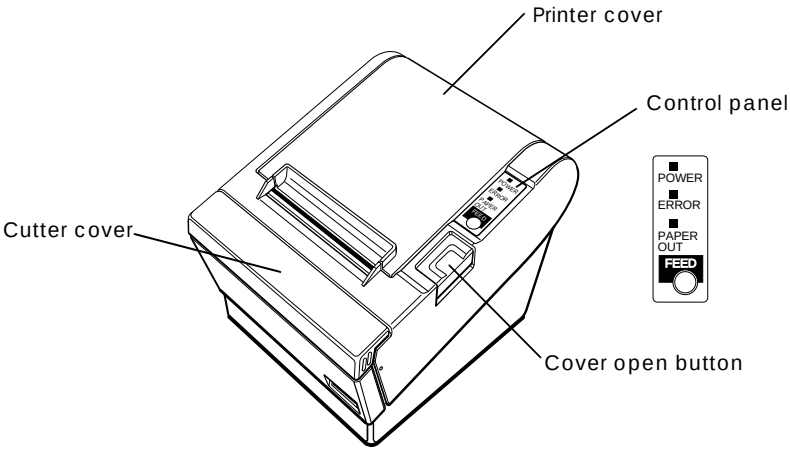
receipt printer

TM-T88/T88P

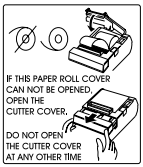
Operator's Manual

400644802

Printer Parts and Labels

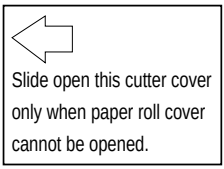


Labels



Label inside printer cover

Label inside cutter section



Instruction label for when cover won't open

Caution label above drawer kick-out connector.

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.

FCC CLASS A

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.

WARNING

The connection of a non-shielded printer interface cable to this printer will invalidate the FCC Verification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

FOR CANADIAN USERS

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigenves du Règlement sur le matériel brouileur 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).

DECLARATION OF CONFORMITY

Product Name: Printer

Type Name: 129A

These printers conform to the following Directives and Norms

Directive 89/336/EEC
- EN 55022 (1986 and 1994) Class B
- EN 50082-1 (1992)
- IEC 801-2 (1991)
- IEC 801-3 (1984)
- IEC 801-4 (1991)

Directive 90/384/EEC
- EN45501: (1992)

EMI and Safety Standards Applied

The following standards are applied only to the printers that are so labeled. (EMC is tested using the EPSON PS-170 power supply)

Europe:	CE marking EN55022 EN50082-1 EN45501
	Safety Standard: TÜV (EN 60950)
North America:	EMI: FCC Class A Safety standards: UL 1950-2TH-D3 C-UL
Japan:	EMI: VCCI Class 1

About This Manual

Setting Up and Using

- **Chapter 1** contains information on unpacking the printer and setting it up.
- **Chapter 2** contains information on using the printer.
- **Chapter 3** contains troubleshooting information.

Reference

- **Chapter 4** contains specifications and character code tables.
- **Chapter 5** contains the commands.
- **Appendix A** tells how to change the DIP switch and paper near end settings, and **Appendix B** lists the EPSON Sales Subsidiaries and their addresses.

Warnings, Cautions, and Notes

⚠WARNING:

Warnings must be followed carefully to avoid serious bodily injury.

⚠CAUTION:

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

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

Introduction

Features

The TM-T88 and TM-T88P are high-quality POS printers that can print on a paper roll. The printers have the following features:

Printing

- ❑ High speed printing: approximately 16.5 lines / second (1 / 6 inch feed).
- ❑ Low-noise thermal printing.
- ❑ High reliability due to a stable mechanism.

Application Software

- ❑ Command protocol is based on the ESC / POS® standard.
- ❑ Various layouts are possible by using page mode.
- ❑ Characters can be scaled up to 64 times as large as the standard size. Smoothing is also possible.
- ❑ Bar code printing is possible by using a bar code command. Bar codes can be printed both in the vertical direction (fence bar code) and in the horizontal direction (ladder bar code).
- ❑ Repeated operation and copy printing are possible by using macro definitions.
- ❑ Character font size (12 x 24 font or 9 x 24 font) can be selected using a command.

Printer Handling

- ❑ Easy paper roll loading.
- ❑ An auto-cutter is standard.
- ❑ The printer allows easy maintenance for tasks such as head cleaning.
- ❑ Four different print densities can be selected by DIP switches.
- ❑ The built-in interface provides control capability for two drawers.

Options and Accessories

- ❑ EPSON power supply unit, PS-170.
- ❑ Affixing tapes (model : DF-10).
- ❑ RS-485 interface board can be equipped as a dealer option.
- ❑ Wall hanging bracket set (WH-10)

Ordering Paper and Supplies

Thermal roll paper can be ordered from the supplier in your area.

Specified Thermal Roll Paper: NTP080-80

In Japan:	Nakagawa Seisakujo 2-5-21 Nishiki-Cho Warabi-Shi Saitama-Ken 335 Japan Tel: (048) 444-8211 Fax: (048) 443-6652
In U.S.A.:	Nakagawa Mfg (USA) Inc. 2305 Lincoln Avenue Hayward, CA 94545 USA Tel: (510) 782-0197 Fax: (510) 782-7124
In Europe:	Nakagawa Mfg (Europe) GmbH. Krützpoort 16, 47804 Krefeld, Germany Tel: 02151-711051 Fax: 02151-713293
In Southeast Asia:	N.A.K. Mfg (Malaysia) SDN BHD Lot 19-11, Bersatu Industrial Complexs, Jalan Satu, Kaw Per. Cheras Jaya,. Balakong Industrial Area, 43200 Cheras. Selangor Darul Ehsan, Malaysia Tel: 03-9047896, 9047900, 9047691 Fax: 03-9047889

Other Qualified Suppliers for Thermal Paper

The following suppliers sell thermal paper that may be used if desired. Contact each company for information.

Original paper: TF50KS-E
Nippon Paper Industry Co., Ltd.
1-12-1, Yuraku-Cho, Chiyoda-Ku
Tokyo 100 Japan

Tel: 03-3218-8000
Fax: 03-3216-1375

Original paper: PD 160R
New Oji Paper Mfg. Co., Ltd.
7-5 Ginza 4-Chome Chuo-Ku
Tokyo 104 Japan

Tel: 03-3563-4800
Fax: 03-3563-1136

Original paper: AF50KS-E
Jujo Thermal Oy (Finland)
P.O. Box 92 FIN27501 Kauttua Finland

Tel: 38-3932900
Fax: 38-3932419

Original paper: F380
Kanzaki Specialty Papers, Inc.
Cummings Street
Ware, MA 01082 U.S.A.

Tel: (413)967-6204
Fax: (413) 734-5101

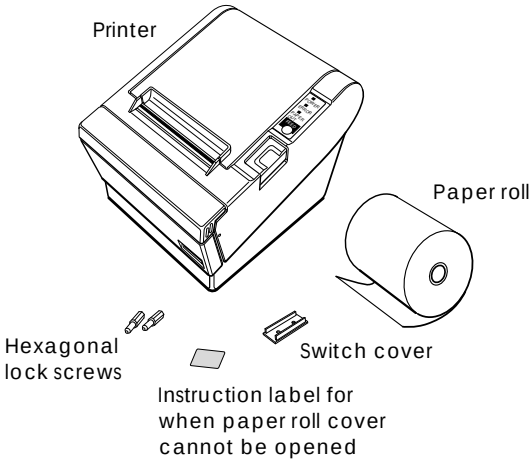
Contents

Chapter 1

Setting Up the Printer

Unpacking

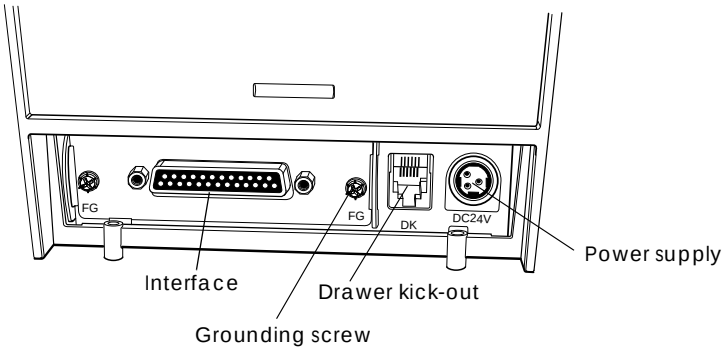
Your printer box should include these items. If any items are damaged or missing, please contact your dealer for assistance.



