Confidential

EPSON

Thermal Label Printer

TM-L90 with Peeler

Specification

STANDARD	
Rev. No.	B
Notes	

Copied Date	, ,
Copied by	

SEIKO EPSON CORPORATION

MATSUMOTO MINAMI PLANT
2070 KOTOBUKI KOAKA, MATSUMOTO-SHI, NAGANO, 399-8702 JAPAN
PHONE+81-263-86-5353 FAX+81-263-86-9925

Confidential

REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment	Takami	--	Murata	I	B	19	B	46	B
B	Change	Furihata	Takami	Murata	II	B	20	B	47	B
					III	B	21	B	48	B
					IV	B	22	B	49	B
					V	B	23	B	50	B
					VI	B	24	B	51	B
					VII	B	25	B	52	B
							26	B	53	B
							27	B	54	B
					1	B	28	B	55	B
					2	B	29	B	56	B
					3	B	30	B	57	B
					4	B	31	B	58	B
					5	B	32	B	59	B
					6	B	33	B	60	B
					7	B	34	B	61	B
					8	B	35	B	62	B
					9	B	36	B	63	B
					10	B	37	B	64	B
					11	B	38	B	65	B
					12	B	39	B	66	B
					13	B	40	B	67	B
					14	B	41	B	68	B
					15	B	42	B	69	B
					16	B	43	B	70	B
					17	B	44	B	71	B
					18	B	45	B	72	B

TITLE

TM-L90 with Peeler
Specification
(STANDARD)

Front Part					Contents	Appendix	Total
Cover	Rev. Sheet	Confidentiality Agreement	General Features	Table of Contents			
1	4	1	1	5	180	20	212

Confidential

REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				73	B	100	B	127	B
B	Change				74	B	101	B	128	B
					75	B	102	B	129	B
					76	B	103	B	130	B
					77	B	104	B	131	B
					78	B	105	B	132	B
					79	B	106	B	133	B
					80	B	107	B	134	B
					81	B	108	B	135	B
					82	B	109	B	136	B
					83	B	110	B	137	B
					84	B	111	B	138	B
					85	B	112	B	139	B
					86	B	113	B	140	B
					87	B	114	B	141	B
					88	B	115	B	142	B
					89	B	116	B	143	B
					90	B	117	B	144	B
					91	B	118	B	145	B
					92	B	119	B	146	B
					93	B	120	B	147	B
					94	B	121	B	148	B
					95	B	122	B	149	B
					96	B	123	B	150	B
					97	B	124	B	151	B
					98	B	125	B	152	B
					99	B	126	B	153	B

TITLE

TM-L90 with Peeler
Specification
(STANDARD)

Front Part					Contents	Appendix	Total
Cover	Rev. Sheet	Confidentiality Agreement	General Features	Table of Contents			
1	4	1	1	5	180	20	212

Confidential

REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				154	B	App.1	B		
B	Change				155	B	App.2	B		
					156	B	App.3	B		
					157	B	App.4	B		
					158	B	App.5	B		
					159	B	App.6	B		
					160	B	App.7	B		
					161	B	App.8	B		
					162	B	App.9	B		
					163	B	App.10	B		
					164	B	App.11	B		
					165	B	App.12	B		
					166	B	App.13	B		
					167	B	App.14	B		
					168	B	App.15	B		
					169	B	App.16	B		
					170	B	App.17	B		
					171	B	App.18	B		
					172	B	App.19	B		
					173	B	App.20	B		
					174	B				
					175	B				
					176	B				
					177	B				
					178	B				
					179	B				
					180	B				

TITLE	Front Part					Contents	Appendix	Total
TM-L90 with Peeler Specification (STANDARD)	Cover	Rev. Sheet	Confidentiality Agreement	General Features	Table of Contents			
	1	4	1	1	5	180	20	212

Confidential

REVISION SHEET

REV.	SHEET	CHANGED CONTENTS
B	All	All pages are revised.
	7	1.7 Paper Specifications 1) Paper type • Notes on preprinting on the recording surface of thermal paper (added)
	8	1.7 Paper Specifications 6) Notes on using two-color thermal paper • The reliability when two-color … (added) • Do not print on the single-color … (added)
	9	10) Requirement for die-cut label length Label length (deleted), Label interval (added)
	10	11) Requirement for black mark intervals Black mark length ((added)
	19	1.15 Installation Continuous issuing mode: Horizontal installation (deleted) NOTES: • Install the printer … (added) • Do not Install the printer … (added)
	54	3.3.3 Mode switch NOTES: (added)
	67	3.9 Automatic Paper Layout Setting Mode NOTES: • The condition of the paper … (added)
	71	3.12 Peeler Open Lever (moved from 3.13) 3.13 Roll Paper Cover Open Lever (moved from 3.12)
	72	4.3 External Appearance Figure 4.3.2 (changed)
	73	5.1 Standard Accessories • Panel label for horizontal installation (deleted) • Operation label (added)
	127, 128	GS (E <Function 49> Figures (added) • For the paper dimensions … (added) 3.6 mm → 2.75 mm
	App.2	A.2 Notes on Printer Installation • Install the printer … (added) A.3 Other Notes 1) Printer mechanism handling • To access the mode switch, … (added) • Do not change the mode switch … (added)
	App.4	3) Notes on the printer installation → Notes on supplying the power to the printer
	App.6, App.7	B.2 Setting the Paper Information 6) NOTE (added) 7) NOTE (added)
	App.8	APPENDIX C: NOTES: 3) (deleted)

TITLE

TM-L90 with Peeler

Specification

(STANDARD)

Confidential

CONFIDENTIALITY AGREEMENT

BY USING THIS DOCUMENT, YOU AGREE TO ABIDE BY THE TERMS OF THIS AGREEMENT.
PLEASE RETURN THIS DOCUMENT IMMEDIATELY IF YOU DO NOT AGREE TO THESE TERMS.

1. This document contains confidential, proprietary information of Seiko Epson Corporation or its affiliates. You must keep such information confidential. If the user is a business entity or organization, you must limit disclosure to those of your employees, agents, and contractors who have a need to know and who are also bound by obligations of confidentiality.
2. On the earlier of (a) termination of your relationship with Seiko Epson, or (b) Seiko Epson's request, you must stop using the confidential information. You must then return or destroy the information, as directed by Seiko Epson.
3. If a court, arbitrator, government agency, or the like orders you to disclose any confidential information, you must immediately notify Seiko Epson. You agree to give Seiko Epson reasonable cooperation and assistance in the negotiation.
4. You may use confidential information only for the purpose of operating or servicing the products to which the document relates, unless you obtain the prior written consent of Seiko Epson for some other use.
5. Seiko Epson warrants that it has the right to disclose the confidential information. SEIKO EPSON MAKES NO OTHER WARRANTIES CONCERNING THE CONFIDENTIAL INFORMATION OR ANY OTHER INFORMATION IN THE DOCUMENT, INCLUDING (WITHOUT LIMITATION) ANY WARRANTY OF TITLE OR NON-INFRINGEMENT. Seiko Epson has no liability for loss or damage arising from or relating to your use of or reliance on the information in the document.
6. You may not reproduce, store, or transmit the confidential information in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Seiko Epson.
7. Your obligations under this Agreement are in addition to any other legal obligations. Seiko Epson does not waive any right under this Agreement by failing to exercise it. The laws of Japan apply to this Agreement.

Cautions

1. This document shall apply only to the product(s) identified herein.
2. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Seiko Epson Corporation.
3. The contents of this document are subject to change without notice. Please contact us for the latest information.
4. While every precaution has been taken in the preparation of this document, Seiko Epson Corporation assumes no responsibility for errors or omissions.
5. Neither is any liability assumed for damages resulting from the use of the information contained herein.
6. Neither Seiko Epson Corporation nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs, or expenses incurred by the purchaser or third parties as a result of: accident, misuse, or abuse of this product or unauthorized modifications, repairs, or alterations to this product, or (excluding the U. S.) failure to strictly comply with Seiko Epson Corporation's operating and maintenance instructions.
7. Seiko Epson Corporation shall not be liable against any damages or problems arising from the use of any options or any consumable products other than those designated as Original EPSON Products or EPSON Approved Products by Seiko Epson Corporation.

Trademarks

EPSON® and ESC/POS® are registered trademarks of Seiko Epson Corporation.

General Notice: Other product and company names used herein are for identification purposes only and may be trademarks of their respective companies.

GENERAL FEATURES

1) This specification applies to the following models of the TM-L90 series printer:

TM-L90 with Peeler (with serial interface)

TM-L90P with Peeler (with parallel interface)

* This specification describes only the outline of the general functions and the model-dependent functions of the commands. For detailed specifications and usage of the commands, please refer to the ESC/POS APG (Application Programming Guide) that is separately issued.

2) Features

This printer has the following features:

<Peeler function>

- Peels label off of liner (backing paper) automatically.
- Continuous label issuing (without peeling off) is selectable.

<Printing>

- Label printing is possible. (Die-cut label paper)
  Die-cut label paper: Label paper that has a predefined size of labels with an interval between labels.
- High-speed printing is possible.
  Normal printing: 120 mm/s {4.72"/s}
  High-speed printing: 150 mm/s {5.91"/s}
- Using two-color thermal paper, two-color printing is possible (print speed: 90 mm/s {3.54"/s} maximum).

<Printer handling>

- The printer can be placed vertically (standard) or hung vertically on a wall.
- Easy drop-in paper loading.
- Cable connectors are housed in the bottom of the printer.

<Software>

- Command protocol is based on the ESC/POS® Proprietary Command System.
- OPOS ADK and Windows® printer drivers are available.
- Printing of various bar codes is possible. Two-dimensional codes (PDF417, MaxiCode, QRCode) are supported.
- Various layouts are possible by using page mode.

<General>

- Various interface boards (EPSON UB series, except UB-P02, UB-U05, UB-U06, and UB-U19) can be used.
- Using a paper roll spacer, various width papers can be used (38 mm to 70 mm {1.5 to 2.76"}) by adjustment of the paper roll spacer.
- Can use a paper roll with up to 90 mm {3.5"} diameter.
- Environment-friendly design reduces the power consumption in standby mode (compared to the EPSON's legacy models: approximately 1/2).
- Using with the EPSON PS-180 power supply (power-saving type), the power consumption for the printer and the AC adapter can be reduced by a large amount.

Confidential

Table of Contents

Confidential

1. GENERAL SPECIFCATIONS

1.1 Printing Specifications

1) Printing method: Thermal line printing

2) Dot density: 8 dots/mm × 8 dots/mm (203 dpi × 203 dpi)
(dpi: dots per 25.4 mm {1"})

3) Printing direction: Unidirectional forward with friction feed
(When feeding to the print starting position, paper may be fed in a reverse direction.)

4) Paper width: 80 mm {3.15"} (default setting) or variable other than 80 mm with the paper roll spacer packed in the box.
(Refer to Section 1.5, Paper Roll Supply Device, for details.)

5) Print width: 72 mm {2.83"}, 576 dot positions
(when the paper width is 80 mm)

6) Number of characters per line:
48 (using font A when the paper width is 80 mm)
(The default setting is font A)

7) Print speed: <Normal> (default setting)
120 mm/s {4.72"} maximum
In the label peeler issuing mode, the print speed must be less than 120 mm/s {4.72"}.

<Maximum> (selected with the command)
150 mm/s {5.91"} maximum
(The high-speed printing is selected when the specified paper is used. Refer to Section 1.7, Paper Specifications, for details.)

<Ladder bar code, two-dimensional code printing>
90 mm/s {3.54"} maximum

<Two-color printing>
90 mm/s {3.54"} maximum

NOTES:
- The print speeds listed above are values when the print density is set to the default setting at 24 V and 25°C {77°F}. The print speed may change automatically depending on the power supply voltage and the condition of the head temperature.
- Printing speed may be slower depending on the data transmission speed and the combination of control commands.
- Low transmission speed may cause intermittent printing. It is recommended to transmit data to the printer as quickly as possible. (Example: at least 19,200 bps for printing with font A) (bps: bits per second)
- When the ladder bar code or 2-dimensional code is printed, the print starts when the specific paper feed speed is reached. Therefore, the paper may be fed for the maximum 10 dot lines, depending on the paper feed speed at the time that the print data is received.

8) Line spacing: 3.75 mm {0.15"}
(Programmable by control command.)

1.2 Character Specifications

1) Number of characters:

Alphanumeric characters: 95
Extended graphics: 128 × 11 pages (including one space page)
International characters: 37
Japanese model: JIS (JIS X0208-1990): 6879
Special font:

Code System	Number of Characters	JIS Code	Shift JIS Code
Special	845	2D-21 ~ 2D-7E 79-21 ~ 7C-7E	87-40 ~ 87-9D ED-40 ~ EE-FC FA-40 ~ FC-4E

2) Character structure:

Font A (12 × 24): 12 × 24
Font B (9 × 17): 9 × 17
Font B (10 × 24): 10 × 24
Font C (8 × 16): 8 × 16
Kanji font A (24 × 24): 24 × 24
Kanji font B (20 × 24): 20 × 24
Kanji font C (16 × 16): 16 × 16

Depending on the model types, the supported fonts are different.
Font A is selected as the default.

3) Character size (Character area):

<ANK model>

Table 1.2.1 Character Size for ANK Model

		Standard W×H (mm)	Double-height W×H (mm)	Double-width W×H (mm)	Double-width / Double-height W×H (mm)
Font A	12 × 24	1.50 × 3.0	1.50 × 6.0	3.0 × 3.0	3.0 × 6.0
Font B	9 × 17	1.13 × 2.13	1.13 × 4.25	2.25 × 2.13	2.25 × 4.25
Kanji font A	24 × 24	3.0 × 3.0	3.0 × 6.0	6.0 × 3.0	6.0 × 6.0

NOTES: 1. The actual print character may be smaller than the size shown in the table above, because the above size includes spaces in the font.

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

3. Character size not including the horizontal spacing in the standard scale is as follows:

Font A (12 × 24): 1.25 (W) × 3.0 (H) mm
Font B (9 × 17): 0.88 (W) × 2.13 (H) mm

(ANK = alphanumeric)

<Japanese model>

Table 1.2.2 Character Size for Japanese Model

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

NOTES: 1. The actual print character may be smaller than the size shown in the table above, because the above size includes spaces in the font.

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

3. Character size not including the horizontal spacing in the standard scale is as follows:

Font A (12 × 24): 1.25 (W) × 3.0 (H) mm
Font B (10 × 24): 1.0 (W) × 3.0 (H) mm
Font C (8 × 16): 0.875 (W) × 2.0 (H) mm

4) Product specifications and supported characters

Table 1.2.3 Product Specifications and Supported Characters

Product Specifications	Supported Characters	
ANK model	• Alphanumeric • Extended graphics • International characters	---
Japanese model		Japanese characters, Special font

(ANK = alphanumeric)

1.3 Peeler

1) Function:

Open the peeler cover, and pass the liner of the paper to the liner exit, so that the label is peeled off of the liner.
If the paper is inserted out of the peeler cover, the label is not peeled off. In this case, the printed paper is removed by cutting it with the manual cutter.

2) Mode switch:

A mode switch is provided.
This switch selects the label peeler issuing mode or the continuous issuing mode. The switch is located beside the roll paper cover.

3) Label peeler detection:

The printer automatically detects the presence of a label that has been peeled, then feeds the label to the next print position if the label is removed.

NOTE: For paper loading, refer to Appendix B.

1.4 Manual Cutter

1) Function:

Cuts the liner of the receipt or the label manually only when issuing labels continuously.

2) Paper thickness that is possible to be cut:

100 μm or less

1.5 Paper Detectors

The printer has the paper detection functions described below:

1) Roll paper end detector

The type of paper can be detected with the memory switch settings:

- Paper end detection

  This detects the presence of paper, regardless of the type of paper or the memory switch settings.

- Label position detection

  This detects the label position if the origin of the layout is set to “label” with the memory switch or if the auto-setting mode of the paper layout specifies “label.”
  (Refer to 3.8, Auto-setting Mode for Paper Layout, for details.)

- Black mark detection

  This detects the black mark position if the origin of the layout is set to “black mark” with the memory switch or if the auto-setting mode of the paper layout specifies “black mark paper” (Refer to 3.9, Auto-setting Mode for Paper Layout, for details.)

2) Roll paper near-end detector

Refer to Section 1.6.

3) Label peeler detector

Refer to 3) of Section 1.3.

1.6 Paper Roll Supply Device

1) Supply method: Drop-in paper roll

2) Near-end sensor:

a) Detection method: Microswitch

b) Paper roll spool diameter: Inside: 25.4 mm {1.00"}
Outside: 31.4 mm {1.24"}

c) Near-end adjustment: Adjusting screw
Fixed position #1 (approximately 36 mm {1.42"})
#2 (approximately 41 mm {1.61"})
(The adjusting screw has two positions.)

NOTES:
- A command can be used to select whether printing is stopped or not when the paper near end is detected.
- When the paper roll diameter becomes sufficiently small, the sensor detects a near-end of the paper roll, and the PAPER OUT LED indicator lights. If the sensor is enabled, the printer stops printing.
  After installing a new paper roll, close the roll paper cover; then the printer restarts printing.

3) Paper width selection: 80 mm {3.15"} (default setting)
By adjusting the paper roll spacer, it is also possible to set optional positions in the range of 38 to 70 mm {1.50 to 2.76"}. The range of 71 to 79 mm {2.80 to 3.11"} cannot be set.

NOTES:
- Be sure to set the paper width with the memory switch to adjust printing to the print width.
- Never change the paper width from narrow to wide once you set the paper width to narrow.
  Example: 60 mm {2.36"} → 80 mm {3.15"}
  The reason not to change the width setting if the printer has ever been used is because once narrow paper is used, some part of the head always contacts the platen. Therefore, if a width setting of 80 mm is set, there is a possibility that the head or the cutter blade may be worn out. By this means, printing is inhibited in the area described above.
- If roll paper other than the specified ones is used, the paper near-end may not be detected correctly. However, the paper near-end for roll paper that has a 12 mm {0.47"} inside diameter and 18 mm {0.71"} outside diameter or 12 mm inside diameter and 22 mm {0.87"} outside diameter can be detected, even though it is not as accurate as the specified roll paper.

1.7 Paper Specifications

1) Paper type: Specified thermal paper

The following four kinds of paper can be used:

- Receipt paper (without black mark)
- Receipt paper (with black mark)
- Die-cut label paper (without black mark)
- Die-cut label paper (with black mark)

Refer to Function 49 of the **GS (E** command for the paper layout details.

NOTES:

- Die-cut label paper is a label paper that has a predefined size of labels with an interval between labels.
- When a die-cut label (with black mark) is printed, the user must consider the print position.
- If printing is executed on the backing paper (liner), the thermal print head may be damaged.
- Die-cut labels (with black marks) cannot be used in the automatic paper layout setting mode.
- Notes on preprinting on the recording surface of thermal paper

  When using thermal paper the recording surface of which has been preprinted, sticking (a problem of the thermal head sticking to the surface of the thermal paper during printing) may occur, causing faulty printing and other problems. The print density also may become faint due to the preprinting. It is, therefore, strongly recommended to avoid using preprinted thermal paper. If such paper must be used, conduct preprinting tests under the conditions recommended by the paper manufacturer (type of ink/print conditions) and confirm that no faulty printing or faint print density occur before you use it for actual printing.

2) Form: Paper roll (Paper with labels that are pasted inside of the paper roll is not permittable.)

3) Paper width:
80 mm paper width model: 79.5 ± 0.5 mm {3.13 ± 0.02"}
60 mm paper width model: 59.5 ± 0.5 mm {2.34 ± 0.02"}
38 mm paper width model: 37.5 ± 0.5 mm {1.48 ± 0.02"}

4) Paper roll size:

Roll diameter:	Maximum 90 mm {3.54"}
Take-up paper roll width:	80, 60, 38, +0.5/-1.0 mm {3.15", 2.36", 1.50", +0.02"/-0.04"}

5) Specified original paper type No.:

Use the specified paper as listed below. Otherwise, the print quality or the product's reliability may not be guaranteed or the issued label may not be peeled.
(Paper marked with * is a specified roll paper.)

