when the power is turned on to when the printer is ready to receive data. • During the self test
25	INIT	Input	Changing the memory switch 1-8 setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains SPACE for 1 ms or more.

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XON/XOFF

When XON/XOFF control is selected, the printer transmits XON or XOFF signals as follows. Transmit timing differs depending on the memory switch 1-3 setting.

	Printer status	Memory Switch 1-3	
		ON	OFF
XON	1) When the printer goes online after turning on the power (or reset using interface)	Transmit	Transmit
	2) When the receive buffer is released from the buffer full state	Transmit	Transmit
	3) When the printer switches from offline to online	—	Transmit
	4) When the printer recovers from an error using the **DLE ENQ 1** or **DLE ENQ 2** commands	—	Transmit
XOFF	5) When the receive buffer becomes full	Transmit	Transmit
	6) When the printer switches from online to offline	—	Transmit

Code

The XON/XOFF codes are shown below.

❏ XON code: <11>H

❏ XOFF code: <13>H

✎ *Note:*
When the printer goes from offline to online mode and the receive buffer is full, XON is not transferred.

When the printer goes from online to offline mode and the receive buffer is full, XOFF is not transferred.

When memory switch Msw 1-3 is off, XON is not transferred as long as the printer is offline even if a receive buffer full state has been cleared.

Resetting the printer using the interface

The printer can be reset using interface pins 6 and 25 by changing the DIP switch setting.

Reset Switching

Signal Line	Memory Switch	Reset Condition
Pin 6 (DSR)	MSW 1-7: ON	MARK level input
Pin 25 (INIT)	MSW 1-8: ON	SPACE or TTL-HIGH level input

To reset the printer, the following requirements must be satisfied.

❏ DC characteristics:

Reset DC Characteristics

		Pin 6 (DSR)	Pin 25 (INIT)
Input HIGHT voltage	VHI	-15 to +3 V	+2 to +15 V
Input LOW voltage	VIL	+3 to +15 V	-15 to + 0.8 V
Input HIGH current	IIH	-5.3 mA (maximum)	1 mA (maximum)
Input LOW current:	IIL	-5.0 mA (maximum)	-2 mA (maximum)
Input impedance:	RIN	3 kΩ (minimum)	

❏ AC characteristics:
Minimum reset pulse width:TRS 1 ms (minimum)

• When using pin 6 (DSR) (Msw 1-7 is ON):

Minimum Reset Pulse Width (pin 6)
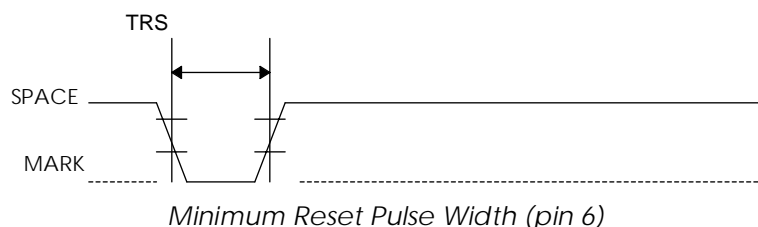
• When using pin 25 (INIT) (Msw 1-8 is ON):

Minimum Reset Pulse Width (pin 25)
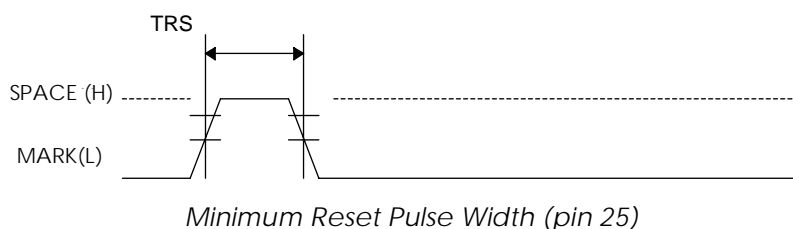
✎ *Note:*
When a signal that does not satisfy the requirements above is input, printer operation is not guaranteed.
When a signal is input to pin 25 (INIT) at the TTL level, the requirements above must also be satisfied.
Although a signal is input to pin 6 (DSR) at the TTL level, according to the DC characteristics described above, the operation is not guaranteed and pin 6 cannot be controlled.

When pin 6 (DSR) and pin 25 (INIT) are open, the printer is operating

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IEEE1284 Parallel Interface

Mode

The IEEE1284 parallel interface is comprised of the following two modes.

Mode	Communication direction	Other information
Compatibility Mode	Host → printer communication	Centronics standard
Reverse Mode	Printer → host communication	Assumes a data transfer from an asynchronous printer.

❏ Compatibility Mode

• Compatibility Mode is Data Transmission from Host to Printer: Centronics compatible.

• Specifications

Data transmission: 8-bit Parallel

Synchronization: Externally supplied nStrobe signals*

Handshaking: nAck and Busy signals*

Signal levels: TTL compatible

Connector: ADS-B36BLFDR176 (HONDA) or
                 equivalent (IEEE 1284 Type B)

Reverse communication(Printer Host):   Nibble or Byte Mode

* n before the signal name indicates active LOW.

❏ Reverse Mode

The status data transmission from the printer to the host proceeds in the Nibble or Byte mode.

This mode allows data transmission from the asynchronous printer under the control of the host.
Data transmissions in the Nibble Mode are made via the existing control lines in units of four bits (Nibble). In the Byte Mode, data transmissions proceed by making the eight-bits data lines bidirectional.
Both modes fail to proceed concurrently with the Compatibility Mode, thereby causing half duplex transmission.

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Interface Signals

Connector Pin Assignment

Pin	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	nStrobe	HostClk	HostClk
2	Host/Ptr	Data0(LSB)	Data0(LSB)	Data0(LSB)
3	Host/Ptr	Data1	Data1	Data1
4	Host/Ptr	Data2	Data2	Data2
5	Host/Ptr	Data3	Data3	Data3
6	Host/Ptr	Data4	Data4	Data4
7	Host/Ptr	Data5	Data5	Data5
8	Host/Ptr	Data6	Data6	Data6
9	Host/Ptr	Data7(MSB)	Data7(MSB)	Data7(MSB)
10	Printer	nAck	PtrClk	PtrClk
11	Printer	Busy	PtrBusy/Data3,7	PtrBusy
12	Printer	Perror	AckDataReq/Data2,6	AckDataReq
13	Printer	Select	Xflag/Data1,5	Xflug
14	Host	nAutoFd	HostBusy k	HostBusy
15		NC	ND	ND
16		GND	GND	GND
17		FG	FG	FG
18	Printer	Logic-H	Logic-H	Logic-H
19		GND	GND	GND
20		GND	GND	GND
21		GND	GND	GND
22		GND	GND	GND
23		GND	GND	GND
24		GND	GND	GND
25		GND	GND	GND
26		GND	GND	GND
27		GND	GND	GND
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	nInit	nInit	nInit
32	Printer	nFault	nDataAvail/Data0,4	nDataAvail
33		GND	ND	ND
34	Printer	DK_STATUS	ND	ND
35	Printer	+5V	ND	ND
36	Host	nSelectIn	1284-Active	1284-Ative

*NC : None Connect
ND : Not Defined

✎ *Note:*
A signal name prefixed by "n" indicates an "L" active signal.

Bidirectional communications cannot take place unless all signal names for both sides correspond to each other.

Connect all signal lines using twisted pair cable. Connect the return side to the signal ground level.

Make sure that the signals satisfy electrical characteristics.

Set the leading edge and trailing edge times to 0.5 ms or less.

Do not ignore nAck or BUSY signals during a data transfer. Ignoring such signals may result in data corruption.

Make the interface cables as short as possible.

Electrical characteristics

DC Characteristics (excluding logic-H, +5 V signals)

Characteristic item			Symbol	Standard		Condition
				Minimum value	Maximum value	
Output	Voltage	H level	VOH	* 2.4 V	5.5 V	*IOH = 0.32 mA
		L level	VOL	–0.5 V	* 0.4 V	*IOL = –12 mA
	Current	H level	IOH	0.32 mA	-	VOH = 2.4 V
		L level	IOL	–12 mA	-	VOL = 0.4 V
Input	Voltage	H level	VIH	2.0 V	-	
		L level	VIL	-	0.8 V	
	Current	H level	IIH	-	–0.32 mA	VIH = 2.0 V
		L level	IIL	-	12 mA	VIL = 0.8 V

LOGIC-H Signal Transfer Characteristics

Characteristic item			Symbol	Standard		Condition
				Minimum value	Maximum value	
Output	Voltage	H level	VOH	3.0 V	5.5 V	
		L level	VOL	-	2.0 V	During power off

+5 V Signal Transfer Characteristics

Characteristic item			Symbol	Standard		Condition
				Minimum value	Maximum value	
Output	Voltage	H level	VOH	* 2.4 V	5.5 V	*IOH = 0.32 mA
		L level	VOL	-	-**	During power off
	Current	H level	IOH	-	0.32 mA	VOH = 2.4 V
		L level	IOL	-**	-	During power off

* VO and IOL are not guaranteed during a power off condition.

