TM-U325D/U325PD

User's Manual

Printer Parts and Labels

Printer cover

Serial interface connector

Parallel interface connector

Control panel

On/Off switch

Control panel

FEED RELEASE RECEIPT OUT VALIDATION ERROR POWER

Labels

① ② ③ ④ ⑤ CUT ② SET ① ③ ⑥ CLOSE THE PRINTER COVER
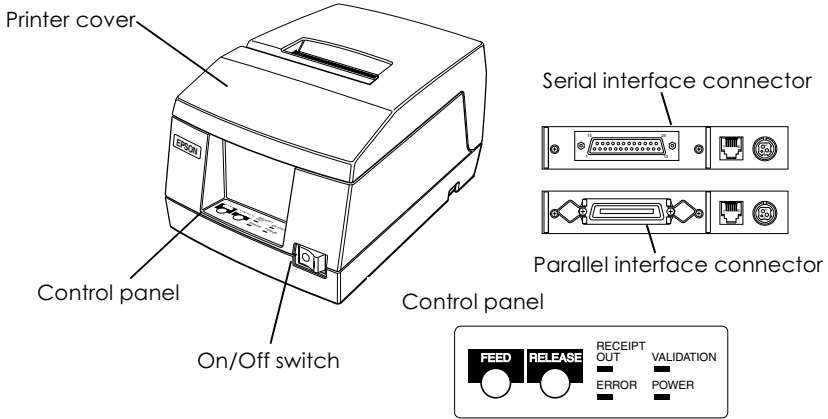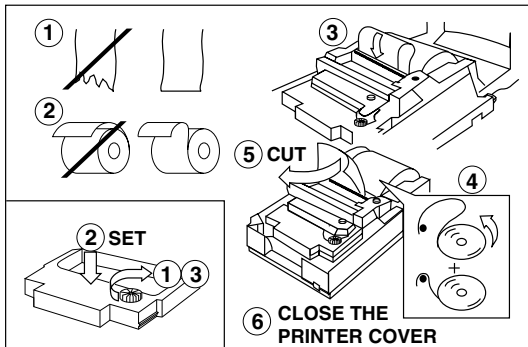
⚠ ♨ *CAUTION/ VORSICHT:*

Print head cover and print head are hot.

Druckkopfabdeckung und Druckkopf sind heiß.

⚠ *CAUTION/ VORSICHT:*

Caution label for drawer kick-out connector.

Vorsichtsetikett für Schnappsteckerbuchse.

Quick Reference

This Quick Reference will direct you to key areas of this Operator's Manual. For a complete listing of topics, see the Contents.

EMC and Safety Standards Applied

Product Name: TM-U325D/TM-U325PD
Model Name: M133A

The following standards are applied only to the printers that are so labeled. (EMC is tested using SEIKO EPSON's AC Adapter provided with the printer or EPSON PS-170 power supply.)

Europe: CE marking
                           Safety: EN 60950
North America: EMI: FCC/ICES-003 Class A
                           Safety: UL 1950/CSA C22.2 No. 950
Oceania: EMC: AS/NZS 3548

WARNING

The connection of a non-shielded printer interface cable to this printer will invalidate the EMC standards of this device.

You are cautioned that changes or modifications not expressly approved by SEIKO EPSON Corporation could void your authority to operate the equipment.

CE Marking

The printer conforms to the following Directives and Norms:

Directive 89/336/EEC

EN 55022 Class B
EN 55024
    IEC 61000-4-2
    IEC 61000-4-3
    IEC 61000-4-4
    IEC 61000-4-5
    IEC 61000-4-6
    IEC 61000-4-11

FCC Compliance Statement
For American Users

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

FOR CANADIAN USERS

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

GEREÄUSCHPEGEL

Gemäß der Dritten Verordnung zum Gerätesicherheitsgesetz (Maschinenlärminformations-Verordnung-3. GSGV) ist der arbeitsplatzbezogene Geräusch-Emissionswert kleiner als 70 dB(A) (basierend auf ISO 7779).

About This Manual

Setting Up and Using

❏ **Chapter 1** contains information on unpacking the printer, setting it up, attaching the paper roll near-end sensor, and setting the DIP switches.

❏ **Chapter 2** contains information on using the printer.

❏ **Chapter 3** contains troubleshooting information.

Reference

❏ **Chapter 4** contains specifications and character code tables.

Warnings, Cautions, and Notes

⚠️*WARNING / WARNUNG:*

Warnings must be followed carefully to avoid serious bodily injury.

Warnhinweise müssen sorgfältig befolgt werden, um Unfälle mit möglicherweise schweren Verletzungen zu vermeiden.

⚠️*CAUTION / VORSICHT:*

Cautions must be observed to avoid minor injury to yourself or damage to your equipment.

Vorsichtshinweise müssen sorgfältig befolgt werden, um Unfälle mit der Gefahr leichter Verletzungen oder Schäden am Gerät zu vermeiden.

✎ *Note:*
Notes have important information and useful tips on the operation of your printer.

Introduction

Features

The TM-U325D and TM-U325PD are high-quality POS printers that can print a multiple-line validation and on receipt paper (paper roll). The printer has the following features:

❏ Easily changeable interface specifications for serial or parallel by exchanging the interface board.

❏ Excellent reliability (long life) and good operability (drop-in paper loading).

❏ Multiple-line validation printing (possible to print a maximum of 9 lines).

❏ Compact and light in weight.

❏ High-speed printing through logic-seeking control.

❏ Excellent reliability and long life due to adoption of stepping motor, both for moving the carriage and for paper feeding.

❏ Flexible line space setting permits printing in accordance with any user-defined format.

❏ Conforms with ESC/POS®; excellent universality of control.

❏ Built-in drawer kick-out interface provides capability to drive two drawers.

❏ Selectable character fonts (7×9 and 9×9).

❏ Semi-automatic paper loading capability.

❏ AC adapter provides compact power supply.

❏ Automatic status back (ASB) function that automatically transmits changes in printer status.