Receipt paper:

- Single-color thermal roll paper:

*TF60KS-E (paper thickness: 75 μm)	Nippon Paper Industries Co., Ltd.
TF50KS-E (paper thickness: 65 μm)	Nippon Paper Industries Co., Ltd.
PD150R (paper thickness: 75 μm)	Oji Paper Mfg. Co., Ltd.
PD160R (paper thickness: 75 μm)	Oji Paper Mfg. Co., Ltd.
P350 (paper thickness: 62 μm)	Kanzaki Specialty Paper (USA)
F5041 (paper thickness: 60 μm)	Mitsubishi HiTec Paper Flensburg GmbH (Germany)
KF50 (paper thickness: 62 μm)	KANZAN Spezialpapiere GmbH (Germany)

- Two-color thermal roll paper:

*PD750R (paper thickness: 75 μm)	Oji Paper Mfg. Co., Ltd.

Die-cut label paper:

- Single-color thermal label:

HW76B	Nippon Paper Industries Co., Ltd.
KL470	NAKAGAWA MFG (USA), Inc.
KL80GT	NAKAGAWA MFG (Germany), GmbH

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

6) Notes on using two-color thermal paper

- Two-color printing is performed using a two-color thermal paper, if the two-color print is selected by the customized value setting with Function 5 of the **GS (E** command.
- There may be some cases where the print color may not be clear depending on the print pattern.
- Printing with Color 2 (red on the specified two-color thermal paper) may fade over time, depending on the environmental circumstances. To keep the print for long-term storage, it is recommended to print with Color 1 (black on the specified two-color thermal paper).
- The reliability when two-color thermal paper is used differs from the reliability when single-color thermal paper is used. Refer to Section 1.13, Reliability, for details.
- Do not print on the single-color paper in two-color printing.
  Otherwise, the print quality may be lowered, the printer's reliability may be reduced, or the thermal head may be damaged.

7) Paper roll spool diameter

Inside: 25.4 mm {1.00"}

Outside: 31.4 mm {1.24"}

NOTE: Paper must not be pasted to the paper roll spool.

8) Print density adjustment

For best print quality and reliability, select the proper print density for the paper type used. See the table below. Print density can be set with a software command.

Original Paper No.	Density Level
P350	90 %
KF50	95 %
TF60KS-E, TF50KS-E, PD750R, F5041	100 %
PD160R, PD150R	105 %
HW76B, KL470, KL80GT	130 %

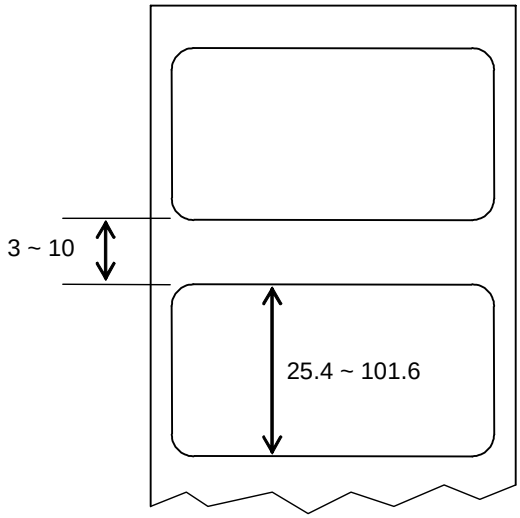
9) Paper to use for high speed

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

- TF60KS-E
- PD160R
- TF50KS-E
- P350
- F5041
- KF50
- HW76B
- KL470
- KL80GT

In the label peeler issuing mode, the print speed must be less than 120 mm/s {4.72"}

10) Requirement for die-cut label length
(when die-cut labels (without black marks) or die-cut labels (with black marks) are used)



[Units: mm]

Figure 1.7.1 Requirement for Die-cut Label Length

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

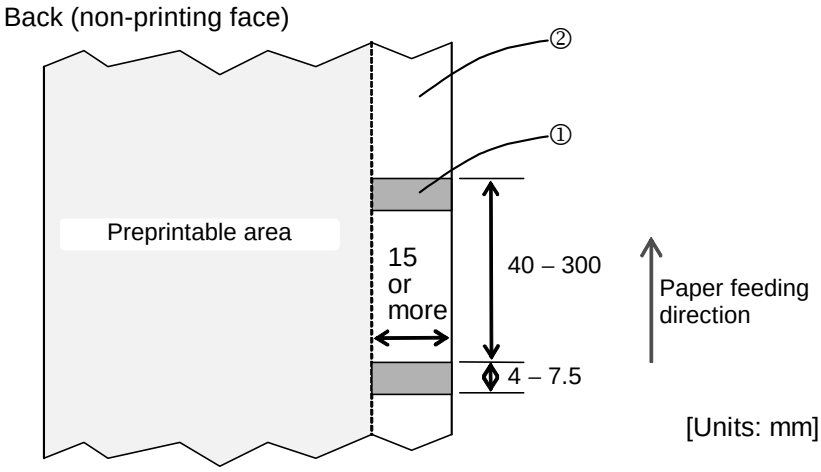


Figure 1.7.2 Requirement for Black Mark Intervals

NOTE: The allowable relation between the reflecting rate in the black mark portion (①) and the non black mark portion (②) must be as shown in the table in (12).

12) Requirement for black mark position (when die-cut labels (with black marks) are used)

Back (non-printing face)

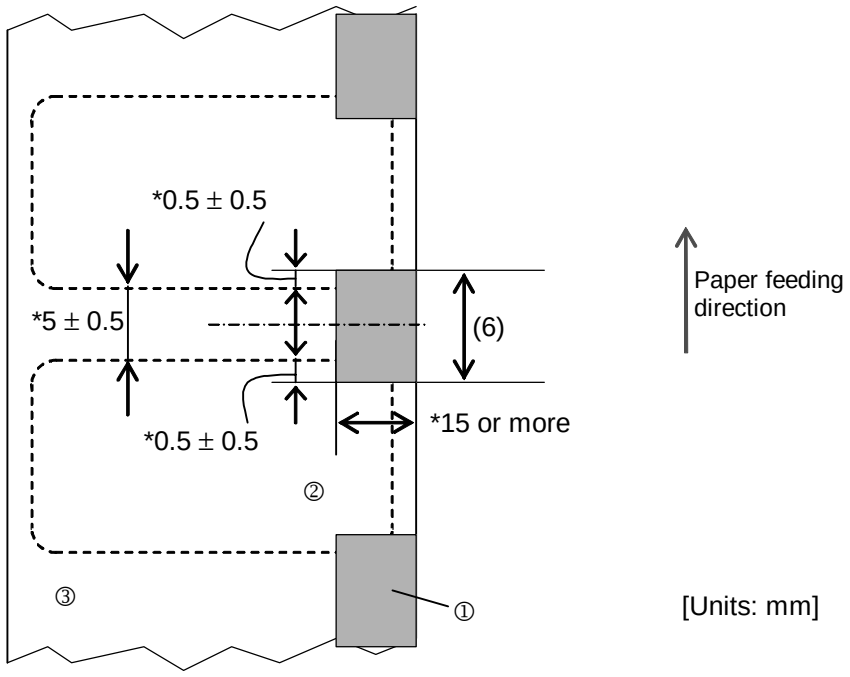


Figure 1.7.3 Requirement for Black Mark Position

NOTES:

- If die-cut labels (with black marks) are used, set the paper layout using Function 49 of the **GS (E** command.
- The allowable relation between the reflecting rate in the black mark portion (①) and the non black mark portion (② and ③) must be as shown in the table below (② is the back of label and liner, ③ is a back of liner):

	Allowable combination of the reflecting rate [Units: %]					
Black mark portion ①	17	16	15	14	13	or less
Non black mark portion ②, ③	90	85	80	75	70	or more

- The reflecting rate means the value which is measured with a Macbeth density meter (PCMII) D filter.

1.8 Printable Area

1) Receipt paper

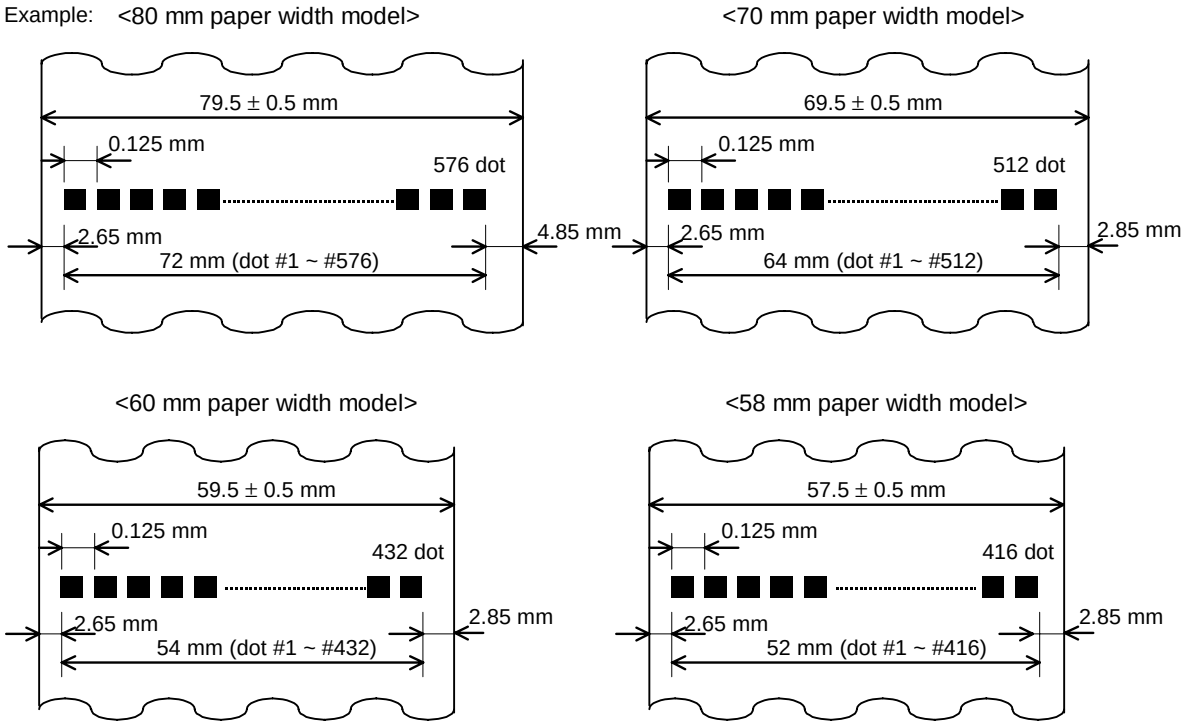


Figure 1.8.1 Printable Area (for Thermal Paper)

NOTES:
- The printable area may be out of alignment by 2 mm {0.08"} maximum (left or right), due to the paper position or tolerance of parts. Therefore, the print area must be set in the range of more than 2 mm from the edges of the paper. To make the margin for both sides safely, it is recommended to set a margin of 2.6 mm {0.1"} or more, as shown in Figure 1.8.1.
- A roll paper which has a 71 to 79 mm of the paper width cannot be used because of the thickness of the paper roll spacer.

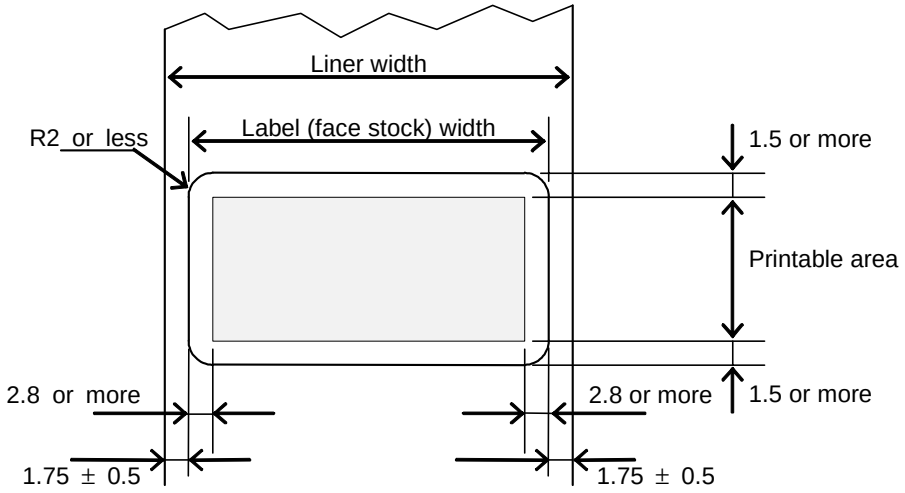
Table 1.8.1 Paper Width and Printable Area

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

(Numeric values used here are average values for designing. Only the paper width dimension is exact. The values in parentheses are the maximum value for the paper tolerance.)

2) Die-cut Labels (face stocks)

Make a margin of 2.8 mm {0.11"} or more from the label edges on both left and right sides and a margin of 2.0 mm {0.079"} or more from the label edges on both upper and bottom as the printable area of the label (face stock).



[Units: mm]

Figure 1.8.2 Printable Area (for Labels)

NOTES:
- If the margins are not set, the printing may be off the label due to paper misalignment or the parts tolerance.
- A label which has a 71 to 79 mm of the liner width cannot be used because of the thickness of the paper roll spacer.

Table 1.8.2 Example of Liner Width and Printable Area

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

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

1.9 Printing and Peeling Positions, Manual Cutter Position

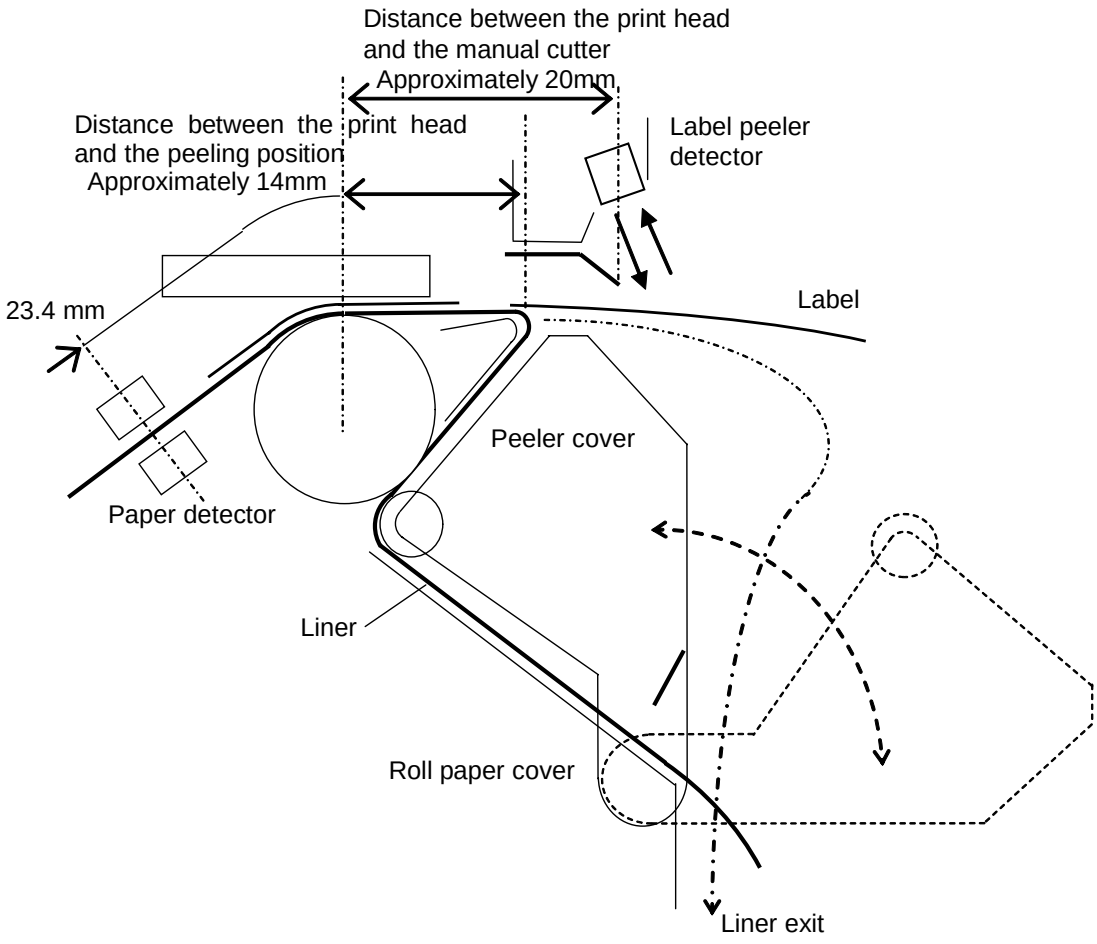


Figure 1.9.1 Printing and Cutting Positions

NOTE: Numeric values used here are typical values; the values may vary slightly as a result of paper slack or variations in the paper. Take this into account when setting the manual cutting position.

1.10 Internal Buffer

1) Receive buffer: Selectable as 45 bytes or 4KB using a memory switch

2) User-defined buffer:
   - Downloaded bit image: Approximately 12KB (common for all models)
   - User-defined characters: Approximately 11KB (for ANK model) Approximately 15KB (for Japanese model)

3) Macro buffer: 2KB

4) NV (non-volatile) graphics data area: 0 bytes through 384KB

5) NV user memory: 1KB through 192KB

6) Page mode area: 106KB

NOTE: Since the NV graphics data area and the NV user memory use the same memory area, each area has a limitation. Refer to **GS (E** <Function 5> for details.

1.11 Electrical Characteristics

1) Supply voltage: +24 VDC ± 7% (optional power supply: EPSON PS-170, PS-180)

2) Current consumption (at 24 V at room temperature):

Mean: Approximately 1.7 A (for single-color printing)
(Character font A, alphanumeric, capital letters, 36-character rolling pattern, full-column printing)

Mean: Approximately 1.7 A (for two-color printing)
(Character font A, alphanumeric, capital letters, 36-character rolling pattern, full-column printing, changing the print color each line)

Peak: Approximately 7.7 A maximum (with full dot printing)

Standby:

Mean: Approximately 0.1 A

NOTE: Maximum 1 A for drawer kick-out driving.

1.12 EMI and Safety Standards Applied

EMC is measured using SEIKO EPSON's AC adapter PS-180.

1) Europe	CE marking: Directive: 89/336/EEC EN55022 Class B EN55024 IEC61000-4-2 IEC61000-4-3 IEC61000-4-4 IEC61000-4-5 IEC61000-4-6 IEC61000-4-11 Safety Standard: TUV (EN60950)
2) North America	EMI: FCC/ICES-003 Class A Safety standards: UL1950/CSA C22.2 No.950
3) Japan	EMC: VCCI Class A
4) Oceania	EMC: AS/NZE 3548 / CISPR22 ClassB

UL's Conditions of Acceptability

1. This component has been judged on the basis of the required spacings in the Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment, CAN/CSA C22.2 No.950-95 * UL 1950, Third Edition, including revisions through revision date March 1, 1998, which are based on the Fourth Amendment to IEC 950, Second Edition, which would cover the component itself if submitted for Listing.
2. The equipment has been evaluated for use in a Pollution Degree 2 environment.

1.13 Reliability

1) Life:

Printer mechanism (including the thermal head life)

When printing labels (face stock) (in single-color mode):

1,000,000 labels issued

(When the length of the label in the paper feeding direction is 25.4 mm {1"} through 63.5 mm {2.5"}. The value above corresponds to approximately 30 km to 70 km {18.64 to 43.5 miles} of running length. When printing labels whose length exceeds 63.5 mm, the label-issuing life is 70 km {43.5 miles} of running length.)