** No guarantee is offered to VOL and IOL while the power is OFF.

Data Reception Timing (Compatibility Mode)
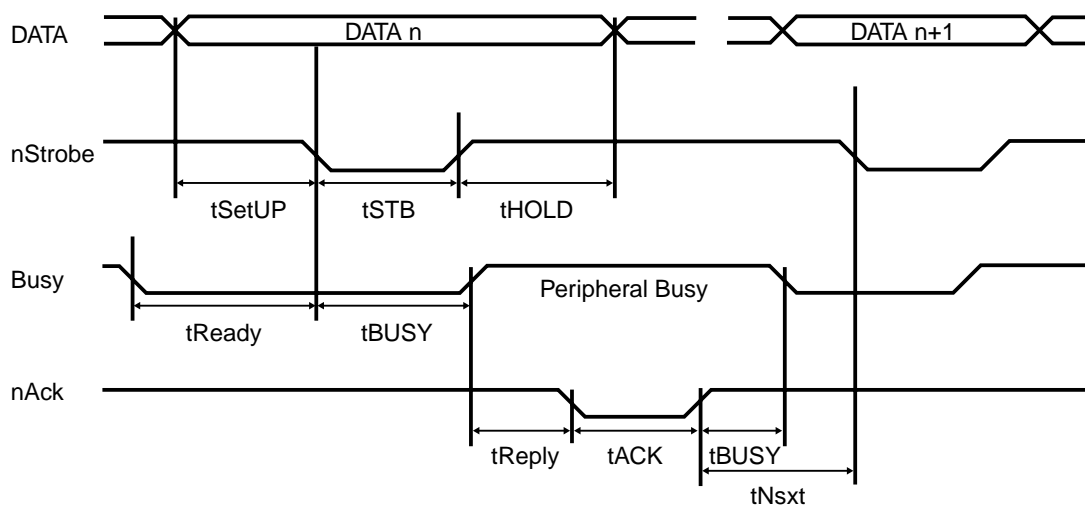
Characteristic item	Symbol	Requirement	
		Minimum [ns]	Maximum [ns]
Data hold time (host)	tHold	750	-
Data setup time	tSetup	750	-
Strobe pulse width	tSTB	750	-
Ready cycle idle time	tReady	0	-
BUSY output delay time	tBUSY	0	500
Data transfer time	tReply	0	•
ACKNLG pulse width	tACK	500	10 ms
BUSY release time	tnBUSY	0	•
ACK cycle idle time	tNext	0	-

The printer latches data at the rising edge of the nStrobe signal.

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Resetting the printer through the interface

When the printer is reset through the interface nInit signal (#31 pin) in compatibility mode, satisfy the following characteristics, however, note that the reset signal is ignored in Reverse Mode (#36 pin nSelectIn (1284-Active:"H").

- DC Characteristics   TTL level

- AC Characteristics   Minimum reset pulse width TR: 50 µs (minimum)

```
nSelectIn
(1284-Active)          min.0  |←→|←————————→|  min.1 ms

nInit                                  min.50 µ s
                              |←————→|
                                 TR
```
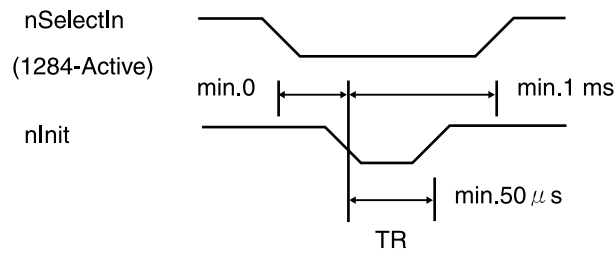
Status transfer from printer

In the bidirectional parallel interface, status signals can be transferred from the printer using the bidirectional function of the IEEE1284 Nibble/Byte modes.

✎ *Note:*

In this case, different from in the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled and thus precautions must be taken for the following;

- *The allowable capacity of the printer internal buffer is 99 bytes (except ASB status). The status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data accept data (Reverse Mode).*

- *When ASB is used, the host is preferably in the wait state for accepting data (Reverse Idle Mode). When this state is not available, the host shall enter the Reverse Mode to always monitor the presence of data.*

- *When ASB is used in the Reverse Mode, preference shall be given to the ASB status for transmission over the other status signals. Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmission shall be transmitted together at a time as one ASB status, showing the presence of change, followed by the latest ASB status.*

❏ Example:

Normal ASB status (standby) are shown below.

Status 1	Status 2	Status 3	Status 4
0001 0000	0000 0000	0000 0000	0000 1111

The following data is accumulated when near end detection, R cover open and R cover closed occur in stated order.

	Status 1	Status 2	Status 3	Status 4	
①	0001 0000	0000 0000	0000 0011	0000 1111	Near end detection
②	0011 1000	0000 0000	0000 0011	0000 1111	Cover open
③	0001 0000	0000 0000	0000 0011	0000 1111	Cover closed

If an ASB status is received after this, the combined ASBs (①+②+③) and the latest ASB (③), a total of 8 bytes is transferred.

Status 1	Status 2	Status 3	Status 4	
0011 1000	0000 0000	0000 0011	0000 1111	ASB (①+②+③)
0001 0000	0000 0000	0000 0011	0000 1111	Latest ASB

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Connectors Specifications

Power Supply Connector

This connector is used to connect the printer to an external power source.

Pin assignments

Power Supply Connector Pin Assignments

Pin Number	Signal Name
1	+24 VDC
2	GND
3	NC
Shell	Frame GND
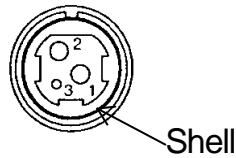
Power Supply Connector

✎ *Note:*
Make sure to ground the frame GND with the screw hole for the frame GND on the metal plate of the interface connector.

Connector model

❏ Printer side: Hosiden TCS7960-532010 or equivalent

❏ User side: Hosiden TCP8927-631100 or equivalent
Hosiden TCP8927-531100 or equivalent
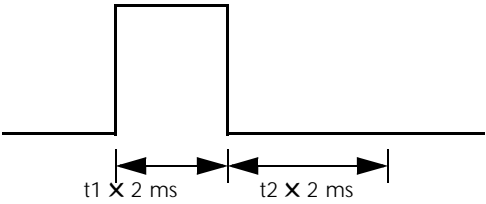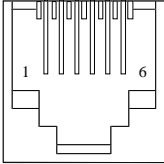
Drawer kick connector

Pulses specified using the **ESC p** command are output to this connector. The host computer uses **DLE EOT**, **GS a** (ASB), or **GS r** commands to detect the status of the input signal.

Specifications

Drawer Kick Connector Specifications

Item		Specifications
Pin arrangement		See the "Drawer Kick Connector Pin Arrangement" table.
Model number	Printer side	DDK 285D-7660J-100 (or equivalent product)
	User side	6 pole, 6 pin (RJ12 telephone connector)
Drawer kick drive signal	Output voltage	Approx. 24 V
	Output current	1 A or less
	Output waveform

t1 ✕ 2 ms   t2 ✕ 2 ms

This waveform is output to points A and B in the connector circuit diagram. (On time t1 and off time t2 are selected using **ESC p**.) |
| Drawer open/close signal | Input signal level (connector pin 3) | "L"= 0 — 0.8 V
"H"= 2 — 5 V |
| Connector Configuration | External view | |

Drawer Kick Connector Pin Arrangement

Pin #	Signal name	Direction
1	Frame ground	—
2	Drawer kick drive signal 1	Output
3	Drawer kick open/close signal	Input
4	+24V	—
5	Drawer kick drive signal 2	Output
6	Signal ground	—

✎ *Note:*
Pin 4 outputs +24 V when the power is on. Do not use this for purposes other than operating the drawer.

Connector circuit

Drawer kick connector

Shielded type

Drawer kick solenoid

F. G

1

2

A

P-GND

3

+24V   4

5

B

OPEN/CLOSE
SW

P-GND

6

Printer Side   User side (drawer side)
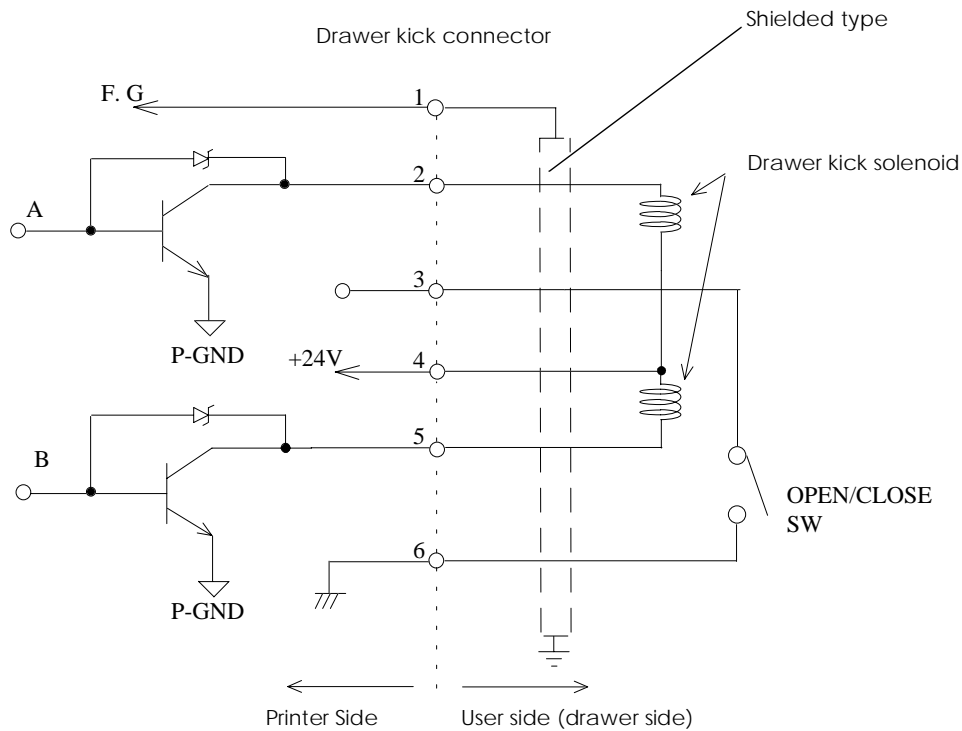
✎ *Note:*

The following restrictions apply to the drawer kick connector.