Accessories

❏ AC adapter

❏ EPSON ribbon cassette, ERC-38(P) or ERC-38(B)

Options

❏ EPSON power supply unit, PS-170

❏ Printer fastening tape (Model No. DF-10)

Contents

Chapter 1
Setting Up the Printer

Unpacking

The illustration below shows the items included for the standard specification printer.
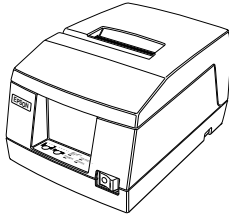
Printer
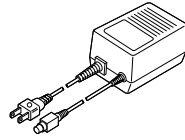
Power supply
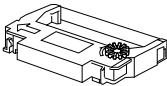
Ribbon cassette
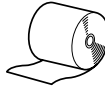
Paper roll
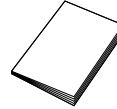
Manual

Spacers for the paper roll
near-end sensor
2 pcs

Power switch cover

If any item is damaged, please contact your dealer for assistance.

Selecting a Location

Place the printer on a surface that is as horizontal as possible. Make sure that the printer does not tilt more than 15 degrees.

The printer should be installed so that it does not move or vibrate during paper cutting or the drawer kick-out operation.

Fastening tape is available as an option.

Adjusting the Paper Roll Near-End Sensor

✎*Notes:*
Use paper rolls with an inner core diameter of 10.5 to 12.5 mm so that the sensor detects the remaining paper correctly.

When the last portion of a paper roll bears red markings, the marking is sometimes an adhesive that pulls the entire paper roll up. In this case, the sensor may not detect the remaining paper correctly.

If a paper roll easily becomes loose because of the quality of the paper or other factors, incorrect detection of the paper end may result.

1. Make sure that the power supply is disconnected from the printer.

2. Two spacers are included. See the illustration below and decide whether or not you want to use them. Use them if you want the near-end sensor to be triggered when distance A is 3 to 4 mm; otherwise it will be triggered when distance A is approximately 6 mm.

Distance A
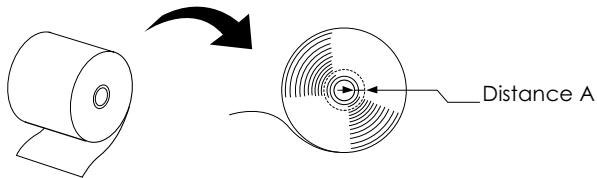
3. Secure the paper roll near-end sensor (and spacers) with two screws. When you insert the spacers, be sure you set the spacers in the direction shown in the illustration.

Spacers

Paper roll near-end sensor
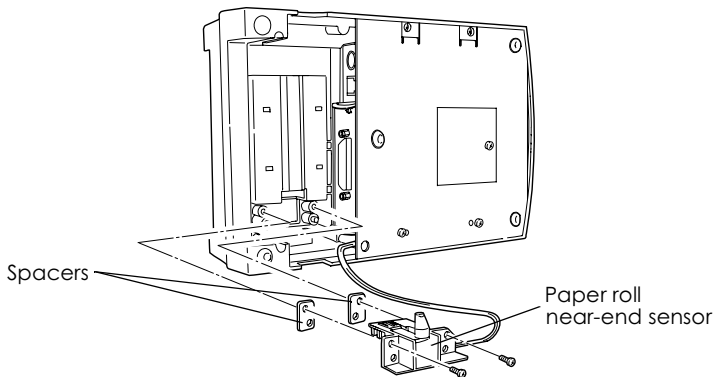
4. Check to be sure that the detecting lever moves freely.

Connecting the Cables and Grounding the Printer

You can connect up to three cables and a grounding wire to the printer. They all connect to the connector panel on the bottom of the printer, which is shown below:
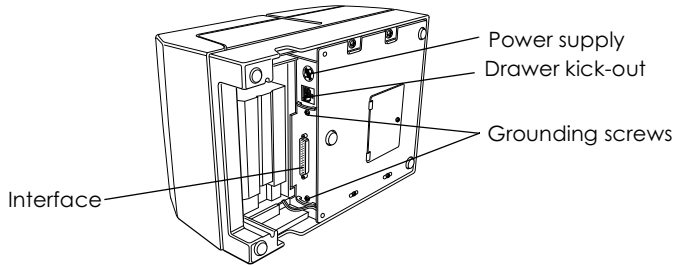
Notes:
There is a caution label beside the drawer kick-out connector.

Depending on the interface installed, the interface connector on your printer may look different from the one illustrated.

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

Connecting the Computer

1. Plug the cable into the connector on the printer and tighten the screws on both sides of the cable connector, as shown.
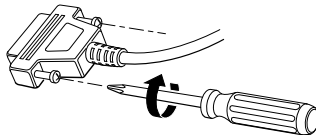
2. Connect the other end of the cable to the connector on your computer.

Connecting the Drawer

⚠ WARNING:

Use a drawer that matches the printer specification. Using an improper drawer may damage the drawer as well as the printer.

⚠ CAUTION:

Do not connect a telephone line to the drawer kick-out connector; otherwise the printer and the telephone line may be damaged.

Plug the drawer cable into the drawer kick-out connector on the bottom of the printer next to the power supply connector.
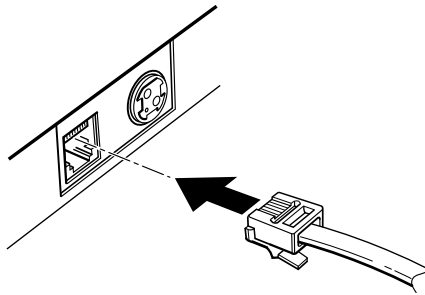
Anschließen der Lade

⚠ WARNUNG:

Eine für den Drucker geeignete Lade verwenden. Bei Verwendung einer falschen Lade kann diese oder der Drucker beschädigt werden.

⚠ ACHTUNG:

Kein Telefonkabel an die Schnappsteckerbuchse anschließen, da sonst der Drucker und die Telefonkabel beschädigt werden können.