When printing receipts (in single-color mode):

20,000,000 lines printed (3.75 mm {0.15"} for one line)

(When the value above is calculated, the printer uses 15-line feeding and 10-line printing repeatedly with 75 µm of paper thickness. The value above corresponds to approximately 120 km {74.57 miles} of running length.)

When printing labels (face stock) (in two-color mode):

500,000 labels issued

(When the length of the label in the paper feed direction is 25.4 mm {1"} through 63.5 mm {2.5"}. The value above corresponds to approximately 15 km to 35 km {9.32 to 21.75 miles} of running length.)

When printing receipts (in two-color mode):

10,000,000 lines printed (3.75 mm {0.15"} for one line)

(When the value above is calculated, the printer uses 15-line feeding and 10-line printing repeatedly. The value above corresponds to approximately 60 km {37.28 miles} of running length.)

Thermal head: 150 million pulses

NOTE: End of life is defined as the point at which the component reaches the beginning of the wearout period.

2) MTBF: 360,000 hours (when printing receipts in single-color)
(Failure is defined as a random failure occurring during the random failure period.)

3) MCBF: 70,000,000 lines printed (when printing receipts in single-color)
(This is an average failure interval based on failures relating to wearout and random failures up to the life of 20,000,000 lines printed.)

NOTE: Depending on the paper condition, paper or glue may stick to the thermal head, platen, or peeler unit easily. The reliability values listed above are given in the condition of performing cleaning after every 100,000 label issues. For cleaning, refer to Appendix D.

1.14 Environmental Conditions

1) Temperature:
Operating: 5 to 45°C {41 to 113°F}
Storage: -10 to 50°C {14 to 122°F} (except for paper)

2) Humidity:
Operating: 10 to 90% RH
Storage: 10 to 90% RH (except for paper)

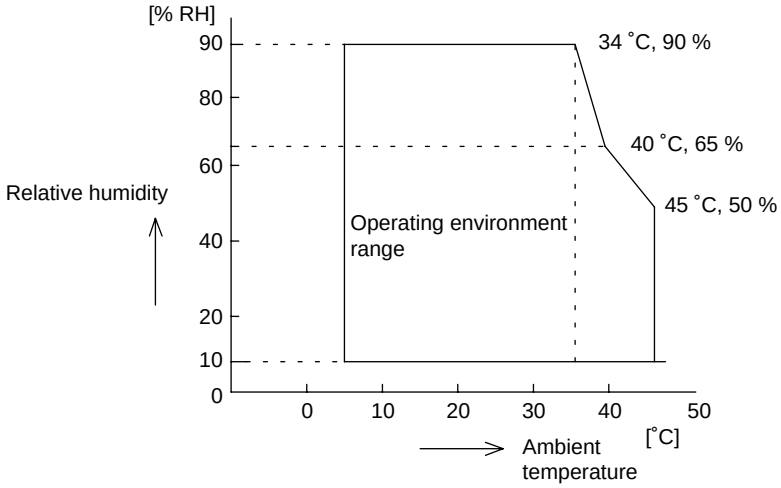


Figure 1.14.1 Operating Temperature and Humidity Range

NOTES:
- The environmental conditions as described above must be guaranteed only when the specified paper is used.
- If the printer is not used for a long time with paper installed, some part of the printing may be light, due to the deformation of the paper. If the printer is not used for a long time with paper installed, be sure to feed paper approximately 30 mm {1.18"} before printing.

3) Vibration resistance:
When packed:
Frequency: 5 to 55 Hz
Acceleration: Approximately 19.6 m/s^2 {2 G}
Sweep: 10 minutes (half cycle)
Duration: 1 hour
Directions: x, y, and z

No external or internal damage should be found after the vibration test, and the unit should operate normally.

4) Impact resistance:

When packed:
- Package: EPSON standard package
- Height: 60 cm {23.62"}
- Directions: 1 corner, 3 edges, and 6 surfaces

No external or internal damage should be found after the drop test, and the unit should operate normally.

When unpacked:
- Height: 5 cm {1.97"}
- Directions: Lift one edge and release it (for all 4 edges).

When the printer is not printing, no external or internal damage should be found after the drop test.

5) Acoustic noise (operating): Approximately 53 dB (ANSI bystander position)

NOTE: The value as shown above is measured when the EPSON evaluation printing pattern is used. This value may be different, depending on the paper to be printed, the print duty, or the print conditions, such as the print speed or the print density.

1.15 Installation

Label peeler issuing mode and continuous issuing mode:

Vertical installation

(Place in the direction as shown in Section 4, case specifications.)

- Possible to hang the printer with an optional wall-hanging bracket.

NOTES:
- Vibration during paper loading and using a drawer should be considered. Take measures to prevent the printer from moving. Affixing tapes are provided as an option.
- Avoid installing the printer in locations that receive direct sunlight or strong light. Otherwise, the label peeler detector may not detect the paper correctly.
- Install the printer in a location where the backing paper will not accumulate near the paper exit so that the backing paper will not stick to the peeled label. Otherwise, the paper jam may occur.
- Do not install the printer in a horizontal direction since a paper jam may be caused by the backing paper sticking to the peeled label.

2. CONFIGURATION

2.1 Interface

2.1.1 RS-232 Serial Interface

2.1.1.1 Specifications

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15 V: Logic "1"/ OFF SPACE = +3 to +15 V: Logic "0"/ ON
Baud rates:	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps (bps: bits per second)
Data word lengths:	7 or 8 bits
Parity settings:	None, even, odd
Stop bits:	1 bit or more
Connector (printer side):	Female DSUB-25 pin connector

NOTES:
- The handshaking, data word length, baud rate, and parity depend on the DIP switch settings. (Refer to Section 3.3.3.) or the memory switch. (Refer to the **GS (E** command.)
- The stop bit from the printer side is fixed to 1.

2.1.1.2 Switching between online and offline

The printer does not have an online/offline switch.

The printer goes offline:

1) Between when the power is turned on (or the printer is reset using the interface) and when the printer is ready to receive data.
2) During the self-test.
3) When the roll paper cover is open.
4) During paper feeding using the paper FEED button.
5) When the printer stops printing due to a paper-end (in cases when an empty paper supply is detected by either paper roll end detector or the paper roll near-end detector with a printing halt feature due to a paper-end enabled by **ESC c 4**).
6) During standby status for macro execution.
7) When a temporary abnormality occurs in the power supply voltage.
8) When an error has occurred.
9) Before the paper FEED button is pressed in the label peeler issuing mode. (*)

*: The paper loading operation is completed by pressing the paper FEED button after the paper is loaded. The printer goes to the waiting state for the paper FEED button to be pressed when the roll paper cover is closed after the paper is loaded.
(The PAPER OUT LED flashes, and turns off if the paper FEED button is pressed.)

* The printer goes offline when the label peeler detector cannot detect the paper correctly if the printer is installed in a location that receives direct sunlight or strong light.

2.1.1.3 Interface connector terminal assignments and signal functions

The interface connector terminal assignments and signal functions are described in Table 2.1.1.

Table 2.1.1 TM-L90 Printer Status and Signals

<table>
<tr><th>Pin number</th><th>Signal name</th><th>Signal direction</th><th>Function</th></tr>
<tr><td>1</td><td>FG</td><td>—</td><td>Frame ground</td></tr>
<tr><td>2</td><td>TXD</td><td>Output</td><td>Transmit data</td></tr>
<tr><td>3</td><td>RXD</td><td>Input</td><td>Receive data</td></tr>
<tr><td>4</td><td>RTS</td><td>Output</td><td>Same as DTR signal (pin 20)</td></tr>
<tr><td>6</td><td>DSR</td><td>Input</td><td>This signal indicates whether the host computer can receive data.
SPACE indicates that the host computer can receive data, and MARK indicates that the host computer cannot receive data.
When DTR/DSR control is selected, the printer transmits data after confirming this signal.
When XON/XOFF control is selected, the printer does not check this signal.
Changing memory switch Msw 1-7 enables this signal to be used as a reset signal for the printer (refer to Section 3.3.4).
The printer is reset when the signal remains MARK for 1 ms or more (refer to Section 2.1.1.6).</td></tr>
<tr><td>7</td><td>SG</td><td>—</td><td>Signal ground</td></tr>
<tr><td>20</td><td>DTR</td><td>Output</td><td>1) When DTR/DSR control is selected, this signal indicates whether the printer is busy. SPACE indicates that the printer is ready to receive data, and MARK indicates that the printer is busy. The busy condition can be changed by using memory switch as follows (refer to Section 3.3.4):
<table>
<tr><th></th><th>Printer status</th><th>Memory switch Msw 1-3 status</th><th></th></tr>
<tr><td rowspan="10">Offline</td><td>1. During the period from when the power is turned on (including resetting using the interface) to when the printer is ready to receive data.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>2. During the self-test.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>3. When the cover is open.</td><td>—</td><td>BUSY</td></tr>
<tr><td>4. During paper feeding using the paper FEED button.</td><td>—</td><td>BUSY</td></tr>
<tr><td>5. When the printer stops printing due to a paper-end.</td><td>—</td><td>BUSY</td></tr>
<tr><td>6. During standby status for macro execution.</td><td>—</td><td>BUSY</td></tr>
<tr><td>7. When a temporary abnormality occurs in the power supply voltage.</td><td>—</td><td>BUSY</td></tr>
<tr><td>8. When an error has occurred.</td><td>—</td><td>BUSY</td></tr>
<tr><td>9. While waiting for the paper FEED button to be pressed in the label peeler issuing mode.</td><td>—</td><td>BUSY</td></tr>
<tr><td>10. When the receive buffer becomes full. (*1)</td><td>BUSY</td><td>BUSY</td></tr>
</table></td></tr>
</table>

Table 2.1.1 TM-L90 Printer Status and Signals (Continued)

Pin number	Signal name	Signal direction	Function
			2) When XON/XOFF control is selected: The signal indicates whether the printer is correctly connected and is ready to receive data. SPACE indicates that the printer is ready to receive data. The signal is always SPACE except in the following cases: • During the period from when the power is turned on to when the printer is ready to receive data • During the self-test
25	INIT	Input	Changing memory switch Msw 1-8 enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains SPACE for 1 ms or more.

*1:
- When the receive buffer capacity is specified to 45 bytes:
  When the remaining space in the receive buffer drops to 16 bytes, the printer status becomes “buffer full” and it remains “buffer full” until the space in the receive buffer increases to 26 bytes.
- When the receive buffer capacity is specified as 4KB:
  When the remaining space in the receive buffer drops to 128 bytes, the printer status becomes “buffer full” and it remains “buffer full” until the space in the receive buffer increases to 256 bytes.
- The printer ignores the data received when the remaining space in the receive buffer is 0 bytes.

2.1.1.4 XON/XOFF transmission timing

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

Table 2.1.2 XON/XOFF Transmission Timing

	Printer status	Memory switch Msw 1-3 status	
		ON	OFF
XON transmission	① When the printer goes online after turning on the power (or resetting using interface)	Transmit	Transmit
	② When the receive buffer is released from the buffer full state	Transmit	Transmit
	③ When the printer switches from offline to online	—	Transmit
	❨ When the printer recovers from an error using the **DLE ENQ 1** or **DLE ENQ 2** commands	—	Transmit
XOFF transmission	❩ When the receive buffer becomes full	Transmit	Transmit
	❮ When the printer switches from online to offline	—	Transmit

NOTES:
- The XON code is <11>H and the XOFF code is <13>H.
- In case ❩, XON is not transmitted when the receive buffer is full.
- In case ❮, XOFF is not transmitted when the receive buffer is full.
- When memory switch Msw 1-3 is set to OFF, XON is not transmitted if the printer is in offline state in case ❨.

2.1.1.5 Notes on setting the handshake operation using memory switch Msw 1-3

1) The printer mechanism stops but does not become busy when: an error has occurred, the cover is open, printing stops due to a paper-end, paper is fed using the paper FEED button, waiting for pressing the paper FEED button in the label peeler issuing mode or waiting for pressing the paper FEED button in macro execution.
2) When setting the memory switch to enable handshaking with the printer, be sure to check the printer status using the **GS a** command and the ASB function. In this setting, the default value of *n* for **GS a** is 2. The printer automatically transmits the printer status, depending on online/offline changes.
3) When using **DLE EOT, DLE ENQ**, and **DLE DC4** be sure that the receive buffer does not become full.
   - When using a host that cannot transmit data when the printer is busy:

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

     When the receive buffer becomes full while transmitting bit-image data, and **DLE EOT**, **DLE ENQ**, or **DLE DC4** is used while sending bit-image data, the code is processed as bit-image data. The data transmitted when the receive buffer is full may be lost.

     Example: Check the printer status using **GS r** after transmitting each line of data and use the 4KB receive buffer. Transmit data one line at a time so that the receive buffer does not become full.

2.1.1.6 Notes on resetting the printer using the interface

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

Table 2.1.3 Reset Switching

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

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

- DC characteristics:

Table 2.1.4 Reset DC Characteristics

		Pin 6 (DSR)	Pin 25 (INIT)
Reset active voltage	V_A	-15 to -3 V	+2 to +15 V
Reset negative voltage	V_N	+3 to +15 V	-15 to + 0.8 V
Reset active current	I_A	-5.3 mA (maximum)	1 mA (maximum)
Reset negative current	I_N	-5.0 mA (maximum)	-2 mA (maximum)
Input impedance	R_{IN}	3 kΩ (minimum)	

- AC characteristics:

  Minimum reset pulse width: TRS 1 ms (minimum)

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

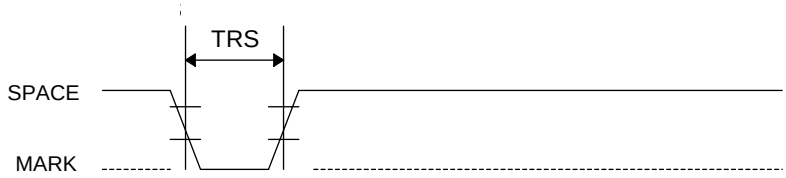


Figure 2.1.1 Minimum Reset Pulse Width (Pin 6)

  - When using pin 25 (INIT) (Msw 1-8: ON):

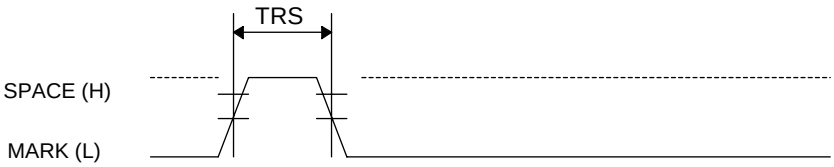


Figure 2.1.2 Minimum Reset Pulse Width (Pin 25)

NOTES:
- When a signal that does not satisfy the requirements above is input, printer operation is not guaranteed. When a signal is input to pin 25 (INIT) at the TTL level, the requirements above must also be satisfied. Although a signal is input to pin 6 (DSR) at the TTL level, according to the DC characteristics described above, the operation is not guaranteed and pin 6 cannot be controlled.
- When pin 6 (DSR) and pin 25 (INIT) are open, the printer is operating.

2.1.2 IEEE 1284 Bidirectional Parallel Interface (Parallel Interface Specifications)

2.1.2.1 Compatibility mode

(data transmission from host to printer: Centronics compatible)

1) Outline

Compatibility mode supports the compatibility with a Centronics parallel interface.

2) Specifications

Data transmission:	8-bit parallel
Synchronization:	Externally supplied nStrobe signals
Handshaking:	nAck and Busy signals
Signal levels:	TTL compatible
Connector:	ADS-B36BLFDR176 (Honda) or equivalent (IEEE 1284 Type B)

3) Switching between online and offline

The printer is not equipped with any online/offline switch. The printer is placed into offline status in the following conditions:

1) When the power is turned on or until the printer becomes ready for data transmission after it is initialized by the reset signal (nInit) from the interface.
2) During the self-test.
3) When the roll paper cover is open.
4) During paper feeding using the paper FEED button.
5) When the printer stops printing due to a paper-end (in cases when an empty paper supply is detected by either the paper roll end detector or the paper roll near-end detector with a printing halt feature due to a paper end enabled by **ESC c 4**).
6) During standby status for macro execution.
7) When a temporary abnormality occurs in the power supply voltage.
8) When an error has occurred.
9) Before the paper FEED button is pressed in the label peeler issuing mode. (*)

*: The paper loading operation is completed by pressing the paper FEED button after the paper is loaded. The printer goes to the waiting state for the paper FEED button to be pressed by when the roll paper cover is closed after the paper is loaded.
(The PAPER OUT LED flashes, and turns off if the paper FEED button is pressed.)

* The printer goes offline when the label peeler detector cannot detect the paper correctly if the printer is installed in a location that receives direct sunlight or strong light.

2.1.2.2 Reverse mode (data transmission from printer to host)

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

- Description

This mode allows data transmission from the asynchronous printer under the control of the host. Data transmissions in the Nibble Mode are made via the existing control lines in units of four bits (a nibble). In the Byte Mode, data transmissions are accomplished by making the eight-bit data lines bidirectional.
Both modes cannot work at the same time as the Compatibility Mode, thereby causing half duplex transmission.

2.1.2.3 Interface Pin Assignments for Each Mode

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

*NC: Not Connected
ND: Not Defined

NOTES: 1. A prefix “n” to signal names refers to “L” active signals. If the host does not support the signal lines listed above, both-way communication fails.
2. For interfacing, signal lines shall use twisted pair cables with the return sides connected to signal ground level.
3. Interfacing conditions shall be all based on the TTL level to meet the characteristics described below. In addition, both rise time and fall time of each signal shall be 0.5 μs or less.
4. Data transmission shall not ignore the signal nAck or Busy. An attempt to transmit data with either signal, nAck or Busy, ignored can cause lost data
5. Interface cables shall be as short in length as possible.