- *Be sure to use resistance of 24 Ω or greater for the drawer solenoid. If less than 24 Ω, overcurrent can develop that will burn out the solenoid.*

- *Use shielded cable for the drawer connector cable.*

- *Two drives cannot be operated at the same time.*

- *Do not operate the drawer on a continuous basis.*

- *Make sure to use the printer power supply (4 pin connector) as the drawer power supply.*

- *Do not connect a standard telephone line to the drawer kick connector.*

Appendix B
Option and Consumable Products

Paper Roll

Paper specification is shown below.

Paper specifications

Paper type	Specified thermal paper ❏ Receipt paper without back mark ❏ Receipt paper with back mark ❏ Label (face stock) paper
Form	Roll
Paper width	Select from the following options. ❏ 79.5 mm ± 0.5 mm ❏ 59.5 mm ± 0.5 mm ❏ 57.5 mm ± 0.5 mm ❏ 37.5 mm ± 0.5 mm
Core	Inside: 25.4 mm {1.00"} Outside: 31.4 mm {1.24"}
External size	Roll diameter: Maximum 90 mm {3.54"} Take-up paper roll width: 80, 60, 38, +0.5/-1.0 mm

✎ *Note:*
Standard of roll core varies. Paper roll near end detector can not detect remaining amount of paper roll precisely.

Specified roll paper type No.

Receipt	Paper width			Original paper
	80 mm {3.15"}	60 mm {2.36"}	38 mm {1.50"}	
Monochrome thermal roll paper	ENTPD080090	---	---	TF60KS-E
Monochrome thermal roll paper (thickness type)	ENTPE080090	---	---	TF11KS-ET
Two-color thermal roll paper	ENTPC080090	---	---	PD750R

Label (face stock)	Length of label	Liner width			Original paper
		80 mm {3.15"}	60 mm {2.36"}	38 mm {1.50"}	
Monochrome label (face stock) paper	25 mm {1"}	ENTLA080090025	ENTLA060090025	ENTLA038090025	
	51 mm {2"}	ENTLA080090051	ENTLA060090051	---	
	76 mm {3"}	ENTLA080090076	ENTLA060090076	---	
	102mm {4"}	ENTLA080090102	ENTLA060090102	---	
Two-color label (face stock) paper	25 mm {1"}	ENTLB080090025	ENTLB060090025	ENTLB038090025	
	51 mm {2"}	ENTLB080090051	ENTLB060090051	---	
	76 mm {3"}	ENTLB080090076	ENTLB060090076	---	
	102mm {4"}	ENTLB080090102	ENTLB060090102	---	

✎ *Note:*

To ensure print quality, be sure to use the specified paper.

Refer to "Notes on using two-color thermal paper" on page B-3 of this section for notes on using two-color thermal paper.

Print quality may be reduced if labels (face stock) are used for high ratio printing, such as full dot or outline character printing.

Specified original paper type No

The following original paper can be used for receipt:
(Paper marked with * is a specified roll paper.)

❏ Monochrome thermal roll paper:
   *TF60KS-E (paper thickness: 75 μm)   Nippon Paper Industries Co., Ltd.
   *TF11KS-ET (paper thickness: 145 μm)   Nippon Paper Industries Co., Ltd.
   TF50KS-E (paper thickness: 65 μm)   Nippon Paper Industries Co., Ltd.
   PD160R (paper thickness: 75 μm)   Oji Paper Mfg. Co., Ltd.
   P350 (paper thickness: 62 μm)   Kanzaki Specialty Paper (USA)
   KF50 (paper thickness: 62 μm)   KANZAN Spezialpapiere GmbH ・29
                                              (Germany)

❏ Two-color thermal roll paper:
   *PD750R (paper thickness: 75 μm)   Oji Paper Mfg. Co., Ltd.

Notes on using two-color thermal paper

❏ Two-color printing is performed using a two-color thermal paper, if the two-color print is selected by the customized value setting with Function 5 of the GS (E command.

❏ There may be some cases where the print color may not be clear depending on the print pattern.

❏ The reliability when two-color thermal paper is used differs from the reliability when monochrome thermal paper is used. Refer to "Reliability" on page 1-16 for details.

Paper roll spool diameter

❏ Inside: 25.4 mm {1.00"}

❏ Outside: 31.4 mm {1.24"}

✎ *Note:*
Paper must not be pasted to the paper roll spool.

Print density adjustment

For best print quality and reliability, select the proper print density for the paper type used. See the table below. If the density levels shown in the table are exceeded, "Reliability" on page 1-16 cannot be guaranteed. Print density can be set with a software command.

Roll Paper No.	Original Paper No.	Density Level
	P350	× 0.9
	KF50	× 0.95
ENTPC series ENTPD series	TF60KS-E, TF50KS-E, PD750R	× 1.0
ENTPE series	PD160R, TF11KS-ET	× 1.05
ENTLA series ENTLB series		× 1.3

Paper to use for high speed

If any one of the following types of thermal paper is used, the customized value setting can be used to set the maximum print speed to 150 mm/s {5.91"/s} (level 9):

- ENTLA series
- TF60KS-E
- PD160R
- TF50KS-E
- P350
- KF50

Requirement for label length
(when labels (without black marks) or labels (with black marks) are used.)

30.4–106.6

25.4–101.6

[Units: mm]
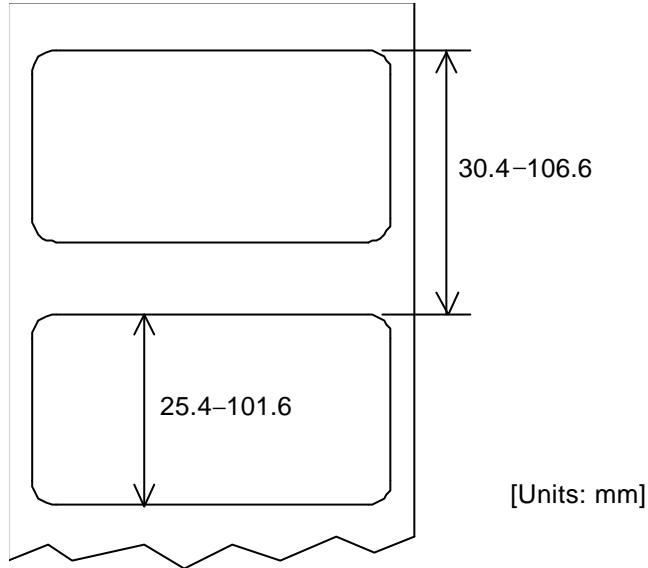
Requirement for Label Length

Requirement for black mark intervals
(when receipt paper (with black marks) is used.)

Back (non-printing face)

Preprintable area

15
or
more

40 – 160

Paper feeding
direction

[Units: mm]
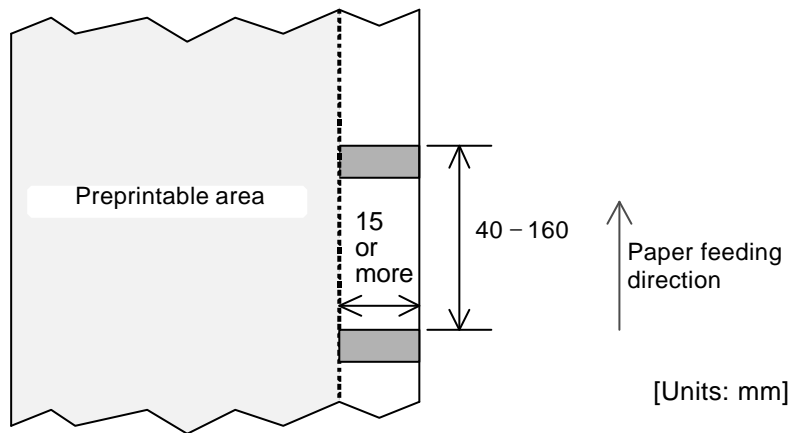
Requirement for Black Mark Intervals

*Requirement for black mark position
(when labels (with black marks) are used.)_E29*

Back (non-printing face)