Das Kabel der Lade an die Schnappsteckerbuchse unten am Drucker neben dem Netßzanschluß anschließen.
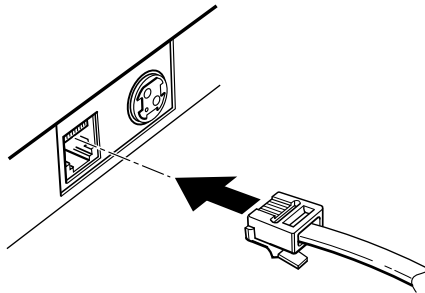
Grounding the Printer

You need a ground wire to ground your printer. Make sure that the wire meets the specifications below.

Thickness of wire: AWG 18 or equivalent
Diameter of terminal to be attached: 3.2

1. Make sure that the printer is turned off.

2. Connect the ground wire to the printer using the FG screw on the bottom of the printer, as shown.
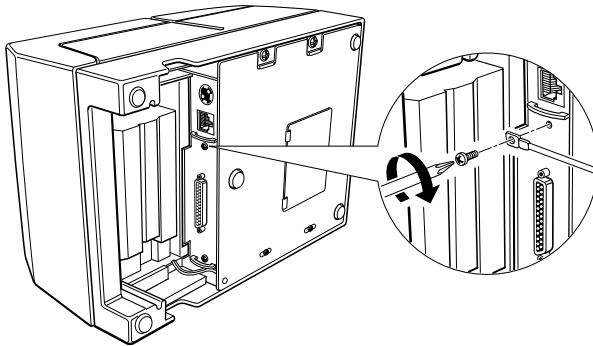
Connecting the Power Supply

This printer requires an external power supply. Be sure to use a power supply that matches the specifications.

⚠ *WARNING / WARNUNG:*

Using an incorrect power supply may cause fire or electrical shock.

Bei Verwendung der falschen Stromversorgung besteht Brand- oder Stromschlaggefahr.

⚠ *CAUTION / VORSICHT:*

When connecting or disconnecting the power supply from the printer, make sure that the power supply is not plugged into an electrical outlet; otherwise you may damage the power supply or the printer.

If the power supply's rated voltage and your outlet's voltage do not match, contact your dealer for assistance. Do not plug in the power cord. Otherwise you may damage the power supply or the printer.

Beim Anschließen der Stromversorgung an den Drucker und beim Herausziehen der Stromversorgung aus dem Drucker darf die Stromversorgung nicht in eine Steckdose eingesteckt sein. Andernfalls kann die Stromversorgung oder der Drucker beschädigt werden.

Wenn die Nennspannung der Stromversorgung und die Spannung der Steckdose nicht übereinstimmen, den Händler um Hilfe bitten. Das Netzkabel nicht einstecken. Andernfalls kann die Stromversorgung oder der Drucker beschädigt werden.

1. Make sure that the printer's power switch is turned off, and the power supply's power cord is unplugged from the electrical outlet.

2. Plug in the power supply's cord as shown below. Notice that the flat side of the connector faces down.
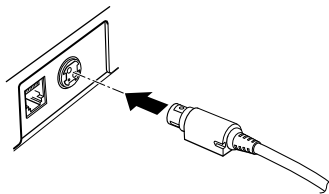
3. Plug the power supply's power cord into an outlet.

✎ *Note:*
If you ever need to remove the cable, unplug the power supply's power cord from the outlet and then grasp the connector firmly at the arrow mark and pull it straight out.

Installing the Ribbon Cassette

Use the EPSON ERC-38(P) or ERC-38(B) ribbon cassette for your printer.

Note the label inside the printer cover that can assist you in installing the ribbon.

⚠ CAUTION / VORSICHT:

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.

Den Transportknopf an der Farbbandkassette nur in die durch den Pfeil gekennzeichnete Richtung drehen. Andernfalls kann die Farbbandkassette beschädigt werden.

1. Be sure the printer is not receiving data when you replace a ribbon cassette; otherwise data may be lost.

2. Open the printer cover.

3. Turn the ribbon cassette's knob in the direction of the arrow, to take up any slack in the ribbon.
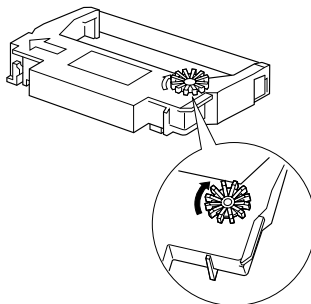
4. Insert the ribbon in the position shown in the illustration below and push the ribbon cassette until it clicks.

✎ *Note:*
   Make sure that the ribbon is installed between the print head and the platen without wrinkles or creases.
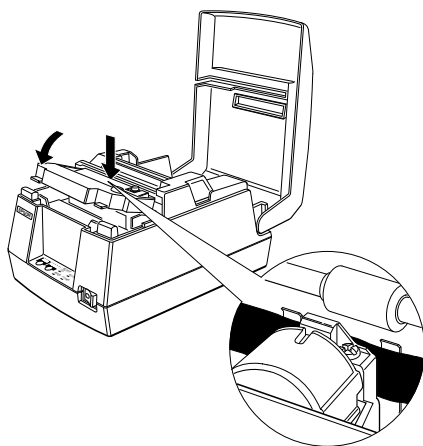
5. Turn the ribbon cassette's knob 5 or 6 times in the direction of the arrow again, to take up any slack in the ribbon.
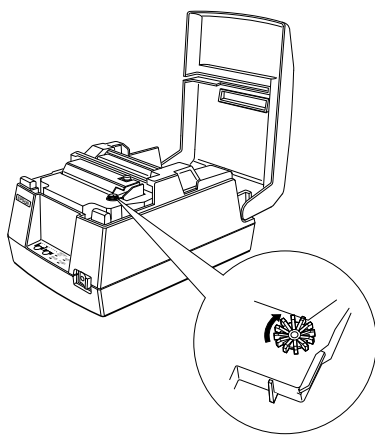
Installing the Paper Roll

✎ *Notes:*

Be sure to use a paper roll that meets the specifications.

