EPSON
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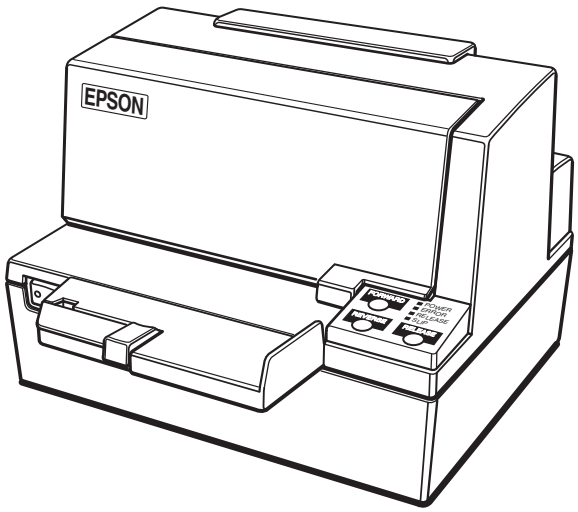
TM-U590

Technical Reference Guide



Product Overview

Describes features and general specifications for the product.

Setup

Describes setup and installation of the product and peripherals.

Application Development Information

Describes how to control the printer and necessary information when you develop applications.

Handling

Describes how to handle the product.

Appendix

Describes interfaces, connectors and character code tables.

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Rev. A

Cautions

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ESC/POS® Command System

EPSON has been taking industry's initiatives with its own POS printer command system (ESC/POS). ESC/POS has a large number of commands including patented ones. Its high scalability enables users to build versatile POS systems. The system is compatible with all types of EPSON POS printers and displays. Moreover, its flexibility makes it easy to upgrade the future. The functionality and the user-friendliness is valued around the world.

Revision History

Revision	page	Details of change
Rev. A	All pages	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 damage. • Possibility of causing information loss.
CAUTION	Provides information that must be observed to avoid damage to your equipment or a malfunction.
NOTE	Provides important information and useful tips.

Warnings

WARNING

- To avoid risk of electric shock, do not set up this product or handle cables during a thunderstorm
- **Never insert or disconnect the power plug with wet hands.**
  Doing so may result in severe shock.
- **Handle the power cable with care.**
  Improper handling may lead to fire or electric shock.
  * Do not modify or attempt to repair the cable.
  * Do not place any heavy object on top of the cable.
  * Avoid excessive bending, twisting, and pulling.
  * Do not place the cable near heating equipment.
  * Check that the plug is clean before plugging it in.
  * Be sure to push the plug all the way in.
- **Be sure to use the specified power source.**
  Connection to an improper power source may cause fire or shock.
- **Do not place multiple loads on the power outlet.**
  Overloading the outlet may lead to fire.
- **Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise**.
  Continued use may lead to fire. Immediately unplug the equipment and contact your dealer or a Seiko Epson service center for advice.
- **Never attempt to repair this product yourself.**
  Improper repair work can be dangerous.
- **Never disassemble or modify this product.**
  Tampering with this product may result in injury or fire.
- **Do not allow foreign matter to fall into the equipment.**
  Penetration by foreign objects may lead to fire.
- **If water or other liquid spills into this equipment, do not continue to use it.**
  Continued use may lead to fire. Unplug the power cord immediately and contact your dealer or a Seiko Epson service center for advice.
- **If you open the DIP switch cover, be sure to close the cover and tighten the screw after adjusting the DIP switch.**
  Using this product with the cover open may cause fire or electric shock.
- **Do not use aerosol sprayers containing flammable gas inside or around this product.**
  Doing so may cause fire.

Cautions

CAUTION

- **Do not connect cables in ways other than those mentioned in this manual.**
  Different connections may cause equipment damage or fire.
- **Be sure to set this equipment on a firm, stable, horizontal surface.**
  The product may break or cause injury if it falls.
- **Do not use this product in locations subject to high humidity or dust levels.**
  Excessive humidity and dust may cause equipment damage or fire.
- **Do not place heavy objects on top of this product. Never stand or lean on this product.**
  Equipment may fall or collapse, causing breakage and possible injury.
- **To avoid injury, do not insert fingers or any part of the hand in the roll paper opening where the manual cutter is installed.**
- **Do not open the roll paper cover without taking the necessary precautions, as this can result in injury from the autocutter fixed blade.**
- **To ensure safety, unplug this product before leaving it unused for an extended period.**

Restriction of Use

When this product is used for applications requiring high reliability/safety such as transportation devices related to aviation, rail, marine, automotive etc.; disaster prevention devices; various safety devices etc; or functional/precision devices etc, you should use this product only after giving consideration to including fail-safes and redundancies into your design to maintain safety and total system reliability. Because this product was not intended for use in applications requiring extremely high reliability/safety such as aerospace equipment, main communication equipment, nuclear power control equipment, or medical equipment related to direct medical care etc, please make your own judgment on this product's suitability after a full evaluation.

About this Manual

Aim of the Manual

This manual was created to provide information on development, design, and installation of POS systems and development and design of printer applications for developers.

Manual Content

The manual is made up of the following sections:

Chapter 1	Product Overview
Chapter 2	Setup
Chapter 3	Application Development Information
Chapter 4	Handling
Appendix	Specifications of Interface and Connector Character Code Tables

Contents

Appendix 51

Product Overview

This chapter describes features and specifications of the product.

Features

The TM-U590 is a POS printer that can print on slip paper.

- Copy printing is possible (original + 4 sheets maximum)
- Maximum characters per line: 88 with 7 × 9 font.
- High throughput using bidirectional, minimum distance printing.
- EPSON customer display series connection (DM-D) (Available only for serial interface model).
- Command protocol is based on the ESC/POS® Proprietary Command System.
- OPOS ADK and Windows® printer driver are available.
- Automatic Status Back (ASB) function that automatically transmits changes in the printer status.

Product Configuration

Interface

- Serial interface model (RS-232C)
- Parallel interface model (IEEE1284)

Color

- ECW (Epson Cool White)

Accessories

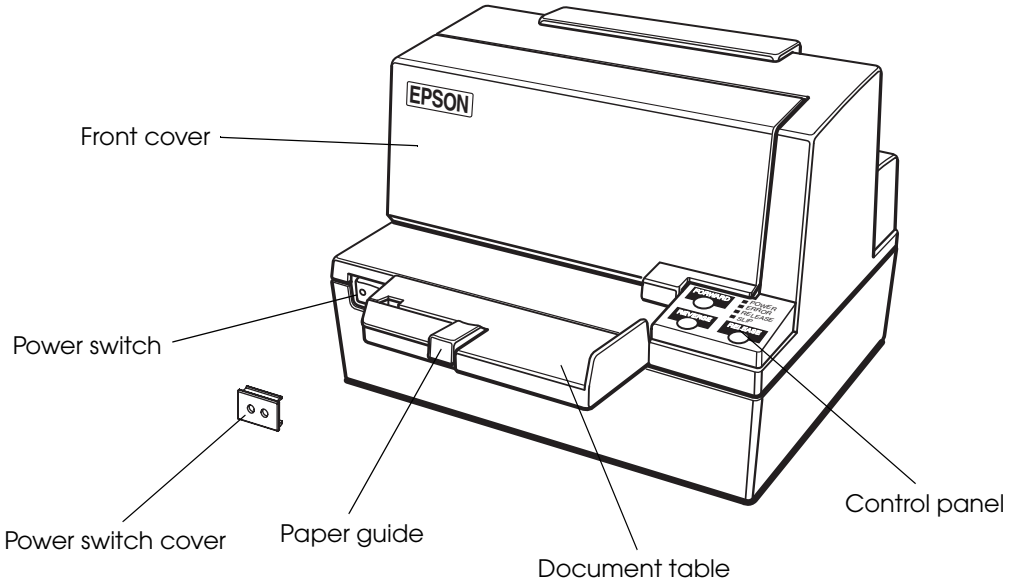
Attachments

- Exclusive cassette ribbon (Model: ERC-31B)
- User's manual
- Power switch cover

Options

- External power supply (Model: PS-180)

Part Names and Functions



Power Switch

Turns the printer on or off. The marks on the switch: (⏻ / |)

CAUTION

Before turning on the printer, be sure to check that the AC adapter is connected to the power supply.

Power Switch Cover

Install the power switch cover that comes with the TM-U590 onto the printer to prevent inadvertent changing of the power switch, to prevent tampering, and to improve the appearance of the printer.

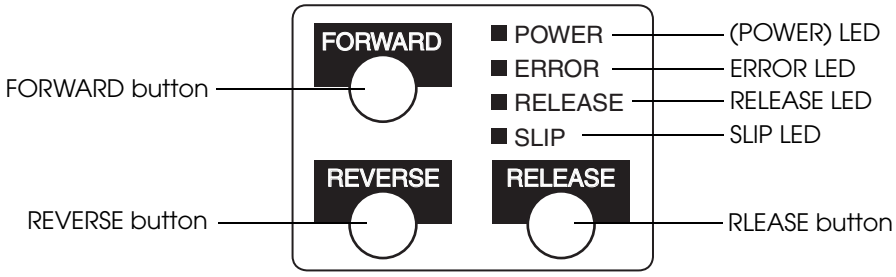
To reset the printer when the power switch cover is installed, insert a long, thin object (such as the end of a paper clip) into the hole in the power switch cover and press the power switch.