Paper feeding
direction

4

5

15 or more

[Units: mm]
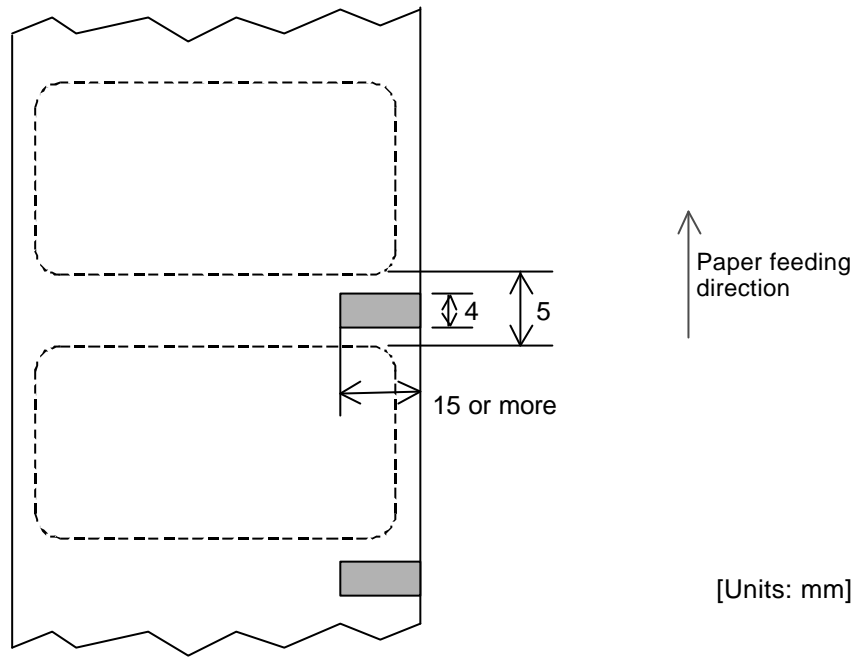
Requirement for Black Mark Position

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Power supply:

❏ PS-170, PS-180

PS-170

Electrical characteristics

❏ Input Conditions

Input voltage (rating):	90 to 264 VAC
	(100VAC -10 % to 230VAC +15 %)
Frequency (rating)	50 to 60 Hz ± 3Hz
Input current (rating):	100 VA
AC switch	None
Energizing LED	None

❏ Output Conditions

Output voltage (rating):	24 VDC ± 5%
Output voltage (rating):	2.0 A
Output electric power (rating):	48 W
Output peak current:	4.5 A (within 300 msec)

Case specification

❏ Size: 80 mm(D) ✕ 166 mm (L) ✕ 44 mm (H) (excluding projections)Refer to figure below.

❏ Weight: Approx. 0.52 kg (excluding the AC cable)
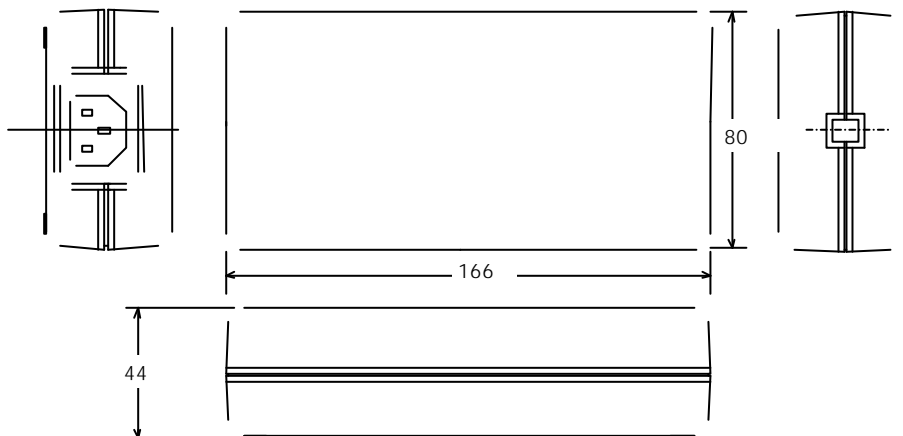
❏ Material: Flame-resistance grade: V0

❏ Color: Black(mat)

Case specification

Material

No specific brominated flame retardants such as PBBE, PBB are used in this product.

AC cable selection

❏ Select an AC cable which satisfies following conditions.

• Safety Standard product

• Plug with P.E terminal

❏ The AC cable is not included in the package.

PS-180

Electrical characteristics

❏ Input Conditions

Input voltage (rating):	90 to 264 VAC
	(100 VAC -10% to 230 VAC +15%)
Frequency (rating):	47 Hz to 63 Hz
Input current (rating):	100VA
AC switch	None
Energizing LED	None

❏ Output Conditions

Output voltage (rating):	24 VDC ± 5%
Output Current (rating):	2.0 A
Output electric power (rating):	48 W
Output peak current:	4.5 A (within 300ms on 6/1 duty)

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Case specification

- ❏ Size: 68mm(D) × 136mm(L) × 32mm(H) (excluding projections)
Refer to figure below.

- ❏ Mass: Approx. 0.4kg (excluding the AC cable)
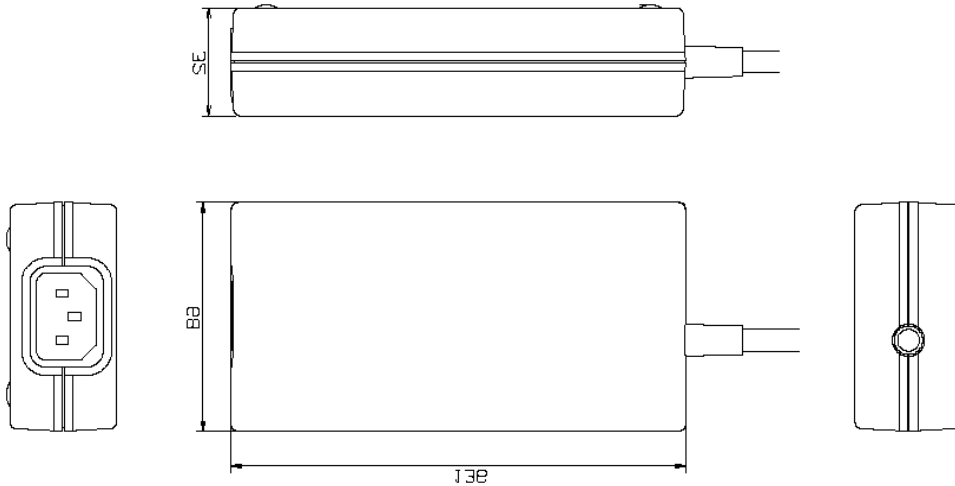
- ❏ Material: Flame-resistance grade: V0

- ❏ Color: Black (mat)

Case specification

Material

No Specific brominated flame retardants such as PBBE, PBB are used in this product.

DC cable

- ❏ Connector: TCP8927-63-1110(HOSHIDEN) equivalent product

- ❏ Cable: 2-wire shielded (AWG 18)

- ❏ Length: Approx. 1500mm +100∕-0 mm

- ❏ Pin assignment   No.1=+24V
No.2=GND
No.3=N.C.
SHELL=shielded(F.G.)

Usage cautions

- ❏ AC cableSelect an AC cable which satisfies following conditions

  - • Safety Standards product
  - • Plug with P.E. terminal
- ❏ Ground connectionCertainly ground for safety

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Appendix C

Character Code Table

Page 0 (PC437: USA, Standard Europe) (International character set: when America is selected.)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0 0000	NUL (00)	DLE (16)	SP (32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	░ (176)	└ (192)	╨ (208)	α (224)	≡ (240)
1 0001	(01)	XON (17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	æ (145)	í (161)	▒ (177)	┴ (193)	╤ (209)	ß (225)	± (241)
2 0010	(02)	(18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	╥ (210)	Γ (226)	≥ (242)
3 0011	(03)	XOFF (19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	╙ (211)	π (227)	≤ (243)
4 0100	EOT (04)	(20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	╘ (212)	Σ (228)	⌠ (244)
5 0101	ENQ (05)	(21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	à (133)	ò (149)	Ñ (165)	╡ (181)	┼ (197)	╒ (213)	σ (229)	⌡ (245)
6 0110	(06)	(22)	& (38)	6 (54)	F (70)	V (86)	f (102)	v (118)	å (134)	û (150)	ª (166)	╢ (182)	╞ (198)	╓ (214)	µ (230)	÷ (246)
7 0111	(07)	(23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	ù (151)	º (167)	╖ (183)	╟ (199)	╫ (215)	τ (231)	≈ (247)
8 1000	BS (08)	(24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ê (136)	ÿ (152)	¿ (168)	╕ (184)	╚ (200)	╪ (216)	Φ (232)	° (248)
9 1001	(09)	(25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	⌐ (169)	╣ (185)	╔ (201)	┘ (217)	Θ (233)	∙ (249)
A 1010	LF (10)	(26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Ω (234)	· (250)
B 1011	(11)	ESC (27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ï (139)	¢ (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	δ (235)	√ (251)
C 1100	FF (12)	FS (28)	, (44)	< (60)	L (76)	\ (92)	l (108)		(124)	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	∞ (236)	ⁿ (252)
D 1101	CR (13)	GS (29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ì (141)	¥ (157)	¡ (173)	╜ (189)	═ (205)	▌ (221)	φ (237)	² (253)
E 1110	(14)	(30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	₧ (158)	« (174)	╛ (190)	╬ (206)	▐ (222)	ε (238)	■ (254)
F 1111	(15)	(31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	SP (127)	Å (143)	ƒ (159)	» (175)	┐ (191)	╧ (207)	▀ (223)	∩ (239)	SP (255)

Page 1 (Katakana)