2.1.2.4 Electrical Characteristics

DC Characteristics (Except Logic-H, +5 V signals)

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	*2.4 V	5.5 V	*I_{OH}=0.32 mA
Output LOW voltage	V_{OL}	-0.5 V	*0.4 V	*I_{OL}=-12 mA
Output HIGH current	I_{OH}	0.32 mA	-	V_{OH}=2.4 V
Output LOW current	I_{OL}	-12 mA	-	V_{OL}=0.4 V
Input HIGH voltage	V_{IH}	2.0 V	-	
Input LOW voltage	V_{IL}	-	0.8 V	
Input HIGH current	I_{IH}	-	-0.32 mA	V_{IH}=2.0 V
Input LOW current	I_{IL}	-	12 mA	V_{IL}=0.8 V

Logic-H Signal Sender Characteristics

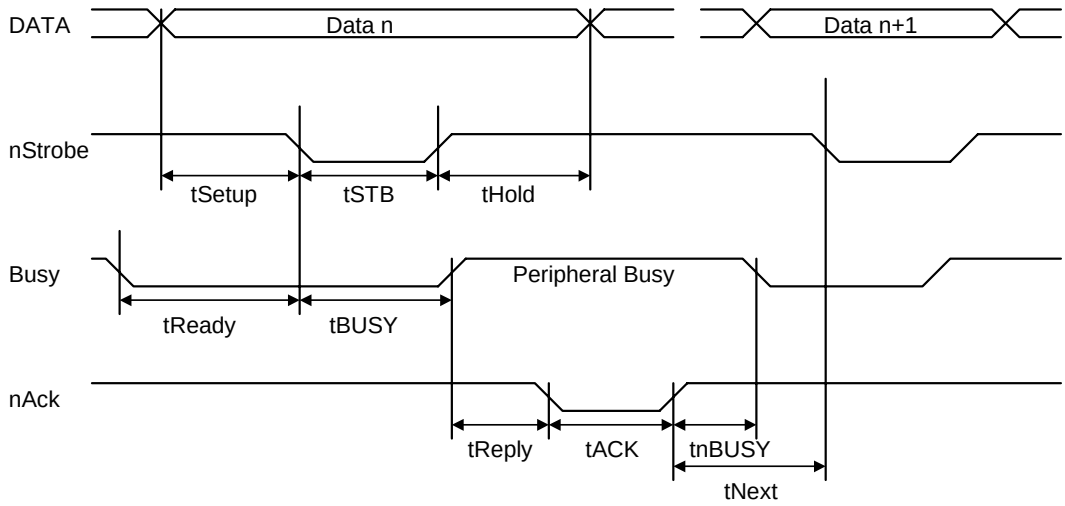
Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	3.0 V	5.5 V	
Output LOW voltage	V_{OL}	-	2.0 V	While the power is OFF

+5 V Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	*2.4 V	5.5 V	*I_{OH}=0.32 mA
Output LOW voltage	V_{OL}	-	- **	While the power is OFF
Output HIGH current	I_{OH}	-	0.32 mA	V_{OH}=2.4 V
Output LOW current	I_{OL}	- **	-	While the power is OFF

** No guarantee is offered to V_{OL} and I_{OL} while the power is OFF.

2.1.2.5 Data Receiving Timing (Compatibility Mode)



Characteristics	Symbol	Specifications	
		Min [ns]	Max [ns]
Data Hold Time (host)	tHold	750	--
Data Setup Time	tSetup	750	--
STROBE Pulse Width	tSTB	750	--
READY Cycle Idle Time	tReady	0	--
BUSY Output Delay Time	tBUSY	0	500
Data Processing Time	tReply	0	∞
ACKNLG Pulse Width	tACK	500	10 µs
BUSY Release Time	tnBUSY	0	∞
ACK Cycle Idle Time	tNext	0	--

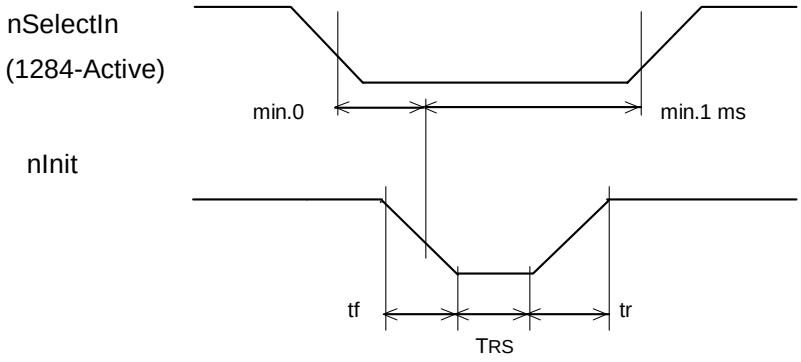
*The printer latches data at a nStrobe ↓ timing

2.1.2.6 Notes on resetting the printer through the interface

To enable the printer reset through the interface nInit signal (pin #31) in compatibility mode, the following signal timing shall be statisfied. However, the printer reset is ignored when the signal nSelectIn (pin #36, 1284-Active HIGH) is active in reverse mode.

- DC characteristics:
  TTL level
- AC characteristics:

Minimum reset pulse width:	TRS	50 μs (min.)
Trailing edge period:	tf	500 ns (max.)
Leading edge period:	tr	500 ns (max.)



2.1.2.7 Reception of status from the printer through the bidirectional parallel interface

In the bidirectional parallel interface specifications, the printer status transmission is available by using the both-way communication facility in the Nibble/Byte Modes in accordance with the IEEE 1284.

In this case, unlike the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled and thus precautions must be taken:

1) The allowable capacity of the printer internal buffer is 99 bytes (except ASB status). Status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data reception (Reverse Mode).
2) When ASB is used, the host is preferably in the wait state for data reception (Reverse Idle Mode). When this state is not available, the host shall enter the Reverse Mode to continually monitor the presence of data.
3) When ASB is used, preference shall be given to the ASB status for transmission over the other status signals.

2.1.2.8 Notes on setting memory switch Msw 1-3 to ON

1) The printer mechanism stops but does not become busy when: an error has occurred, the cover is open, printing stops due to a paper-end, paper is fed using the paper FEED button, waiting for pressing the paper FEED button in the label peeler issuing mode or waiting for pressing the paper FEED button in macro execution.
2) When setting the memory switch to enable handshaking with the printer, be sure to check the printer status using the **GS a** command and the ASB function. In this setting, the default value of *n* for **GS a** is 2. The printer automatically transmits the printer status, depending on online/offline changes.
3) When using **DLE EOT, DLE ENQ**, and **DLE DC4**, be sure that the receive buffer does not become full.
   - When the printer is busy due to a receive buffer-full state:
     If an error has occurred, **DLE EOT**, **DLE ENQ**, and **DLE DC4** cannot be used.

2.1.3 Other Interfaces

Various interface boards (EPSON UB series, except UB-P02, UB-U05, UB-U06, and UB-U19) can be used.

2.2 Connectors

2.2.1 Interface Connectors

Refer to Section 2.1, Interfaces.

2.2.2 Power Supply Connector

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

1) Pin assignments: Refer to Table 2.2.1.

Table 2.2.1 Power Supply Connector Pin Assignments

Pin Number	Signal Name
1	+24 V
2	GND
3	NC
SHELL	Frame GND

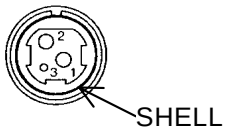


Figure 2.2.1 Power Supply Connector

NOTE: Be sure to ground the metal of the interface using through hole for the frame ground.

2) Connector model: Printer side: Hosiden TCS7960-532010 or equivalent
User side: Hosiden TCP8927-631100 or equivalent
Hosiden TCP8927-531100 or equivalent

2.2.3 Drawer Kick-out Connector (Modular Connector)

The pulse specified by **ESC p** or **DLE DC4** is output to this connector. The host can confirm the status of the input signal by using the **DLE EOT**, **GS a**, or **GS r** commands.

1) Pin assignments: Refer to Table 2.2.2

Table 2.2.2 Drawer Kick-out Connector Pin Assignments

Pin Number	Signal Name	Direction
1	Frame GND	—
2	Drawer kick-out drive signal 1	Output
3	Drawer open/close signal	Input
4	+24 V	—
5	Drawer kick-out drive signal 2	Output
6	Signal GND	—

+24 V is output through pin 4 when the power is turned on. However, pin 4 must be used only for the drawer.

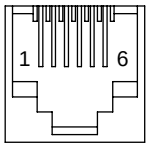


Figure 2.2.2 Drawer Kick-out Connector

2) Connector model: Printer side: DDK 285D-7660J-100 or equivalent
User side: 6-position 6-contact (RJ12 telephone jack)

3) Drawer kick-out drive signal

Output signal: Output voltage: Approximately 24 V
Output current: 1 A or less

CAUTION: To avoid an overcurrent, the resistance of the drawer kick-out solenoid must be 24 Ω or more.

Output waveforms: Outputs the waveforms in Figure 2.2.3 to the points A and B in Figure 2.2.4.

ON time and OFF time are specified by **ESC p** or **DLE DC4**.

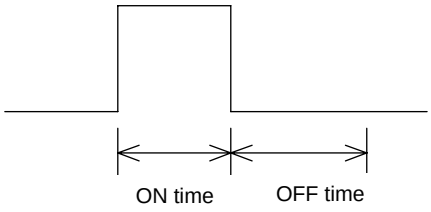


Figure 2.2.3 Drawer Kick-out Drive Signal Output Waveform

4) Drawer open/close signal

Input signal level (connector pin 3): "L" = 0 to 0.8 V
"H" = 2 to 5 V

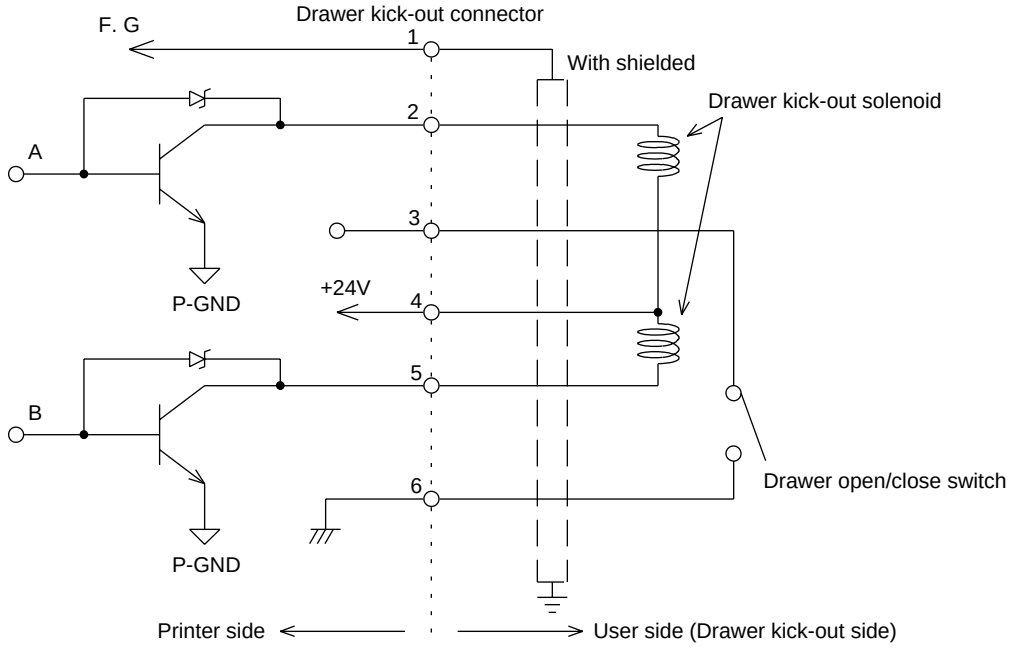


Figure 2.2.4 Drawer Circuitry

NOTES:
1. Use a shielded cable for the drawer connector cable.
2. Two driver transistors cannot be energized simultaneously.
3. The drawer drive duty must be as shown below.

$$\frac{\text{ON time}}{\text{(ON time + OFF time)}} \leq 0.2$$

4. Be sure to use the printer power supply (connector pin 4) for the drawer power source.
5. The resistance of the drawer kick-out solenoid must not be less than the specified resistance. Otherwise, an overcurrent could damage the solenoid.
6. Do not connect telecommunication network to the drawer kick-out connector.

3. FUNCTIONS

3.1 List of Commands

Command	Name
HT	Horizontal tab
LF	Print and line feed
FF	Print and return to standard mode (in page mode)
CR	Print and carriage return
CAN	Cancel print data in page mode
DLE EOT	Transmit real-time status
DLE ENQ	Send real-time request to printer
DLE DC4	Generate pulse in real-time (*fn* = 1)
	Execute power-off sequence (*fn* = 2)
	Clear buffer(s) (*fn* = 8)
ESC FF	Print data in page mode
ESC SP	Set right-side character spacing
ESC !	Select print mode(s)
ESC $	Set absolute print position
ESC %	Select/cancel user-defined character set
ESC &	Define user-defined characters
ESC *	Select bit-image mode
ESC –	Turn underline mode on/off
ESC 2	Select default line spacing
ESC 3	Set line spacing
ESC =	Select peripheral device
ESC ?	Cancel user-defined characters
ESC @	Initialize printer
ESC D	Set horizontal tab positions
ESC E	Turn emphasized mode on/off
ESC G	Turn double-strike mode on/off
ESC J	Print and feed paper
ESC L	Select page mode
ESC M	Select character font
ESC R	Select an international character set
ESC S	Select standard mode
ESC T	Select print direction in page mode
ESC V	Turn 90° clockwise rotation mode on/off
ESC W	Set print area in page mode
**ESC **	Set relative print position
ESC a	Select justification

Command	Name
ESC c 3	Select paper sensor(s) to output paper-end signals
ESC c 4	Select paper sensor(s) to stop printing
ESC c 5	Enable/disable panel buttons
ESC d	Print and feed n lines
ESC p	Generate pulse
ESC t	Select character code table
ESC {	Turn upside-down print mode on/off
FS (L	Select label and black mark control function(s) <Function 48> Transmit the positioning information. <Function 65> Feed paper to the label peeling position. <Function 67> Feed paper to the print starting position.
GS !	Select character size
GS $	Set absolute vertical print position in page mode
GS (A	Execute test print
GS (C	Edit NV user memory <Function 0> Delete the specified record. <Function 1> Store the data in the specified record. <Function 2> Transmit the data in the specified record. <Function 3> Transmit capacity of the NV user memory currently being used. <Function 4> Transmit the remaining capacity of the NV user memory. <Function 5> Transmit the key code list. <Function 6> Delete all data in the NV user memory.
GS (D	Enable/disable real-time command
GS (E	Set user setup commands <Function 1> Change into the user setting mode. <Function 2> End the user setting mode session. <Function 3> Change the memory switch. <Function 4> Transmit the settings of the memory switch. <Function 5> Set the customized setting values. <Function 6> Transmit the customized setting values. <Function 7> Copy the user-defined page. <Function 8> Define the data (column format) for the character code page. <Function 9> Define the data (raster format) for the character code page. <Function 10> Delete the data for the character code page. <Function 11> Set the configuration item for the serial interface. <Function 12> Transmit the configuration item for the serial interface. <Function 48> Delete the paper layout. <Function 49> Set the paper layout. <Function 50> Transmit the paper layout information.
GS (H	Request response transmission <Function 48> Set the process ID response. <Function 49> Enable/disable the offline response transmission.
GS (K	Select print control method(s) <Function 48> Select the print control mode. <Function 49> Select the print density. <Function 50> Select the print speed. <Function 97> Select the number of parts for the thermal head energizing.

Command	Name
GS (L / GS 8 L	Set graphics data <Function 48> Transmit the NV graphics memory capacity. <Function 50> Print the graphics data in the print buffer. <Function 51> Transmit the remaining capacity of the NV graphics memory. <Function 64> Transmit the key code list for defined NV graphics. <Function 65> Delete all NV graphics data. <Function 66> Delete the specified NV graphics data. <Function 67> Define the NV graphics data (raster format). <Function 69> Print the specified NV graphics data. <Function 112> Store the graphics data in the print buffer (raster format).
GS (M	Customize printer control value(s) <Function 1> Save the setting values from the work area into the storage area. <Function 2> Load the setting values stored in the storage area to the work area. <Function 3> Select the setting values loaded to the work area after the initialization process.
GS (N	Select character style(s) <Function 48> Select character color.
GS (k	Set up and print symbol <Function 065> PDF417: Set the number of columns in the data region. <Function 066> PDF417: Set the number of rows. <Function 067> PDF417: Set the width of the module. <Function 068> PDF417: Set the row height. <Function 069> PDF417: Set the error correction level. <Function 070> PDF417: Select the options. <Function 080> PDF417: Store the data in the symbol storage area. <Function 081> PDF417: Print the symbol data in the symbol storage area. <Function 082> PDF417: Transmit the size information of the symbol data in the symbol storage area. <Function 165> QR Code: Select the model. <Function 167> QR Code: Set the size of module. <Function 169> QR Code: Select the error correction level. <Function 180> QR Code: Store the data in the symbol storage area. <Function 181> QR Code: Print the symbol data in the symbol storage area. <Function 182> QR Code: Transmit the size information of the symbol data in the symbol storage area. <Function 265> MaxiCode: Select the mode. <Function 280> MaxiCode: Store the data in the symbol storage area. <Function 281> MaxiCode: Print the symbol data in the symbol storage area. <Function 282> MaxiCode: Transmit the size information of the symbol data in the symbol storage area.
GS .	Define downloaded bit image
GS /	Print downloaded bit image
GS :	Start/end macro definition
GS B	Turn white/black reverse print mode on/off
GS H	Select print position of HRI characters
GS I	Transmit printer ID
GS L	Set left margin
GS P	Set horizontal and vertical motion units
GS T	Set print position to the beginning of the print line
GS W	Set print area width

Command	Name
**GS **	Set relative vertical print position in page mode
GS ^	Execute macro
GS a	Enable/disable Automatic Status Back (ASB)
GS b	Turn smoothing mode on/off
GS f	Select font for HRI characters
GS g 0	Initialize maintenance counter
GS g 2	Transmit maintenance counter
GS h	Set bar code height
GS k	Print bar code
GS r	Transmit status
GS w	Set bar code width
GS z 0	Set online recovery wait time

List of Multi-byte Code Characters Commands (for Japanese model)

Command	Name
FS !	Select print mode(s) for Kanji characters
FS &	Select Kanji character mode
FS (A	Select Kanji character style(s) <Function 48> Select Kanji character font.
FS –	Turn underline mode on / off for Kanji characters
FS .	Cancel Kanji character mode
FS 2	Define user-defined Kanji characters
FS C	Select Kanji character code system
FS S	Set Kanji character spacing
FS W	Turn quadruple-size mode on / off for Kanji characters

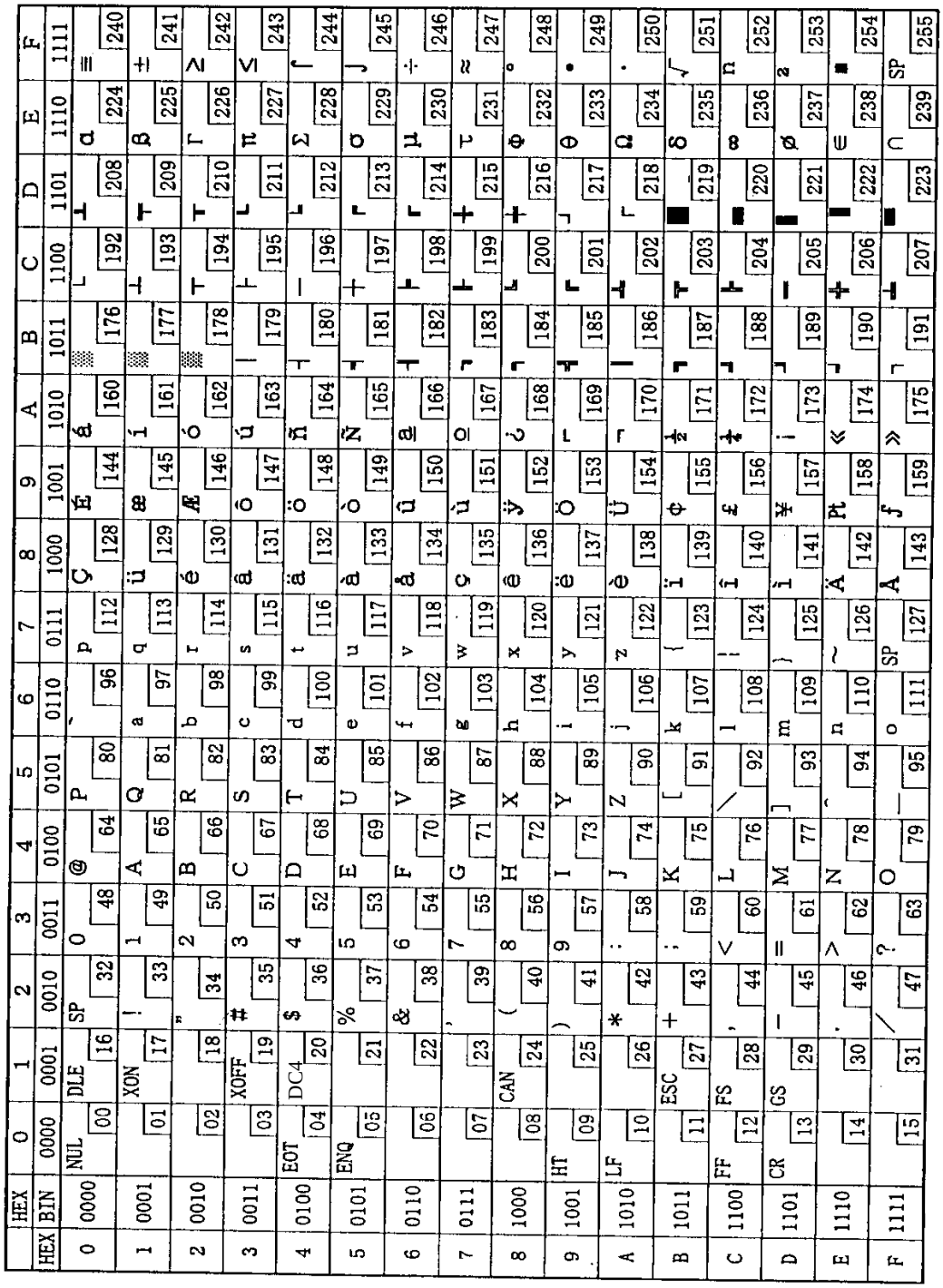
The commands listed below in the first column are defined as “obsolete commands” in the ESC/POS® command system. This printer supports both upward-compatible commands and obsolete commands. However, the upward-compatible commands are recommended for use.