WARNING

If an accident occurs with the power switch cover attached, unplug the power cord immediately.

Continued use may cause fire or shock.

Control Panel



Buttons

FORWARD button

Pressing this button once feeds the slip paper by one line. Holding this button down feeds the slip paper continuously.

REVERSE button

- Pressing this button once reverses the slip paper by one line. Holding this button down reverses the slip paper continuously.
- Turning on the power switch while pressing this button starts the self-test. (For details about the self-test, see "Self-test Mode" on page 42.)

RELEASE button

Pressing this button releases the slip paper.

LED

POWER LED (green)

- Lights when the power supply is on.
- Goes out when the power supply is turned off.

ERROR LED (red)

Lights or flashes when the printer is offline.

- Lights after the power is turned on or after a reset (offline). Automatically goes out after a while to indicate that the printer is ready.
- Flashes when an error occurs. (For details about the flash codes, see "Error Status" on page 15.)
- Goes out during regular operation (online).

RELEASE LED (green)

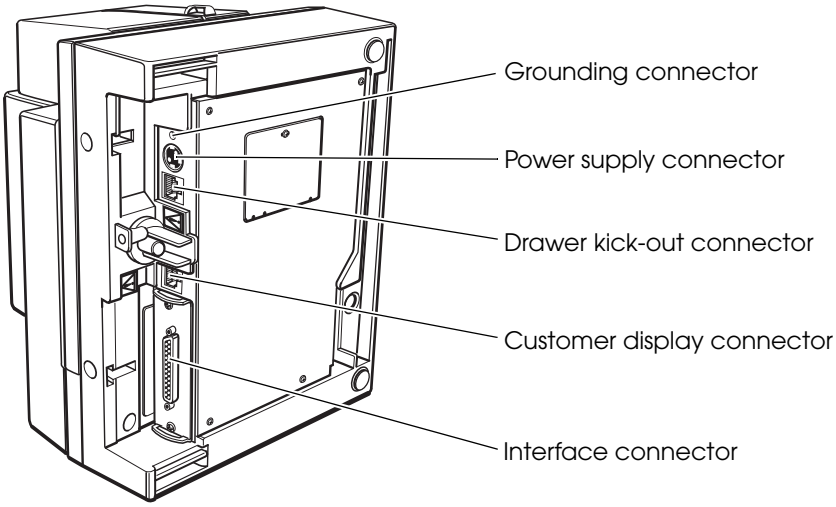
- Lights when the slip paper can be inserted.
- Flashes during waiting for continuous self-test printing.

SLIP LED (green)

- Lights during regular operation.
- Flashes during waiting for slip insertion/removal.
- Goes out when ejecting a slip paper.

Connectors

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



- Grounding connector: Connects the ground wire.
- Power supply connector: Connects the power supply unit.
- Drawer kick-out connector: Connects the cash drawer.
- Customer display connector: Connects the customer display.
- Interface connector: Connects the printer with the host computer interface.

CAUTION The picture above shows a serial interface model. For details on the parallel interface and how to connect the power supply connector and cash drawer, see "Connecting the Printer to the Host Computer" on page 31 and "Connecting the Cash Drawer" on page 35.

Offline

The printer automatically goes offline under the following conditions:

- During power on (including resetting with the interface) until the printer is ready
- During the self-test
- While the front cover is open
- While roll paper is fed using the FEED button.
- When an error has occurred

Error Status

There are two possible error types: recoverable errors and unrecoverable errors.

Recoverable Errors

Printing is no longer possible when recoverable errors occur. They can be recovered easily by turning the power off and then on again or sending an error recovery command from the driver after eliminating the cause of the error.

Error	Error description	Error LED flash code (Approx. 160 ms)	Recovery measure
Home position detection error	The home position cannot be detected due to a paper jam.		Send the error recover command to recover.
Carriage detection error	The carriage is malfunctioning due to a paper jam.		Send the error recover command to recover.
Front cover open error	Printing on the slip is not performed correctly due to a cover-open.		When the cover is closed, send the error recover command to recover.
Slip ejection error	The slip is not ejected when the printer feeds a specified amount of paper.		Send the error recover command to recover.

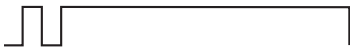
CAUTION The error recovery command is valid only if a recoverable error occurs.

Unrecoverable Errors

Printing is no longer possible when an unrecoverable error occurs. The printer must be repaired.

CAUTION

Turn off the power immediately when an unrecoverable error occurs.

Error	Error description	Error LED flash code (Approx. 160 ms)
R/W error in memory or gate array	After R/W checking, the printer does not work correctly.	
High voltage error	The power supply voltage is extremely high.	
Low voltage error	The power supply voltage is extremely low.	
CPU execution error	• The CPU is executing an incorrect address. • I/F board is not connected.	
Thermistor error	• The print head temperature is abnormal. • The thermistor is not detected. • Thermistor wiring is not connected.	

Product Specifications

Printing method		Serial impact dot matrix
Paper feed	Paper feed method	Friction feed
	Paper feed pitch	Default 4.23 mm {1/6"} 0.176 mm {1/144"} Units can be set by a command.
Interface		Serial (RS232C), Parallel (IEEE1284)
Buffer	Receive buffer	4 KB/69 bytes (selectable using the DIP switch 1-2)
	Downloade buffer	5 KB (both for user-defined characters and downloaded images)
Ribbon	Model	ERC-31B
	Life	4,500,000 characters (when 1 character = 18 dots)
DKD Function		2 drives
Power supply		Optional PS-180 AC adapter
Life	Mechanism	12,000,000 lines
	Thermal head	200 million pulses (when printing Font B)
	MTBF	180,000 hours
	MCBF	29,000,000 lines
Temperature/humidity		Operating: 5 to 45°C {41 to 113°F}, 10 to 90% RH Storage: -10 to 50°C {14 to 122°F}, 10 to 90% RH
Overall dimensions (H × W × D)		185 × 252 × 266 mm {7.28 × 9.92 × 10.47"} (including the document table)
Weight (mass)		Approx. 5.0 kg {11.0 lb}

Printing Specifications

Printing method		Serial impact dot matrix
Head wire configuration		9-pin vertical line, 0.353 mm {1/72"} wire pitch
Head wire diameter		0.29 mm {0.01"}
Printing direction		Bidirectional, minimum distance printing
Printing speed	Font A	233 cps
	Font B	311 cps
	Font C	233 cps
Characters per line	Font A	66 cpl
	Font B	88 cpl
	Font C	66 cpl
Character intervals	Font A	2.03 mm
	Font B	1.52 mm
	Font C	2.03 mm

cps: characters per inch

cpl: characters per line

NOTE

Printing speed may be slower, depending on the such items as the data transmission speed.

Character Specifications

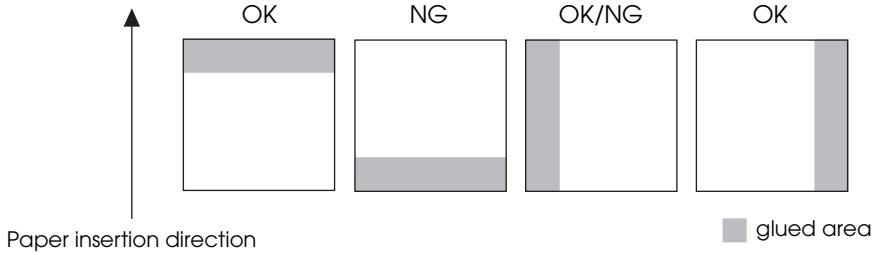
Number of characters		Alphanumeric characters: 95 Extended graphics: 128 × 8 pages (including user-defined page) International characters: 37
Character structure	Font A	9 × 9, 3-dot spacing (in half-dot units)
	Font B	7 × 9, 2-dot spacing (in half-dot units)
	Font C	5 × 9, 1-dot spacing (in normal-dot units)
Character size	Font A	1.6 × 3.1 mm {0.06 × 0.12"}
	Font B	1.3 × 3.1 mm {0.05 × 0.12"}
	Font C	1.6 × 3.1 mm {0.06 × 0.12"}

Paper Specifications

Paper type		Normal paper, Carbon copy paper, Pressure sensitive paper
Total thickness		009 to 0.36 mm {0.0035 to 0.0141"}
Size (W × L)		70 × 70 mm to 210 × 297 mm {2.76 × 2.76" to 8.27 × 11.69"} (A4 size)
Paper thickness	Normal paper (single-ply)	009 to 0.2 mm {0.0035 to 0.0079"}
	Carbon copy paper combination	5 sheets maximum (original + 4 copies) • Backing paper: 0.06 to 0.15 mm {0.0023 to 0.0059"} • Copy and original: 0.04 to 0.07 mm {0.0015 to 0.0028"} • Carbon paper: Approximately 0.035 mm {0.0014"} • Total thickness: 0.30 mm {0.0118"} or less (original to original + 3 copies) 0.36 mm {0.0141"} or less (original + 4 copies)
	Pressure sensitive paper	5 sheets at maximum (original + 4 copies) • Backing paper: 0.06 to 0.15 mm {0.0023 to 0.0059"} • Copy and original: 0.06 to 0.075 mm {0.0023 to 0.003"} • Total thickness: 0.24 mm {0.0094"}or less (original to original + 3 copies) 0.30 mm {0.0118"}or less (original + 4 copies)