HEX		8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	─ 128	⊥ 144	SP 160	─ 176	タ 192	ﾐ 208	= 224	× 240
1	0001	━ 129	┬ 145	° 161	ア 177	チ 193	ム 209	╞ 225	円 241
2	0010	■ 130	┤ 146	「 162	イ 178	ツ 194	メ 210	╪ 226	年 242
3	0011	■ 131	├ 147	」 163	ウ 179	テ 195	モ 211	╡ 227	月 243
4	0100	■ 132	─ 148	、 164	エ 180	ト 196	ヤ 212	◢ 228	日 244
5	0101	■ 133	─ 149	・ 165	オ 181	ナ 197	ユ 213	◣ 229	時 245
6	0110	■ 134	│ 150	ヲ 166	カ 182	ニ 198	ヨ 214	◥ 230	分 246
7	0111	■ 135	│ 151	ァ 167	キ 183	ヌ 199	ラ 215	◤ 231	秒 247
8	1000	│ 136	┌ 152	ィ 168	ク 184	ネ 200	リ 216	♠ 232	〒 248
9	1001	│ 137	┐ 153	ゥ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	1010	▌ 138	└ 154	ェ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	1011	▌ 139	┘ 155	ォ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	1100	▌ 140	⌐ 156	ャ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	1101	▌ 141	╮ 157	ュ 173	ス 189	ヘ 205	ン 221	○ 237	人 253
E	1110	▌ 142	╲ 158	ョ 174	セ 190	ホ 206	゛ 222	／ 238	▒ 254
F	1111	┼ 143	╱ 159	ッ 175	ソ 191	マ 207	゜ 223	＼ 239	SP 255

Page 2 (PC850: Multilingual)

HEX		8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	▓ 176	└ 192	ð 208	Ó 224	─ 240
1	0001	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	= 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	0110	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	, 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	└ 200	Ï 216	Þ 232	° 248
9	1001	ë 137	Ö 153	® 169	╣ 185	┌ 201	┘ 217	Ú 233	¨ 249
A	1010	è 138	Ü 154	¬ 170	║ 186	┴ 202	┌ 218	Û 234	· 250
B	1011	ï 139	ø 155	½ 171	┐ 187	┬ 203	■ 219	Ù 235	¹ 251
C	1100	î 140	£ 156	¼ 172	┘ 188	├ 204	■ 220	ý 236	³ 252
D	1101	ì 141	Ø 157	¡ 173	¢ 189	= 205	¦ 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	┼ 206	Ì 222	─ 238	■ 254
F	1111	Å 143	ƒ 159	» 175	┐ 191	¤ 207	■ 223	´ 239	SP 255

Confidential

Page 3 (PC860: Portuguese)

HEX	BIN	8 1000	9 1001	A 1010	B 1011	C 1100	D 1101	E 1110	F 1111
0	0000	Ç 128	É 144	á 160	░ 176	└ 192	┴ 208	α 224	≡ 240
1	0001	ü 129	À 145	í 161	▒ 177	┴ 193	┬ 209	ß 225	± 241
2	0010	é 130	È 146	ó 162	▓ 178	┬ 194	┬ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	└ 211	π 227	≤ 243
4	0100	ã 132	õ 148	ñ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5	0101	à 133	ò 149	Ñ 165	╡ 181	┼ 197	┌ 213	σ 229	⌡ 245
6	0110	Á 134	Ú 150	ª 166	┤ 182	├ 198	┌ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	º 167	┐ 183	├ 199	┼ 215	τ 231	≈ 247
8	1000	ê 136	Ì 152	¿ 168	┐ 184	└ 200	┼ 216	Φ 232	° 248
9	1001	Ê 137	Õ 153	Ò 169	┤ 185	┌ 201	┘ 217	θ 233	∙ 249
A	1010	è 138	Ü 154	¬ 170	║ 186	┴ 202	┌ 218	Ω 234	· 250
B	1011	Í 139	¢ 155	½ 171	┐ 187	┬ 203	■ 219	δ 235	√ 251
C	1100	Ô 140	£ 156	¼ 172	┘ 188	├ 204	▪ 220	∞ 236	^{n} 252
D	1101	ì 141	Ù 157	¡ 173	┘ 189	═ 205	▌ 221	ø 237	^{2} 253
E	1110	Ã 142	₧ 158	« 174	┘ 190	┼ 206	▐ 222	∈ 238	■ 254
F	1111	Â 143	Ó 159	» 175	┐ 191	┴ 207	▪ 223	∩ 239	SP 255

none
none


Confidential

Page 4 (PC863: Canadian-French)

HEX		8	9	A	B	C	D	E	F
HEX	**BIN**	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	¦ 160	▓ 176	└ 192	⊥ 208	α 224	≡ 240
1	0001	ü 129	È 145	´ 161	▓ 177	⊥ 193	┬ 209	ß 225	± 241
2	0010	é 130	Ê 146	ó 162	▓ 178	┬ 194	┬ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	⌐ 211	π 227	≤ 243
4	0100	Â 132	Ë 148	¨ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5	0101	à 133	Ï 149	¸ 165	╡ 181	┼ 197	┌ 213	σ 229	⌡ 245
6	0110	¶ 134	û 150	³ 166	╢ 182	├ 198	┌ 214	µ 230	÷ 246
7	0111	ç 135	ù 151	─ 167	┐ 183	├ 199	┼ 215	τ 231	≈ 247
8	1000	ê 136	¤ 152	Î 168	╕ 184	└ 200	┼ 216	Φ 232	° 248
9	1001	ë 137	Ô 153	⌐ 169	╣ 185	┌ 201	┘ 217	θ 233	• 249
A	1010	è 138	Ü 154	¬ 170	║ 186	⊥ 202	┌ 218	Ω 234	· 250
B	1011	ï 139	¢ 155	½ 171	╗ 187	┬ 203	■ 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	├ 204	▬ 220	∞ 236	ⁿ 252
D	1101	= 141	Ù 157	¾ 173	┘ 189	═ 205	▌ 221	ø 237	² 253
E	1110	À 142	Û 158	« 174	┘ 190	┼ 206	▐ 222	∈ 238	■ 254
F	1111	§ 143	ƒ 159	» 175	┐ 191	⊥ 207	▬ 223	∩ 239	SP 255

Page 5 (PC865: Nordic)

HEX		8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	░ 176	└ 192	⊥ 208	α 224	≡ 240
1	0001	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5	0101	à 133	ò 149	Ñ 165	╡ 181	┼ 197	┌ 213	σ 229	⌡ 245
6	0110	å 134	û 150	ª 166	╢ 182	╞ 198	┌ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	º 167	╖ 183	╟ 199	┼ 215	τ 231	≈ 247
8	1000	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	θ 233	• 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	1011	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	1101	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	1110	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	1111	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▄ 223	∩ 239	SP 255

Confidential

Page 16 (WPC1252)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	€ 128	SP 144	SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	0001	SP 129	' 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	‚ 130	' 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	0011	ƒ 131	" 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	„ 132	" 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	… 133	• 149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	0110	† 134	– 150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	1000	ˆ 136	˜ 152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	1001	‰ 137	™ 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	1010	Š 138	š 154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	‹ 139	› 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	SP 141	SP 157	173	½ 189	Í 205	Ý 221	í 237	ý 253
E	1110	Ž 142	ž 158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SP 143	Ÿ 159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

Page 17 (PC866: Cyrillic #2)

HEX	HEX BIN	8 1000	9 1001	A 1010	B 1011	C 1100	D 1101	E 1110	F 1111
0	0000	А 128	Р 144	а 160	176	192	208	р 224	Ё 240
1	0001	Б 129	С 145	б 161	177	193	209	с 225	ё 241
2	0010	В 130	Т 146	в 162	178	194	210	т 226	Є 242
3	0011	Г 131	У 147	г 163	179	195	211	у 227	є 243
4	0100	Д 132	Ф 148	д 164	180	196	212	ф 228	Ї 244
5	0101	Е 133	Х 149	е 165	181	197	213	х 229	ї 245
6	0110	Ж 134	Ц 150	ж 166	182	198	214	ц 230	Ў 246
7	0111	З 135	Ч 151	з 167	183	199	215	ч 231	ў 247
8	1000	И 136	Ш 152	и 168	184	200	216	ш 232	° 248
9	1001	Й 137	Щ 153	й 169	185	201	217	щ 233	• 249
A	1010	К 138	Ъ 154	к 170	186	202	218	ъ 234	· 250
B	1011	Л 139	Ы 155	л 171	187	203	219	ы 235	√ 251
C	1100	М 140	Ь 156	м 172	188	204	220	ь 236	№ 252
D	1101	Н 141	Э 157	н 173	189	205	221	э 237	¤ 253
E	1110	О 142	Ю 158	о 174	190	206	222	ю 238	254
F	1111	П 143	Я 159	п 175	191	207	223	я 239	SP 255

Page 18 (PC852: Latin2)

HEX	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⊞ 176	└ 192	đ 208	Ó 224	240
1	0001	ü 129	Ĺ 145	í 161	▬ 177	┴ 193	Đ 209	ß 225	″ 241
2	0010	é 130	Í 146	ó 162	■ 178	┬ 194	Ď 210	Ô 226	˛ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ń 227	ˇ 243
4	0100	ä 132	ö 148	Ą 164	┤ 180	─ 196	ď 212	ń 228	˘ 244
5	0101	ů 133	Ľ 149	ą 165	Á 181	┼ 197	Ň 213	ň 229	§ 245
6	0110	ć 134	ľ 150	Ž 166	Â 182	Ă 198	Í 214	Š 230	÷ 246
7	0111	ç 135	Ś 151	ž 167	Ě 183	ă 199	Î 215	š 231	¸ 247
8	1000	ì 136	ś 152	Ę 168	Ş 184	└ 200	ě 216	Ŕ 232	° 248
9	1001	ë 137	Ö 153	ę 169	╣ 185	┌ 201	┘ 217	Ú 233	¨ 249
A	1010	Ö 138	Ü 154	170	║ 186	┴ 202	┌ 218	ŕ 234	· 250
B	1011	ö 139	Ť 155	ź 171	┐ 187	┬ 203	■ 219	Ũ 235	ũ 251
C	1100	î 140	ť 156	Č 172	┘ 188	├ 204	▄ 220	ý 236	Ř 252
D	1101	Ź 141	Ł 157	ş 173	Ż 189	═ 205	Ţ 221	Ý 237	ř 253
E	1110	Ä 142	× 158	« 174	ż 190	╬ 206	Ů 222	ţ 238	■ 254
F	1111	Ć 143	č 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