See the note on page 1-3 for information about the hexagonal lock screws.

Connecting the Cables and Grounding the Printer

You can connect up to four cables to the printer. They all connect to the connector panel on the back of the printer, which is shown below:



Notes:
There is a caution label above the drawer kick-out connector. Depending on the interface installed, the interface connector on your printer may look different from the one illustrated.

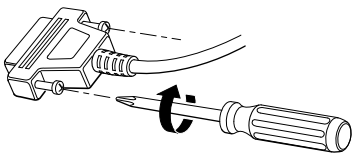
Before connecting any of the cables, make sure that both the printer and the computer are turned off.

Connecting the computer

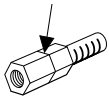
You need an appropriate interface cable.

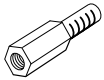
1. Plug the cable connector securely into the printer's interface connector.

2. Tighten the screws on both sides of the cable connector.



Note:
Your printer has inch-type hexagonal lock screws installed. If your interface cable requires millimeter-type screws, replace the inch-type screws with the enclosed millimeter-type screws using a hex screwdriver (5 mm).


Inch screw


Millimeter screw

3. Attach the other end of the cable to the computer.

Connecting the Drawer

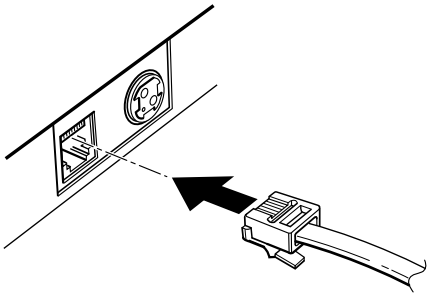
⚠ *WARNING:*

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 back of the printer next to the power supply connector.



Anschließen der Lade

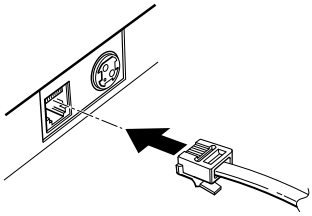
⚠ *WARNUNG:*

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 hinten am Drucker neben dem Netßzanschluß anschließen.

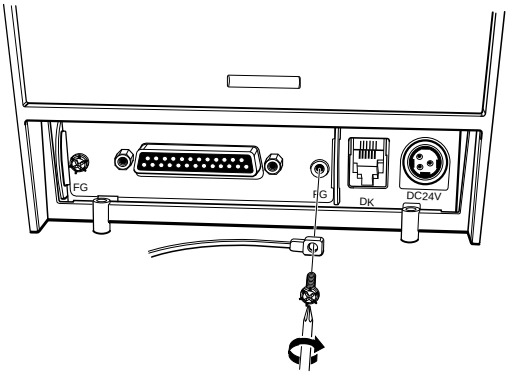


Grounding the Printer

You need a ground wire to ground your printer. Make sure that the wire is AWG 18 or equivalent.

1. Make sure that the printer is turned off.

2. Connect the ground wire to the printer using one of the the FG screws on the back of the printer, as shown.



Connecting the Power Supply

Use the optional EPSON PS-170 or equivalent power supply for your printer.

⚠ *WARNING:*

Make sure that you use the EPSON PS-170 power supply or equivalent. Using an incorrect power supply may cause fire or electrical shock.

⚠ *CAUTIONS:*

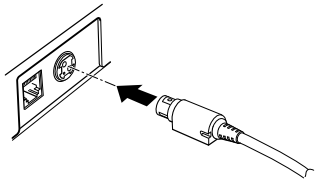
When connecting or disconnecting the power supply from the printer, make sure that the power supply is not plugged into an electrical outlet. Otherwise you may damage the power supply or the printer.

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.

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. Check the label on the power supply to make sure that the voltage required by the power supply matches that of your electrical outlet.

3. Plug in the power supply's cable as shown below. Notice that the flat side of the plug faces down.



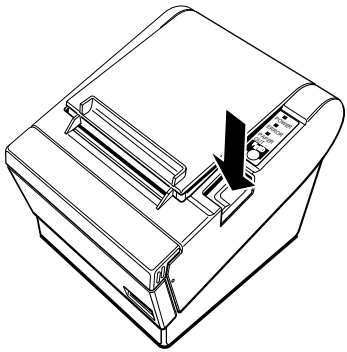
Note:
To remove the DC cable connector, make sure that the power supply's power cord is unplugged; then grasp the connector at the arrow and pull it straight out.

Installing or Replacing the Paper Roll

Note:
Be sure to use paper rolls that meet the specifications. Do not use paper rolls that have the paper glued to the core because the printer cannot detect the paper end correctly.

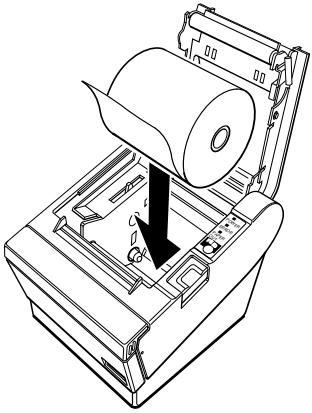
1. Make sure that the printer is not receiving data; otherwise, data may be lost.

2. Open the paper roll cover by pressing the cover-open button. If the cover-open button will not open the cover, see page 3-4 or 3-6 in Troubleshooting.

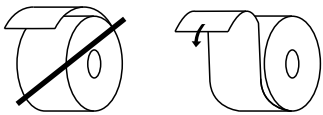


3. Remove the used paper roll core if there is one.

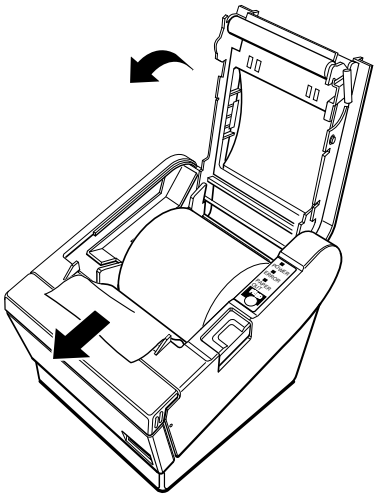
4. Insert the paper roll as shown.



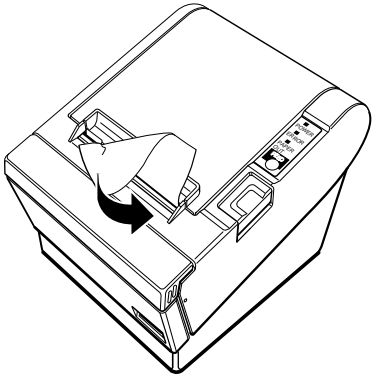
5. Be sure to note the correct direction that the paper comes off the roll.



6. Pull out a small amount of paper, as shown. Then close the cover.



7. Tear off the paper as shown.

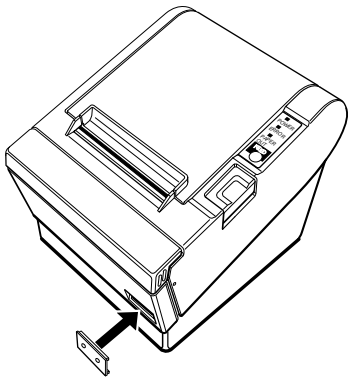


Using the Power Switch Cover

⚠ WARNING:

If an accident occurs when the power switch cover is attached, unplug the power supply cord from the outlet immediately. Continued usage may lead to fire or shock.