CAUTION

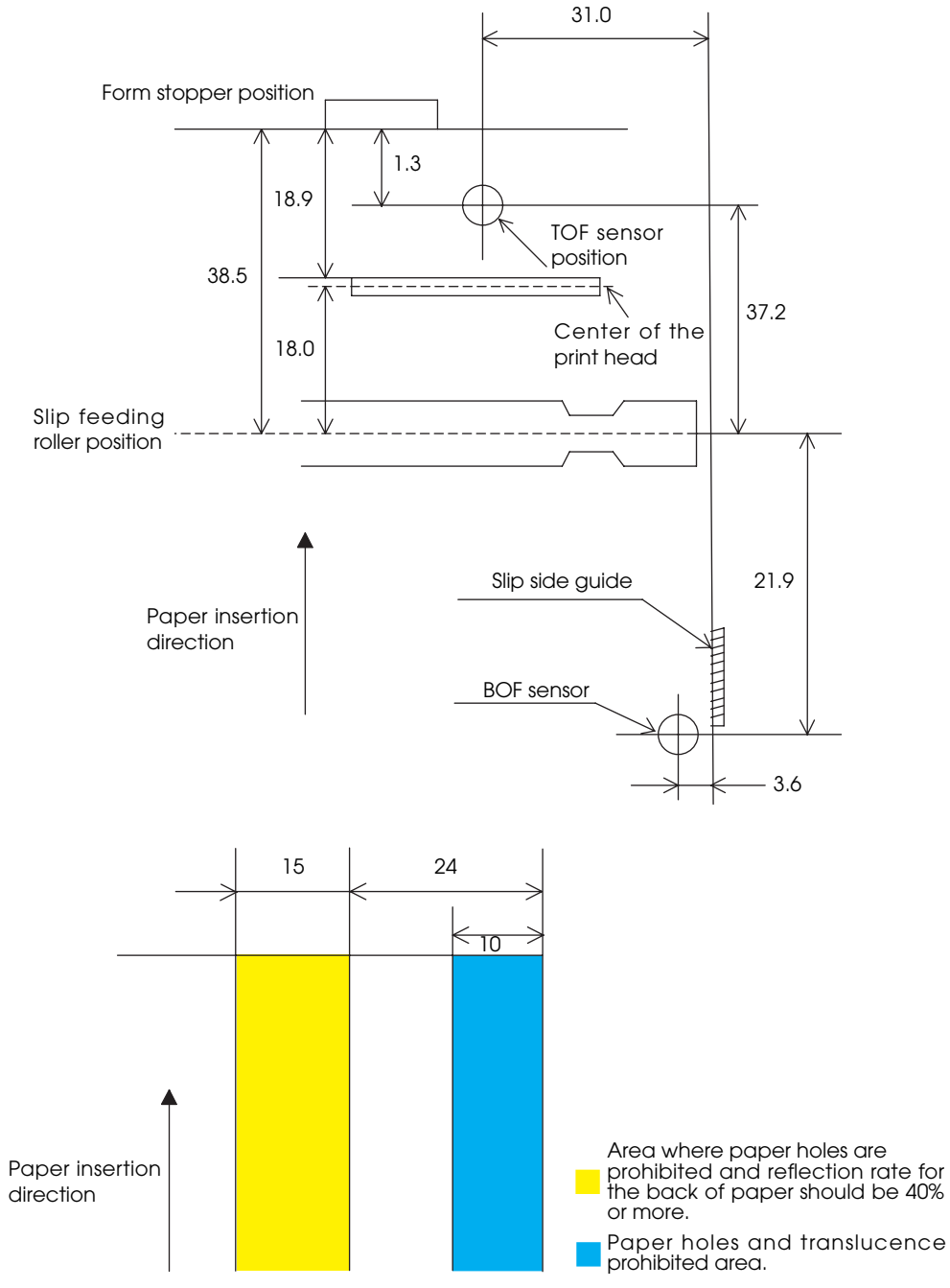
- Copy capability is greatly influenced by the ambient temperature, so printing must be performed under the conditions shown below:
  - ∗ Original + 4 copies: 20 to 45° C {68 to 113° F}
  - ∗ Original + 1 to 3 copies: 5 to 45° C {41 to 113° F}
- The slip paper must be flat, without curls or wrinkles, especially at the top edges.
- There must be no glue on the bottom edge of slip paper. Choose slip paper carefully since paper feeding is affected by gluing conditions such as position and dimension.



- Use thinner paper (N30 or equivalent) between the top and bottom sheets of multi-ply paper. If thick paper is used, the copy capability is lowered.

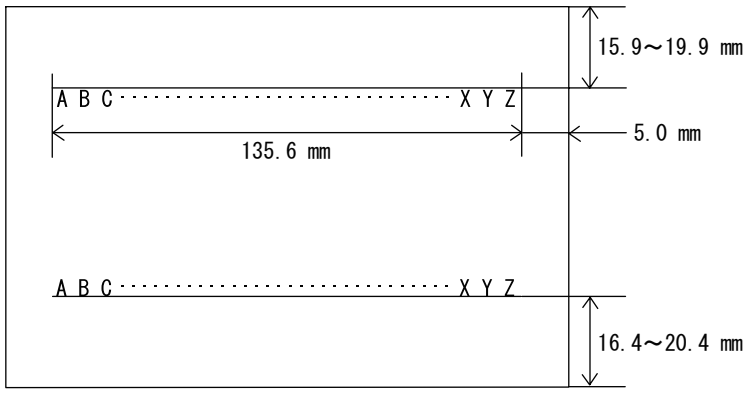
CAUTION

- Do not use paper that has holes or is translucent at the BOF position.
- Do not use paper that has holes at the TOF sensor position or that has dark positions with low reflection (less than 40% reflection) on the back.



(Units: mm (All the numeric values are typical.))

Printable Area



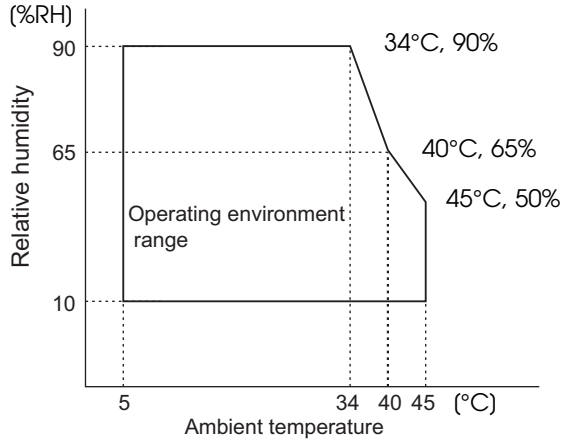
(All the numeric values aa are typical.)

NOTE	The top margin can be set to a minimum of 5 mm {0.19"} by using a command to feed the paper backward.

Electrical Characteristics

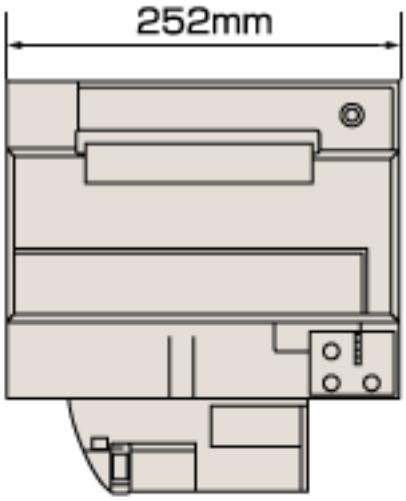
Supply voltage		DC24V ± 10%
Current consumption (at 24V, except for drawer kickout driving)	Standby	Mean: Approximately 0.3A
	Operating	Mean: Approximately 1.9A (Character font A α-N all column printing)

Environmental Conditions

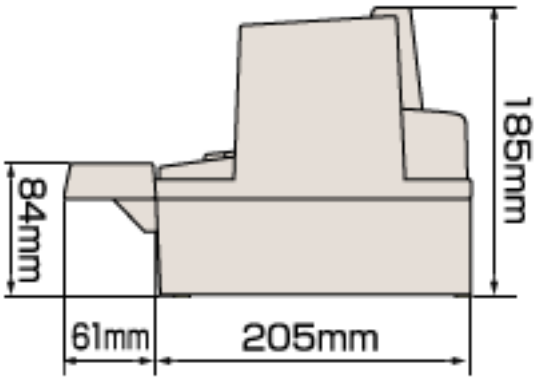
Temperature/ Humidity	Operating	5 to 45°C {41 to 113°F}, 10 to 90% RH (See the operating temperature and humidity range below.)
	Storage	-10 to 50°C {14 to 122°F}, 10 to 90% RH (except for paper)
		
Acoustic noise (Operating)		Approximately 65 dB (Bystander position) Note) The values above are measured in the Epson evaluation condition. The acoustic noise differs depending on the paper used, printing contents, and print speed.