Do not use paper rolls that have the paper glued to the core because the printer cannot detect the paper end correctly. However, if you will stop the printing using the paper roll near-end sensor, you can use glued type paper rolls.

1. Using scissors, cut the leading edge of the paper roll as shown below.
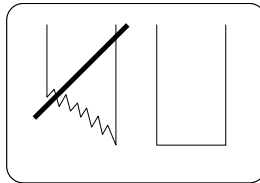
2. Turn on the printer and open the printer cover.

3. Insert the paper roll.
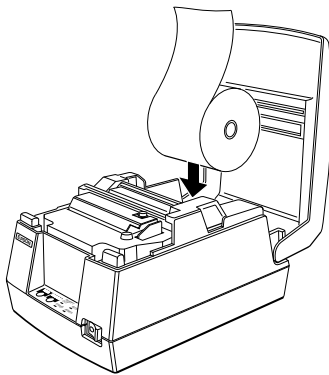
Be sure to note the correct direction that the paper comes off the roll as shown below.
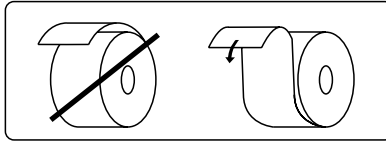
4. Hold both edges of the paper and insert it straight into the paper slot. The printer feeds the paper automatically.
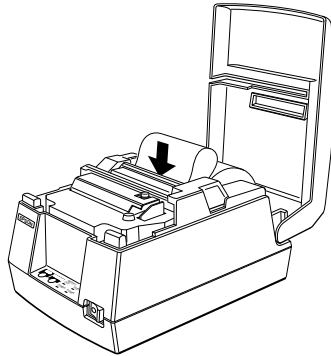
5. Tear off the paper; then close the cover.

   ✐ *Note:*
   Before closing the cover, make sure that the paper from the paper roll is not slack.
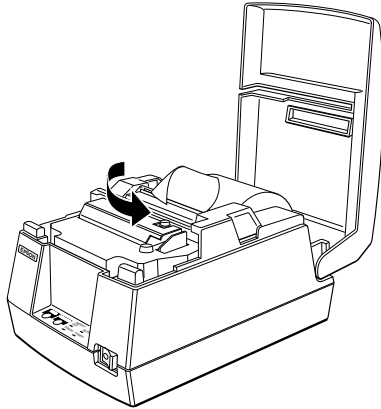
To remove the paper roll, follow the steps below.

1. Open the printer cover.

2. Pull up the paper and cut the paper at the dotted line shown in the illustration below.

Cut here
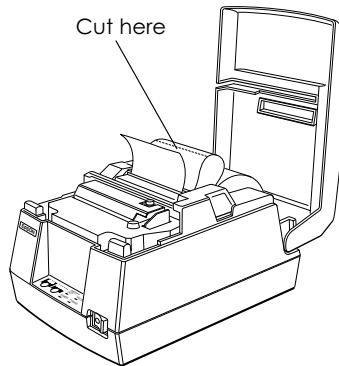
3. Remove the paper roll from the printer.

4. Press the FEED button to remove the remaining paper.

Running the Self Test

Any time that you want to check the performance of your printer, you can run the self test described below. This shows whether your printer is working correctly. It is independent of any other equipment or software.

✎ *Note:*
Be sure to install the ribbon cassette and the paper roll before you run the self test.

1. To perform the self test, hold down the FEED button while you turn on the printer with the power switch.

2. The printer prints the current printer settings and then the RECEIPT OUT light blinks to indicate that the printer is in the test printing standby state.

3. Press the FEED button to start the second part of the test, in which the printer prints a pattern using the built-in character set.

4. After the printer completes a certain number of lines, it prints the following:

<div align="center">*** completed ***</div>

Then it enters the normal mode.

✎ *Note:*
   If you want to pause the self test manually, press the FEED *button. Press the* FEED *button again to continue the self test.*

Setting the DIP Switches
Einstellen der DIP-Schalter

⚠ CAUTION / VORSICHT:

Turn off the printer while removing the DIP switch cover to prevent an electrical short, which can damage the printer.

Den Drucker vor Abnahme der DIP-Schalterabdeckung ausschalten, um einen Kurzschluß zu verhindern, durch den der Drucker beschädigt werden könnte.

If you have special requirements, you can change the DIP switch settings.

Wenn besondere Anforderungen vorliegen, können die DIP-Schaltereinstellungen geändert werden.

1. Make sure that the printer is off.
   Sicherstellen, daß der Drucker ausgeschaltet ist.

2. Turn the printer over and remove the DIP switch access cover, as shown below.
    Den Drucker umdrehen und die DIP-Schalterabdeckung abnehmen (siehe Abbildung).
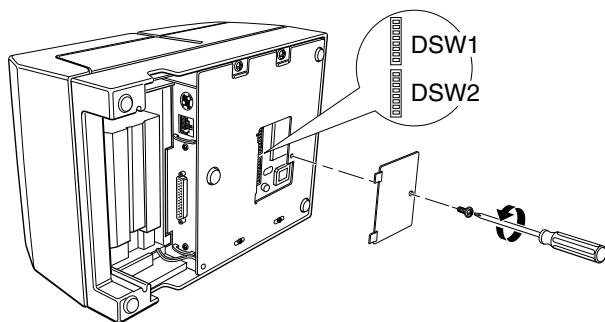
3. There are two sets of switches. Notice that ON is marked on each set of switches. Use tweezers or another narrow tool to move the switches.
    Es gibt zwei Gruppen von Schaltern. Auf beiden Gruppen ist die Einstellung ON (EIN) markiert. Zum Verschieben der Schalter eine Pinzette oder ein anderes kleines Werkzeug verwenden.

4. Use the following tables to set the DIP switches. Numbers starting with 1 are in the first set, and numbers starting with 2 are in the second.
    Die DIP-Schalter anhand der folgenden Tabellen einstellen. Schalter, die mit 1 beginnen, befinden sich in der ersten Gruppe, Schalter, die mit 2 beginnen, in der zweiten Gruppe.