Obsolete command		Upward-compatible command
GS C 0	Select counter print mode	None
GS C 1	Select count mode (A)	None
GS C 2	Set counter	None
GS C ;	Select count mode (B)	None
GS c	Print counter	None
GS v 0	Print raster bit image	**GS (L** <Function 112 + 50>

NOTE: “Obsolete commands” are commands that are supported by legacy models; however it is recommended to replace them with upward-compatible commands, because they will not be supported in the future products.

3.2 Character Code Tables

3.2.1 Page 0 (PC437: USA, Standard Europe) (International Character Set: USA)



HEX	BIN	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	HEX	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	XON 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▒ 177	┴ 193	┬ 209	β 225	± 241
2	0010	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	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 DC4 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	% 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	& 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	' 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	CAN 08	(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	) 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	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	┴ 186	┴ 202	┌ 218	Ω 234	· 250
B	1011	ESC 11	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	┐ 187	┬ 203	▄ 219	δ 235	√ 251
C	1100	FS 12	, 44	< 60	L 76	\ 92	l 108	¦ 124	î 140	£ 156	¼ 172	┘ 188	├ 204	▄ 220	∞ 236	n 252
D	1101	GS 13	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	┘ 189	─ 205	▄ 221	ø 237	2 253
E	1110	14	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	┘ 190	┼ 206	▄ 222	∈ 238	■ 254
F	1111	15	/ 47	? 63	O 79	_ 95	o 111	SP 127	Å 143	ƒ 159	» 175	¬ 191	┴ 207	▄ 223	∩ 239	SP 255

NOTE: The character code tables show only character configurations. They do not show the actual print pattern.

3.2.2 Page 1 (Katakana)

	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	刊 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

3.2.3 Page 2 (PC850: Multilingual)

HEX	BIN	8	9	A	B	C	D	E	F
		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

3.2.4 Page 3 (PC860: Portuguese)

HEX	BIN	8	9	A	B	C	D	E	F
	HEX	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

3.2.5 Page 4 (PC863: Canadian-French)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	┆ 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	0010	é 130	Ê 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	0110	¶ 134	û 150	³ 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	0111	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	1000	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	1010	è 138	Ù 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

3.2.6 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

3.2.7 Page 16 (WPC1252)

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

3.2.8 Page 17 (PC866: Cyrillic #2)

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

3.2.9 Page 18 (PC852: Latin2)

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

3.2.10 Page 19 (PC858)

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

3.2.11 Page 255 (Space Page)

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

3.2.12 International Character Sets

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

3.3 Switches and Buttons

3.3.1 Power button (Non-locking push button)

1) The power button located on the upper right front of the printer turns the power on or off. The power button is enabled or disabled with a DIP switch.

   NOTE: Turn on the power only after connecting the power supply.

2) To turn the power off, press the power button for at least 3 seconds.

3) The printer operates depending on the DIP switch setting (enable/disable power button function) as shown in Table 3.3.1.

Table 3.3.1 Printer Operation by DIP SW1-1

	Setting of the DIP SW 1-1	
	On (power button is disabled)	Off (power button is enabled)
When the power button is pressed for at least 3 seconds	The printer is reset (only when an error has occurred). (*1)	The printer power is turned off.
When the power off is controlled by the host PC (Transmission of **DLE DC4 2**)	The printer flashes the POWER LED after power off processing. (*2)	The printer power is turned off.

NOTES: *1: Refer to Section 3.8.1 for types of error.

*2: Refer to Section 3.4.1 for the POWER LED flashing pattern.

<How to disable the power button>

1) Power button cover
   A power button cover option is available. Use this cover to avoid turning power off accidentally.

2) **DLE DC4** (Execute power-off sequence)
   To control the printer's power off in situations when the power button is covered, disable the power button using the DIP switch and the power off command **DLE DC4**. (Refer to Appendix G for details.)

NOTE: Pulling the paper out forcibly causes turning the power button on when the power button is turned off, if +24 V power voltage is supplied and the DIP switch 1-1 is off (the power button is effective).

3.3.2 Panel buttons

1) FEED button

Type: Non-locking push button

Function
- When the label or roll paper with the black mark is used, the printer feeds paper to the next print starting position.
  When the receipt paper is used, the printer feeds paper one line, based on the line spacing set by **ESC 2** and **ESC 3**. However, paper feeding using the FEED button cannot be performed under the following conditions:
  ① The paper roll end sensor detects a paper end.
  ② When the roll paper cover is open.
  ③ When the label is waiting to be removed.
  ④ Before the paper FEED button is pressed after the paper is loaded.
  ⑤ When an error has occurred.
- If you press this button when the printer is in the macro execution standby state, the defined macro is executed.
- During self-test printing, you can stop the self-test temporarily by pressing this button and restart it by pressing the button again.
- If you push this button after the roll paper cover is open and closed, the printer is initialized.
  ① If the paper is loaded after the roll paper cover is open and closed, the printer goes to the waiting state for the paper FEED button (the PAPER OUT LED flashes) to be pressed. In this case, press the paper FEED button. (If the paper FEED button is pressed, the PAPER OUT LED is turned off.)
  ② If the power is turned off after opening and closing the roll paper cover when the paper is loaded during the power off, press the paper FEED button. (When memory switch 8-6 is On.)
- When a paper layout error occurs, the printer recovers from the error by when the paper FEED button is pressed, then executes the paper layout automatic recognition. (Selectable with memory switch 8-1).

NOTE: This button is enabled or disabled by **ESC c 5**. If “Disabled” is set, the paper cannot by be fed by the paper FEED button.

3.3.3 Mode switch

Type: Slide switch

Function: This switch selects the label peeler mode or the roll paper continuous issuing mode.

NOTE: To access the mode switch, open the roll paper cover.
Since the setting of the mode switch becomes effective when the power is turned on or the roll paper cover is closed, the setting of the mode switch is not be effective until one of these things is done.

Right: Label peeler issuing mode

Left: Continuous issuing mode

NOTE: Do not change the mode switch by pointed metal such as a ball-point pen. Otherwise, the switch may be broken.

3.3.4 DIP switches

DIP switch 1 is located on the left side inside the roll paper cover and is accessible when the DIP switch cover is removed. DIP switch 2 is located on the main PCB.

3.3.4.1 Serial interface

Table 3.3.2 DIP Switch 1

SW 1	Function	ON	OFF
1	Power button function	Disabled	Enabled
2	Interface condition selection	By DIP switch	By memory switch
3	Handshaking	XON/XOFF control	DTR/DSR control
4	Word length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7	Transmission speed selection	Refer to Table 3.3.3	
8			

Table 3.3.3 Transmission Speed

Transmission Speed (bps)	SW1-7	SW1-8
2400	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

bps: bits per second

NOTE: 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.

Table 3.3.4 DIP Switch 2

SW 2	Function	ON	OFF
1	Reserved	--	Fixed to Off.

3.3.4.2 Parallel interface

Table 3.3.5 DIP Switch 1

SW 1	Function	ON	OFF
1	Operation of the power button	Disabled	Enabled
2	Reserved	Fixed to On	--
3–8	Reserved	--	Fixed to Off

NOTE: 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.

Table 3.3.6 DIP Switch 2

SW 2	Function	ON	OFF
1	Reserved	--	Fixed to Off

3.3.5 Memory switches

The memory switches are: Msw 1, Msw 2, Msw 7, and Msw 8. These switches

- Set customized values
- Set the communication conditions of the serial interface

1) Tables for memory switches Msw 1, Msw7, and Msw 8 are shown below.

Table 3.3.7 Memory Switch Msw 1

Bit	Function	48 (Off)	49 (On)
1	Transmit the power ON information	Does not transmit	Transmits
2	Capacity of receive buffer	4KB	45 bytes
3	Conditions for BUSY	Receive buffer full or offline	Receive buffer full
4	Data processing for receiving error	Prints "?"	Ignored
5	Automatic line feed	Disabled	Enabled
6	Reserved	Fixed to Off	--
7	Pin #6: Selection of reset signal	Not used	Used
8	Pin #25: Selection of reset signal	Not used	Used

Table 3.3.8 Memory Switch Msw 2

Bit	Function	48 (Off)	49 (On)
1	Reserved	Fixed to 49 (On). (Do not change the setting.)	
2	--	--	--
3	--	--	--
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--

Table 3.3.9 Memory Switch Msw 7

Bit	Function	48 (Off)	49 (On)
1	Reserved	--	--
2	Reserved	--	--
3	Reserved	--	--
4	Reserved	--	--
5	Reserved	--	--
6	Reserved	--	--
7	Reserved	--	--
8	Selection of the operation when pressing the paper FEED button	Feeds paper to the next print starting position.	Feeds paper to the manual cutting position.

NOTES:
- The function of Msw 7-8 is enabled only in the label continuous issuing mode.
- When Msw 7-8 is set to off, the printer feeds paper to the next print starting position, when Msw 7-8 is set to on, if you press the paper FEED button once, the printer feeds one piece of the label to the manual cutting position. If you press the paper FEED button twice, the printer feeds the next label to the print starting position. By pressing the paper FEED button repeatedly, the operation described above is repeated.

Table 3.3.10 Memory Switch Msw 8

Bit	Function	48 (Off)	49 (On)
1 (*1)	Recovery method when a paper layout error has been occurred.	Recovers from the error by pressing the paper FEED button.	Does not recover from the error by pressing the paper FEED button.
2 (*2)	Method to recover from the paper layout error	**DLE ENQ**, **DLE DC4** (*fn* = 8) or the cover open/close. (*2)	**DLE ENQ**, **DLE DC4** (*fn* = 8)
3	PAPER OUT LED coming on when an near-end detected.	Comes on	Does not come on
4	Selection of the maximum length of automatic paper measurement	160 mm	300 mm
5	Enable left or right margin of bar code print	Does not enable margin	Enables margin
6	Feeding paper to the print starting position at power on	Enabled	Disabled
7	Reserved	--	--
8	Printer cover open during operation	Errors that automatically recover	Errors that can possibly recover

NOTES: *1: If the printer recovers from the paper layout error when Msw 8-1 is set to off, the printer executes the automatic paper layout recognition. When the layout settings for paper have been already stored in the NV memory, the printer overwrites the settings with the result of the automatic paper layout recognition.

*2: When the printer recovers from the paper layout error if Msw 8-2 is off, the printer executes the automatic paper layout recognition. If the settings for the paper layout are already stored in the NV memory, these settings are overwritten with the result of the automatic paper recognition.

2) Customized value

The customized value is set with the **GS (E** command.

Function	Value		
Selection of the NV user memory capacity	1KB	64KB	
	128KB	192KB	
Selection of the NV graphics memory capacity	None	64KB	
	128KB	192KB	
	256KB	320KB	
	384KB	--	
Selection of the paper width	38 mm, 39 mm, ….. 79 mm, 80 mm (43 settings in increments of 1 mm)		
Selection of the print control	One-part energizing	Two-part energizing	
	Three-part energizing	Four-part energizing	
Selection of the print density	70 %	75 %	
	80 %	85 %	
	90 %	95 %	
	100 %	105 %	
	110 %	115 %	
	120 %	125 %	
	130 %	135 %	140 %
Selection of the paper	Single-color	Two colors	
Selection of the print speed	Print speed level 1 (max. 26 mm/s), print speed level 2, print speed level 3, print speed level 4, print speed level 5, print speed level 6 (max. 120 mm/s), print speed level 7, print speed level 8, print speed level 9 (max. 150 mm/s).		
Selection of black-color density in two-color printing	Light	Medium	
	Dark	--	

NOTES:
- Since the NV graphics data area and the NV user memory use the same memory area, each area has a limitation. Refer to **GS (E** <Function 5> for details.
- The maximum print speed is available only in one-part energizing mode.
- Four-part energizing mode can reduce power consumption.
- The print width can be set for 43 paper types with a 1 mm pitch in the range from 38 to 80 mm {1.50 to 3.15"}. However, print width cannot be set in the range from 71 to 79 mm {2.80 to 3.11"}, because of the thickness of the paper roll spacer.

3) Communication conditions of the serial interface

The communication conditions of the serial interface are set with the **GS (E** command.

Function	Value	
Baud rate	2400 bps	4800 bps
	9600 bps	19200 bps
	38400 bps	57600 bps
	115200 bps	--
Parity	None	Odd
	Even	--
Handshaking	DSR/DTR control	XON/XOFF control
Data length	7 bits	8 bits

NOTE: To set the communication conditions with the memory switch, turn DIP SW 1-2 off in advance.

3.4 Indicators

3.4.1 Panel LEDs

1) Power (POWER) LED: Green

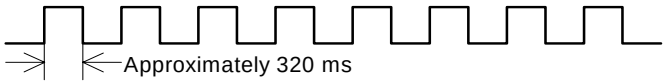
On: Power is stable.

Off: Power is not stable.

Flashing: During execution of each operation

<Flashing pattern>

During executing each operation: Flashing



Power off termination (after executing **DLE DC4 2**): Flashing

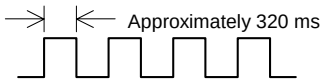
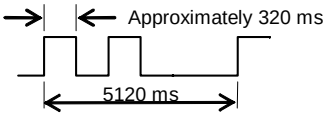
2) Paper roll end (PAPER OUT) LED: Red

On: The roll paper near end or real end is detected.

Off: Paper is loaded (normal condition)

Blinking:
- Self-test waiting state for test print
- Macro execution standby state when the macro execution command is used.

Table 3.4.1 Standby State Indication

State	PAPER LED Flashing Pattern	Recovery Operation
Waiting for self-test printing to be continued, macro execution ready state, or waiting for paper FEED button to be pressed.	PAPER OUT 	Pressing the FEED button causes self-test printing to be continued, executes the macro or initializes the mechanism.
Waiting for label to be removed.		Recovers by removing the label.

NOTES:
- A macro can be executed *r* times (*r* specifies the number of times to execute the macro) within the specified definition range. The macro can be executed continuously or can be executed by pressing the button.
- If the macro is executed by pressing the FEED button, the PAPER OUT LED flashes to indicate the macro execution ready state. (See Section 6, Commands.)
- After opening and closing the roll paper cover, if the PAPER OUT LED flashes (this means that the paper loading is completed in the paper path for peeler or continuous issuing), press the paper FEED button.
- If the PAPER OUT LED still flashes even after the issued label is removed, there may be a possibility that the label peeler detector cannot work correctly due to direct sunlight or strong light. To recover this, press the FEED button once.

3) Error (ERROR) LED: Red

On: Offline (except during paper feeding using the FEED button and during test printing, and in the error state). Refer to “Switching between online and offline” in Section 2.1, Interfaces.

Flashing: Error (refer to Section 3.8)

Off: Normal condition

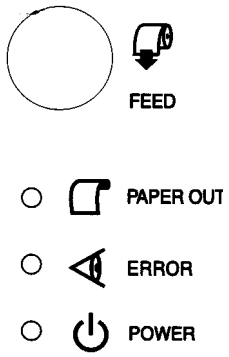


Figure 3.4.1 Panel Switches and Indicators

3.5 Self-test

1) The printer has a self-test function that checks the following:

- Control circuit functions
- Printer mechanisms
- Print quality
- Control software version
- DIP switch settings
- Memory switch settings
- Paper width to be set

2) Executing the self-test

[Starting the self-test]

To start the self-test on roll paper, hold down the paper FEED button and turn on the printer with the cover closed, and continue holding down the paper FEED button until the ERROR LED comes on; then the current printer status (*1) is printed.

(*1)
- Control software version
- DIP switch settings
- Memory switch settings
  (The contents of the memory switch settings may not be the same as the actual print in the self-test. If the paper layout is not saved in memory, the printer prints “6553.5.”)

[Self-test standby state]

After printing the current printer status, the printer prints the message "If you want to continue SELF-TEST printing, please press FEED button." The PAPER OUT LED indicator flashes and the printer enters the test printing (*2) standby state. Press the paper FEED button to start test printing.

(*2)
- Prints with a rolling pattern using only the built-in character set
- Feeds to the print starting position

3) Ending the self-test

After a number of lines are printed, the printer indicates the end of the self-test by printing "*** completed ***," and initializes.

3.6 Hexadecimal Dumping

1) Hexadecimal dumping function

This function prints the data transmitted from the host computer in hexadecimal numbers and their corresponding characters.

2) Starting hexadecimal dumping

Open the cover and turn the power on while pressing the paper FEED button (located inside the printer). Next close the cover, load the paper to the paper path (peeler or the continuous issuing), then press the paper FEED button. Or execute the **GS (A** command. The printer first prints "Hexadecimal Dump To terminate..." on the paper roll and prints the received print data in hexadecimal numbers and their corresponding characters.

NOTES: 1. If a character does not correspond to the data received, the printer prints "."

2. During hexadecimal dumping, any commands other than **DLE EOT, DLE ENQ**, and **DLE DC4** do not function.
3. Insufficient print data to fill the last line can be printed by setting the printer offline.

3) Ending hexadecimal dumping

Hexadecimal dumping ends by turning the power off, pressing the paper FEED button three times, or resetting the printer after printing has finished.

<Printing example>

```
Hexadecimal Dump
To terminate hexadecimal dump,
press FEED button three times.



1B 21 00 1B 26 02 40 40 1B 69          . ! . . & . @@ . i
1B 25 01 1B 63 34 00 1B 30 31          . % . . c 4 . . 0 1
41 42 43 44 45 46 47 48 49 4A          A B C D E F G H I J

                          *** completed ***
```

3.7 Memory Switch Setting Mode

1) Memory switch setting function

The following memory switch can be set by operating the button and opening and closing the cover:

①Setting communication conditions of the serial interface

②Making settings related to the serial communication

- Capacity of the receive buffer
- Data processing for receiving error
- Conditions for BUSY

③Selection of interface reset signal

④Setting paper width

⑤Setting print density

⑥Setting type of paper (single-color/two-color)

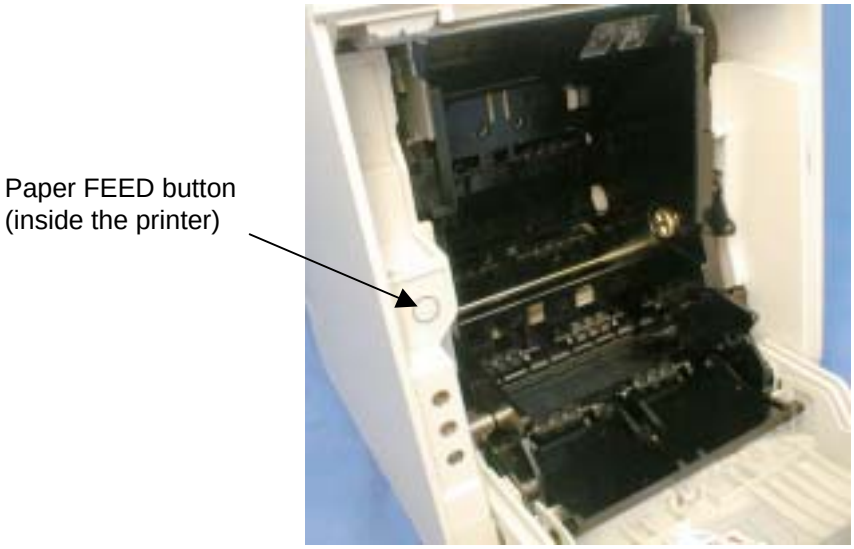
⑦Setting label

2) Starting the memory switch setting mode

Open the roll paper cover and turn the power on while holding down the paper FEED button (located inside the printer), and continue holding down the paper FEED button until the ERROR LED comes on; release the paper FEED button once the ERROR LED comes on. Next, press the paper FEED button (located inside the printer) twice and close the cover, then press the paper FEED button. The printer prints the possible setting contents of the memory switch and instructions. Follow the instructions to set the memory switches.