External Dimensions and Mass

- Height: Approximately 185 mm {7.28"}
- Width: Approximately 252 mm {9.92"}
- Depth: Approximately 266 mm {10.47"} (including the document table)
- Mass: Approximately 5.0 kg {11.0 lb}



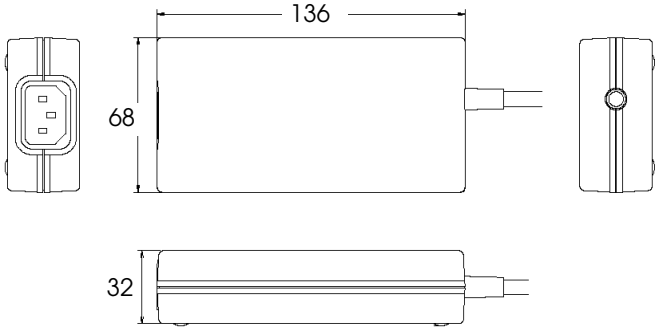
<Top view>



<Side view>

Option Specifications

Power Supply Unit (PS-180)



(Unit: mm)

Electric characteristics	Input conditions	input voltage (rating): 90 to 264VAC (100VAC -10% to 230VAC +15%)
		Frequency (rating): 50/60 Hz ± 3 Hz
		Power consumption (rating): 100VA
	Output conditions	Output voltage (rating): 24VDC ± 5%
		Output current (rating): 2.0A
		Output electric power (rating): 48VA
		Output peak current: 4.5A
Case specifications	Dimensions (H × W × D)	68 × 136 × 32 mm {2.68 × 5.35 × 1.26"} (excluding projections)
	Weight	Approx. 0.4 kg {14.11 oz} (excluding the AC cable)
	Color	Black (matte)

Material

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

AC cable selection

Select an AC cable that satisfies the following conditions.

- Safety standard product
- Plug with PE terminal

Ground connections

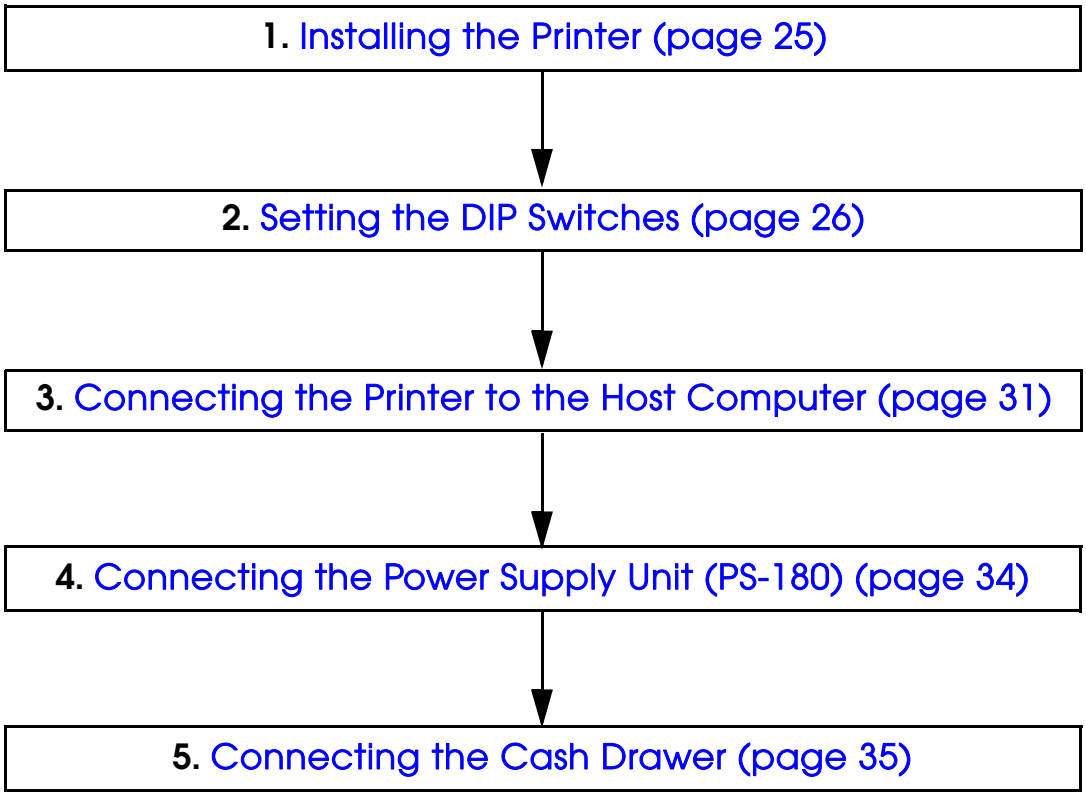
Be sure to ground for safety.

Setup

This chapter describes setup and installation of the product and peripherals.

Flow of Setup

This chapter consists of the following sections along with the setup flow of the product and peripherals.



Installing the Printer

Important Notes on Installation

- The printer must be installed horizontally.
- Do not place the printer in dusty locations.
- Do not apply excessive pressure to the printer.
- Do not put any liquids or drinks such as coffee on the printer case.

Setting the DIP Switches

On this printer, you can make various settings with DIP switches. The DIP switch functions differ depending on the interface model.

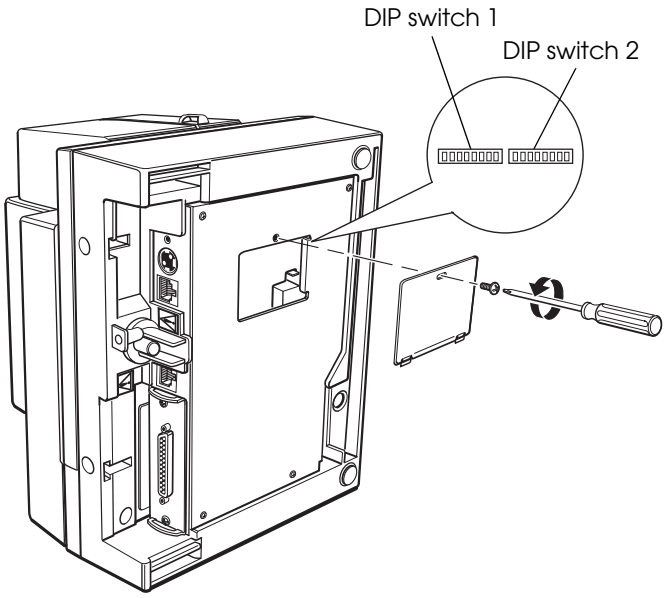
Setting Procedure

Follow the steps below to change the DIP switch settings.

> **CAUTION**
>
> **Before you remove the DIP switch cover, turn the printer off.**
> Otherwise, a short-circuit may cause the printer to malfunction.

> **CAUTION**
>
> DIP switch settings are enabled only when the power is turned on or the printer is reset via the interface. If the settings are changed after that, the functions will not change.

1. Make sure the power supply for the printer is turned off.
2. Unscrew the screw to remove the DIP switch cover from the base of the printer.



3. Set the DIP switches, using the tip of a tool, such as a small screwdriver.
4. Attach the DIP switch cover, and screw it in place.

For Serial Interface

DIP Switch Bank 1

SW	Function	ON	OFF	Factory setting
1-1	Data reception error	Ignored	Prints "?"	OFF
1-2	Receive buffer capacity	69 bytes	4 KB	OFF
1-3	Handshaking	XON/XOFF	DTR/DSR	OFF
1-4	Word length	7 bits	8 bits	OFF
1-5	Parity check	Yes	No	OFF
1-6	Parity selection	Even	Odd	OFF
1-7	Transmission speed selections	See the " Transmission speed (DIP switch 1-7/1-8)" table below.		ON
1-8				OFF

Transmission speed (DIP switch 1-7/1-8)

Transmission speed (bps)	SW 1-7	SW 1-8
2400	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

bps: bits per second

DIP Switch Bank 2

> **CAUTION** If you turn on DIP switch 2-7 or 2-8 while the printer power is turned on, the printer may be reset, depending on the signal state. DIP switches should not be changed while the printer power is on.

SW	Function	ON	OFF	Factory setting
2-1	Handshaking (BUSY condition)	Receive buffer full	• Offline • Receive buffer full	OFF
2-2	Customer display (DM-D) connection	Connected	Not connected	OFF
2-3 ~ 2-4	Undefined	—	—	OFF
2-5 ~ 2-6	Reserved (Do not change settings)	Fixed to OFF		OFF
2-7	I/F pin 6 reset signal	Enabled	Disabled	OFF
2-8	IF pin 25 reset signal	Enabled	Disabled	OFF

> **CAUTION** For DIP switch 2-1 (BUSY condition), see also "Selecting the BUSY Status" on page 30.

For Parallel Interface

DIP switch bank 1

SW	Function	ON	OFF	Factory setting
1-1	Auto line feed	Always enabled	Always disabled	OFF
1-2	Receive buffer capacity	69 bytes	4 KB	OFF
1-3 ~ 1-8	Undefined	—	—	OFF

DIP switch bank 2

CAUTION If you turn on DIP switch 2-7 or 2-8 while the printer power is turned on, the printer may be reset, depending on the signal state. DIP switches should not be changed while the printer power is on.

SW	Function	ON	OFF	Factory setting
2-1	Handshaking (BUSY condition)	• Receive buffer full • Reading data	• Offline • Receive buffer full • Reading data	OFF
2-2	Reserved (Do not change settings)	Fixed to OFF		OFF
2-3 ~ 2-4	Undefined	—	—	OFF
2-5 ~ 2-7	Reserved (Do not change settings)	Fixed to OFF		OFF
2-8	IF pin 31 reset signal (Do not change settings)	Fixed to ON		ON

CAUTION For DIP switch 2-1 (BUSY condition), see also "Selecting the BUSY Status" on page 30.