Serial Interface (TM-U325D)

These are the settings for printers equipped with a serial interface.

DIP Switch Set 1

Switch	Function	ON	OFF
1-1	Data reception error	Ignored	Prints"?"
1-2	Receive buffer capacity	45 bytes	4K bytes
1-3	Handshaking	XON/XOFF	DTR/DSR
1-4	Word length	7 bits	8 bits
1-5	Parity check	Yes	No
1-6	Parity selection	Even	Odd
1-7, 1-8	Transmission speed (see table below)		

Transmission Speed

Transmission Speed (BPS)-bits per second	1-7	1-8
2400	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

DIP Switch Set 2

Switch	Function	ON	OFF
2-1	Handshaking (BUSY condition)	Receive buffer full	Off line or receive buffer full
2-2	Not defined	—	—
2-3	Select number of characters per line (CPL) 7×9 font/9×9 font	42CPL/35CPL	40CPL/33CPL
2-4, 2-5	Not defined	—	—
2-6	Internal use	—	Fixed to Off
2-7	I/F pin 6 reset signal	Enabled	Disabled
2-8	I/F pin 25 reset signal	Enabled	Disabled

✎ *Notes:*
Changes in DIP switch settings (excluding switches 2-7 and 2-8) are recognized only when the printer power is turned on or when the printer is reset by using the interface. If the DIP switch setting is changed after the printer power is turned on, the change does not take effect until the printer is turned on again or is reset.

If DIP switch 2-7 or 2-8 is turned on while the printer 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.

Parallel Interface (TM-U325PD)

These are the settings for printers equipped with a parallel interface.

DIP Switch Set 1

Switch	Function	ON	OFF
1-1	Auto line feed	Enabled	Disabled
1-2	Receive buffer capacity	45 bytes	4K bytes
1-3~1-8	Not defined	—	—

DIP Switch Set 2

Switch	Function	ON	OFF
2-1	Handshaking (BUSY condition)	Receive buffer full	Off line or receive buffer full
2-2	Not defined	—	—
2-3	Select number of characters per line (CPL) 7×9 font/9×9 font	42CPL/35CPL	40CPL/33CPL
2-4, 2-5	Not defined	—	—
2-6	Internal use	—	Fixed to Off
2-7	Not defined	—	—
2-8	I/F pin 31 reset signal	Fixed to On	—

✎ *Notes:*

Changes in DIP switch settings are recognized only when the printer power is turned on or when the printer is reset by using the interface. If the DIP switch setting is changed after the printer power is turned on, the change does not take effect until the printer is turned on again or is reset.

5. Replace the DIP switch cover and secure it with the screw.
   Die DIP-Schalterabdeckung wieder aufsetzen und mit der Schraube befestigen.

Using the Power Switch Cover
Verwendung der Netzschalterabdeckung

⚠ WARNING / WARNUNG:

If an accident occurs when the power switch cover is attached, unplug the power supply cord from the outlet immediately; otherwise the printer may be damaged.

Wenn ein Unfall auftritt und die Netzschalterabdeckung aufgesetzt ist, das Netzkabel sofort aus der Steckdose herausziehen. Andernfalls kann der Drucker beschädigt werden.

You can use the provided power switch cover to protect the power switch from accidental or improper operation. Attach the cover as shown in the illustration below.

You can turn the power on or off with the switch cover attached by inserting a pointed object (like a ball point pen) through either of the two small holes on the switch cover.

Mit der mitgelieferten Netzschalterabdeckung läßt sich der Netzschalter vor versehentlicher oder unbefugter Benutzung schützen. Die Abdeckung ist wie in der Abbildung dargestellt anzubringen.

Um den Drucker ein- und auszuschalten, während die Netzschalterabdeckung aufgesetzt ist, einen spitzen Gegenstand (wie z.B. einen Kugelschreiber) in eine der beiden kleinen Öffnungen in der Abdeckung einführen.
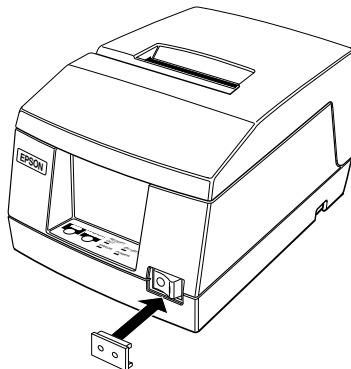
Affixing the Fastening Tape (Option)

Two sets of tape are included as an option to fasten your printer to a countertop or other surface. Follow the steps below:

1. Clean the countertop or other surface where the printer will be installed.

2. Peel the green backing paper off of one side of each of the two sets of tapes and affix them to the bottom of the printer, as shown below.
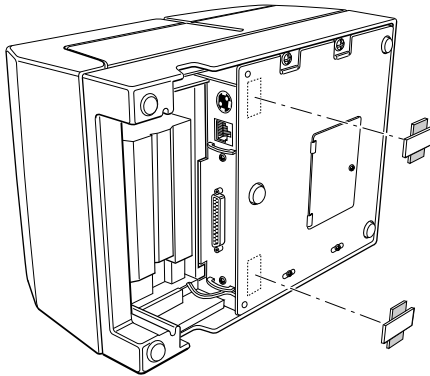
3. Peel the green backing paper off of the other side of the tapes.

4. Press the printer onto the countertop; it will be held firmly in place by the fastening tape.

Chapter 2
Using the Printer

Operating the Control Panel

You can feed or release paper with the buttons on the control panel. The indicator lights help you monitor the printer's status.
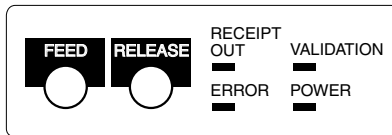
Switch

The power switch on the front of the printer turns the printer on and off.

Buttons

FEED

Press the FEED button once to advance the paper roll one line. You can also hold down the FEED button to feed the paper continuously.

RELEASE

Press the RELEASE button to release the validation paper.