You can use the enclosed power switch cover to make sure that the power switch is not accidentally pressed. If you want to use this cover, install it as shown in the illustration below.



Self Test

The self test lets you know if your printer is operating properly. It checks the control circuits, printer mechanisms, print quality, ROM version, and DIP switch settings.

This test is independent of any other equipment or software.

Running the self test

1. Make sure the printer is turned off and the printer covers are closed properly.

2. While holding down the FEED button, turn on the printer using the switch on the front of the printer to begin the self test. The self test prints the printer settings and then prints the following, cuts the paper, and pauses. (The PAPER OUT light blinks.)

Self test printing.
Please press the PAPER FEED button.

3. Press the FEED button to continue printing. The printer prints a pattern using the built-in character set.

4. The self test automatically ends and cuts the paper after printing the following:

*** completed ***

The printer is ready to receive data as soon as it completes the self test.

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

Adjustments and Settings

The TM-T88/T88P is set up at the factory to be appropriate for almost all users. It does, however, offer some settings for users with special requirements.

It has DIP switches that allow you to change communication settings, such as handshaking and parity check, as well as print density.

The TM-T88/T88P also has a near-end sensor for the paper. This can give you a warning when the paper is almost out. If you find that there is not enough paper remaining on the roll when the near-end detector is triggered, you can change the near-end sensor setting.

See Appendix A if you need to make any of these changes.

Chapter 2

Using the Printer

Operating the Control Panels

You can control the basic paper feeding operations of the printer with the button on the control panel. The indicator lights help you monitor the printer's status.

Control Panel

Button

The button can be disabled by the **ESC c 5** command.

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

Panel lights

POWER

The POWER light is on whenever the printer is on.

ERROR

This indicates an error. See Chapter 3 for information on what to do when this light comes on.

PAPER OUT

This light indicates the near end of the paper roll. Install a new paper roll and the printer will continue printing.

When the light blinks, it indicates the self-test printing standby state or macro execution standby state when the macro execution command is used.

Chapter 3

Troubleshooting

Troubleshooting

This chapter gives solutions to some printer problems you may have.

General problems

The lights on the control panel do not come on.

Make sure that the power supply cables 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 on (not blinking) and nothing is printed.

If the PAPER OUT light is **on**, the paper roll is not installed or is at or near the end. Install a new paper roll. See Chapter 1 for instructions.

If the PAPER OUT light is **off**, make sure that the printer cover is properly closed. Press the printer cover until the cover audibly clicks into place.

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 within two or three minutes).

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 ERROR light is still flashing, 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.

Printing is poor.

Paper dust on the heating element of the thermal print head can lower the print quality. Try cleaning the print head as described below:

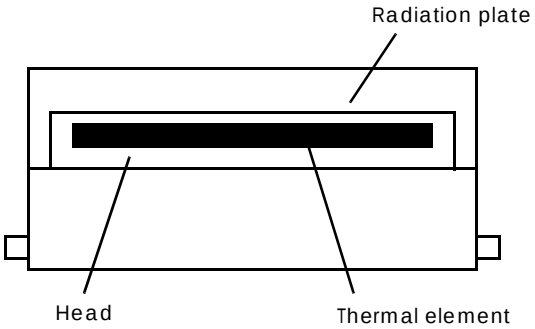
Cleaning the print head

⚠ *CAUTIONS:*

After printing, the print head can be very hot. Be careful not to touch it. Also let it cool before you clean it.
Do not damage the print head by touching it with your fingers or any hard object.

1. Open the printer cover.

2. Clean the thermal element of the print head with a cotton swab moistened with an alcohol solvent (ethanol, methanol, or IPA).



Paper handling problems

Paper is jammed inside the printer.

⚠ *CAUTIONS:*

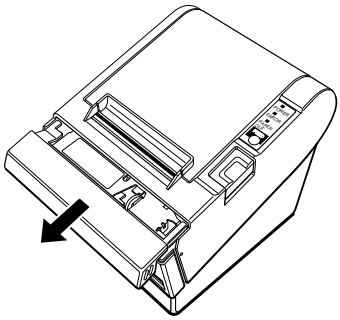
Do not touch the print head because it can be very hot after printing continuously for a long time.

To clear a paper jam, follow the steps below:

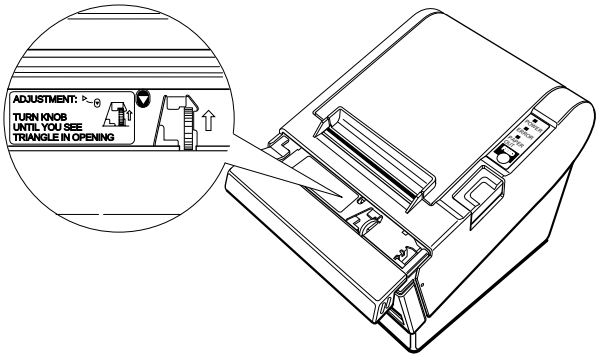
1. Turn the printer off and press the cover open button to open the cover.

2. Remove the jammed paper and put the roll back in the printer and close the cover.

3. If paper is caught in the automatic cutter and the printer cover cannot be opened, open the cutter cover as shown below.



4. Then turn the knob until you see ▽ in the opening, as shown in the illustration below. This returns the cutter blade to the normal position. Also notice that there is a label near the cutter to assist you.



5. Close the cutter cover.

6. Open the printer cover.

7. Remove the jammed paper.

Auto cutter problems

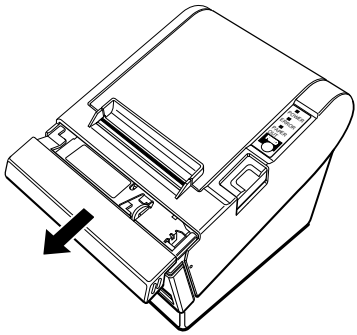
The auto cutter is jammed.

If a foreign object such as a push pin or paper clip drops in the auto cutter and causes the auto cutter to lock up, the printer enters an error state and begins the recovery operation automatically.

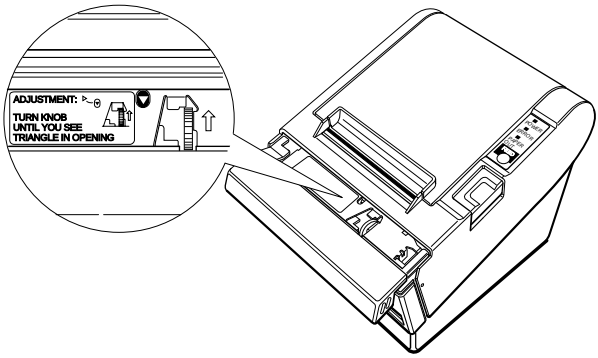
If the problem is not serious, the auto cutter returns to its normal position without any intervention by the user.