Selecting the BUSY Status

With DIP switch 2-1, you can select conditions for invoking a BUSY state as either of the following:

- When the receive buffer is full
- When the receive buffer is full or the printer is offline

> **CAUTION** In either case above, the printer enters the BUSY state after power is turned on (including resetting with the interface), and when a self-test is being run.

Printer BUSY condition and status of DIP switch 2-1

Printer status		DIP SW 2-1	
		ON	OFF
Offline	During the period after power is turned on (including resetting with 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 feed with the FEED button.	—	BUSY
	When an error has occurred.	—	BUSY
When the receive buffer becomes full.*1		BUSY	BUSY

*1: When the remaining space in the buffer drops to 16 bytes, the printer status becomes "buffer full" and it remains "buffer full" until the space in the receive buffer increases to 26 bytes.

> **CAUTION** If DIP switch 2-1 is on, the printer will not become BUSY
> - When error has occurred
> - When the cover is open
> - When paper is fed by the FEED button

Connecting the Printer to the Host Computer

CAUTION

- Be sure to install the driver before connecting the printer to the host computer.
- The printer uses the modular connectors specifically designed for the cash drawer. Do not connect these connectors to an ordinary telephone line.

For Serial Interface

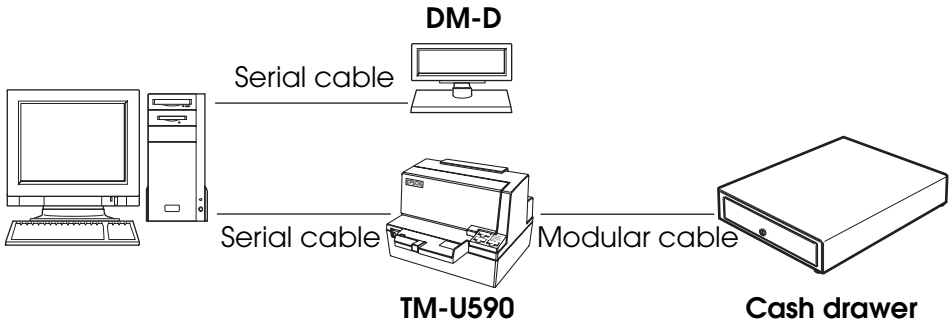
Serial interface connection diagram

When this printer is connected to a host computer by the serial interface, three connection forms are possible:

- Stand alone
- Pass-through connection
- Y connection

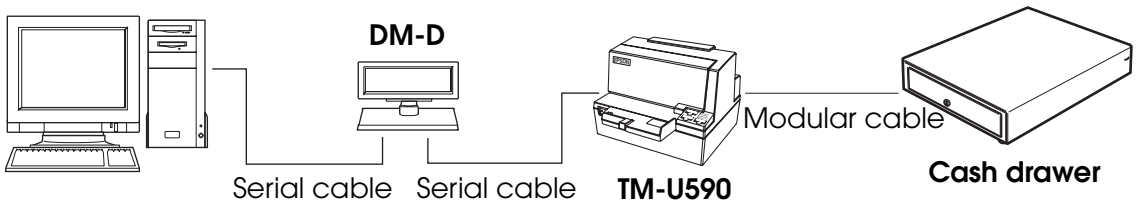
Stand alone

This printer is connected to the host computer directly via the serial port. When a customer display (DM-D) is to be connected, connect it to the host computer via the serial port.



Pass-through connection

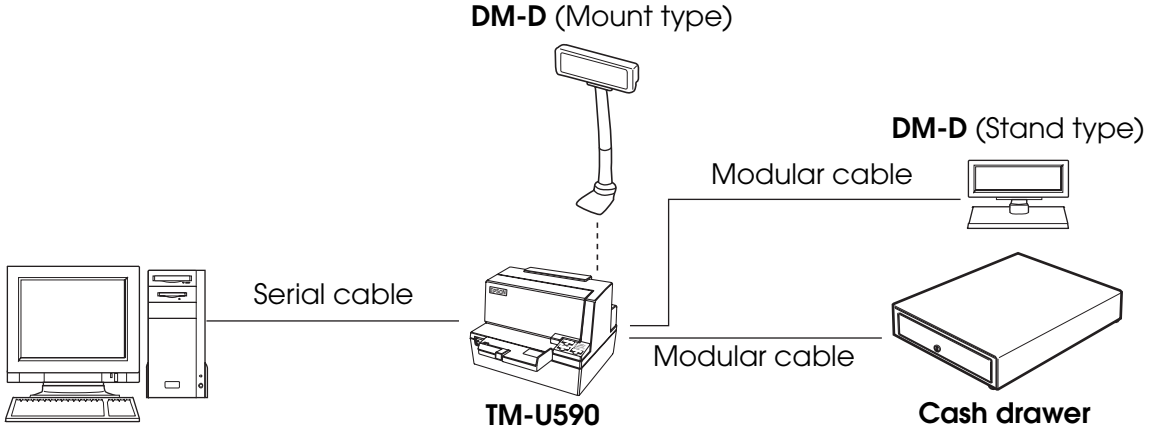
This printer is connected to the host computer over the serial interface via a customer display (DM-D).



Y connection

This printer is connected to the host computer via the serial port. When a customer display (DM-D) is to be connected, connect it to the printer via the modular cable.

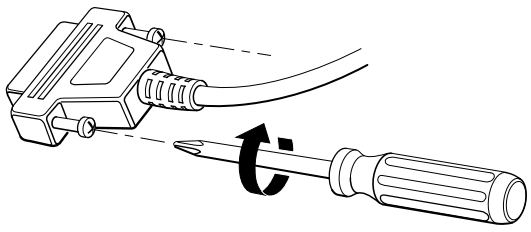
> **NOTE** A mount type customer display can be directly installed on the printer.



Connecting the serial interface (RS-232C) cable

> **WARNING** **Be sure to turn off the power supply for both the printer and host computer before connecting the cables.**

1. Insert the interface cable connector firmly into the interface connector on the connector panel.
2. When using connectors equipped with screws, tighten them to secure the connectors firmly.

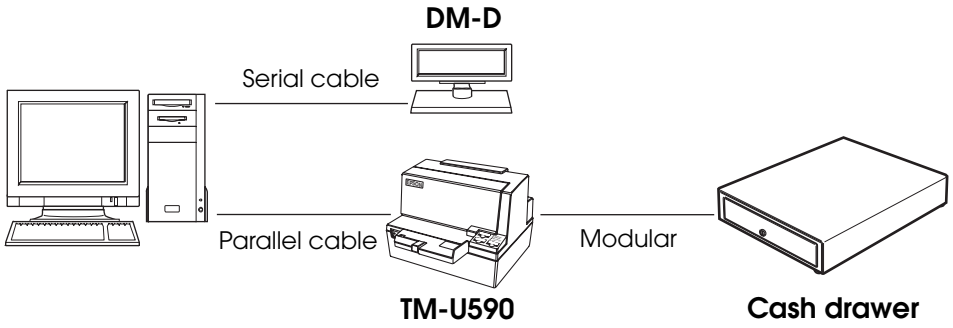


3. When using interface cables equipped with a grounding line, attach the ground line to the screw hole marked "FG" on the printer.
4. Connect the other end of the interface cable to the host computer.

For Parallel Interface

Parallel interface connection diagram

This printer is connected to the host computer via the parallel port. When a customer display (DM-D) is to be connected, connect it to the host computer via the serial port.



Connecting the parallel interface cable

1. Insert the interface cable connector firmly into the interface connector on the connector panel.
2. Press down the clips on either side of the connector to lock it in place.
3. When using 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.

Connecting the Power Supply Unit (PS-180)

Use the PS-180 or an equivalent product as the power supply unit.

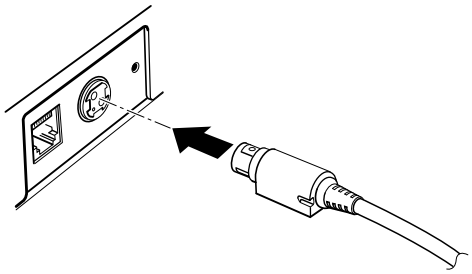
WARNING

- **Always use the EPSON PS-180 or an equivalent product as the power supply unit.** Using a nonstandard power supply can result in electric shock and fire.
- **Should a fault ever occur in the EPSON PS-180 or equivalent product, immediately turn off the power to the printer and remove the power supply cable from the wall socket.**

Connecting the Power Supply Unit

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

2. Insert the connector of the power supply cable onto the power supply connector (stamped **24V**).



WARNING

- **Be sure to remove the power supply unit's 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.
- **Make sure 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 and the printer.

CAUTION

Before removing the DC cable connector from the PS-180, make sure the power supply cable has been removed from the power supply unit, then grasp the arrow-marked section of the connector and pull straight out.

Connecting the Cash Drawer

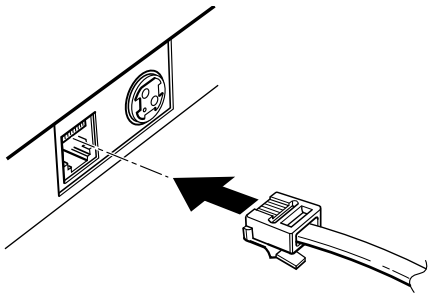
Use a cash drawer handled by EPSON or your dealer.