✎ *Notes:*
*These buttons can be disabled by the **ESC c 5** command, but they work whenever the printer cover is open, even if they have been disabled by the **ESC c 5** command.*
The power switch and FEED button can also be used to start the self test.

Indicator lights

The control panel lights provide information on printer conditions.

POWER (Green)

The POWER light is on when the printer power is on.

RECEIPT OUT (*Red*)

This light is on when the paper roll is at the end or near the end.

This light blinks in the following cases. When it blinks, press the FEED button.

❏   In the self-test standby state

VALIDATION (*Green*)

The light is on when validation paper is inserted and the printer is ready to print. The light blinks when the printer is in the validation insertion/removal waiting state.

ERROR (*Red*)

This light is on when the printer is off line (except during paper feed using the FEED button and during the self-test). It blinks to indicate an error condition.

The blinking pattern shown below indicates that the temperature of the print head is too high. The printer recovers automatically and resumes printing when the head cools.

Approximately 160 ms

If the printer stops working and the ERROR light is blinking, turn the printer off, check for jammed paper, and remove the paper by following the instructions on page 3-3, if necessary. Then turn the printer back on. If the printer still does not work, unplug the power supply cord from the outlet immediately, and contact a qualified service person.

⚠️ 🔥 *CAUTION / VORSICHT:*

The print head becomes very hot during printing. Allow it to cool before you reach into the printer.

Der Druckkopf wird beim Drucken sehr heiß. Warten, bis er sich abgekühlt hat, bevor Sie in den Drucker fassen.

Validation Paper Handling

✎ *Notes:*
Use only validation paper that matches the printer's specifications. See Paper Specifications in Chapter 4.

Be sure that a paper roll is loaded before you use validation paper.

Be sure that the validation paper is flat, without curls, folds, or wrinkles.

1. Send appropriate control commands from the computer to print on validation paper.

2. When the VALIDATION light blinks, insert the validation paper into the validation paper inlet using the right edge of the validation paper inlet as a guide. (Follow steps ① and ② in the illustration.)
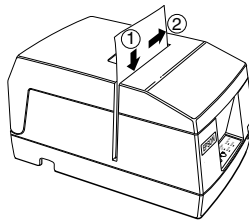
3. Make sure you insert the validation paper into the inlet as far as it will go.

4. When the validation paper is detected by the sensor, the VALIDATION light is changed from blinking to on and the paper is automatically drawn into the printer and printing begins.

5. When the VALIDATION light begins blinking after printing, remove the validation.

Chapter 3
Troubleshooting

Troubleshooting

This chapter gives solutions to some of the more common printer problems.

General Problems

The lights on the control panel do not come on.

Make sure that the power supply cords are correctly plugged into the printer, the power unit, and to the power outlet.

Make sure that power is supplied to the power outlet. If the outlet is controlled by a switch or timer, use another outlet.

Printing Problems

The ERROR light is blinking and the printer does not print.

First, turn off the printer and check for a paper jam. (See the paper jam description on page 3-3.)

If there is no paper jam and the printer has been printing for quite a while, the print head may be overheated. If the print head is overheated, the printer will resume printing when the head has cooled (usually about 30 seconds).

If there is no paper jam and the print head is not overheated, turn off the printer and turn it back on after about 10 seconds. If the printer still does not work, unplug the power supply cord from the outlet immediately. Then contact a qualified service person.

The **ERROR** light is off, but nothing is printed.

Try to run the self test to check that the printer works properly. See the self test instructions in Chapter 1 to run the self test. If the self test does not work, contact your dealer or a qualified service person.

If the self test works properly, check the following:

1. Check the connection at both ends of the interface cable between the printer and the computer. Also make sure that this cable meets the specifications for both the printer and the computer.

2. The data transmission settings may be different between the printer and computer. Make sure that the printer's DIP switch settings for data transmission are the same as the computer's. You can print the printer's interface settings using the self test.

If the printer still does not print, contact your dealer or a qualified service person.

The printer sounds like it is printing, but nothing is printed.

The ribbon cassette may not be installed properly. See the instructions in Chapter 1.

The ribbon may be worn out. Replace the ribbon cassette as described in Chapter 1.

The printout is faint.

The ribbon may be worn out. Replace the ribbon cassette as described in Chapter 1.

A line of dots is missing in the printout.

The print head may be damaged. Stop printing and contact your dealer or a qualified service person.

Removing Jammed Paper

Follow these steps to clear a paper jam:

⚠ 🔥 *CAUTION / VORSICHT:*

The print head becomes very hot during printing. Allow it to cool before you reach into the printer.

Der Druckkopf wird beim Drucken sehr heiß. Warten, bis er sich abgekühlt hat, bevor Sie in den Drucker fassen.

1. Open the printer cover.

2. Pull up the paper and cut the paper at the dotted line shown in the illustration below.

Cut here
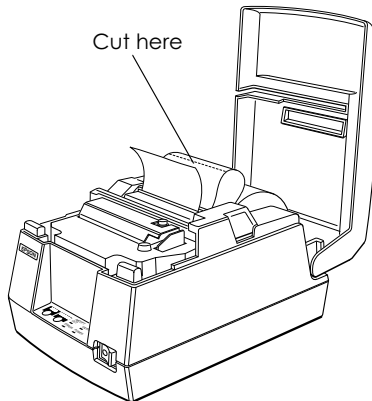
3. Remove the paper roll from the printer.

4. Remove the ribbon cassette.

5. Loosen the screw on the print head cover as shown below.
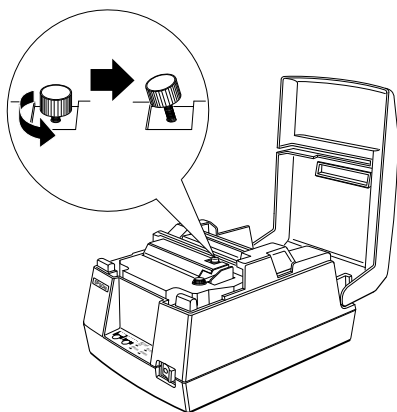
6. Lift up the print head cover.
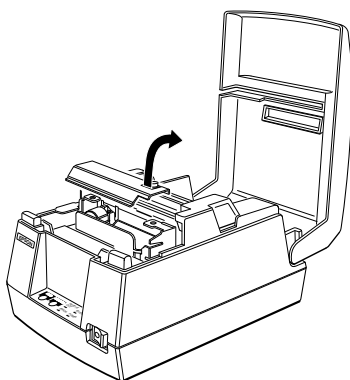
7. Remove all the jammed paper.