If the auto cutter does not return to its normal position by itself, follow the steps below to correct the problem:

1. Pull the cutter cover toward you so that you can rotate the cutter motor knob.



2. Following the instructions on the label, rotate the knob until the ▽ appears in the hole.



3. Close the cutter 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 hex dump feature, follow these steps:

1. After you make sure that the printer is off, open the cover.

2. Hold down the FEED button while you turn on the printer.

3. Close the cover.

4. Run any software program that sends data to the printer. The printer prints "Hexadecimal Dump" and then 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 21 00 1B 26 02 40 40   .!..&.@@
   1B 25 01 1B 63 34 00 1B   .%..c4..
   41 42 43  44 45 46 47 48   ABCDEFGH
   ```

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

   - ❑ During the hex dump all commands except **DLE EOT** and **DLE ENQ** are disabled.

5. Open the cover to set the printer off line so that it will print the last line.

6. Close the cover and turn off the printer or reset it to turn off the hex dump mode.

Chapter 4

Reference Information

Printing Specifications

Printing method:	Thermal line printing
Dot density:	180 dpi × 180 dpi [the number of dots per 25.4 mm (1")]
Printing direction:	Unidirectional with friction feed
Printing width:	72 mm (2.83"), 512 dot positions
Characters per line (default):	42 (Font A) 56 (Font B)
Character spacing (default):	0.28 mm (.01") (2 dots) (Font A) 0.28 mm (.01") (2 dots) (Font B) Programmable by control command.
Printing speed - High:	Approximately 16.5 lines / second (1 / 6" inch feed, at 24V, 20° C, density level 2) Approximately 70 mm / second (approximately 2.76" / second)
Printing speed - Low:	Approximately 11.8 lines / second (1 / 6" feed) Approximately 50 mm / second (approximately 2.0" / second) High and low speeds are switched automatically depending on the voltage applied to the printer and the temperature of the environment. Approximately 28 mm / second (approximately 1.1" / second) when a ladder bar code is printed.

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

The printer switches the mode of the printing speed automatically.

There may be variations in printing after switching the mode of the printing speed. To prevent this for logo printing, using a downloaded bit image is recommended. (Change in printing speed does not occur during downloaded bit image printing).

Paper feeding speed:	Approximately 70 mm / second (approximately 2.76" / second) continuous printing
Line spacing (default):	4.23 mm (1 / 6") Programmable by control command.
Number of characters:	Alphanumeric characters: 95 International characters: 32 Extended graphics: 128 × 7 pages (including one space page)
Character structure:	Font A: 12 × 24 (including 2-dot spacing in horizontal) Font B: 9 × 24 (including 2-dot spacing in horizontal) Font A is the default

	Standard		Double-height		Double-width		Double-width/ Double-height	
	W x H (mm)	CPL	W x H (mm)	CPL	W x H (mm)	CPL	W x H (mm)	CPL
Font A 12 x 24	1.41 x 3.39 (.06" x .13")	42	1.41 x 6.77 (.06" x .27")	42	2.82 x 3.39 (.11" x .13")	21	2.82 x 6.77 (.11" x .27")	21
Font B 9 x 24	0.99 x 3.39 (.04" x .13")	56	0.99 x 6.77 (.04" x .27")	56	1.98 x 3.39 (.08" x .13")	28	1.98 x 6.77 (.08" x .27")	28

* CPL = Characters Per Line

* Space between characters is not included

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

Paper Specifications

Paper roll (single-ply):

Size:	Width: 79.5 mm ± 0.5 mm (3.13" ± 0.02")
Maximum outside diameter:	83 mm (3.27")
Paper roll spool diameter:	Inside: 12 mm (0.47") Outside: 18 mm (0.71") Paper must not be pasted to the paper roll spool.
Take up paper roll width:	$80^{+0.5}_{-1.0}$ mm $3.15^{+0.02}_{-0.04}$

Electrical Characteristics

Supply voltage:	+24 VDC ± 7% (optional power supply: EPSON PS-170)	
Current consumption: (at 24V, except for drawer kick-out driving)	Operating:	Mean: approximately 1.5A (character font A α-N, capital letters, 36-character rolling pattern, 42 columns printing) Peak: Approximately 5.0 A
	Standby:	Mean: approximately 0.2A

Note:
Maximum 1A for drawer kick-out driving

Reliability

Life:	Mechanism:	15,000,000 lines
	Thermal head:	100 million pulses, 100 km
	Auto cutter:	1,000,000 cuts
	(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:	37,000,000 lines (This is an average failure interval based on failures relating to wearout and random failures up to the life of 15 million lines.)	

Environmental Conditions

Temperature:	Operating:	5° to 45°C (41° to 113°F)
	Storage:	-10° to 50°C (14° to 122°F) (except for paper)
Humidity:	Operating:	10 to 90% RH
	Storage:	10 to 90% RH (except for paper)

Character Code Tables

The following pages show the character code tables. To find the character corresponding to a hexadecimal number, count across the top of the table for the left digit and count down the left column of the table for the right digit. For example, 4A = J.

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

Note:
The character code tables show only which characters are printed. They do not show the actual print pattern.

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	ー 128	144	SP 160	ー 176	タ 192	ミ 208	二 224	× 240
1	0001	▬ 129	145	。 161	ア 177	チ 193	ム 209	卜 225	円 241
2	0010	▬ 130	146	「 162	イ 178	ツ 194	メ 210	丰 226	年 242
3	0011	▬ 131	147	」 163	ウ 179	テ 195	モ 211	彐 227	月 243
4	0100	■ 132	148	、 164	エ 180	ト 196	ヤ 212	◢ 228	日 244
5	0101	■ 133	ー 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 1 (Katakana)

	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

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	╨ 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	⌐ 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 3 (PC860: Portuguese)

	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

Page 255 (Space Page)

International character set

Country	ASCII code												
	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	^	`	æ	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	æ	ø	å	ü
Denmark II		#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

Chapter 5

Commands

Command Notation

[Name]	The name of the command.
[Format]	The code sequence. ASCII indicates the ASCII equivalents. Hex indicates the hexadecimal equivalents. Decimal indicates the decimal equivalents. [ ]k indicates the contents of the [ ] should be repeated k times.
[Range]	Gives the allowable ranges for the arguments.
[Description]	Describes the function of the command.

Explanation of Terms

LSB	Least Significant Bit

Control Commands

HT

[Name]	Horizontal tab	
[Format]	ASCII	HT
	Hex	09
	Decimal	9
[Description]	Moves the print position to the next horizontal tab position.	

LF

[Name]	Print and line feed	
[Format]	ASCII	LF
	Hex	0A
	Decimal	10
[Description]	Prints the data in the print buffer and feeds one line based on the current line spacing.	

FF

[Name] Print and return to standard mode (in page mode)

[Format]

ASCII	FF
Hex	0C
Decimal	12

[Description] In page mode, prints the data in the print buffer collectively and returns to standard mode.