Connecting the Drawer Kick-out Cable

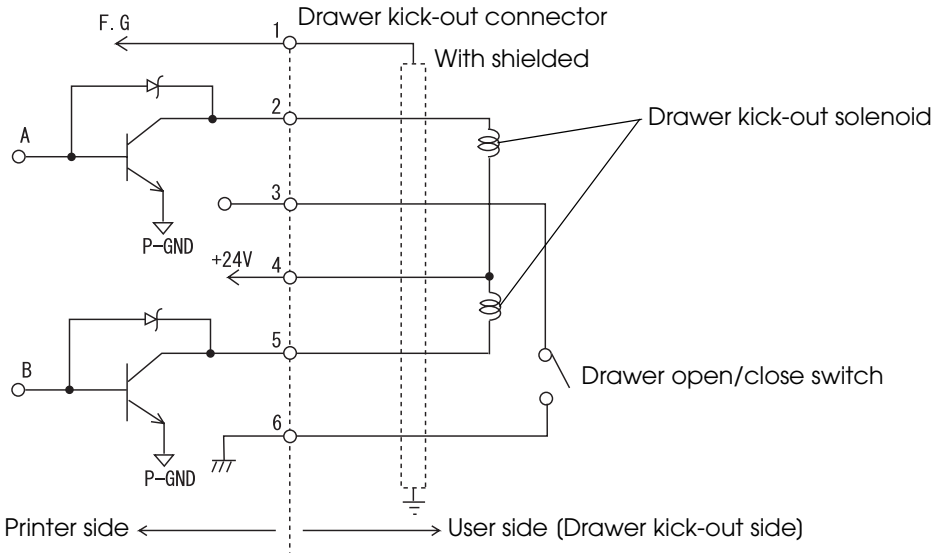
WARNING

- **Specifications of drawers differ depending on makers or models. When you use a drawer other than specified, make sure its specification meets the following conditions.**
  Otherwise, devices may be damaged.
  - ∗ The load, such as a drawer kick-out solenoid, must be connected between pins 4 and 2 or pins 4 and 5 of the drawer kick-out connector.
  - ∗ When the drawer open/close signal is used, a switch must be provided between drawer kick-out connector pins 3 and 6.
  - ∗ The resistance of the load, such as a drawer kick-out solenoid, must be 24 Ω or more or the input current must be 1A or less.
  - ∗ Be sure to use the 24V power output on drawer-kick out connector pin 4 for driving the equipment.
- **Use a shield cable for the drawer connector cable.**
- **Leave intervals longer than 4 times the drawer driving pulse when sending it continuously.**
- **Be sure to use the printer power supply (connector pin 4) for the drawer power source.**
- **Do not insert a telephone line into the drawer kick-out connector.**
  Doing so may damage the telephone line or printer.

Connect the connector of the drawer kick-out cable to the printer.



Drawer Circuitry



Application Development Information

This chapter describes how to control the printer and gives information useful for printer application development.

How to Control the Printer

Use a driver or ESC/POS commands to control the printer.

Selecting a Driver

Choose one of the drivers, Advanced Printer Driver (APD) or OPOS ADK, depending on the application operating environment. You cannot control the same printer with both of the drivers. For information about the driver operating environment, see the installation manual for each driver.

When you newly develop an application

- Use APD if you want to print TrueType fonts or print much graphics.
- OPOS ADK is recommended for system extensibility. An OPOS driver is provided for various peripherals and it is now a POS industry standard. It enables efficient POS system establishment and effective use of application assets.

When APD is used for your existing application

Use APD.

When OPOS ADK is used for your existing application

Use OPOS ADK.

NOTE

You can use all functions including ones not supported by OPOS ADK or APD by using a driver with ESC/POS commands. Use the DIRECT I/O function of OPOS ADK, the control A command of APD, or Status API to send ESC/POS commands from each driver. (See "ESC/POS command functions" on page 38.)

ESC/POS Command

ESC/POS is the Epson original printer command system. With ESC/POS commands, you can directly control all the TM printer functions, but detailed knowledge of printer specifications or combination of commands is required compared to using a driver.

To use ESC/POS commands, you need to make a nondisclosure contract first and get the ESC/POS Application Programing Guide. Ask your dealer for details.

The ESC/POS command functions are listed as follows. See the ESC/POS Application Programing Guide for more details.

ESC/POS command functions

Commands for printing
Print and line feed
Print and eject slip paper
Set slip paper eject length
Set/cancel slip paper reverse eject
Print and feed paper
Print and reverse feed
Print and feed *n* lines
Print and reverse feed *n* lines
Set slip paper wait time
Release
Enable/disable operation of feed to the print starting position for slip paper
Print data in page mode
Print and return to standard mode (in page mode)
Commands for line spacing
Set line spacing
Select default line spacing
Commands for print character
Select character code table
Select an international character set
Turn unidirectional printing mode on/off

Set right-side character spacing
Set all print decoration
Turn underline mode on/off
Turn emphasized mode on/off
Select character font
Select character size
Turn upside-down print mode on/off
Turn 90° clockwise rotation mode on/off
Set character decoration
Select/cancel user-defined character set
Define user-defined characters
Cancel print data in page mode
Commands for panel buttons
Enable/disable panel buttons
Commands for paper sensors
Select paper sensor(s) to stop printing
Select paper sensor(s) to output paper-end signals
Commands for print positions
Horizontal tab
Set horizontal tab positions
Set left margin
Set print area width
Select justification
Set absolute print position
Set relative print position
Set print area in page mode
Select print direction in page mode
Set absolute vertical print position in page mode
Set relative vertical print position in page mode

Commands for bit image
Select bit-image mode
Define downloaded bit image
Print downloaded bit image
Commands for status
Enable/disable Automatic Status Back (ASB)
Transmit status
Transmit real-time status
Commands for mechanical control
Return carriage to home position
Commands for sub-functions
Initialize printer
Transmit printer ID
Set horizontal and vertical motion units
Select peripheral device
Generate pulse to drawer
Generate pulse to drawer in real-time
Clear buffer(s)
Send real-time request to printer
Select page mode
Select standard mode
Execute test print

Software and Manuals

The following software and manuals are provided for application development.

Software	Description	Manual
Drivers		
EPSON Advanced Printer Driver (APD)	In addition to ordinary Windows driver functions, this driver has controls specific to POS such as controls of paper cut, a cash drawer, or customer display. The Status API (Epson original DLL) that monitors printer status and sends ESC/POS commands is also attached to this driver.	• APD installation manual • APD TM driver manual • APD Printer driver specification • Status API Reference manual
OPOS ADK (OPOS)	This OCX driver can control POS peripherals using OLE technology*1. Because controlling POS peripherals with original commands is not required on the application side, efficient system development is possible.	• OPOS installation manual • User's guide • Application development guide • OPOS Application Programing Guide*2 • Sample program guide • TM Flash Logo Utility user's manual

*1: OLE technology developed by Microsoft divides software into part blocks. The OPOS driver is supposed to be used with a develop environment such as Visual Basic, unlike ordinary Windows drivers. It is not a driver to be used for printing from commercial applications.

*2: Describes not Epson's specific functions, but general information on how to control printers using OPOS ADK (in the chapter "POS Printer").

Other than listed in the previous page, the UB-E02 Technical Reference Guide is provided to develop applications for the LAN interface.

Download

Drivers, utilities, and manuals can be downloaded from one of the following URLs.

For customers in North America, go to the following web site:

http://www.epsonexpert.com/ and follow the on-screen instructions.

For customers in other countries, go to the following web site:

http://www.epson-pos.com/

Setting Check Modes

Besides the ordinary print mode, the printer has a self-test mode and hexadecimal dumping mode to check settings of the printer.

Self-test Mode

You can confirm the following printer functions by running the self-test.

- Control circuit functions
- Printer mechanism
- Print quality
- ROM version
- DIP switch settings

Starting Self-test

Follow the steps below to run the self-test.

1 Close the front cover.

2 While pressing the REVERSE button, turn on the printer.

3 When the SLIP LED flashes, insert the slip paper.

The printer prints current status of the printer on the slip paper.

When the printer finishes printing the printer status, the printer ejects the slip paper, and the SLIP LED flashes.

4 Insert another slip paper.

The printer prints a test pattern.

When the printer finishes printing the test pattern, the printer prints the following message, is initialized, and returned to the normal mode.

"*** completed ***"

> **NOTE** If you want to pause the self-test manually, press the REVERSE button. Press the REVERSE button again to continue the self-test.

Hexadecimal Dumping Mode

In the hexadecimal dumping mode, the printer prints the data transmitted from a host computer in hexadecimal numbers and their corresponding characters.

Starting hexadecimal dumping

Follow the steps below to perform the hexadecimal dumping.

CAUTION

- If there is no character corresponding to print data, "." is printed.
- Applications that confirm printer status may not work correctly during the hexadecimal dumping mode. The printer returns only the status for "Transmit real-time status."

1 Open the front cover.

2 While pressing the REVERSE button, turn on the printer.

3 Close the front cover.
Data received from then on is printed out from the printer in hexadecimal numbers and their corresponding characters.