3) Ending the memory switch setting mode

Once setting is performed, the setting contents are stored; then the printer executes initialization. After initializing, the printer enters the normal state.



3.8 Automatic Paper Recognition Function

1) Automatic paper recognition function

This function is to detect the paper type – any of the following papers – and store that information in the volatile memory (RAM).

① Die-cut label (face stock) paper (without black mark)
② Receipt (without black mark)
③ Receipt (with black mark)

In this function, the length of the label interval in ① (distance between the bottom of the label and the bottom of the next label) and the length of the black mark (BM) interval in ③ (distance between the top of the BM and the top of the next BM) are also measured.

NOTES:
- If die-cut labels (with black marks) are used, the automatic paper recognition function must not be used. Use Function 49 or the **GS (E** command.
- If the automatic paper layout setting mode for die-cut labels (with black marks) is used, the automatic paper recognition function may not work correctly.

2) Starting the automatic paper recognition function

This function will start in the following case, and the paper is fed until it is finished:

- When the power is turned on and the paper is loaded, and then the roll paper cover is closed.

NOTE: If the paper layout information is already written in the NV memory, this function will not work. For the paper layout setting in the NV memory, refer to function 49, 50 of **GS (E**, **GS (A**, or Section 3.9, Automatic paper layout setting mode.

3.9 Automatic Paper Layout Setting Mode

1) Automatic paper layout setting mode

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

2) Starting the automatic paper layout setting mode

There are two methods to start this mode:

A) When the power is turned off

Open the roll paper cover and turn the power on while holding down the paper FEED button (located inside the printer), and continue holding down the paper FEED button until the ERROR LED comes on; release the paper FEED button once the ERROR LED comes on. Press the paper FEED button (located inside the printer) six times, and then close the roll paper cover. After loading the paper in the paper path for the peeler or continuous issuing, press the paper FEED button; the printer starts this mode.

B) When the power is turned on:

Open the roll paper cover, and press the paper FEED button once, then close the roll paper cover. The PAPER OUT LED flashes (this indicates the waiting state for the paper FEED button to be pressed). After loading the paper in the paper path for the peeler or continuous issuing, press the paper FEED button; the printer turns PAPER OUT LED off, then starts this mode.

NOTES:
- If die-cut labels (with black marks) are used, the automatic paper layout setting function must not be used. Use Function 49 or the **GS (E** command.
- If the automatic paper layout setting mode for die-cut labels (with black marks) is used, the automatic paper recognition function may not work correctly.
- Refer to section 1.7 for the paper specifications.
- The condition of the paper or the printer may vary depending on the environmental conditions. Make sure to set the paper layout under the same condition that it is used.

3) Ending the automatic paper layout setting mode

Once the setting is performed, the automatic paper layout setting mode is ended.

3.10 Paper Setting Clear Mode for Paper Layout

1) Paper setting clear function for paper layout

This function changes all setting values for the paper layout to “nothing set.”

2) Starting the Mode

Open the roll paper cover and turn the power on while holding down the paper FEED button (located inside the printer) and continue holding down the paper FEED button until the ERROR LED comes on; release the paper FEED button once the ERROR LED comes on. Next, press the paper FEED button (located inside the printer) four times, and close the cover. Then the printer clears the paper layout setting. After loading the paper in the paper path for the peeler or continuous issuing, press the paper FEED button; the printer starts this mode.

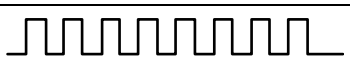
NOTE: After completing the clear operation, the printer executes the paper feed operation, then executes the automatic setting function.

3.11 Error Processing

3.11.1 Error Types

1) Errors that recover automatically

Table 3.11.1 Automatically Recoverable Errors

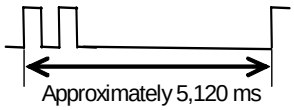
Error	Description	ERROR LED Flashing Pattern (Approximately 320 ms)	Recovery
Paper roll cover open error (when recoverable error is selected) (*1)	Printing on the paper roll is not performed correctly due to a cover-open.		Recovers automatically when the roll paper cover is closed.
Print head high temperature error (*2)	The temperature of the print head is extremely high.		Recovers automatically when the print head cools.

NOTES: *1: The roll paper cover open error operation can be selected with a memory switch.

*2: This is an error when the print head temperature becomes high because of the continuous high duty printing, and is not abnormal. If a unexpected value is detected by the abnormal cause in the circuit, the internal circuit connection error comes out.

2) Errors that can be recovered with a command

Table 3.11.2 Errors That Can Possibly Recover

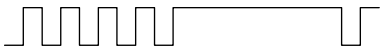
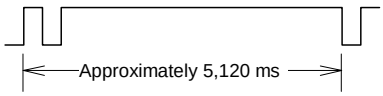
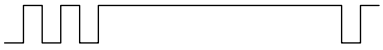
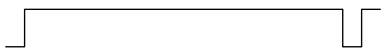
Error	Description	ERROR LED Flashing Pattern 	Recovery
Paper roll cover open error (when an error that can possibly recover is selected) (*1)	Printing on the paper roll is not performed correctly due to a cover-open.		Send **DLE ENQ 1**, **DLE ENQ 2,** or **DLE DC4** (*fn* = 8) when the cover is closed.
Paper layout error (*2)	Label or the black mark cannot be detected		Send **DLE ENQ 1**, **DLE ENQ 2**, **DLE DC4** (*fn* = 8), or open and close the cover, or press the paper FEED button.

NOTES: *1: The roll paper cover open error operation can be selected with memory switch 8-8.

*2: When an error occurs because of jammed paper while printing, turn the power off and remove the jammed paper; then turn the power on again. This operation can be selected with memory switches 8-1 and 8-2.

3) Unrecoverable errors

Table 3.11.3 Unrecoverable Errors

Error	Description	ERROR LED Flashing Pattern (Approximately 320 ms)	Recovery
CPU execution error	CPU executes an incorrect address.		Impossible to recover.
R/W error in memory or gate array	After R/W checking, the printer does not work correctly.		Impossible to recover.
High-voltage error	The power supply voltage is extremely high.		Impossible to recover.
Low-voltage error	The power supply voltage is extremely low.		Impossible to recover.
Internal circuit connection error	Internal circuits are not connected correctly.		Impossible to recover.
UIB error	An abnormal operation occurs in UIB.		Impossible to recover.

NOTE: When any error shown above occurs, turn off the power as soon as possible.

3.11.2 Printer Operation When an Error Occurs

The printer executes the following operations when detecting an error.

- Stops all printer operations (printing, feeding, or drawer driving).
- Goes BUSY (When the BUSY in offline is set for the conditions for BUSY with the memory switch)
- Flashes the ERROR LED.

3.11.3 Data Receive Error (Only for the Serial Interface Model)

If one of the following errors occurs during serial interface communication, the printer prints "?" or ignores the data, depending on the setting of the memory switch.

- Parity error
- Framing error
- Overrun error

3.12 Peeler Open Lever

Operating the peeler open lever lets the peeler cover open.

NOTES:
- Make sure to use the peeler open lever whenever the peeler cover is open.
- Do not open the peeler cover while the printer is printing in the peeler issuing mode.
- Keep to close the peeler cover while the printer is printing in the continuous issuing mode.
- Keep to close in waiting for label to be removed.

3.13 Roll Paper Cover Open Lever

When the roll paper cover open lever is operated after the peeler cover is open, the roll paper cover is opened.

NOTES:
- To open the roll paper cover, confirm that the peeler cover is open then operate the roll paper cover open lever. Be sure to use the roll paper cover open lever to open the roll paper cover.
- Do not open the roll paper cover during printing.
- If the roll paper cover is open and closed such when the remaining amount of the roll paper is checked during the power off, or if the roll paper cover is open and closed during the power on, make sure to initialize the mechanism (paper feed operation) by pressing the paper FEED button after the paper is loaded.

3.14 Cover Open Sensor

The cover open sensor monitors the roll paper cover. If the roll paper cover is open during standby, the printer goes offline. When the roll paper cover is closed and the roll paper cover is pressed, the printer recovers to online. When the sensor detects a cover open during printing, the printer enters an error state and flashes the error LED then goes offline automatically.

When an error that automatically recovers is selected:
To return to online.
Close the roll paper cover then press the roll paper cover, the error LED turns off and the printer initializes by itself and starts printing from the beginning of the line that stopped printing.

When an error that can possibly recover is selected:
When the cover is closed, the printer recovers by **DLE ENQ 1** or **DLE ENQ 2**.

NOTE: Whether the cover is open or not does not affect the status reported by the paper roll sensor.

3.15 Print Buffer-full Printing

- In standard mode
  When subsequent data is received after the printer processes one line of data in the print buffer, the printer prints the processed line and automatically feeds the paper one line.
- In paper mode
  When subsequent data is received after the printer processes one line of data in the print buffer, the printer prints the processed line and automatically sets the print starting position to the next line.

4. CASE SPECIFICATIONS

4.1 External Dimensions and Mass

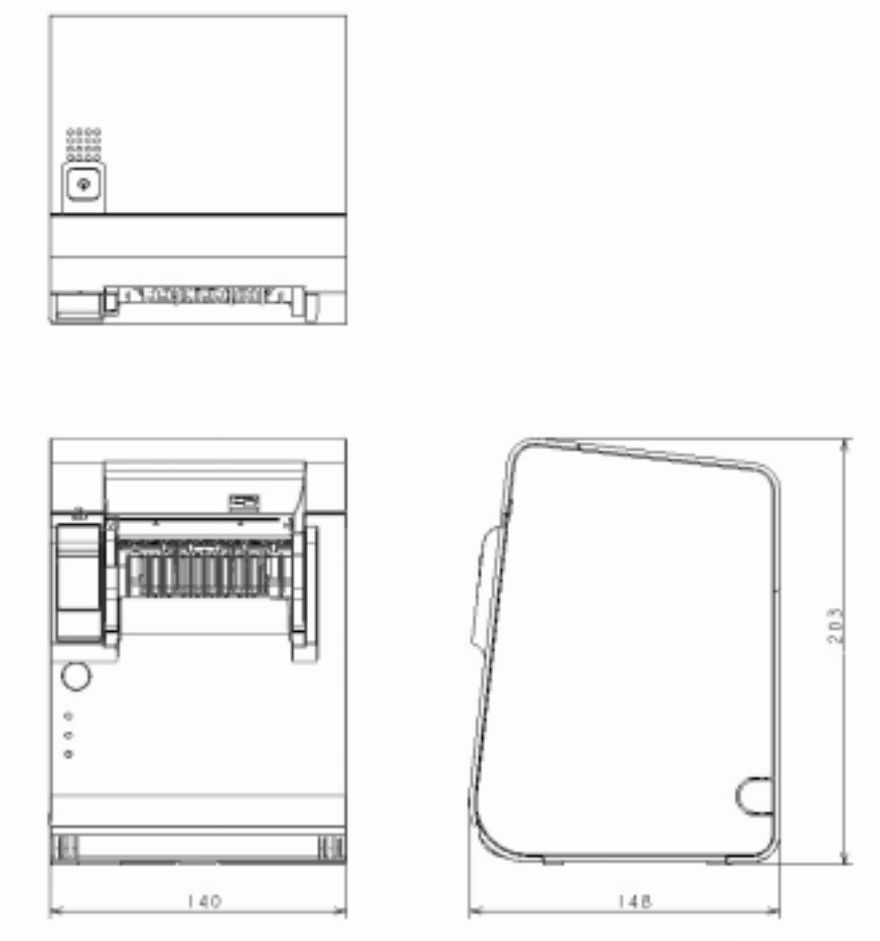
Height: 203 mm {7.99"}
Width: 140 mm {5.51"}
Depth: 148 mm {5.83”}

Mass: Approximately 1.9 kg {4.18 lb} (except for the paper roll)

4.2 Color

EPSON standard color (ECW, EDG)

4.3 External Appearance



[Units: mm]

Figure 4.3.1 External Appearance

5. OPTIONS AND CONSUMABLES

5.1 Standard Accessories

- Label roll paper (diameter 40 mm {1.57"})
- User's manual (Languages: English, German, French, Spanish, Portuguese, Italian, Dutch, Japanese)
- Paper roll spacer
- Power switch cover
- External power supply unit (model: PS-180)
  (For models packed with a power supply unit, the packed power supply differs depending on the model.)
- Operation label
  (Label that indicates the instruction of the peeler open lever and the roll paper cover open lever.)

5.2 Options

- Affixing Velcro® tape (model: DF-10)
- Wall handing bracket (model: WH-10)
- External power supply (model: PS-180, PS-170) (PS-180 is a power-saving type)
- Interface boards (EPSON UB series, except UB-P02, UB-U05, UB-U06, and UB-U19)

5.3 Consumables

- Specified paper

  Thermal roll paper: Refer to Section 1.7, Paper Specifications.

6. COMMANDS

6.1 Command Notation

XXXX

[Name]	The name of the command.
[Format]	The code sequence. *[ ]k* indicates the contents in brackets [ ] should be repeated *k* times.
[Range]	Gives the allowable ranges, if any, for the command parameters.
[Default]	Gives the default values, if any, for the arguments.
[Description]	Describes the function of the command. "–" in the table indicates 0 or 1.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[Reference]	Gives a reference, if any.

6.2 Explanation of Terms

1) Real-time command

Real-time commands are identified with a **DLE** extension such as **DLE EOT**, **DLE ENQ,** or **DLE DC4**. The printer executes these commands as soon as they are received.

2) Obsolete command

Obsolete commands are commands that will not be supported by future printer models. Therefore, we recommend replacing them with more recent, upward-compatible commands that have the same functions.

3) NV memory write command

NV memory write commands delete or store data in the NV memory (flash ROM)

GS (A <some functions>, **GS (C** <some functions>, **GS (E** <some functions>, **GS (L** / **GS 8 L** <some functions>, **GS (M** <some functions>, **GS g 0**

4) ESC/POS Handshaking Protocol

ESC/POS Handshaking Protocol is a handshaking protocol between the host computer and the printer when the printer transmits data. The ESC/POS Handshaking Protocol is required if the following commands are executed:

GS (C <some functions>, **GS (L** / **GS 8 L** <some functions>

5) Print buffer

The print buffer is used to store image data for printing

6) Receive buffer

The receive buffer is used to store data from the host computer. All received data is stored in this buffer and processed in the order received.

7) Maximum printable area

The maximum printable area of this printer is as follows:

Usable paper	Standard Mode (Horizontal direction)	Page Mode	
		Horizontal direction	Vertical direction
Receipt	Approximately 72 mm {576/203"}	Approximately 72 mm {576/203"}	Single-color: Approximately 184.50 mm {2952/406"} Two-color: Approximately 92.25 mm {1476/406"}
Die-cut label	Approximately 70 mm {560/203"}	Approximately 70 mm {560/203"}	Single-color: Approximately 101.50 mm {1624/406"} Two-color: Approximately 92.25 mm {1476/406"}

8) Paper layout

This is the information to control printing of labels or black mark paper. The paper layout includes the origin of the layout, print starting position, size of label, or other information. The paper layout is set with **GS (A** and **GS (E** <Function 48, 49, and 50> for detailed control.

9) Horizontal or vertical motion units

The horizontal or vertical motion units are used for calculating the setting values for various commands and can be changed with **GS P**.

10) Left edge of the print area

The left edge of the print area indicates the first column for character(s) to be developed, and also the print position to be moved when ($n_L + n_H \times 256$) = 0 is specified with **ESC $**.

- In standard mode, the left edge of the print area is the position of the left margin.
- In page mode, the left edge of the print area is the position of the left edge when the starting position specified with **ESC T** is viewed as the left top of the print area.

11) Column format / Raster format

Column format is a format where data is set in descending order (bit 7, 6, …, 0) from the top vertically.

d1	*d4*	*d7*	MSB LSB
d2	*d5*	*d8*	MSB LSB
d3	*d6*	*d9*	MSB LSB

Raster format is a format where data is set in descending order (bit 7, 6, …, 0) from the left horizontally.

d1	*d2*	*d3*
d4	*d5*	*d6*
d7	*d8*	*d9*
MSB LSB	MSB LSB	MSB LSB

12) Inch

A unit of length. One inch is 25.4 mm.

13) dpi

dpi (dots per inch) is the number of dots per 25.4 mm.

6.3 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.

[Notes]
- If the paper layout (the origin of the layout) specifies “bottom of the label” or “top of the black mark” in standard mode, the printer executes either one of the following operations when the paper feed amount exceeds the printing area in the vertical layout:
  - If the maximum height of the characters in one line exceeds the printing area specified in the vertical layout, the printer feeds the paper to the print starting position on the next label and executes the process of this command from the print starting position on the next label.
  - If the maximum height of the characters in one line does not exceed the printing area specified in the vertical layout, but the paper feed amount exceeds the printing area, the printer executes printing on the current label and feeds the paper to the bottom of the printing area.

FF (In page mode)

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

[Format]

ASCII	FF
Hex	0C
Decimal	12

[Description]
- Prints all the data in the print buffer collectively and switches from page mode to standard mode.

CR

[Name] Print and carriage return

[Format]
ASCII	CR
Hex	0D
Decimal	13

[Description] • Executes one of the following operations.

Condition	Function
When automatic line feed is enabled.	Functions the same as **LF**.
When automatic line feed is disabled and when using the serial interface model.	This command is ignored.

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 print area.

DLE EOT *n [a]*

[Name] Transmit real-time status

[Format]

ASCII	DLE	EOT	*n*	*[a]*
Hex	10	04	*n*	*[a]*
Decimal	16	4	*n*	*[a]*

[Range] $1 \le n \le 4$, $n = 8$
$a = 3$ [when $n = 8$]

[Description] • Transmits the real-time status.

n	*a*	Function
1	--	Transmits printer status.
2	--	Transmits offline cause status.
3	--	Transmits error cause status.
4	--	Transmits roll paper sensor status.
8	3	Transmits peeler status.

• When $1 \le n \le 4$ is specified, *a* is not necessary.

• This printer transmits the following status in real time.

• Printer status (*n* = 1)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	Drawer kick out connector pin 3 is LOW.
	On	04	4	Drawer kick out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	Off	00	0	Not waiting for online recovery.
	On	20	32	Waiting for online recovery.
6	Off	00	0	Paper FEED button is turned off.
	On	40	64	Paper FEED button is turned on.
7	Off	00	0	Fixed.

Bit 5: While waiting for the FEED button to be pressed, if **GS ^** is executed or the label peeler issuing mode is selected, the bit indicates “waiting for online recovery.”

• Offline cause status (*n* = 2)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	Roll paper cover is closed.
	On	04	4	Roll paper cover is open.
3	Off	00	0	Paper is not being fed by the paper FEED button.
	On	08	8	Paper is being fed by the paper FEED button.
4	On	10	16	Fixed.
5	Off	00	0	No paper end stop.
	On	20	32	Printing stopped by paper end.
6	Off	00	0	No error.
	On	40	64	Error occurred.
7	Off	00	0	Fixed.