CR

[Name] Print and carriage return

[Format]

ASCII	CR
Hex	0D
Decimal	13

[Description]

Paper	When automatic line feed enabled	Automatic line feed disabled
Paper roll	Functions as same as LF	Ignored

- This command is set according to the DIP switch 1-1 setting at power-on or resetting the printer with a parallel interface .

CAN

[Name] Cancel print data in page mode

[Format]

ASCII	CAN
Hex	18
Decimal	24

[Description] In page mode, deletes all the print data in the current printable area.

DLE EOT *n*

[Name] Real-time status transmission

[Format]

ASCII	DLE	EOT	*n*
Hex	10	04	*n*
Decimal	16	4	*n*

[Range] $1 \leq n \leq 4$

[Description] Transmits the selected printer status specified by *n* in real time, according to the following parameters:

n = 1: Transmit printer status

n = 2: Transmit off-line status

n = 3: Transmit error status

n = 4: Transmit paper roll sensor status

DLE ENQ *n*

[Name] Real-time request to printer

[Format]				
	ASCII	DLE	ENQ	*n*
	Hex	10	05	*n*
	Decimal	16	5	*n*

[Range] $1 \leq n \leq 2$

[Description] Responds to a request from the host computer. *n* specifies the request as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error after clearing the receive and print buffers

ESC FF

[Name] Print data in page mode

[Format]			
	ASCII	ESC	FF
	Hex	1B	0C
	Decimal	27	12

[Description] In page mode, prints all buffered data in the printing area collectively.

ESC SP *n*

[Name] Set right-side character spacing

[Format]				
	ASCII	ESC	SP	*n*
	Hex	1B	20	*n*
	Decimal	27	32	*n*

[Range] $0 \leq n \leq 255$

[Description] Sets the character spacing for the right side of the character to [n × horizontal or vertical motion units].

ESC ! *n*

[Name] Select print mode(s)

[Format]	ASCII	ESC	!	*n*
	Hex	1B	21	*n*
	Decimal	27	33	*n*

[Range] $0 \leq n \leq 255$

[Description] Selects print mode(s) using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 x 24).
	On	01	1	Character font B (9 x 24).
1, 2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

- Determine the values of *n* by adding the values of all the characteristics you want to select.

ESC $ *nL nH*

[Name] Set absolute print position

[Format]	ASCII	ESC	$	*nL nH*
	Hex	1B	24	*nL nH*
	Decimal	27	36	*nL nH*

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

[Description] Sets the print starting position from the beginning of the line.

- The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times$ (vertical or horizontal motion unit)].

ESC % *n*

[Name] Select / cancel user-defined character set

[Format]				
	ASCII	ESC	%	*n*
	Hex	1B	25	*n*
	Decimal	27	37	*n*

[Range] $0 \leq n \leq 255$

[Description] Selects or cancels the user-defined character set.

- When the LSB is 0, the user-defined character set is canceled and the internal character set is selected.
- When the LSB is 1, the user-defined character set is selected.

ESC & *y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]*

[Name] Define user-defined characters

[Format]				
	ASCII	ESC	&	*y c1 c2 [x1 d1...d(y × x1)]... [xk d1...d(y × xk)]*
	Hex	1B	26	*y c1 c2 [x1 d1...d(y × x1)]... [xk d1...d(y × xk)]*
	Decimal	27	38	*y c1 c2 [x1 d1...d(y × x1)]... [xk d1...d(y × xk)]*

[Range]

$y = 3$
$32 \leq c1 \leq c2 \leq 126$
$0 \leq x \leq 12$ Font A (12×24)
$0 \leq x \leq 9$ Font B (9×24)
$0 \leq d1 \ldots d(y \times xk) \leq 255$

[Description] Defines user-defined characters.

- *y* specifies the number of bytes in the vertical direction.
- *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.
- *x* specifies the number of dots in the horizontal direction.
- *d* is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The allowable character code range is from ASCII code 20H(32) to 7EH(126).
- The data to define a user-defined character is ($y \times x$) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.

ESC * *m nL nH d1 ... dk*

[Name] Select bit-image mode

[Format]

ASCII	ESC	*	*m nL nH d1 ... k*
Hex	1B	2A	*m nL nH d1 ... k*
Decimal	27	42	*m nL nH d1 ... k*

[Range] *m* = 0, 1, 32, 33

$0 \le nL \le 255$

$0 \le nH \le 3$

$0 \le d \le 255$

[Description] Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

m	Mode	Vertical Direction		Horizontal direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (K)
0	8-dot single-density	8	60 DPI	90 DPI	$nL + nH \times 256$
1	8-dot double-density	8	60 DPI	180 DPI	$nL + nH \times 256$
32	24-dot single-density	24	180 DPI	90 DPI	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	180 DPI	180 DPI	$(nL + nH \times 256) \times 3$

- The *nL* and *nH* indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \times 256$.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

ESC - n

[Name] Turn underline mode on / off

[Format]

ASCII	ESC	-	*n*
Hex	1B	2D	*n*
Decimal	27	45	*n*

[Range] $0 \le n \le 2, 48 \le n \le 50$

[Description] Turns underline mode on or off, based on the following values of *n*:

n	Function
0, 48	Turns off underline mode
1, 49	Turns on underline mode (1-dot thick)
2, 50	Turns on underline mode (2-dots thick)

ESC 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Sets the line spacing to 1/6 inch.

ESC 3 *n*

[Name] Set line spacing

[Format]

ASCII	ESC	3	*n*
Hex	1B	33	*n*
Decimal	27	51	*n*

[Range] $0 \leq n \leq 255$

[Description] Sets the line spacing to [*n* × vertical or horizontal motion unit].

ESC = *n*

[Name] Set peripheral device

[Format]

ASCII	ESC	=	*n*
Hex	1B	3D	*n*
Decimal	27	61	*n*

[Range] $1 \leq n \leq 255$

[Description] Selects device to which host computer sends data, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled.
	On	01	1	Printer enabled
1-7	-	-	-	Undefined.

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	*n*
Hex	1B	3F	*n*
Decimal	27	63	*n*

[Range] $32 \leq n \leq 126$

[Description] Cancels user-defined characters.

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

ESC D *n*1 ... *nk* NUL

[Name] Set horizontal tab positions

[Format]					
	ASCII	ESC	D	*n*1 ... *nk*	NUL
	Hex	1B	44	*n*1 ... *nk*	00
	Decimal	27	68	*n*1 ... *nk*	0

[Range] $1 \le n \le 255$

$0 \le k \le 32$

[Description] Sets horizontal tab positions.

- *n* specifies the column number for setting a horizontal tab position from the beginning of the line.
- *k* indicates the total number of horizontal tab positions to be set.

ESC E *n*

[Name] Turn emphasized mode on/off

[Format]				
	ASCII	ESC	E	*n*
	Hex	1B	45	*n*
	Decimal	27	69	*n*

[Range] $0 \le n \le 255$

[Description] Turns emphasized mode on or off

- When the LSB is 0, emphasized mode is turned off.
- When the LSB is 1, emphasized mode is turned on.

ESC G *n*

[Name] Turn double-strike mode on/off

[Format]				
	ASCII	ESC	G	*n*
	Hex	1B	47	*n*
	Decimal	27	71	*n*

[Range] $0 \le n \le 255$

[Description] Turns double-strike mode on or off.

- When the LSB is 0, double-strike mode is turned off.
- When the LSB is 1, double-strike mode is turned on.

ESC J *n*

[Name] Print and feed paper

[Format]				
	ASCII	ESC	J	*n*
	Hex	1B	4A	*n*
	Decimal	27	74	*n*

[Range] $0 \le n \le 255$

[Description] Prints the data in the print buffer and feeds the paper $n \times$ vertical or horizontal motion unit.