✎ *Note:*
Do not pull the jammed paper in the opposite direction of paper feeding.

8. Replace the print head cover and secure it with the screw.

9. Replace the ribbon cassette and paper roll; then close the printer cover.

Hexadecimal Dump

This feature allows experienced users to see exactly what data is coming to the printer. This can be useful in finding software problems. When you turn on the hex dump function, the printer prints all commands and other data in hexadecimal format along with a guide section to help you find specific commands.

To use the hexadecimal dump feature, follow these steps:

1. Turn on the printer while you hold down the FEED button; then close the cover.

2. When the printer enters the hexadecimal dump mode, it prints "Hexadecimal Dump."

3. Run any software program that sends data to the printer. The printer prints all the codes it receives in a two-column format. The first column contains the hexadecimal codes and the second column gives the ASCII characters that correspond to the codes.

   ```
   Hexadecimal Dump
   1B 40 1B 21 30 41 42 43    . @ . ! 0 A B C
   44 45 46 47 0A             DE F G.
   ```

   ❏ A period (.) is printed for each code that has no ASCII equivalent.

   ❏ During the hexadecimal dump, all commands except **DLE EOT** and **DLE ENQ** are disabled.

4. When the printing finishes, turn off the printer or reset it to turn off the hexadecimal dump mode.

✎ *Note:*
 Insufficient print data to fill the last line can be printed by setting the printer off-line.

Chapter 4

Reference Information

Printing Specifications

Printing Method:	Serial impact dot-matrix
Head wire configuration:	9-pin serial configuration
Printing Direction:	Bi-directional, logic-seeking
Characters/line (default):	See table on page 4-2.
Character spacing (default) Fonts A and B:	See table on page 4-2.
Printing speed:	Approx. 3.5 lines/second (40 columns, 16 cpi) Approx. 6.4 lines/second (16 columns, 16 cpi) (excluding data transmission time and processing time)

[cpi: characters per 25.4 mm (characters per inch)]

Note:

When printing exceeds the allowable print duty cycle, the printer automatically stops printing. In this case, the printing speed described above is not guaranteed.

Character Specifications

Number of characters	Alphanumeric characters: 95 Extended graphics: 128×8 pages, International characters: 32
Character structure:	7×9 (the total number of dots for each horizontal line: 400 in half dot units) 9×9 (the total number of dots for each horizontal line: 400 in half dot units)
Character size:	See table below.

Character Sizes, Character Spacing, Character Columns

Character structure		Character size W x H (mm)	Character spacing Dot space	CPL	CPI
W x H (mm)	**Character**				
7 x 9	ANK	1.2 x 3.1	3 half dots	40	16
	Graphics	1.7 x 3.1	0	40	16
9 x 9	ANK	1.6 x 3.1	3 half dots	33	13.3
	Graphics	2.0 x 3.1	0	33	13.3
7 x 9	ANK	1.2 x 3.1	2 half dots	42	17.8
	Graphics	1.6 x 3.1	0	42	17.8
9 x 9	ANK	1.6 x 3.1	2 half dots	35	14.5
	Graphics	1.9 x 3.1	0	35	14.5

[cpl: characters per line]

[cpi: characters per 25.4 mm (characters per inch)]

Notes:

- The default is 7 x 9.

- 2-dot spacing in half dot units and 3-dot spacing in half dot units depend on the DIP switch setting.

Paper Specifications

Paper feed method: Friction feed

Paper feed pitch: Default 4.23 mm {1/6 inch}

Can be set in units of 0.176 mm {1/144 inch} by commands.

Paper feed speed: Approx. 105.918 mm {4.17 inches}/ second (25 lines/second) (continuous feeding)

Paper size and weight:

Paper roll: **Normal paper (single-ply)**

Size: Width 76 mm ± 0.5 mm {3.0" ± 0.02"}

Maximum outside dia: 83 mm {3.27"}

Thickness: 0.06 to 0.085 mm {.0024 to .0033"}

Mass: 52.3 to 64.0 g/m^2 {13.9 to 17 lbs} (45 to 55 Kg {20.41 to 24.94 lbs}/1000 sheets/ 1091 mm × 788 mm {43.00" × 31.02"}

Pressure sensitive paper

Maximum 1 original + 2 copies

Size:	Width 76 mm ± 0.5 mm {3.0" ± 0.02"}
Maximum outside dia:	83 mm {3.27"}
Thickness:	0.05 to 0.08 mm {.0020 to .0031"} (Total thickness should be 0.2 mm or less and each sheet should be 0.05 to 0.08 mm.)
Recommend -ed paper:	MITSUBISHI PAPER MILLS, LTD.

Non-carbon paper
(blue color)

Top and middle sheets:
N40Hi
(thickness: 0.06 mm,
mass: 47.2 g/m^2)

Bottom sheet: N60
(thickness: 0.08 mm,
mass: 68.0 g/m^2)

Note:

When using original + 2 copies (the total is 3), the edges of the paper might fold when the temperature is 34°C and the humidity is 90%.