4 To quit the hexadecimal dumping mode, turn off or reset the printer.

Printing example

```
Hexadecimal Dump

1B 40 1B 21 00 41 42 43 44 45 46 47 48 49 4A 4B    .@.!.ABCDEFGHIJK
4C 4D 4E 4F 50 51 52 53 54 55 56 57 58 59 5A 0C    LMNOPQRSTUVWXYZ.
```

Handling

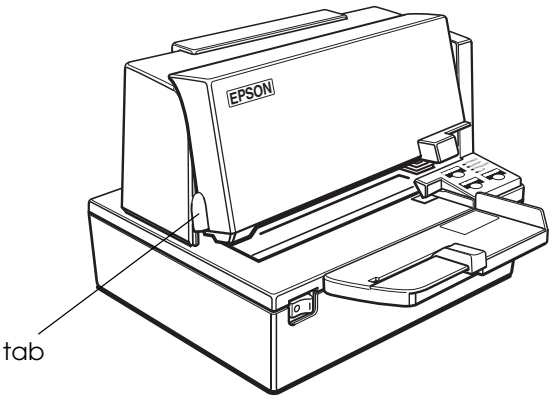
This chapter describes basic handling of the printer.

Installing the Ribbon Cassette

CAUTION Use the EPSON ERC-31 ribbon cassette. The use of any ribbon cassettes other than those approved by EPSON may damage the printer and will void the warranty.

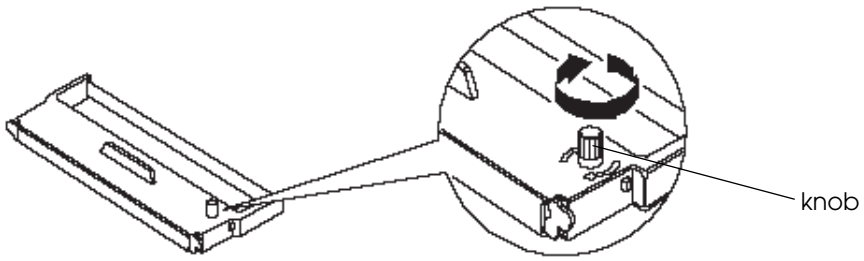
1 Turn the printer on.

2 Open the front cover by pulling up the tab on the front cover.

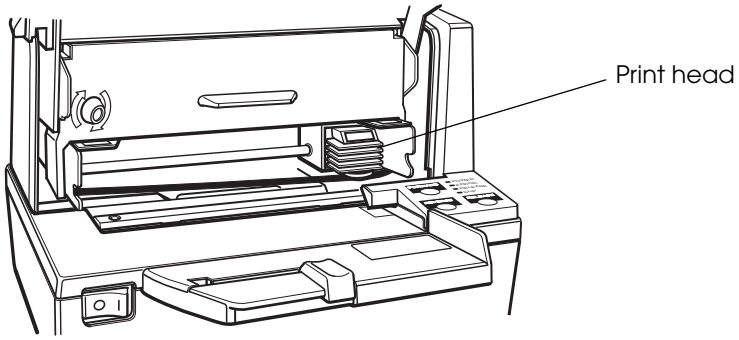


3 Turn the cassette knob on the cartridge in the direction of the arrow 2 or 3 times to remove any slack.

CAUTION Never turn the ribbon cassette's feed knob in the opposite direction of the arrow marked on the cassette; otherwise the ribbon cassette may be damaged.



4 Inset the ribbon so that the ribbon has no wrinkles or creases and is installed below the print head.



5 Turn the cassette knob 2 or 3 times again to remove any slack.

6 Close the front cover.

Inserting Slip Paper

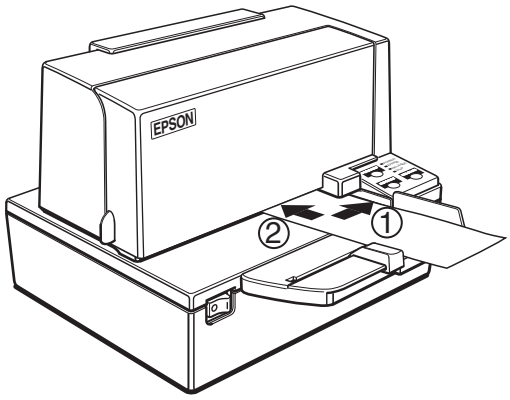
CAUTION

- Use slip paper that meets the printer specification. For details about paper specification, see "Paper Specifications" on page 19.
- Do not use wrinkled or curled paper.

1 Turn the printer on.

2 When the SLIP LED flashes, insert the slip paper, using the right edge of the slip paper inlet as a guide (①) as far as it will go (②).

When the slip paper is detected by the sensor, the SLIP LED stops flashing but stays on and the paper is automatically drawn into the printer and printing begins.



NOTE

After the slip paper is detected, the printer moves the slip paper back and forth to detect the position of its top edge. If the setting position of the slip paper is not correct, the printer takes a few seconds to detect the position of the top edge.

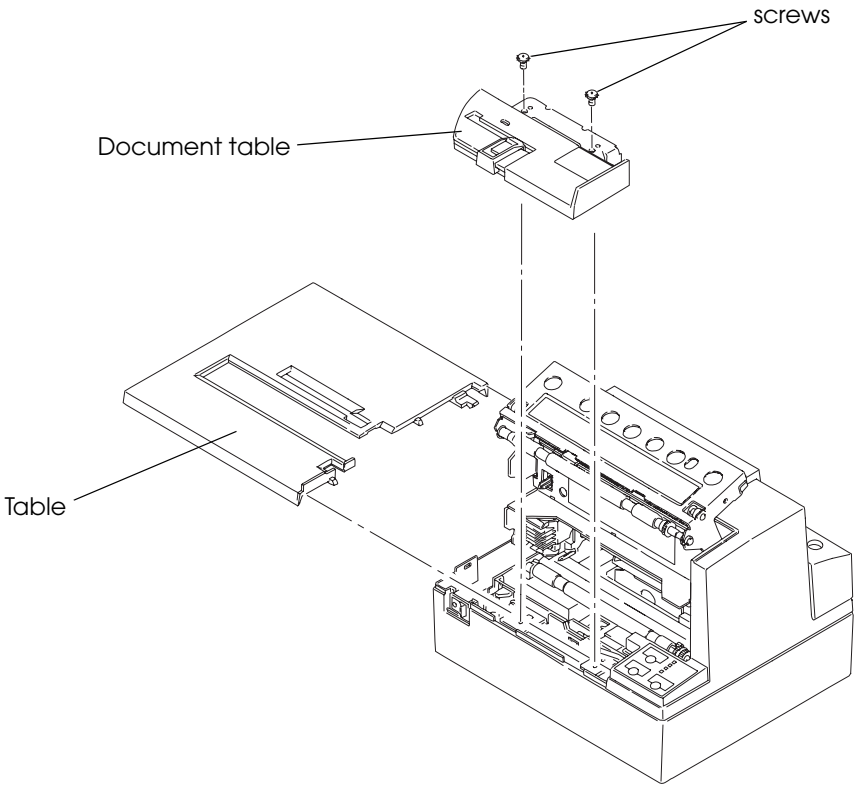
3 After printing is complete, remove the slip paper.

Removing the Paper Guide

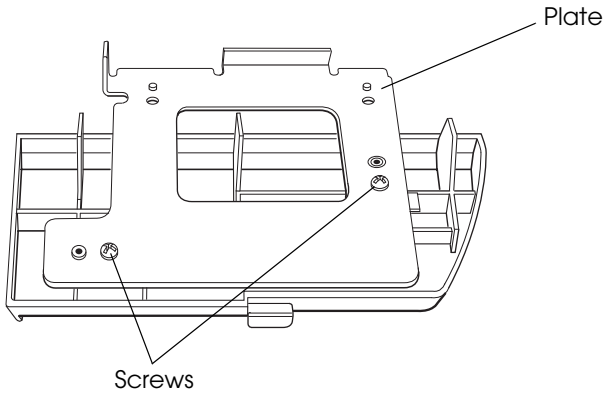
If you use especially wide paper, you may not want to use the paper guide on the document table. You can remove it, as described below.

1. Open the front cover by pulling up the tab on the front cover.
2. Slide the table to the left and remove it.
3. Loosen the screws and remove the document table from the printer.

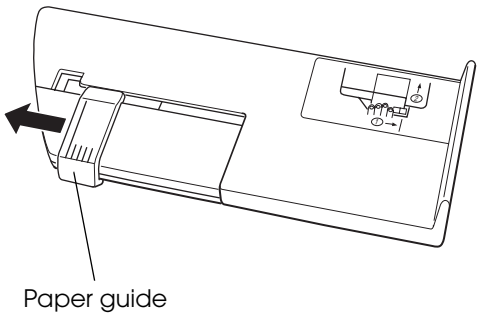
> **CAUTION** Be sure not to drop the screws in the printer.



4 Turn the document table over, remove the two screws, and remove the plate.



5 Slide the paper guide to the left as shown below to remove it.



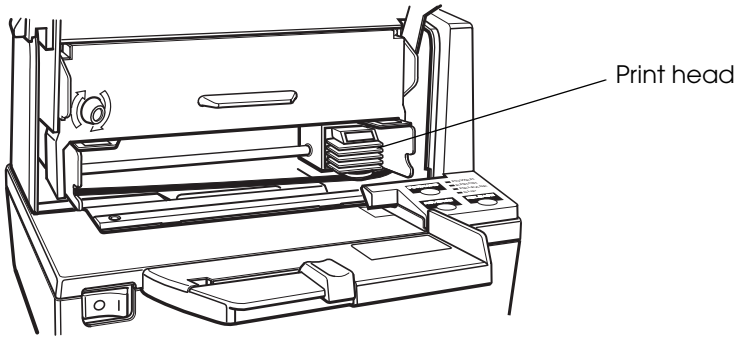
6 Replace the plate and install the document table and the table.