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L	
Hex	1B	4C	
Decimal	27	76	

[Description] Switches from standard mode to page mode.

ESC R *n*

[Name] Select an international character set

[Format]

ASCII	ESC	R	*n*
Hex	1B	52	*n*
Decimal	27	82	*n*

[Range] $0 \le n \le 10$

[Description] Selects an international character set *n* from the following table:

n	Character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] Switches from page mode to standard mode.

ESC T *n*

[Name] Select print direction in page mode

[Format]

ASCII	ESC	T	*n*
Hex	1B	54	*n*
Decimal	27	84	*n*

[Range] $0 \le n \le 3$

$48 \le n \le 51$

[Description] Selects the print direction and starting position in page mode.

n specifies the print direction and starting position as follows:

n	Print Direction	Starting Position
0, 48	Left to right	Upper left
1, 49	Bottom to top	Lower left
2, 50	Right to left	Lower right
3, 51	Top to bottom	Upper right

ESC V *n*

[Name] Turn 90° clockwise rotation mode on / off

[Format]

ASCII	ESC	V	*n*
Hex	1B	56	*n*
Decimal	27	86	*n*

[Range] $n = 0, 1, 48, 49$

[Description] Turns 90° clockwise rotation mode on / off
n is used as follows:

n	Function
0, 48	Turns off 90° clockwise rotation mode
1, 49	Turns on 90° clockwise rotation mode

ESC W $x_L\ x_H\ y_L\ y_H\ dx_L\ dx_H\ dy_L\ dy_H$

[Name] Set printing area in page mode

[Format]

ASC II	ESC	W	$x_L\ x_H\ y_L\ y_H\ dx_L\ dx_H\ dy_L\ dy_H$
Hex	1B	57	$x_L\ x_H\ y_L\ y_H\ dx_L\ dx_H\ dy_L\ dy_H$
Decimal	27	87	$x_L\ x_H\ y_L\ y_H\ dx_L\ dx_H\ dy_L\ dy_H$

[Range] $0 \le x_L, x_H, y_L, y_H, dx_L, dx_H, dy_L, dy_H \le 255$
(except $dx_L = dx_H = 0$ *or* $dy_L = dy_H = 0$)

[Description]

- The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as x0, y0, dx, dy, respectively.

  Each setting for the printing area is calculated as follows:

  $x0 = [(x_L + x_H\ (256) \times (\text{horizontal motion unit})]$

  $y0 = [(y_L + y_H\ (256) \times (\text{vertical motion unit})]$

  $dx = [dx_L + dx_H\ (256) \times (\text{horizontal motion unit})]$

  $dy = [dy_L + dy_H\ (256) \times (\text{vertical motion unit})]$

ESC \ *nL nH*

[Name] Set relative print position

[Format]

ASCII	ESC	\	*nL nH*
Hex	1B	5C	*nL nH*
Decimal	27	92	*nL nH*

[Range] $0 \le n_L \le 255$
$0 \le n_H \le 255$

[Description] Sets the print starting position based on the current position.

- This command sets the distance from the current position to [($n_L + n_H \times 256$) × horizontal or vertical motion unit]

ESC a *n*

[Name] Select justification

[Format]

ASCII	ESC	a	*n*
Hex	1B	61	*n*
Decimal	27	97	*n*

[Range] $0 \le n \le 2, 48 \le n \le 50$

[Description] Aligns all the data in one line to the specified position
n selects the justification as follows:

n	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

ESC c 3 *n*

[Name] Select paper sensor(s) to output paper end signals

[Format]

ASCII	ESC	c	3	*n*
Hex	1B	63	33	*n*
Decimal	27	99	51	*n*

[Range] $0 \le n \le 255$

[Description] Selects the paper sensor(s) to output paper end signals

This command is available only with a parallel interface and is ignored with serial interface.

- Each bit of *n* is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled.
	On	01	1	Paper roll near-end sensor enabled.
1	Off	00	0	Paper roll near-end sensor disabled.
	On	02	2	Paper roll near-end sensor enabled.

Bit	Off/On	Hex	Decimal	Function
2	Off	00	0	Paper roll end sensor disabled.
	On	04	4	Paper roll end sensor enabled.
3	Off	00	0	Paper roll end sensor disabled.
	On	08	8	Paper roll end sensor enabled.
4-7	-	-	-	Undefined.

ESC c 4 *n*

[Name] Select paper sensor(s) to stop printing

[Format]

ASCII	ESC	c	4	*n*
Hex	1B	63	34	*n*
Decimal	27	99	52	*n*

[Range] $0 \le n \le 255$

[Description] Selects the paper sensor(s) used to stop printing when a paper-end is detected, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled.
	On	01	1	Paper roll near-end sensor enabled.
1	Off	00	0	Paper roll near-end sensor disabled.
	On	02	2	Paper roll near-end sensor enabled.
2-7	-	-	-	Undefined.

ESC c 5 *n*

[Name] Enable / disable panel buttons

[Format]

ASCII	ESC	c	5	*n*
Hex	1B	63	35	*n*
Decimal	27	99	53	*n*

[Range] $0 \le n \le 255$

[Description] Enables or disables the panel buttons.

- When the LSB is 0, the panel buttons are enabled.
- When the LSB is 1, the panel buttons are disabled.

ESC d *n*

[Name] Print and feed *n* lines

[Format]

ASCII	ESC	d	*n*
Hex	1B	64	*n*
Decimal	27	100	*n*

[Range] $0 \le n \le 255$

[Description] Prints the data in the print buffer and feeds *n* lines.

ESC p *m t1 t2*

[Name] Generate pulse

[Format]

ASCII	ESC	p	*mt1 t2*
Hex	1B	70	*mt1 t2*
Decimal	27	112	*mt1 t2*

[Range] $m = 0, 1, 48, 49$

$0 \le t1 \le 255, 0 \le t2 \le 255$

[Description] Outputs the pulse specified by *t1* and *t2* to connector pin *m* as follows:

m	Connector pin
0, 48	Drawer kick-out connector pin 2.
1, 49	Drawer kick-out connector pin 5.

ESC t *n*

[Name] Select character code table

[Format]

ASCII	ESC	t	*n*
Hex	1B	74	*n*
Decimal	27	116	*n*

[Range] $0 \le n \le 5, n = 255$

[Description] Selects a page n from the character code table.

n	Page
0	0 (PC437 [U.S.A., Standard Eutope])
1	1 (Katakana)
2	2 (PC850 [Multilingual])
3	3 (PC860 [Portuguese])
4	4 (PC863 [Canadian-French])
5	5 (PC865 [Nordic])
255	Space page

ESC { *n*

[Name] Turns upside-down printing mode on/off

[Format]	ASCII	ESC	{	*n*
	Hex	1B	7B	*n*
	Decimal	27	123	*n*

[Range] $0 \le n \le 255$

[Description] Turns upside-down printing mode on or off.

- When the LSB is 0, upside-down printing mode is turned off.
- When the LSB is 1, upside-down printing mode is turned on.

GS ! *n*

[Name] Select character size

[Format]	ASCII	GS	!	*n*
	Hex	1D	21	*n*
	Decimal	29	33	*n*

[Range] $0 \le n \le 255$

($1 \le$ vertical number of times ≤ 8, $1 \le$ horizontal number of times ≤ 8)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0	Character height selection. See Table 2.			
1				
2				
3				
4	Character width selection. See Table 1.			
5				
6				
7				

Table 1
Character Width Selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (double-width)
20	32	3
30	48	4

Table 2
Character Height Selection

Hex	Decimal	Height
00	0	1(normal)
01	1	2 (double-height)
02	2	3
03	3	4

Table 1
Character Width Selection

Hex	Decimal	Width
40	64	5
50	80	6
60	96	7
70	112	8

Table 2
Character Height Selection

Hex	Decimal	Height
04	4	5
05	5	6
06	6	7
07	7	8

GS $ *nL nH*

[Name] Set absolute vertical print position in page mode

[Format]

ASCII	GS	$	*nL nH*
Hex	1D	24	*nL nH*
Decimal	29	36	*nL nH*

[Range] $0 \le nL \le 255, 0 \le nH \le 255$

[Description]

- Sets the absolute vertical print starting position for buffer character data in page mode.
- This command sets the absolute print position to [$(nL + nH \times 256) \times$ (vertical or horizontal motion unit)] inches.

GS * *x y d1 ... d*($x \times y \times 8$)

[Name] Define downloaded bit-image

[Format]

ASCII	GS	*	*x*	*y*	*d1 ... d*($x \times y \times 8$)
Hex	1D	2A	*x*	*y*	*d1 ... d*($x \times y \times 8$)
Decimal	29	42	*x*	*y*	*d1 ... d*($x \times y \times 8$)

[Range]

$1 \le x \le 255$

$1 \le y \le 48$

$0 \le d \le 255$