Validation paper:	Normal, pressure sensitive, and carbon copy paper
Paper size (W × L):	135 mm × 70 mm (minimum) to 182 mm × 182 mm (maximum) {5.31″ × 2.76″ to 7.17″ × 7.17″} (maximum 9 lines at 4.23 mm {.17″} pitch)
Single-ply paper thickness (without copy paper):	0.09 mm to 0.12 mm {.0035″ to .0047″}

Copy paper thickness:	Backing paper:	0.07 mm to 0.12 mm {.0028″ to .0047″}
	Copy and original paper:	0.04 mm to 0.07 mm {.0016″ to .0028″}
	Carbon copy paper:	Approximately 0.035 mm {.00138″}
	Total thickness:	0.09 mm to 0.31 mm {.0035″ to .012″}

Example:	Original + 2-ply copy
	Original paper: 0.04 mm {.0016″}
	Carbon copy paper: 0.07 mm {.0028″}
	(0.035 mm {.0138″} × 2 sheets)
	Copy paper: 0.04 mm {.0016″}
	Backing paper: 0.07 mm {.0028″}
	Roll paper: 0.08 mm {.0031″}
	Total thickness: 0.30 mm {.0118″}

Copy capability

Paper roll and validation paper:	Copy capability is greatly influenced by the ambient temperature, so printing must be performed under the conditions described in the table below.

Relationship between ambient temperature and number of copies

Paper roll and validation paper:

Number of copies	Ambient temperature
Original + 2 copies	10° to 40°C {50° to 104°F}
Original + 1 copy	5° to 50°C {41° to 122°F}

Notes on validation paper

❏ For correct validation printing, be sure that a paper roll is loaded before you use validation paper. Also be aware that the printing on validation paper may also be visible on the roll paper if the roll paper is pressure-sensitive paper.

❏ Use validation paper that is flat, without curls, folds, warps, or wrinkles, especially at the paper edge. Otherwise, the paper may become ink stained or the ribbon may get caught in the printer mechanism.

❏ Choose validation paper carefully when glue is on the edge, since paper feeding and insertion are affected by gluing conditions (e.g., glue quality, method, and length) and glue location.

❏ Using a multi-ply copy paper with a thick middle sheet may decrease copying capability.

❏ Printing noise may change depending on paper thickness. Noise may increase when thick single-ply paper is used.

❏ Validation paper with holes (e.g., sprocket holes) within the areas shown below must not be used. Otherwise, the paper cannot be detected by the paper sensor. Translucent paper must not be used.

: Holes are prohibited in this area.

7mm (.28")

Inserting direction

11mm (.43")
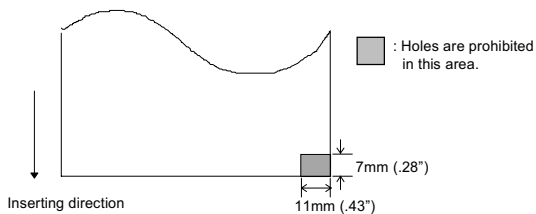
Electrical Specifications

Packaged AC adapter:

Factory setting	Voltage	Manufacturer Number
North America	120 V ± 10 % 60 Hz	PB--6509

Current consumption (excluding driving drawer kick-out)

Operating :
Mean-approx. 43 W

Standby:
Mean-approx. 6 W

Reliability

Life: 20,000,000 lines

❏ End of Life is defined as the point at which the printer reaches the beginning of the Wearout Period.

MTBF: 180,000 hours

❏ Failure is defined as Random Failure occurring at the time of the Random Failure Period.

MCBF: 49,000,000 lines

❏ This is an average failure interval based on failures relating to wearout and random failures up to the life of 20 million lines.

Print head life: 150 million characters (when printing an average of 2 dots/wire per character)

Validation switching operation life: 500,000 transactions

Environmental Conditions

Temperature

Operating   0 to 50°C {32 to 122°F}
         (when the temperature is 30°C or more,
         there is a limitation for the humidity.
   Refer to the figure below.)

         –10 to 50° C {14 to 122° F}
Storage   (except for paper, and a ribbon)

Humidity

Operating   10 to 90% RH

Storage   10 to 90% RH
         (except for paper and a ribbon)

Operating environment range
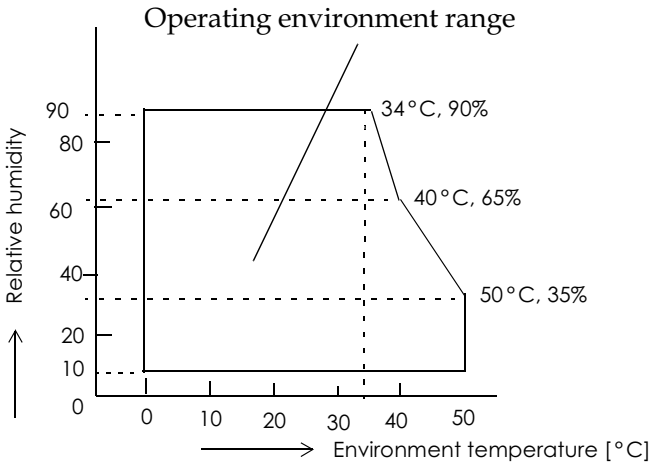
Character Code Tables

SP in a table represents space.

Page 0 (PC437: U.S.A., Standard Europe) (International character set: U.S.A)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX 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	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	HT 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	ø 237	² 253
E 1110	14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	┤ 190	┼ 206	█ 222	∈ 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	ー 176	タ 192	ミ 208	二 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

4-12 Reference Information

Page 3 (PC860: Portuguese)

	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	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

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	β 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

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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	Ö 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

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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	ö 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

International character set

Country	ASCII code (hexadecimal)											
	Hex	**23**	**24**	**40**	**5B**	**5C**	**5D**	**5E**	**60**	**7B**	**7C**	**7D**	**7E**
	Dec	**35**	**36**	**64**	**91**	**92**	**93**	**94**	**96**	**123**	**124**	**125**	**126**
U.S.A.		#	$	@	[	\	]	^	`	{	¦	}	~
France		#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany		#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.		£	$	@	[	\	]	^	`	{	¦	}	~
Denmark I		#	$	@	Æ	Ø	Å	^	`	œ	ø	å	~
Sweden		#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy		#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain		Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan		#	$	@	[	¥	]	^	`	{	¦	}	~
Norway		#	¤	É	Æ	Ø	Å	Ü	é	œ	ø	å	ü
Denmark II		#	$	É	Æ	Ø	Å	Ü	é	œ	ø	å	ü