Removing Jammed Paper

CAUTION

Do not touch the print head because it can be very hot after printing.

1. Turn off the printer.
2. Open the front cover by pulling up the tab on the front cover.



3. Remove the jammed paper.
4. Close the front cover.

Preparing for Transport

Follow the steps below to transport the printer.

1. Turn off the printer.
2. Confirm that POWER LED is off.
3. Remove the power supply connector.
4. Pack the printer upright.

Appendix

Specifications of Interface and Connector

RS-232C Serial Interface

Interface board specifications (RS-232C-compliant)

Item		Specifications
Data transfer method		Serial
Synchronization		Asynchronous
Handshake		Select one of the following with DIP switch 1-3: • DTR/DSR • XON/XOFF
Signal level	MARK	-3V to -15V logic "1"/OFF
	SPACE	+3V to +15V logic "0"/ON
Bit length		Select one of the following with DIP switch 1-4: • 7 bit • 8 bit
Transmission speed (bps: bits per second)		Select one of the following with DIP switch 1-7/1-8: 2400/4800/9600/19200 bps (bps: bits per second)
Parity check		Select one of the following with DIP switch 1-5: • Yes • No
Parity selection		Select one of the following with DIP switch 1-6: • Even • Odd
Stop bit		1 or more bits However, the stop bit for data transfer from the printer is fixed to 1 bit.
Connector	Printer side	DSUB 25-pin (female) connector

Functions of each connector pin

Pin no.	Signal name	Signal direction	Function
1	FG	—	Frame ground
2	TXD	Output	Transmission data
3	RXD	Input	Reception data
4	RTS	Output	Equivalent to DTR signal (pin 20)
6	DSR	Input	This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data. MARK indicates that the host computer cannot receive data. When DTR/DSR control is selected, the printer transmits data after confirming this signal (except if transmitted using some ESC/POS commands). When XON/XOFF control is selected, the printer does not check this signal. Changing DIP switch 2-7 lets this signal be used as a printer reset signal. When you use this signal as the printer's reset signal, the printer is reset when the signal remains MARK for a pulse width of 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 status Indicates that the printer is ready to receive data. • MARK status Indicates that the printer is BUSY. Set BUSY conditions with DIP switch 2-1. 2) When XON/XOFF control is selected, the signal indicates that the printer is properly connected and ready to receive data from the host. The signal is always SPACE, except in the following cases: • During the period from when power is turned on to when the printer is ready to receive data. • During the self-test.
25	INT	Input	Changing DIP switch 2-8 enables this signal to be used as a reset signal for the printer. The printer is reset if the signal remains at SPACE for a pulse width of 1 ms or more.

XON/XOFF

When XON/XOFF control is selected, the printer transmits the XON or XOFF signals as follows. The transmission timing of XON/XOFF differs, depending on the setting of DIP switch 2-1.

Signal	Printer status	DIP switch 2-1	
		1 (ON)	0 (OFF)
XON	1) When the printer goes online after turning on the power (or reset using the 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 some ESC/POS commands	—	Transmit
XOFF	5) When the receive buffer becomes full	Transmit	Transmit
	6) When the printer switches from online to offline	—	Transmit

Code

The hexadecimal numbers corresponding to the XON/XOFF codes are shown below.

- XON code: 11H
- XOFF code: 13H

CAUTION

- When the printer goes from offline to online and the receive buffer is full, XON is not transmitted.
- When the printer goes from online to offline and the receive buffer is full, XOFF is not transmitted.
- When DIP switch 1-3 is off, XON is not transmitted as long as the printer is offline, even if a receive buffer full state has been cleared.

Modes

The IEEE 1284 parallel interface supports the following two modes.

Mode	Communication direction	Other information
Compatibility mode	Host → Printer communication	Centronics-compliant
Reverse mode	Printer → Host communication	Assumes a data transfer from an asynchronous printer

Compatibility Mode

Compatibility mode allows data transmission from host to printer only: Centronics-compatible.

Specification

Data transmission	8-bit parallel
Synchronization	Externally supplied $\overline{\text{STROBE}}$ signals
Handshaking	$\overline{\text{ACK}}$ and BUSY signals
Signal levels	TTL-compatible connector
Connector	ADS-B36BLFDR176 (HONDA) or equivalent product
Reverse communication	Nibble or byte mode

Reverse Mode

The transfer of status data from the printer to the host proceeds in the nibble or byte mode.

This mode allows data transfer from an asynchronous printer under the control of the host. Data transfers in the nibble mode are made via the existing control lines in units of four bits (a nibble). In the byte mode, data transfer proceeds by making the 8-bit data lines bidirectional. Both modes fail to proceed concurrently in the compatibility mode, thereby causing half-duplex transmission.

Interface signals

Pin	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	Strobe	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	$\overline{\text{Ack}}$	PtrClk	PtrClk
11	Printer	Busy	PtrBusy/Data3,7	PtrBusy
12	Printer	Perror	AckDataReq/Data2,6	AckDataReq
13	Printer	Select	Xflag/Data1,5	Xflag
14	Host	$\overline{\text{AutoFd}}$	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

Pin	Source	Compatibility Mode	Nibble Mode	Byte Mode
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	$\overline{\text{Init}}$	$\overline{\text{Init}}$	$\overline{\text{Init}}$
32	Printer	$\overline{\text{Fault}}$	$\overline{\text{DataAvail/Data0,4}}$	$\overline{\text{DataAvail}}$
33		GND	ND	ND
34	Printer	DK_STATUS	ND	ND
35	Printer	+5V	ND	ND
36	Host	$\overline{\text{SelectIn}}$	1284-Active	1284-Active

NC: None Connect

ND: Not Defined

CAUTION

- A signal name with a rule above it 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 a twisted-pair cable. Connect the return side to the signal ground level.
- Make sure the signals satisfy electrical characteristics.
- Set the leading edge and trailing edge times to 0.5ms or less.
- Do not ignore $\overline{\text{Ack}}$ or BUSY signals during a data transfer. Ignoring such signals may result in data corruption.
- Make the interface cables as short as possible.

Character Code Tables

CAUTION

- The character code tables show only character configurations. They do not show the actual print pattern.
- “SP” in the table shows a space.

Common to All Pages

When International character set (See "International Character Sets" on page 66.) is USA:

HEX	0	1	2	3	4	5	6	7
0	NUL 00	DLE 16	SP 32	0 48	@ 64	P 80	` 96	p 112
1	01	XON 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	02	18	" 34	2 50	B 66	R 82	b 98	r 114
3	03	XOFF 19	# 35	3 51	C 67	S 83	c 99	s 115
4	EOT 04	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	ENQ 05	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117
6	ACK 06	22	& 38	6 54	F 70	V 86	f 102	v 118
7	07	23	' 39	7 55	G 71	W 87	g 103	w 119
8	08	CAN 24	(40	8 56	H 72	X 88	h 104	x 120
9	HT 09	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	FF 12	FS 28	, 44	< 60	L 76	¥ 92	l 108	| 124
D	CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125
E	14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	15	31	/ 47	? 63	O 79	_ 95	o 111	SP 127

Page 0 (PC437: USA, Standard Europe)

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

Page 1 (Katakana)

HEX	8	9	A	B	C	D	E	F
0	_ 128	┴ 144	SP 160	− 176	タ 192	ミ 208	═ 224	╳ 240
1	▬ 129	┬ 145	。 161	ア 177	チ 193	ム 209	╞ 225	円 241
2	▬ 130	┤ 146	「 162	イ 178	ツ 194	メ 210	╪ 226	年 242
3	▬ 131	├ 147	」 163	ウ 179	テ 195	モ 211	╡ 227	月 243
4	■ 132	¯ 148	、 164	エ 180	ト 196	ヤ 212	◢ 228	日 244
5	■ 133	─ 149	・ 165	オ 181	ナ 197	ユ 213	◣ 229	時 245
6	■ 134	│ 150	ヲ 166	カ 182	ニ 198	ヨ 214	◥ 230	分 246
7	■ 135	│ 151	ァ 167	キ 183	ヌ 199	ラ 215	◤ 231	秒 247
8	136	┌ 152	ィ 168	ク 184	ネ 200	リ 216	♠ 232	〒 248
9	▏ 137	┐ 153	ゥ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	▌ 138	└ 154	ェ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	▌ 139	┘ 155	ォ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	▌ 140	┌ 156	ャ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	▌ 141	┐ 157	ュ 173	ス 189	ヘ 205	ン 221	○ 237	人 253
E	▌ 142	└ 158	ョ 174	セ 190	ホ 206	゛ 222	／ 238	▒ 254
F	┼ 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
0	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Đ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

Page 3 (PC860: Portuguese)

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

Page 4 (PC863: Canadian-French)

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

Page 5 (PC865: Nordic)

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

Page 19 (PC858: Euro)

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

Page 255 (Space Page)

NOTE

In the space page (page 25), the following font is defined as the default.

- 7 × 7 font (only when font 7 × 9 is selected. When 9 × 9 font is selected, character codes 80H to FFH are all spaces.)

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

International Character Sets

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
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	#	$	@	[	₩	]	^	`	{	|	}	~