[Description] Defines a downloaded bit-image using the number of dots specified by *x* and *y*

- The number of dots in the horizontal direction is $x \times 8$.
- The number of dots in the vertical direction $y \times 8$.
- If $x \times y$ is out of the specified range, this command is ignored.
- The *d* indicates bit-image data. Data (*d*) specifies a bit printed to 1 and not printed to 0.
- After a downloaded bit-image is defined, it is available until **ESC @** or **ESC &** is executed; the printer is reset; or the power is turned off.

GS / *m*

[Name] Print downloaded bit-image

[Format]

ASCII	GS	/	*m*
Hex	1D	2F	*m*
Decimal	29	47	*m*

[Range] $0 \le m \le 3, 48 \le m \le 51$

[Description] Prints a downloaded bit-image using the mode specified by *m*.

m selects a mode from the table below:

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	180	180
1, 49	Double-width	180	90
2, 50	Double-height	90	180
3, 51	Quadruple	90	90

GS :

[Name] Start / end macro definition

[Format]

ASCII	GS	:
Hex	1D	3A
Decimal	29	58

[Description] Starts or ends macro definition.

GS B *n*

[Name] Turn white / black reverse printing mode on / off

[Format]

ASCII	GS	B	*n*
Hex	1D	42	*n*
Decimal	29	66	*n*

[Range] $0 \le n \le 255$

[Description] Turns on or off white / black reverse printing mode.

- When the LSB is 0, white / black reverse mode is turned off.
- When the LSB is 1, white / black reverse mode is turned on.

GS H *n*

[Name] Select printing position of HRI characters

[Format]

ASCII	GS	H	*n*
Hex	1D	48	*n*
Decimal	29	72	*n*

[Range] $0 \le n \le 3, 48 \le n \le 51$

[Description] Selects the printing position of HRI characters when printing a bar code.

n selects the printing position as follows:

n	Printing posiition
0, 48	Not printed.
1, 49	Above bar code.
2, 50	Below bar code.
3, 51	Both above and below the bar code.

- HRI indicates Human Readable Interpretation.

GS I *n*

[Name] Transmit printer ID

[Format]

ASCII	GS	I	*n*	
Hex	1D	49	*n*	
Decimal	29	73	*n*	

[Range] $1 \le n \le 3, 49 \le n \le 51$

[Description] Transmits the printer ID specified by *n* as follows:

n	Printer ID	Specification	ID (hexidecimal)
1, 49	Printer model ID	TM-T88/T88P	20
2, 50	Type ID	See table below.	
3, 51	ROM version ID	Depends on ROM version.	

n=2, Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte character code not supported.
1	On	02	2	Auto-cutter equipped.
2, 3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

GS L *nL nH*

[Name] Set left margin

[Format]

ASCII	GS	L	*nL*	*nH*
Hex	1D	4C	*nL*	*nH*
Decimal	29	76	*nL*	*nH*

[Range] $0 \le nL \le 255$

$0 \le nH \le 255$

[Description] Sets the left margin using *nL* and *nH* in standard mode.

- The left margin is set to [(*nL* + *nH* × 256) × horizontal motion unit)] from the beginning of the line.

GS P *x y*

[Name]	Set horizontal and vertical motion units				
[Format]	ASCII	GS	P	*x*	*y*
	Hex	1D	50	*x*	*y*
	Decimal	29	80	*x*	*y*
[Range]	$0 \le x \le 255$				
	$0 \le y \le 255$				

[Description] Sets the horizontal and vertical motion units to 1/*x* inch and 1/*y* inches, respectively.

When *x* and *y* are set to 0, the default setting of each value is used.

① GS V *m* ② GS V *m n*

[Name]	Select cut mode and cut paper				
[Format]	①ASCII	GS	V	*m*	
	Hex	1D	56	*m*	
	Decimal	29	86	*m*	
	②ASCII	GS	V	*m*	*n*
	Hex	1D	56	*m*	*n*
	Decimal	29	86	*m*	*n*
[Range]	① *m* = 1, 49				
	② *m* = 66, $0 \le n \le 255$				

[Description] Selects a mode for cutting paper and executes paper cutting. The value of *m* selects the mode as follows:

m	Print mode
1, 49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [n × (vertical motion unit)]), and cuts the paper partially (one point left uncut)

GS W *nL nH*

[Name]	Set printing area width				
[Format]	ASCII	GS	W	*nL*	*nH*
	Hex	1D	57	*nL*	*nH*
	Decimal	29	87	*nL*	*nH*
[Range]	$0 \le nL \le 255$				
	$0 \le nH \le 255$				

[Description] Sets the printing area width to the area specified by *nL* and *nH* in standard mode .

- The printing area width is set to [(*nL* + *nH* × 256) × horizontal motion unit)] inches from the left margin.

GS \ *nL nH*

[Name] Set relative vertical print position in page mode

[Format]				
	ASCII	GS	\	*nL nH*
	Hex	1D	5C	*nL nH*
	Decimal	29	92	*nL nH*

[Range] $0 \le nL \le 255$

$0 \le nH \le 255$

[Description] Sets the relative vertical print starting position from the current position in page mode.

- This command sets the distance from the current position to [($nL + nH \times 256$) × vertical or horizontal motion unit].

GS ^ *r t m*

[Name] Execute macro

[Format]				
	ASCII	GS	^	*r t m*
	Hex	1D	5E	*r t m*
	Decimal	29	94	*r t m*

[Range] $0 \le r \le 255$

$0 \le t \le 255$

$m = 0, 1$

[Description] Executes a macro.

- *r* specifies the number of times to execute the macro.
- *t* specifies the waiting time for executing the macro.

The waiting time is $t \times 100$ msec for every macro execution.

- m specifies macro executing mode.
- When $m = 0$:

The macro executes r times continuously with interval specified by *t*.

- When $m = 1$:

  After waiting for the period specified by *t*, the PAPER OUT LED indicator blinks and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation *r* times.

GS a *n*

[Name] Enable/Disable Automatic Status Back (ASB)

[Format]				
	ASCII	GS	a	*n*
	Hex	1D	61	*n*
	Decimal	29	97	*n*

[Range] $0 \le n \le 255$

[Description] Enables or disables ASB and specifies the status items to include, using *n* as follows:

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	On-line/off-line status disabled.
	On	02	2	On-line/off-line status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-	-	-	Undefined.

GS b *n*

[Name] Turns smoothing mode on / off

[Format]

ASCII	GS	b	*n*
Hex	1D	62	*n*
Decimal	29	98	*n*

[Range] $0 \le n \le 255$

[Description] Turns smoothing mode on or off.
When the LSB is 0, smoothing mode is turned off.
When the LSB is 1, smoothing mode is turned on.

GS f *n*

[Name] Select font for Human Readable Interpretation (HRI) characters

[Format]

ASCII	GS	f	*n*
Hex	1D	66	*n*
Decimal	29	102	*n*

[Range] $n = 0, 1, 48, 49$

[Description] Selects a font for the HRI characters used when printing a bar code.
n selects a font from the following table:

n	Font
0, 48	Font A (12 × 24)
1, 49	Font B (9 × 24)

- HRI indicates Human Readable Interpretation.

GS h *n*

[Name] Set bar code height

[Format]

ASCII	GS	h	*n*
Hex	1D	68	*n*
Decimal	29	104	*n*

[Range] $1 \le n \le 255$

[Description] Sets the height of the bar code.
n specifies the number of dots in the vertical direction.

① GS k *m d1...dk NUL* ② GS k *m n d1...dn*

[Name] Print bar code

[Format]

① ASCII	GS	k	*m*	*d*1...d*k*NUL
Hex	1D	6B	*m*	*d*1...d*k* 00
Decimal	29	107	*m*	*d*1...d*k* 0
② ASCII	GS	k	*m n*	*d*1...*dn*
Hex	1D	6B	*m n*	*d*1...*dn*
Decimal	29	107	*m n*	*d*1...*dn*

[Range] ① $0 \le m \le 6$ (*k* and *d* depends on the bar code system used)
② $65 \le m \le 73$ (*n* and *d* depends on the bar code system used)

[Description] Selects a bar code system and prints the bar code.
m selects a bar code system as follows:

m		Bar Code System	Number of Characters	Remarks
①	0	UPC-A	11 ≤ k ≤ 12	48 ≤ d ≤ 57
	1	UPC-E	11 ≤ k ≤ 12	48 ≤ d ≤ 57