• Error cause status (*n* = 3)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	No recoverable error.
	On	04	4	Recoverable error occurred.
3	--	--	--	Reserved.
4	On	10	16	Fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Fixed.

• Roll paper sensor status (*n* = 4)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2, 3	Off	00	0	Roll paper near-end sensor: paper adequate.
	On	0C	12	Roll paper near-end sensor: paper near end.
4	On	10	16	Fixed.
5, 6	Off	00	0	Roll paper end sensor: paper present.
	On	60	96	Roll paper end sensor: paper not present.
7	Off	00	0	Fixed.

Bits 5 and 6: While the roll paper cover is opening, this shows the state when the cover was still closed.

• Peeler status (*n* = 8, *a* = 3)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	Not waiting for label removal.
	On	04	4	Waiting for label removal.
3	--	--	--	Reserved.
4	On	10	16	Fixed.
5	Off	00	0	Label peeling sensor: paper present.
	On	20	32	Label peeling sensor: paper not present.
6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bit 2: When the continuous issuing mode is selected, the bit is fixed to “0.”

Bit 5: When the peeling issuing mode is selected, the bit changes during feeding of paper or during standby at the label peeling position.
When the continuous issuing mode is selected, the bit is fixed to “1.”

[Notes]

- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs this command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- When this command is transmitted, the data following must not be transmitted until the status is received.

DLE ENQ *n*

[Name] Send real-time request to printer

[Format]

ASCII	DLE	ENQ	*n*
Hex	10	05	*n*
Decimal	16	5	*n*

[Range] $0 \le n \le 2$

[Description]

- Responds to a request in real-time from the host computer.

n	Function
0	While waiting for online recovery as listed below, performs the same process as pressing the button one time. • When waiting for the FEED button to be pressed, if **GS ^** is executed or the label peeler issuing mode is selected.
1	Recovers from a recoverable error and restarts printing from the line where the error occurred. • This command is ignored unless a recoverable error has occurred.
2	Recovers from a recoverable error after clearing the receive and print buffers. • This command is ignored unless a recoverable error has occurred.

[Notes]

- Specify (*n* = 1) or (*n* = 2) after removing the cause of the error.
- When the printer recovers from the paper layout error if either [Msw 8-1] or [Msw 8-2] is off (or if both are off), the automatic paper measurement is done and the paper layout is stored in the NV memory. If the settings for the paper layout are already stored in the NV memory, these settings are overwritten by the result of the automatic paper recognition.
  - When the peeling issuing mode is selected, the operator is required to remove the label manually since the paper is fed in the automatic paper recognition.
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.

DLE DC4 *fn m t* (*fn* = 1)

[Name] Generate pulse in real-time

[Format]

ASCII	DLE	DC4	*fn*	*m*	*t*
Hex	10	14	*fn*	*m*	*t*
Decimal	16	20	*fn*	*m*	*t*

[Range]
fn = 1
m = 0, 1
$1 \le t \le 8$

[Description]
- Outputs the pulse specified by *t* in real-time to connector pin *m*.

m	Connector pin
0	Drawer kick out connector pin 2.
1	Drawer kick out connector pin 5.

- *t* specifies the pulse on time or off time as [$t \times 100$ ms].

[Notes]
- Take the following into consideration:
  - If the received data includes a data string with this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.

DLE DC4 *fn a b* (*fn* = 2)

[Name] Execute power-off sequence

[Format]

ASCII	DLE	DC4	*fn*	*a*	*b*
Hex	10	14	*fn*	*a*	*b*
Decimal	16	20	*fn*	*a*	*b*

[Range]
fn = 2
a = 1
b = 8

[Description]
- Executes the printer power-off sequence and transmits the power-off notice.
  - Stores the values of the maintenance counter.
  - Sets the interface to BUSY.
  - Sets the printer to standby mode.

[Notes]
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- This command does not shut the power off. The operator must turn off the power after receiving the power-off notice.
- If this command is encountered, the printer will not continue to process anything. To recover the printer to print again, it is necessary to turn the power on again or execute a hardware reset.

DLE DC4 *fn d1…d7* (*fn* = 8)

[Name] Clear buffer(s)

[Format]

ASCII	DLE	DC4	*fn*	*d1…d7*
Hex	10	14	*fn*	*d1…d7*
Decimal	16	20	*fn*	*d1…d7*

[Range] *fn* = 8
d1 = 1 , *d2* = 3 , *d3* = 20 , *d4* = 1 , *d5* = 6 , *d6* = 2 , *d7* = 8

[Description]
- Clears all data stored in the receive buffer and the print buffer and transmits Clear response.
- If a recoverable error occurs, recovers from the error.

[Notes]
- Do not use this command in a system that uses the printer with the OPOS driver or the JavaPOS driver provided by Seiko Epson Corporation.
- When the printer recovers from the paper layout error if either [Msw 8-1] or [Msw 8-2] is off (or if both are off), the automatic paper measurement is done and the paper layout is stored in the NV memory. If the settings for the paper layout are already stored in the NV memory, these settings are overwritten by the result of the automatic paper recognition.
- When the peeling issuing mode is selected, the operator is required to remove
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- When this command is transmitted, the data following must not be transmitted until the status is received.

ESC FF

[Name] Print data in page mode

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

[Description]
- In page mode, prints all the data in the print buffer collectively.

ESC SP *n*

[Name] Set right-side character spacing

[Format]

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

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

[Default] $n = 0$

[Description]
- Sets the right-side character spacing to [$n \times$ (horizontal or vertical motion unit)].

[Note]
- The maximum is 31.88 mm {255/203"}.

ESC ! *n*

[Name] Select print mode(s)

[Format]

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

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

[Default] $n = 0$

[Description]
- Selects the character font and styles (emphasized, double-height, double-width, and underlined) together.

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12×24) selected.
	On	01	1	For ANK model: Character font B (9×17) selected. For Japanese model: Character font C (8×16) selected.
1, 2	Off	00	0	Reserved.
3	Off	00	0	Emphasized mode is turned off.
	On	08	8	Emphasized mode is turned on.
4	Off	00	0	Double-height canceled.
	On	10	16	Double-height selected.
5	Off	00	0	Double-width canceled.
	On	20	32	Double-width selected.
6	Off	00	0	Reserved.
7	Off	00	0	Underline mode is turned off.
	On	80	128	Underline mode is turned on.

ESC $ *nL nH*

[Name] Set absolute print position

[Format]

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

[Range] $0 \le (n_L + n_H \times 256) \le 65535$ $(0 \le n_L \le 255, 0 \le n_H \le 255)$

[Description]
- Moves the print position to [$(n_L + n_H \times 256) \times$ (horizontal or vertical motion unit)] from the left edge of the print area.

ESC % *n*

[Name] Select/cancel user-defined character set

[Format]

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

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

[Default] $n = 0$

[Description]
- Selects or cancels the user-defined character set.
  - When the LSB of *n* is 0, the user-defined character set is canceled.
  - When the LSB of *n* 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] For ANK model:

$y = 3$
$32 \le c1 \le c2 \le 126$
$0 \le x \le 12$ [when Font A (12×24) is selected]
$0 \le x \le 9$ [when Font B (9×17) is selected]
$0 \le d \le 255$
$k = c2 - c1 + 1$

For Japanese model:

$y = 3$ [when Font A (12×24) / Font B (10×24) is selected]
$y = 2$ [when Font C (8×16) is selected]
$32 \le c1 \le c2 \le 126$
$0 \le x \le 12$ [when Font A (12×24) is selected]
$0 \le x \le 10$ [when Font B (10×24) is selected]
$0 \le x \le 8$ [when Font C (8×16) is selected]
$0 \le d \le 255$
$k = c2 - c1 + 1$

[Description]
- Defines the user-defined character pattern for the specified character codes.
- *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* specifies the defined data (column format)

ESC ∗ *m nL nH d1...dk*

[Name] Select bit-image mode

[Format]

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

[Range]
$m = 0, 1, 32, 33$
$1 \le (n_L + n_H \times 256) \le 1023 \quad (0 \le n_L \le 255, 0 \le n_H \le 3)$
$0 \le d \le 255$
$k = n_L + n_H \times 256$ [when $m = 0,1$]
$k = (n_L + n_H \times 256) \times 3$ [when $m = 32,33$]

[Description]
- Stores the bit image data in the print buffer using the mode specified by *m*.

m	Bit image mode	Vertical direction	Horizontal direction
0	8-dot single-density	203/3 dpi	203/2 dpi
1	8-dot double-density	203/3 dpi	203 dpi
32	24-dot single-density	203 dpi	203/2 dpi
33	24-dot double-density	203 dpi	203 dpi

- *nL*, *nH* specify the number of dots in the horizontal direction as ($n_L + n_H \times 256$).
- *d* specifies the bit image data (column format).

ESC – *n*

[Name] Turn underline mode on/off

[Format]

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

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

[Default] $n = 0$

[Description]
- Turns underline mode on or off.

n	Function
0, 48	Turns off underline mode.
1, 49	Turns on underline mode, set at 1-dot width.
2, 50	Turns on underline mode, set at 2-dot width.

ESC 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description]
- Sets the line spacing to approximately 3.75 mm {60/406"}.

ESC 3 *n*

[Name] Set line spacing

[Format]

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

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

[Default] Equivalent to approximately 3.75 mm {60/406"}.

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

[Note]
- The maximum is 900 mm {35.5"}.

ESC = *n*

[Name] Select peripheral device

[Format]

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

[Range] $1 \le n \le 3$

[Default] *n* = 1

[Description]
- Selects the device to which the host computer transmits data.

n	Function
1, 3	Enables printer.
2	Disables printer.

- When the printer is disabled (*n* = 2), all data except this command and the real-time commands are ignored.

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

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

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

[Description]
- Deletes the user-defined character pattern specified by character code *n*.

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 modes to the modes that were in effect when the power was turned on.
  Keeps the following data:
  - Offline response setting.
  - Macro definition data.
  - Contents stored in the NV user memory.
  - Contents defined for the NV graphics.
  - Maintenance counter value.
  - Setting value specified with **GS (E**.

ESC D *n1...nk NUL*

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

[Range] $1 \le n1 \le n2 \le ... \le nk \le 255$
$0 \le k \le 32$

[Default] n = 8, 16, 24, 32, 40, ... , 232, 240, 248
(for Font A (12 × 24) in a standard character size width)

[Description]
- Sets horizontal tab positions.
  - *n* specifies the number of digits from the setting position to the left edge of the print area.
  - *k* is used to indicate the number of bytes set for the horizontal tab position.

ESC E *n*

[Name] Turn emphasized mode on/off

[Format]

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

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

[Default] n = 0

[Description]
- Turns emphasized mode on or off.
  - When the LSB of *n* is 0, emphasized mode is turned off.
  - When the LSB of *n* 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] $0 \le n \le 255$

[Default] $n = 0$

[Description]
- Turns double-strike mode on or off.
  - When the LSB of *n* is 0, double-strike mode is turned off.
  - When the LSB of *n* 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)].

[Notes]
- The maximum paper feed amount is 900 mm {35.5"}.
- If the paper layout (the origin of the layout) specifies “bottom of the label” or “top of the black mark” in standard mode, the printer executes either one of the following operations when the paper feed amount exceeds the printing area in the vertical layout:
  - If the maximum height of the characters in one line exceeds the printing area specified in the vertical layout, the printer feeds the paper to the print starting position on the next label and executes the process of this command from the print starting position on the next label.
  - If the maximum height of the characters in one line does not exceed the printing area specified in the vertical layout, but the paper feed amount exceeds the printing area, the printer executes printing on the current label and feeds the paper to the bottom of the printing area.

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 M *n*

[Name] Select character font

[Format]

ASCII	ESC	M	*n*
Hex	1B	4D	*n*
Decimal	27	77	*n*

[Range] $n = 0, 1, 48, 49$ [for ANK model]
$0 \le n \le 2$, $48 \le n \le 50$ [for Japanese model]

[Default] $n = 0$

[Description]
- Selects character font.

For ANK model:

n	Character font
0, 48	Character font A (12×24)
1, 49	Character font B (9×17)

For Japanese model:

n	Character font
0, 48	Character font A (12×24)
1, 49	Character font B (10×24)
2, 50	Character font C (8×16)

ESC R *n*

[Name] Select an international character set

[Format]

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

[Range] $0 \le n \le 13$

[Default] $n = 0$

[Description] • Selects international character set.

n	International character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea

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

[Default] $n = 0$

[Description] • In page mode, selects the print direction and starting position.

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

[Default] $n = 0$

[Description] • In standard mode, turns 90° clockwise rotation mode on or off for characters.

n	Function
0, 48	Turns off 90° clockwise rotation mode.
1, 49 2, 50	Turns on 90° clockwise rotation mode.

ESC W *xL xH yL yH dxL dxH dyL dyH*

[Name] Set print area in page mode

[Format]

ASCII	ESC	W	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Hex	1B	57	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Decimal	27	87	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*

[Range]
$0 \le (xL + xH \times 256) \le 65535 \quad (0 \le xL \le 255, 0 \le xH \le 255)$
$0 \le (yL + yH \times 256) \le 65535 \quad (0 \le yL \le 255, 0 \le yH \le 255)$
$1 \le (dxL + dxH \times 256) \le 65535 \quad (0 \le dxL \le 255, 0 \le dxH \le 255)$
$1 \le (dyL + dyH \times 256) \le 65535 \quad (0 \le dyL \le 255, 0 \le dyH \le 255)$

[Default] When the paper layout (the origin of the layout) is set not to use a layout or to “top of the black mark”:
$(xL + xH \times 256) = 0 \quad (xL = 0, xH = 0)$
$(yL + yH \times 256) = 0 \quad (yL = 0, yH = 0)$
$(dxL + dxH \times 256) = 576 \quad (dxL = 64, dxH = 2)$ [for 80 – 78 mm of the paper width]
$(dxL + dxH \times 256) = (256+(\text{paper width} - 38)\times 8)$ [for 77 – 38 mm of the paper width]
$(dyL + dyH \times 256) = 1476 \quad (dyL = 196, dyH = 5)$

When the paper layout (the origin of the layout) is set to “bottom of the label”:
$(xL + xH \times 256) = 0 \quad (xL = 0, xH = 0)$
$(yL + yH \times 256) = 0 \quad (yL = 0, yH = 0)$
$(dxL + dxH \times 256) = 560 \quad (dxL = 48, dxH = 2)$ [for 80 mm of the paper width]
$(dxL + dxH \times 256) = (224+(\text{paper width} - 38)\times 8)$ [for 79 – 38 mm of the paper width]
$(dyL + dyH \times 256) = 1476 \quad (dyL = 196, dyH = 5)$

[Description]
- In page mode, sets the size and the logical origin of the print area.
- *xL*, *xH* specify the horizontal logical origin as $[(xL + xH \times 256) \times$ (horizontal motion unit)].
- *yL*, *yH* specify the vertical logical origin as $[(yL + yH \times 256) \times$ (vertical motion unit)].
- *dxL*, *dxH* specify the horizontal dimension of print area as $[(dxL + dxH \times 256) \times$ (horizontal motion unit)].
- *dyL*, *dyH* specify the vertical dimension of print area as $[(dyL + dyH \times 256) \times$ (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] $-32768 \le (nL + nH \times 256) \le 32767$

[Description]
- Moves the print position to $[(nL + nH \times 256) \times$ (horizontal or vertical motion unit)] from the current position.
- A positive number specifies movement to the right, and a negative number specifies movement to the left.

ESC a *n*

[Name] Select justification

[Format]

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

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

[Default] $n = 0$

[Description] • In standard mode, aligns all the data in one line to the selected layout.

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] $0 \le n \le 255$

[Default] $n = 0$

[Description] • Selects the paper sensor(s) to output paper end signals when a paper end is detected.

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Roll paper near-end sensor disabled.
	On	01	1	Roll paper near-end sensor enabled.
1	Off	00	0	Roll paper near-end sensor disabled.
	On	02	2	Roll paper near-end sensor enabled.
2	Off	00	0	Roll paper end sensor disabled.
	On	04	4	Roll paper end sensor enabled.
3	Off	00	0	Roll paper end sensor disabled.
	On	08	8	Roll paper end sensor enabled.
4 ~ 7	Off	00	0	Reserved.

[Note] • This command is enabled only with a parallel interface model.

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] $0 \le n \le 255$

[Default] $n = 0$

[Description] • Selects the paper sensor(s) to use to stop printing when a paper end is detected.

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Roll paper near-end sensor disabled.
	On	01	1	Roll paper near-end sensor enabled.
1	Off	00	0	Roll paper near-end sensor disabled.
	On	02	2	Roll paper near-end sensor enabled.
2 ~ 7	Off	00	0	Reserved.

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] $0 \le n \le 255$

[Default] $n = 0$

[Description] • Enables or disables the panel buttons.
- When the LSB of *n* is 0, the panel buttons are enabled.
- When the LSB of *n* is 1, the panel buttons are disabled.

[Notes] • This command affects the FEED button.
• FEED button is disabled regardless of the settings with this command, when the roll paper cover is open.

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 the paper [$n \times$ (current line spacing)].

[Notes]
- The maximum paper feed amount is 900 mm {35.5"}.
- If the paper layout (the origin of the layout) specifies “bottom of the label” or “top of the black mark” in standard mode, the printer executes either one of the following operations when the paper feed amount exceeds the printing area in the vertical layout:
  - If the maximum height of the characters in one line exceeds the printing area specified in the vertical layout, the printer feeds the paper to the print starting position on the next label and executes the process of this command from the print starting position on the next label.
  - If the maximum height of the characters in one line does not exceed the printing area specified in the vertical layout, but the paper feed amount exceeds the printing area, the printer executes printing on the current label and feeds the paper to the bottom of the printing area.

ESC p *m t1 t2*

[Name] Generate pulse

[Format]

ASCII	ESC	p	*m*	*t1*	*t2*
Hex	1B	70	*m*	*t1*	*t2*
Decimal	27	112	*m*	*t1*	*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*.

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

- *t1* specifies the pulse on time as [*t1* $\times$ 2 ms].
- *t2* specifies the pulse off time as [*t2* $\times$ 2 ms].

[Note]
- Specify a value so that the off time is longer than the on time (*t1* < *t2*).

ESC t *n*

[Name] Select character code table

[Format]

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

[Range] $0 \le n \le 5$, $16 \le n \le 19$, $n = 255$

[Default] $n = 0$

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

n	Character code table
0	Page 0 [PC437 (USA: Standard Europe)]
1	Page 1 [Katakana]
2	Page 2 [PC850 (Multilingual)]
3	Page 3 [PC860 (Portuguese)]
4	Page 4 [PC863 (Canadian-French)
5	Page 5 [PC865 (Nordic)]
16	Page 16 [WPC1252]
17	Page 17 [PC866 (Cyrillic #2)]
18	Page 18 [PC852 (Latin 2)]
19	Page 19 [PC858 (Euro)]
255	Page 255 [User-defined page]

ESC { *n*

[Name] Turn upside-down print mode on/off

[Format]

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

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

[Default] $n = 0$

[Description] • In standard mode, turns upside-down print mode on or off.
- When the LSB of *n* is 0, upside-down print mode is turned off.
- When the LSB of *n* is 1, upside-down print mode is turned on.

FS (L *pL pH fn [parameters]*

[Name] Select label and black mark control function(s)

[Description]
- Various processes are performed on label or black mark paper.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**FS (L *pL pH fn m***	48	Transmit the positioning information.
65	**FS (L *pL pH fn m***	65	Feed paper to the label peeling position.
67	**FS (L *pL pH fn m***	67	Feed paper to the print starting position.

[Note]
- When <Function 48> is transmitted, the data following must not be transmitted until the status is received.