Page 19 (PC858: Euro)

HEX	8	9	A	B	C	D	E	F
HEX BIN	1000	1001	1010	1011	1100	1101	1110	1111
0 0000	Ç 128	É 144	á 160	░ 176	└ 192	ð 208	Ó 224	─ 240
1 0001	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
2 0010	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	= 242
3 0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4 0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5 0101	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6 0110	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7 0111	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8 1000	ê 136	ÿ 152	¿ 168	© 184	└ 200	Ï 216	Þ 232	° 248
9 1001	ë 137	Ö 153	® 169	┤ 185	┌ 201	┘ 217	Ú 233	¨ 249
A 1010	è 138	Ü 154	¬ 170	│ 186	┴ 202	┌ 218	Û 234	· 250
B 1011	ï 139	ø 155	½ 171	┐ 187	┬ 203	█ 219	Ù 235	¹ 251
C 1100	î 140	£ 156	¼ 172	┘ 188	├ 204	▄ 220	ý 236	³ 252
D 1101	ì 141	Ø 157	¡ 173	¢ 189	= 205	¦ 221	Ý 237	² 253
E 1110	Ä 142	× 158	« 174	¥ 190	╪ 206	Ì 222	─ 238	■ 254
F 1111	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

Page20 (Thai character code 42)

	8	9	A	B	C	D	E	F
0	⌐	๐		ฆ	ย	เ	่	๛
1	¬	๑	ก	ฌ	ร	แ	้	๎
2	└	๒	ข	ฎ	ฤ	โ	๊	๎
3	┘	๓	ค	ฏ	ล	ใ	＋	๎
4	│	๔	ม	ฐ	ว	ไ	๋	๎
5	─	๕	ฆ	ฑ	ศ	ๅ	･	๎
6	├	๖	จ	ธ	ษ	ๆ	๎	๎
7	┤	๗	ฉ	น	ส	๎	๎	๎
8	┴	๘	ช	บ	ห	๎	๎	๎
9	┬	๙	ซ	ป	ฬ	๎	๎	๎
A	＋	ฃ	ฌ	ผ	อ	๎	๎	๎
B	█	ฅ	ญ	ฝ	ฮ	๎	๎	๎
C	←	ฆ	ฎ	พ	๎	๎	๎	๎
D	↑	ฆ	ฏ	ฟ	ฦ	๎	๎	๎
E	→	๎	ฐ	ภ	ๅ	๎	๎	๎
F	↓	ฆ	ฑ	ม	ๅ	๎	๎	

Page21 (Thai character code 11)

	8	9	A	B	C	D	E	F
0	ุ	ฺ	เ	ฐ	ภ	็	เ	๐
1	ู	ฺ	ก	ฑ	ม	่	แ	๑
2	ฺ	ฺ	ข	ฒ	ย	า	โ	๒
3	ฺ	ฺ	ฃ	ณ	ร	ำ	ใ	๓
4	ฺ	ฺ	ค	ด	ฤ	◠	ไ	๔
5	ฺ	ฺ	ฅ	ต	ล	◠	ๅ	๕
6	ฺ	ฺ	ฆ	ถ	ฦ	◠	ๆ	๖
7	ฺ	ฺ	ง	ท	ว	◡	๎	๗
8	ฺ	ฺ	จ	ธ	ศ	่	๏	๘
9	ฺ	ก	ฉ	น	ษ	้	ฺ	๙
A	ฺ	ᒐ	ช	บ	ส	์	ฺ	๚
B	ฺ	L	ซ	ป	ห	—	+	๛
C	ฺ	┘	ฌ	ผ	ฬ	⊥	ฺ	ฺ
D	ฺ	│	ญ	ฝ	อ	T	๐	๑
E	ฺ	├	ฎ	พ	ฮ	+	ฺ	ฺ
F	ฺ	┤	ฏ	ฟ	ฯ	฿	๏	

Page22 (Thai character code 13)

	8	9	A	B	C	D	E	F
0		ฺ		ฐ	ภ	ั	เ	๐
1	่	้	ก	ฑ	ม	็	แ	๑
2	้	๊	ข	ฒ	ย	ๅ	โ	๒
3	๊	๋	ฃ	ณ	ร	า	ใ	๓
4	๋		ค	ด	ฤ	ฺ	ไ	๔
5		ฺ	ฅ	ต	ล	ฺ	า	๕
6	ฺ	้	ฆ	ถ	ฦ	ฺ	ๅ	๖
7	ฺ	๊	ง	ท	ว	ฺ	ๅ	๗
8	ฺ	๋	จ	ธ	ศ	ฺ	ฯ	๘
9	ฺ		ฉ	น	ษ	ฺ	ฺ	๙
A		ฺ	ช	บ	ส	ฺ	ฺ	๚
B	ฺ	้	ซ	ป	ห	ฺ	ฺ	๛
C	ฺ	๊	ฌ	ผ	ฬ	ฺ	ฺ	←
D	ฺ	๋	ญ	ฝ	อ	ฺ	ฺ	↑
E	ฺ		ฎ	พ	ฮ	เ	ฺ	→
F	ฺ		ฏ	ฟ	ๆ	฿	๏	↓

Page23 (Thai character code 14)

	8	9	A	B	C	D	E	F
0	┌	ਦ		ฐ	ภ	ั	เ	๐
1	ไ	ๆ	ก	ฑ	ม	ุ	แ	๑
2	∟	้	ข	ฒ	ย	า	โ	๒
3	┘	๊	ฃ	ณ	ร	ำ	ใ	๓
4	│	๋	ค	ด	ฤ	ฺ	ไ	๔
5	─	๎	ฅ	ต	ล	ฺ	ๅ	๕
6	├	ฺ	ฆ	ถ	ฦ	ฺ	ๆ	๖
7	┤	ึ	ง	ท	ว	ฺ	ฯ	๗
8	┴	ฺ	จ	ธ	ศ	่	,	๘
9	┬	๋	ฉ	น	ษ	้	ฺ	๙
A	┼	ฺ	ช	บ	ส	·	ฺ	๚
B	▮	ฺ	ซ	ป	ห	ฺ	+	ฺ
C	ฺ	ฺ	ฌ	ผ	ฬ	ฺ	๏	ฺ
D	ฺ	ฺ	ญ	ฝ	อ	ฺ	๐	ฺ
E	ฺ	ฺ	ฎ	พ	ฮ	ฺ	๛	ฺ
F	ฺ	เ	ฏ	ฟ	ฯ	฿	๐	ฺ

Confidential

Page24 (Thai character code 16)

	8	9	A	B	C	D	E	F
0	┌	โ		สฺ	ภ	◌ั	เ	๐
1	┐	ใ	ก	๗	ม	◌ุ	แ	๑
2	└	◌่	บ	๚	ย	า	◌ู	๒
3	┘	◌้	ป	๜	ร	◌ำ	◌ฺ	๓
4	│	◌๊	ค	ด	ฤ	◌ฺ	◌ๅ	๔
5	─	◌๋	ฅ	ต	ล	◌ฺ	ำ	๕
6	├	◌ฺ	ฆ	ถ	ฦ	◌ฺ	ๅ	๖
7	┤	◌ฺ	ง	ท	ว	◌ฺ	◌ฺ	๗
8	┴	◌ฺ	จ	ธ	ศ	◌ฺ	,	๘
9	┬	◌ฺ	ฉ	น	ษ	◌ฺ	◌ฺ	๙
A	┼	◌ฺ	ช	บ	ส	◌ฺ	◌ฺ	๛
B	■	◌ฺ	ซ	ป	ห	◌ฺ	+	◌ฺ
C	←	◌ฺ	ฌ	ผ	ฬ	◌ฺ	◌ฺ	◌ฺ
D	↑	◌ฺ	ญ	ฝ	อ	◌ฺ	◌	◌ฺ
E	→	◌ฺ	ฎ	พ	ฮ	◌ฺ	ไ	◌ฺ
F	↓	◌ฺ	ฏ	ฟ	ๆ	฿	๏	

Page25 (Thai character code 17)

	8	9	A	B	C	D	E	F
0	ุ	ฺ		สฺ	ภ	ะ	เ	0
1	็	้	ก	ฑ	ม	ั	แ	๑
2	๊	๊	บ	ฒ	ย	า	โ	๒
3	๋	๋	ป	ณ	ร	ำ	ใ	๓
4	ุ	่	ค	ด	ฤ	ิ	ไ	๔
5	๋		ฅ	ต	ล	ี	ๅ	๕
6	๋	–	ฆ	ถ	ฦ	ึ	ๆ	๖
7	่	+	ง	ท	ว	ื	๘	๗
8	่	┌	จ	ธ	ศ	ุ	ฯ	๘
9	้	┐	ฉ	น	ษ	ู	ฺ	๙
A	๋	└	ช	บ	ส	์	๎	๚
B	่	┘	ซ	ป	ห	๚	๏	๛
C	่	├	ฌ	ผ	ฬ	๑	๔	←
D	้	┬	ญ	ฝ	อ	๗	๐	↑
E	๊	┤	ฎ	พ	ฮ	เ	๎	→
F	่	┴	ฏ	ฟ	ๆ	฿	๐	↓