	2	JAN13 (EAN 13)	12 ≤ k ≤ 13	48 ≤ d ≤ 57
	3	JAN 8 (EAN 8)	7 ≤ k ≤ 8	48 ≤ d ≤ 57
	4	CODE39	1 ≤ k	48 ≤ d ≤ 57, 65 ≤ d ≤ 90 d = 32, 36, 37, 43, 45, 46, 47
	5	ITF	1 ≤ k (even number)	48 ≤ d ≤ 57
	6	CODABAR	1 ≤ k	48 ≤ d ≤ 57, 65 ≤ d ≤ 68 d = 32, 36, 37, 43, 45, 46, 47, 58

m		Bar Code System	Number of Characters	Remarks
②	65	UPC-A	11 ≤ n ≤ 12	48 ≤ d ≤ 57
	66	UPC-E	11 ≤ n ≤ 12	48 ≤ d ≤ 57
	67	JAN13 (EAN 13)	12 ≤ n ≤ 13	48 ≤ d ≤ 57
	68	JAN 8 (EAN 8)	7 ≤ n ≤ 8	48 ≤ d ≤ 57
	69	CODE39	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 90 d = 32, 36, 37, 43, 45, 46, 47
	70	ITF	1 ≤ n ≤ 255 (even number)	48 ≤ d ≤ 57
	71	CODABAR	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 68 d = 32, 36, 37, 43, 45, 46, 47, 58
	72	CODE93	1 ≤ n ≤ 255	0 ≤ d ≤ 127
	73	CODE128	2 ≤ n ≤ 255	0 ≤ d ≤ 127

[Description for ①]

- *d* indicates the character code to be printed and *k* indicates the number of characters to be printed.

[Description for ②]

- *n* indicates the number of bar code data, and the printer processes *n* bytes from the next character data as bar code data.
- *d* indicates the character code to be printed.

GS r *n*

[Name] Transmit status

[Format]

ASCII	GS	r	*n*
Hex	1D	72	*n*
Decimal	29	114	*n*

[Range] $1 \le n \le 2, 49 \le n \le 50$

[Description] Transmits the status specified by *n* as follows:

n	Function
1, 49	Transmits paper sensor status
2, 50	Transmits drawer kick-out connector status

GS w *n*

[Name] Set bar code width

[Format]

ASCII	GS	w	*n*
Hex	1D	77	*n*
Decimal	29	119	*n*

[Range] $2 \le n \le 6$

[Description] Set the horizontal size of the bar code.

n specifies the bar code width as follows::

n	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.282	0.282	0.706
3	0.423	0.423	1.129
4	0.564	0.564	1.411
5	0.706	0.706	1.834
6	0.847	0.847	2.258

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 (EAN 13), JAN 8 (EAN 8), CODE93, CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, CODABAR

Appendix A

Dip Switch and Paper Near End Settings

Although the factory settings are best for almost all uses, if you have special requirements, you can change the DIP switch or paper near end settings.

Setting the DIP Switches

DIP switch functions

Your printer has two sets of DIP switches. The functions of the switches are shown in the following tables.

Serial interface specification

Set 1

SW	Function	ON	OFF
1-1	Data receive error	Ignored	Prints "?"
1-2	Receive buffer capacity	45 bytes	4K bytes
1-3	Handshaking	XON/XOFF	DTR/DSR
1-4	Data word length	7 bits	8 bits
1-5	Parity check	Enabled	Disabled
1-6	Parity selection	Even	Odd
1-7	Transmission speed (See the table below)		
1-8			

Transmission Speed

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

Set 2

SW	**Function**	**ON**	**OFF**
2-1	Handshaking (BUSY condition)	Receive buffer full	Off line or receive buffer full
2-2	Reserved: do not change settings	Fixed to OFF	
2-3	Selects print density	Refer to table below	
2-4			
2-5	Reserved: do not change settings	Fixed to OFF	
2-6	Reserved: do not change settings	Fixed to OFF	
2-7	I/F pin 6 reset signal	Enabled	Disabled
2-8	I/F pin 25 reset signal	Enabled	Disabled

Print Density Selection

Print Density	SW 2-3	SW 2-4
1 (Light)	ON	ON
2	OFF	OFF
3	ON	OFF
4 (Dark)	OFF	ON

Notes:

- With the optional RS-485 interface, DIP switches 2-7 and 2-8 are disabled.
- Changes in DIP switch settings (excluding switches 2-7 and 2-8 interface reset signals) 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 you turn on DIP switch 2-7 or 2-8 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.
- If the print density is set to level 3 or 4, the printing will be at the low speed.

Parallel interface specification

Set 1

SW	Function	ON	OFF
1-1	Auto line feed	Always enabled	Always disabled
1-2	Receive buffer capacity	45 bytes	4K bytes
1-3~ 1-8	Undefined	–	–

Set 2

SW	Function	ON	OFF
2-1	Handshaking (BUSY condition)	• Receive buffer full • Reading data	• Off-line • Receive buffer full • Reading data
2-2	Reserved (Do not change settings)	Fixed to Off	
2-3	Selects print density	Refer to table below	
2-4			
2-5~ 2-7	Reserved (Do not change settings)	Fixed to Off	
2-8	I/F pin 31 reset signal (Do not change settins)	Fixed to On	

Print Density Selection

Print Density	SW 2-3	SW 2-4
1 (Light)	ON	ON
2	OFF	ON
3	ON	OFF
4 (Dark)	OFF	OFF

Notes:

- Changes in DIP switch settings (excluding switch 2-8 interface reset signal) 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 you turn on DIP switch 2-8 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.
- If the print density is set to level 3 or 4, the printing will be at the low speed.

Changing the DIP switch settings

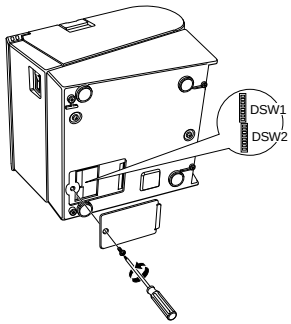
If you need to change settings, follow the steps below to make your changes:

⚠ *CAUTION:*

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

1. Make sure the printer is turned off.

2. Remove the screw from the DIP switch cover. Then take off the DIP switch cover, as shown in the illustration below.



3. Set the switches using a pointed tool, such as tweezers or a small screwdriver.

4. Replace the DIP switch cover. Then secure it with the screw.

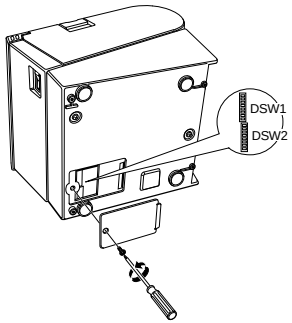
The new settings take effect when you turn on the printer.

⚠ *ACHTUNG:*

Schalten Sie den Drucker aus, während Sie die die DIP-Schalterabdeckung abnehmen, um elektrische Kurzschlüsse zu verhindern, die den Drucker beschädigen können.

1. Stellen Sie sicher, daß der Drucker ausgeschaltet ist.

2. Entfernen Sie die Schraube von der DIP-Schalterabdeckung. Dann nehmen Sie die DIP-Schalterabdeckung ab, wie in der Abbildung unten gezeigt.



3. Stellen Sie die Schalter mit einem spitzen Gegenstand wie einer Pinzette oder einem kleinen Schraubenzieher in die gewünschte Stellung.

4. Setzen Sie die DIP-Schalterabdeckung wieder auf. Anschließend befestigen Sie sie mit der Schraube.

Die neuen Einstellungen werden gültig, wenn der Drucker wieder eingeschaltet wird.

Adjusting the Paper Near End Detector

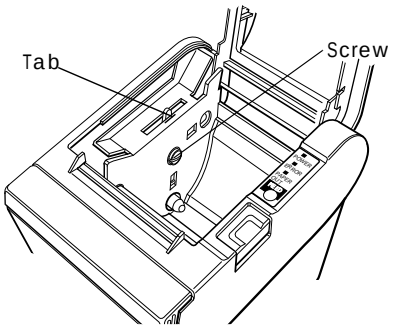
The paper near end detector detects when paper is almost gone by measuring the diameter of the paper roll. The detector has two settings.

Because of variations in paper roll cores, it is not possible for the detector to measure exactly the length of paper left on the roll when the detector is triggered. Of the two settings, the factory setting (lower) leaves the least amount of paper on the roll when the sensor is triggered. If you want more paper left, change the setting as described below.

Note:
The factory setting is based on a paper roll core with an outside diameter of 18mm and an inside diameter of 12mm. If you use a paper roll with a core with an outside diameter of more than 18mm, it is better to change to the upper setting, as described below.

1. Open the printer cover, and remove the paper roll.

2. Loosen the adjusting screw and move the tab up to the upper setting.



3. Tighten the adjusting screw, and check to be sure that the detecting lever moves freely.

4. Replace the paper roll.

Appendix B

EPSON Sales Subsidiaries

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