Confidential

Page26 (Thai character code 18)

	8	9	A	B	C	D	E	F
0	⌐	⌐		ฐ	ภ	ั	เ	๐
1	¬	๑	ก	ฑ	ม	ุ	แ	๑
2	∟	๒	ข	ฒ	ย	า	โ	๒
3	⌐	๓	ฃ	ณ	ร	ำ	ใ	๓
4	¦	๔	ค	ด	ฤ	๎	ไ	๔
5	−	๕	ฅ	ต	ล	๎	ๅ	๕
6	├	๖	ฆ	ถ	ฦ	๎	ๆ	๖
7	┤	๗	ง	ท	ว	๎	๘	๗
8	⊥	๘	จ	ธ	ศ	่	'	๘
9	┬	๙	ฉ	น	ษ	้	๎	๙
A	┼	๎	ช	บ	ส	์	๎	๒
B	■	๎	ซ	ป	ห	๎	๎	๎
C	←	๎	ฌ	ผ	ฬ	๎	๎	๎
D	↑	๎	ญ	ฝ	อ	๎	๐	๎
E	→	๎	ฎ	พ	ฮ	๎	๎	๎
F	↓	๎	ฏ	ฟ	ๆ	฿	๏	

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HEX		8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	0001	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	0010	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	0011	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	0100	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	0101	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	0110	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	0111	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	1000	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	1001	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	1010	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	1011	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	1100	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	1101	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	1110	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	1111	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

UD:undefined

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International Character Set

Country	ASCII code (hexadecimal number)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
America	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
UK	£	$	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	$	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{	|	}	~

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Appendix D

Connection of Cable and Option

Connecting Cables

All cables are connected to the connector panel located on the lower rear side of the printer.

Drawer kick connector

Power supply connector   Interface connector
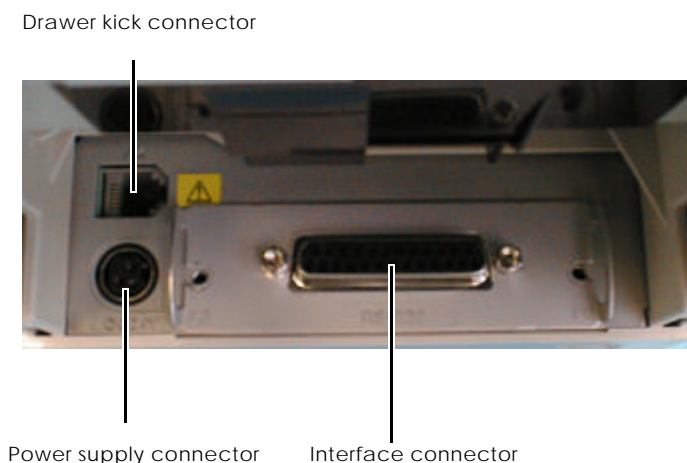
Connector Panel

✎ *Note:*

The figure above shows the connector panel for RS-232/RS-485 interface model printer. The shape of the interface connector varies according to the type of interface used.

Be sure to turn off the power supply for both the printer and the host computer unit before connecting the various cables.

Connecting Host Computer

RS-232/RS-485 Interface Models

1. Press the connector on the end of the interface cable firmly onto the interface connector located on the connector panel.

2. When using connectors equipped with screws, use the screws to tighten the connectors firmly in place.
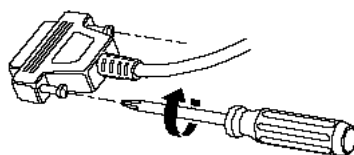
Tightening Screws

✎ *Note:*

The printer comes with hexagon lock bolts with bolt-head thread designed to inch specifications. Users with interface cables that use metric thread screws can replace the inch thread lock bolts with the metric lock bolts that come with the printer using a hexagonal (5 mm) screwdriver.

Identified by encircling line mark

With hole threaded in inches   With hole threaded in millimeters
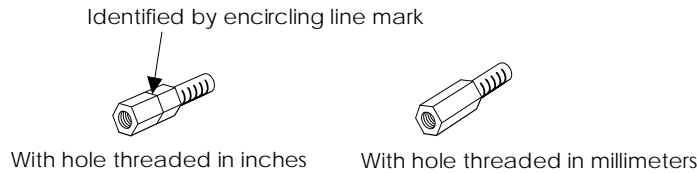
Hexagon Bolts Threaded in Inches and Millimeters

3. For interface cables equipped with a ground line, attach the ground line to the screw hole marked "FG" on the printer.

4. Connect the other end of the interface cable to the host computer.

IEEE Interface Models

1. Press the connector on the end of the interface cable firmly onto the interface connector located on the connector panel.

2. Press down the clips on either side of the connector to lock it in place.

3. For interface cables equipped with a ground line, attach the ground line to the screw hole marked "FG" on the printer.

4. Connect the other end of the interface cable to the host computer.

USB Interface Models

1. Attach the locking wire saddle at the location shown in figure below.

2. Hook the USB cable through the locking wire saddle as shown in the figure below.

✎ *Note:*

Hooking the USB cable through the locking wire saddle as shown in figure below will prevent the cable from coming unplugged.

USB upstream connector

UB-BOARD

Locking wire saddle

USB cable

USB downstream connector
(Only for USB HUB: UB-U01)   DM connector
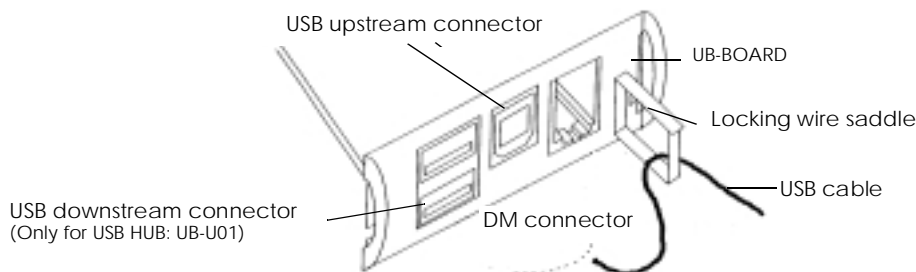
Attaching Locking Wire Saddle

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3. Connect the USB cable from the host computer to the USB upstream connector.

4. For models that have the UB-U01 installed, a maximum of two USB devices can be connected to the USB downstream connector.

✎ *Note:*
The UB-U101 serves as a bus power-supply hub. Therefore, it is important to note that bus power supply hubs (including the UB-U01) and bus power supply functions with power dissipation of 100 mA or more cannot be connected directly to the printer.
(A UB-U02 can be directly connected to a UB-U01 hub.)

5. Install the UB-U01/02 device driver on the host computer.

✎ *Note:*
For information on how to obtain the required device drivers and their installation procedures, contact the nearest Epson service center.

Ethernet Interface Models

Names of parts

The names of the various parts of the Ethernet interface are shown below.

10 BASE-T Ethernet interface connector

LED (green)

LED (red)

Switch

Take care not to press LEDs by mistake.

Pressing the power-supply switch for too long when power is on will reset the system to its factory defaults.
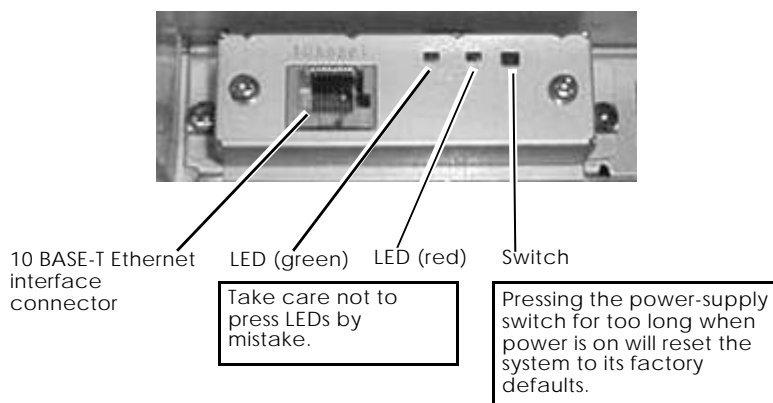
Name of Parts

Connecting interface cables

⚠ CAUTION:

Connecting devices directly to LAN cables that are installed outdoors will expose them to damage from power surges caused by lightning and other inductive sources. It is best to make sure that devices without proper surge protection are cushioned by being connected through devices that do have surge protection. Otherwise, it is better not to connect them to outdoors lines.

1. Confirm that the power supplies for both the printer and the host computer have been turned off.

2. Connect the 10 Base-T cable to the 10 Base-T Ethernet connector by pressing firmly until the connectors click.

⚠ *CAUTION:*

Never attempt to connect the customer display cable, drawer kick out cable or the standard telephone line cable to the 10 Base-T Ethernet connector.

✎ *Note:*
Refer to "UB-E01 Developer's Guide" for various setting methods of Ethernet interface.

UB-S09

Part Names

The following view shows the part names of the UB-S09.

customer display connector   caution label   serial interface connector
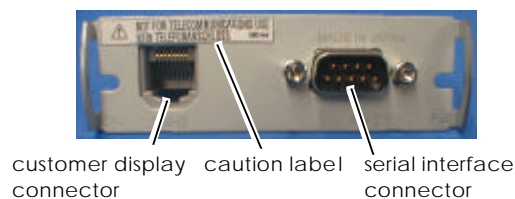
Connecting the Cables

Before connecting any of the cables, make sure that both the printer and the host computer are turned off.

1. Make sure both the printer and the host computer are turned off.

2. Plug the cable connector securely into the UB-S09's interface connector.

3. Tighten the screws on both sides of the connector.
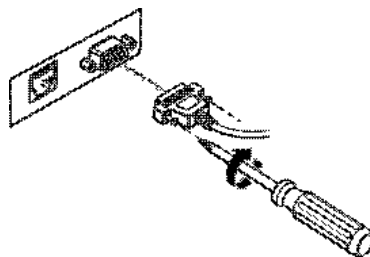
✎ *Note:*
If your interface connector has a grounding wire, attach it to the printer using either of the screws that fasten the UB-S09 to the printer.

4. Attach the other end of the cable to the host computer.

Connecting the display module cable

1. Make sure both the printer and the host computer are turned off.

2. Disconnect the power supply from the printer.

⚠ *CAUTION:*

You must disconnect the power supply because the electrical current is flowing in some parts of the printer circuit even when the power switch is turned off; otherwise you may damage the UB-S09 and the printer.

3. Plug the cable connector (provided with the direct connection display module) securely into the UB-S09's display module connector until it clicks.

⚠ *CAUTION:*

Do not connect this connector to an ordinary telephone line.

customer display
connector
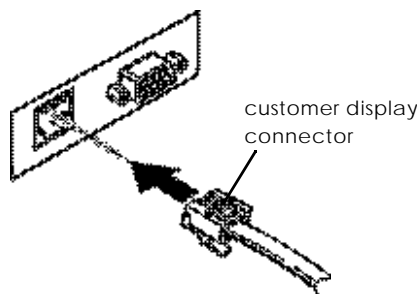
✎ *Note:*
Never connect customer display connectors to both the UB-S09 and the TM printer at the same time.

4. Connect the power supply to the printer.

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Connecting Drawer

⚠ *CAUTION:*

Be sure to connect a drawer that meets printer specifications. Connecting a drawer of the wrong specifications may result in damage to both the drawer and the printer.

Never connect the telephone line to the drawer kick out connector (labeled "DK"). Doing so may result in damage to both the telephone line and the printer.

Never connect the drawer cable to the customer display connector (labeled "DM-D"). Doing so may result in damage to both the drawer cable and the printer.

1. Connect the drawer cable to the drawer kick out connector (labeled DK) on the connector panel.

Drawer kick out connector

Connecting Drawer

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Connecting Power Supply Unit (PS-170,PS-180)

Be sure to use the EPSON PS-170, PS-180 or the equivalent product as the power supply unit.

⚠ *WARNING:*

Always use the EPSON PS-170, PS-180 or equivalent product as the power supply unit. Using a nonstandard power supply can result in shocks and even fire.

Should a fault ever occur in the EPSON PS-170, PS-180 or equivalent product, immediately turn off the power to the printer and remove the power supply cable from the wall socket.

⚠ *CAUTION:*

Be sure to remove the power supply cable from the wall socket whenever connecting or disconnecting the power supply unit to the printer. Failure to do so may result in damage to the power supply unit or the printer.

Be sure to confirm that the wall socket power supply satisfies the rated voltage requirements of the power supply unit. Never insert the power supply cable plug into a socket that does not meet the rated voltage requirements of the power supply unit. Doing so may result in damage to both the power supply unit and the printer.

1. Confirm that the printer's power supply is turned off and the power supply unit's power cable has been removed from the wall socket.

2. Check the specifications label on the power supply unit to confirm that the wall socket power supply meets the rated voltage requirements.

3. To place cables, first break off by hand any of the three portions indicated by circles in the illustration (the other portion is on the right). Then put the cables through the holes and replace the bottom of the cover.
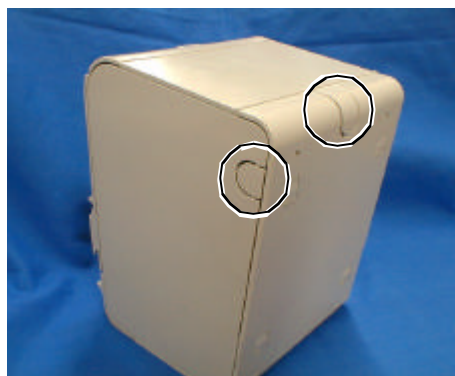
4. Remove the bottom of the cover as shown in the illustration below.
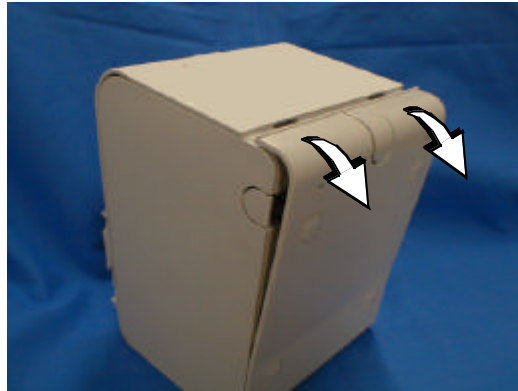
5. Install the connector of the power supply cable onto the power supply connector (labeled DC24V).

Power supply connector

Power Supply Connector

✎ *Note:*
When removing the DC cable connector from the EPSON PS-170, PS-180, first confirm that the power supply cable has been disconnected from the power supply unit; then grasp the arrow marked section of the connector and pull straight out.

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Glossary of Terms

ASB	Auto status back: a feature that allows the printer to send status information back to the host computer automatically.
Bi-directional	Two-way communication between the host and printer, which allows the printer to return status information to the host. The IEEE-1284 standard for the parallel interface has the capacity for bi-directional communication. (See IEEE-1284.)
Bitmap	A graphic or a character comprised of individual pixels or dots. Bitmaps are somewhat limited as to the degree to which they can be enlarged. (See vector.)
Receive Buffer	A memory area in the printer that holds incoming data from the host computer and processed in the order received.
cpl	Characters per line.
hex dump	A test mode in which the printer prints hexadecimal numbers representing characters and codes.
IEEE 1284	The standard used for the TM-L90 parallel interface. This type of interface allows both bi-directional communications and unidirectional ("compatibility mode") communications.
lps	Lines per second.
Maintenance counter	TheTM-L90 maintenance counters provide information that can be retrieved remotely.
NV	Non-volatile, flash memory. The data stored in this type of memory is not lost when the power is turned off. The TM-L90's NV memory is used to store graphics, primarily bitmap logos. (See bitmap.)
Page mode	In this mode, the printer collects data and formatting commands in its buffer until printing is specified with the **ESC FF** or **FF** command. This mode gives the printer more flexibility in formatting, so that it can print character and bar code data, or other graphics data, on the same line.
Partial cut=Perforation cut	Most EPSON printer autocutters leave one point (small segment) of the receipt uncut.
Printable area	The maximum printable area.
RS-232C	The standard serial interface available.

RS-485	A serial interface type available as a dealer option.
Standard mode	In this mode, the printers print data in the print buffer by executing print commands (such as **LF**, **CR**, and **ESC J**) or when the buffer is full.
USB	Universal Serial Bus. A serial interface that allows the addition of peripheral devices on a single bus.
VAR	Value added reseller.
Vector	A graphic or character that is created with mathematical algorithms, or curves. It is scalable larger or smaller without changing its appearance. (See bitmap.)

Index

Numerics

2 Color Printing, 4-5

A

Accessories, 1-1
ASB, 4-6, E-1
Autocutter, 1-10, 3-16
Automatic Line Feed, 3-18
Automatically recoverable errors, 3-5

B

Barcode Printing, 4-5
Basic Serial Interface Setting, 3-16
Bi-directional, E-1
Bitmap, E-1
Busy state, 3-10
Buttons, 1-4

C

Character specifications, 1-18
Commands List, 4-11
Connecting Drawer, D-6
Connecting Power Supply Unit, D-7
Connectors Specifications, A-11
Consumables, 1-2
Control Panel, 1-4
cover open lever, 1-2
cpl, E-1
Customized value, 2-11
Customizing Printer, 4-8
cutter cover, 1-2

D

Data Length, 3-17
Dip Switch, 2-7
Drawer kick connector, A-12
drawer kick-out, 1-3

E

Error (ERROR) LED, 1-4, 3-4
Ethernet, 2-5
Ethernet Interface Models, D-3

F

FAQ, 4-15
FEED Button, 1-4

G

Graphics Printing, 4-9

H

Handshake, 3-17
hex dump, E-1
Hexadecimal Dump Mode, 3-12
Horizontally, 1-5

I

IEEE 1284, A-5, E-1
IEEE Interface Models, D-2
interface, 1-3
Interface Signals, A-6

L

LED, 1-4
lps, E-1

M

Maintenance counter, E-1
Memory Switch, 2-7, 2-10
Memory Switch Setting Mode, 3-12
Models, 1-1

N

Near-End Detect, 1-6
No Paper Roll (PAPER OUT) LED, 3-4
NV, E-1
NV Memory, 4-7

O

Offline, 3-9
Operating specifications, 2-1
Options, 1-2

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Index of Method

EPSON