<Function 48> **FS (L *pL pH fn m*** (*fn* = 48)

[Name] Transmit the positioning information

[Format]

ASCII	FS	(	L	*pL*	*pH*	*fn*	*m*
Hex	1C	28	4C	*pL*	*pH*	*fn*	*m*
Decimal	28	40	76	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 48
m = 48

[Description]
- Transmits the positioning information for the label or black mark paper.

Transmission data block	Hexadecimal	Decimal	Amount of data
Header	37	55	1 byte
Identifier	38	56	1 byte
Positioning information A	See table [Positioning information A]		1 byte
Positioning information B	See table [Positioning information B]		1 byte
NUL	00	0	1 byte

[Positioning information A]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Relationship to the label peeling position: Not at label peeling position.
	On	01	1	Relationship to the label peeling position: Standby at label peeling position.
1	--	--	--	Reserved.
2	Off	00	0	Relationship to the print starting position: Not at print starting position.
	On	04	4	Relationship to the print starting position: Standby at print starting position.
3 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

Bit 0: When the continuous issuing mode is selected, the bit is “1” as soon as removal waiting starts after the paper is fed to the label peeling position, and becomes “0” after the mechanical paper feed operations.
When the peeling issuing mode is selected, the bit becomes “1” immediately after paper is fed to the label peeling position, and becomes “0” after the mechanical paper feed operations.

Bit 2: The bit becomes “1” immediately after paper is fed to the print starting position, and becomes “0” after the mechanical paper feed operations.

[Positioning information B]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Possible to feed paper to the print starting position on the current label.
	On	01	1	Impossible to feed paper to the print starting position on the current label.
1	Off	00	0	Possible to feed paper to the print starting position on the next label.
	On	02	2	Impossible to feed paper to the print starting position on the next label.
2 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

<Function 65> **FS (L *pL pH fn m*** (*fn* = 65)

[Name] Feed paper to the label peeling position

[Format]

ASCII	FS	(	L	*pL*	*pH*	*fn*	*m*
Hex	1C	28	4C	*pL*	*pH*	*fn*	*m*
Decimal	28	40	76	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 65
m = 48 [when the peeling issuing mode is selected]
m = 48, 49 [when the continuous issuing mode is selected]

[Description] • Feeds paper to the label peeling position.

m	Function
48	Feeds paper to the label peeling position. However, if the paper is in standby at the label peeling position, the printer does not feed.
49	Feeds paper to the label peeling position. However, if the paper is in standby at the label peeling position, the printer feeds paper to the next label peeling position.

[Note] • When the peeling issuing mode is selected, the printer awaits removal of the label after executing this function.

<Function 67> **FS (L *pL pH fn m*** (*fn* = 67)

[Name] Feed paper to the print starting position

[Format]

ASCII	FS	(	L	*pL*	*pH*	*fn*	*m*
Hex	1C	28	4C	*pL*	*pH*	*fn*	*m*
Decimal	28	40	76	*pL*	*pH*	*fn*	*m*

[Range] ($p_L + p_H \times 256) = 2$ ($p_L = 2, p_H = 0$)
$fn = 67$
$m = 50$ [when the peeling issuing mode is selected]
$48 \leq m \leq 50$ [when the continuous issuing mode is selected]

[Description] • Feeds paper to the print starting position.

m	Function
48	Feeds paper to the print starting position on the next label. However, if the paper is in standby at the print starting position, the printer does not feed.
49	Feeds paper to the print starting position on the next label. However, if the paper is in standby at the print starting position, the printer feeds paper to the next print starting position.
50	Feeds paper to the print starting position on the current label. However, if the paper is in standby at the print starting position, the printer does not feed.

[Notes]
- When the positioning information B of **FS (L** <Function 48> is [Bit0 = 1: impossible to feed paper to the print starting position on the next label], the operation of (*m*=50) is as follows:
  - When the peeling issuing mode is selected, the printer does not feed.
  - When the continuous issuing mode is selected, the printer feeds paper to the print starting position on the next label.

GS ! *n*

[Name] Select character size

[Format]

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

[Range] $0 \le n \le 7$, $16 \le n \le 23$, $32 \le n \le 39$, $48 \le n \le 55$, $64 \le n \le 71$, $80 \le n \le 87$, $96 \le n \le 103$, $112 \le n \le 119$
($1 \le$ Enlargement in vertical direction ≤ 8, $1 \le$ Enlargement in horizontal direction ≤ 8)

[Default] $n = 0$

[Description] • Selects character size (enlargement in vertical and horizontal directions).

(*n*) Bit	Off/On	Hex	Decimal	Function
0 ~ 2	See table [Enlarged in vertical direction]			Selects the times enlarged in the vertical direction.
3	Off	00	0	Reserved.
4 ~ 6	See table [Enlarged in horizontal direction]			Selects the times enlarged in the horizontal direction.
7	Off	00	0	Reserved.

[Enlarged in vertical direction]

Hex	Decimal	Enlargement
00	0	1 time (standard)
01	1	2 times
02	2	3 times
03	3	4 times
04	4	5 times
05	5	6 times
06	6	7 times
07	7	8 times

[Enlarged in horizontal direction]

Hex	Decimal	Enlargement
00	0	1 time (standard)
10	16	2 times
20	32	3 times
30	48	4 times
40	64	5 times
50	80	6 times
60	96	7 times
70	112	8 times

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] $0 \le (n_L + n_H \times 256) \le 65535$ ($0 \le n_L \le 255$, $0 \le n_H \le 255$)

[Description] • In page mode, moves the vertical print position to [($n_L + n_H \times 256$) × (vertical or horizontal motion unit)] from the starting position set with **ESC T**.

GS (A *pL pH n m*

[Name] Execute test print

[Format]

ASCII	GS	(	A	*pL*	*pH*	*n*	*m*
Hex	1D	28	41	*pL*	*pH*	*n*	*m*
Decimal	29	40	65	*pL*	*pH*	*n*	*m*

[Range] ($p_L + p_H \times 256) = 2$ ($p_L = 2, p_H = 0$)
$0 \le n \le 2$, $48 \le n \le 50$
$1 \le m \le 3$, $49 \le m \le 51$, $m = 64$

[Description]
- Executes a specified test print.
- *pL*, *pH* specify ($p_L + p_H \times 256$) as the number of bytes after *pH* (*n* and *m*).
- *n* specifies the paper used for the test print.

n	Paper source
0, 48	Basic sheet (roll paper)
1, 49 2, 50	Roll paper

- *m* specifies a test pattern.

m	Test pattern
1, 49	Hexadecimal dump print
2, 50	Printer status print
3, 51	Rolling pattern print
64	Automatic setting of paper layout

[Notes]
- The printer executes a software reset after processing this command.
- Clears the receive and print buffers.
- Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the NV memory are not reset.)

GS (C *pL pH m fn b [c1 c2] [d1...dk]*

[Name] Edit NV user memory

[Description]
- Edits the data in the NV user memory.
- *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*m*, *fn*, *b*, *[c1 c2]*, and *[d1...dk]*).
- *fn* specifies the function.
- *c1*, *c2* specify the key code (which identifies the record).
- *[d1...dk]* specify the process of each function.

fn	Format	Function No.	Function name
0, 48	**GS (C *pL pH m fn b c1 c2***	0	Delete the specified record.
1, 49	**GS (C *pL pH m fn b c1 c2 d1...dk***	1	Store the data in the specified record.
2, 50	**GS (C *pL pH m fn b c1 c2***	2	Transmit the data in the specified record.
3, 51	**GS (C *pL pH m fn b***	3	Transmit capacity of the NV user memory currently being used.
4, 52	**GS (C *pL pH m fn b***	4	Transmit the remaining capacity of the NV user memory.
5, 53	**GS (C *pL pH m fn b***	5	Transmit the key code list.
6, 54	**GS (C *pL pH m fn b d1 d2 d3***	6	Delete all data in the NV user memory.

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands while the printer is BUSY.
- When <Function 2, 3, 4, or 5> is transmitted, the data following must not be transmitted until the status is received. And, it will be necessary to perform the ESC/POS Handshaking Protocol procedures when using <Function 2 or 5>.

<Function 0> GS (C *pL pH m fn b c1 c2* (*fn* = 0, 48)

[Name] Delete the specified record

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*

[Range]
(*pL* + *pH* × 256) = 5 (*pL* = 5, *pH* = 0)
m = 0
fn = 0, 48
b = 0
32 ≤ *c1* ≤ 126
32 ≤ *c2* ≤ 126

[Description]
- Deletes the record specified by the key codes (*c1*, *c2*) in the NV user memory.

<Function 1> **GS (C *pL pH m fn b c1 c2 d1...dk*** (*fn* = 1, 49)

[Name] Store the data in the specified record

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*

[Range] $6 \le (p_L + p_H \times 256) \le 65535$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$
$m = 0$
$fn = 1, 49$
$b = 0$
$32 \le c1 \le 126$
$32 \le c2 \le 126$
$32 \le d \le 254$
$k = (p_L + p_H \times 256) - 5$
The total capacity of the NV user memory is selectable as any one of [1K, 64K, 128K, 192K] bytes with **GS (E** <Function 5: *a* = 1>. The default value is 1KB.

[Description]
- Stores the data (*d1...dk*) as the record specified by the key codes (*c1*, *c2*) in the NV user memory.

[Note]
- In cases where there is insufficient capacity available for amounts of data ($p_L + p_H \times 256$) - 5, this function is ignored.

<Function 2> **GS (C *pL pH m fn b c1 c2*** (*fn* = 2, 50)

[Name] Transmit the data in the specified record

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*

[Range] $(p_L + p_H \times 256) = 5$ $(p_L = 5, p_H = 0)$
$m = 0$
$fn = 2, 50$
$b = 0$
$32 \le c1 \le 126$
$32 \le c2 \le 126$

[Description]
- Transmits the data for the record specified by the key codes (*c1*, *c2*) in the NV user memory.

<Function 3> **GS (C *pL pH m fn b*** (*fn* = 3, 51)

[Name] Transmit capacity of the NV user memory currently being used

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0)
m = 0
fn = 3, 51
b = 0

[Description]
- Transmits the number of bytes of memory used in the NV user memory.

<Function 4> **GS (C *pL pH m fn b*** (*fn* = 4, 52)

[Name] Transmit the remaining capacity of the NV user memory

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0)
m = 0
fn = 4, 52
b = 0

[Description]
- Transmits the number of bytes of remaining memory (unused area) in the NV user memory.

<Function 5> **GS (C *pL pH m fn b*** (*fn* = 5, 53)

[Name] Transmit the key code list

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
m = 0
fn = 5, 53
b = 0

[Description]
- Transmits the key code list in the NV user memory.

<Function 6> **GS (C *pL pH m fn b d1 d2 d3*** (*fn* = 6, 54)

[Name] Delete all data in the NV user memory

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*

[Range] ($p_L + p_H \times 256) = 6$ ($p_L = 6, p_H = 0$)
m = 0
fn = 6, 54
b = 0
d1 = 67
d2 = 76
d3 = 82

[Description]
- Deletes all data in the NV user memory.

GS (D *pL pH m [a1 b1]...[ak bk]*

[Name] Enable/disable real-time command

[Format]

ASCII	GS	(	D	*pL*	*pH*	*m*	*[a1*	*b1]...[ak*	*bk]*
Hex	1D	28	44	*pL*	*pH*	*m*	*[a1*	*b1]...[ak*	*bk]*
Decimal	29	40	68	*pL*	*pH*	*m*	*[a1*	*b1]...[ak*	*bk]*

[Range] $3 \le (p_L + p_H \times 256) \le 65535$ ($0 \le p_L \le 255, 0 \le p_H \le 255$)
m = 20
a = 1,2
b = 0,1,48,49

[Default] *b* = 1 [when *a* = 1]
b = 0 [when *a* = 2]

[Description]
- Enables or disables the real-time command specified by *a*.
- *pL*, *pH* specify ($p_L + p_H \times 256$) as the number of bytes after *pH* (*m* and *[a1 b1]...[ak bk]*).

a	*b*	Function
1	0, 48	**DLE DC4 *fn m t*** (*fn* = 1): Not processed (disabled).
	1, 49	**DLE DC4 *fn m t*** (*fn* = 1): Processed (enabled).
2	0, 48	**DLE DC4 *fn a b*** (*fn* = 2): Not processed (disabled).
	1, 49	**DLE DC4 *fn a b*** (*fn* = 2): Processed (enabled).

[Note]
- If graphics data includes a data string matching **DLE DC4** (*fn* = 1 or 2), it is recommended to use this command in advance to disable the real-time commands.

GS (E *pL pH fn [parameters]*

[Name] Set user setup commands

[Description]
- Controls the user setting modes.
  - *pL*, *pH* specify (*pL* + *pH* ×256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
1	**GS (E *pL pH fn d1 d2***	1	Change into the user setting mode.
2	**GS (E *pL pH fn d1 d2 d3***	2	End the user setting mode session.
3	**GS (E *pL pH fn [a1 b18... b11] ... [ak bk8... bk1]***	3	Change the memory switch.
4	**GS (E *pL pH fn a***	4	Transmit the settings of the memory switch.
5	**GS (E *pL pH fn [a1 n1L n1H] ... [ak nkL nkH]***	5	Set the customized setting values.
6	**GS (E *pL pH fn a***	6	Transmit the customized setting values.
7	**GS (E *pL pH fn a d1 d2***	7	Copy the user-defined page.
8	**GS (E *pL pH fn y c1 c2 [x d1...d(y × x)]k***	8	Define the data (column format) for the character code page.
9	**GS (E *pL pH fn x c1 c2 [y d1...d(x × y)]k***	9	Define the data (raster format) for the character code page.
10	**GS (E *pL pH fn c1 c2***	10	Delete the data for the character code page.
11	**GS (E *pL pH fn a d1...dk***	11	Set the configuration item for the serial interface.
12	**GS (E *pL pH fn a***	12	Transmit the configuration item for the serial interface.
48	**GS (E *pL pH fn d1 d2 d3***	48	Delete the paper layout.
49	**GS (E *pL pH fn sa ; sb ; sc ; sd ; se ; sf ; sg ; sh ;***	49	Set the paper layout.
50	**GS (E *pL pH fn n***	50	Transmit the paper layout information.

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 1, 4, 6, 12, or 50> is transmitted, the data following must not be transmitted until the status is received.

<Function 1> **GS (E *pL pH fn d1 d2*** (*fn* = 1)

[Name] Change into the user setting mode

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*
Hex	1D	28	45	*pL*	*pH*	*fn*	*d1*	*d2*
Decimal	29	40	69	*pL*	*pH*	*fn*	*d1*	*d2*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3 , *pH* = 0)
fn = 1
d1 = 73
d2 = 78

[Description]
- Enters the user setting mode and transmits the mode change notice.

<Function 2> **GS (E *pL pH fn d1 d2 d3*** (*fn* = 2)

[Name] End the user setting mode session

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
Hex	1D	28	45	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
Decimal	29	40	69	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*

[Range] (*pL* + *pH* × 256) = 4 (*pL* = 4 , *pH* = 0)
fn = 2
d1 = 79
d2 = 85
d3 = 84

[Description]
- Ends the user setting mode and performs a software reset.
- Clears the receive and print buffers.
- Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the NV memory are not reset.)

<Function 3> **GS (E *pL pH fn [a1 b18...b11]...[ak bk8...bk1]*** (*fn* = 3)

[Name] Change the memory switch

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11]*	*... [ak*	*bk8 ... bk1]*
Hex	1D	28	45	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11]*	*... [ak*	*bk8 ... bk1]*
Decimal	29	40	69	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11]*	*... [ak*	*bk8 ... bk1]*

[Range] $10 \le (p_L + p_H \times 256) \le 65530$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$
$fn = 3$
$a = 1, 7, 8$
$48 \le b \le 50$

[Default (upon shipment)]
[Msw 8-2], [Msw 8-6], and [Msw 8-8] are set to On (b = 49) and all other switches are set to Off (b = 48).

[Description]
- Changes the memory switch specified by a to the values specified by b.
  - When b = 48, the applicable bit is turned Off.
  - When b = 49, the applicable bit is turned On.
  - When b = 50, the applicable bit is not changed. Set b = 50 as the reserved bit.
- Memory switch 1 (Msw 1: a = 1)

Msw	Function	Setting value
1-1	Does not transmit the power-on notice.	48
	Transmits the power-on notice when processing an initialization.	49
1-2	Sets receive buffer capacity to 4KB.	48
	Sets receive buffer capacity to 45 bytes.	49
1-3	Conditions for BUSY: the receive buffer is full or offline.	48
	Conditions for BUSY: the receive buffer is full.	49
1-4	Data processing for receiving error: prints “?.”	48
	Data processing for receiving error: ignores the data.	49
1-5	Automatic line feed is disabled.	48
	Automatic line feed is enabled.	49
1-6	Reserved.	50
1-7	Pin #6: Not used for reset signal.	48
	Pin #6: Used for reset signal.	49
1-8	Pin #25: Not used for reset signal.	48
	Pin #25: Used for reset signal.	49

[Msw 1-5]: Enabled in the parallel interface model.
[Msw 1-7], [Msw 1-8]: Enabled in the serial interface model.

- Memory switch 7 (Msw 7: *a* = 7)

Msw	Function	Setting value
7-1 ~ 7-7	Reserved.	50
7-8	Operation when the FEED button is pressed: Feeds paper to the print starting position on the next label.	48
	Operation when the FEED button is pressed: Issues labels.	49

[Msw 7-8]: Enabled in the continuous issuing mode.
The process of label issuing is as follows:
- Feeds paper to the label peeling position when the FEED button is pressed.
- Feeds paper to the print starting position on the next label when the FEED button is pressed again.

- Memory switch 8 (Msw 8: *a* = 8)

Msw	Function	Setting value
8-1	When a paper layout error occurs, the printer recovers by **DLE ENQ, DLE DC4** (*fn* = 8) or the pressing of the FEED button.	48
	When a paper layout error occurs, the printer does not recover when the FEED button is pressed.	49
8-2	When a paper layout error occurs, the printer recovers by **DLE ENQ, DLE DC4** (*fn* = 8) or the roll paper cover is opened, then closed.	48
	When a paper layout error occurs, the printer does not recover when the roll paper cover is opened, then closed.	49
8-3	The PAPER OUT LED comes on when a paper near-end is detected.	48
	The PAPER OUT LED does not come on when a paper near-end is detected.	49
8-4	Sets the maximum length of automatic paper measurement to 160 mm.	48
	Sets the maximum length of automatic paper measurement to 300 mm.	49
8-5	Does not enable left or right margin of bar code print.	48
	Enables left or right margin of bar code print.	49
8-6	Performs the print starting positioning operation at power on.	48
	Does not perform the print starting positioning operation at power on.	49
8-7	Reserved.	50
8-8	During printing, a roll paper cover open is treated as an error that automatically recover.	48
	During printing, a roll paper cover open is treated as an error that has the possibility of recovery.	49

[Msw 8-1], [Msw 8-2]: When the printer recovers from the paper layout error if the memory switch is off (or if both are off), the automatic paper measurement is done and the paper layout is stored in the NV memory. If the settings for the paper layout are already stored in the NV memory, these settings are overwritten by the result of the automatic paper recognition.

- When the peeling issuing mode is selected, the operator is required to remove the label manually since the paper is fed in the automatic paper recognition.

<Function 4> **GS (E *pL pH fn a*** (*fn* = 4)

[Name] Transmit the settings of the memory switch

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2 , *pH* = 0)
fn = 4
a = 1, 7, 8

[Description]
- Transmits the setting value of the memory switch specified by *a*.

<Function 5> **GS (E *pL pH fn [a1 n1L n1H]...[ak nkL nkH]*** (*fn* = 5)

[Name] Set the customized setting values

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ... [ak*	*nkL*	*nkH]*
Hex	1D	28	45	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ... [ak*	*nkL*	*nkH]*
Decimal	29	40	69	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ... [ak*	*nkL*	*nkH]*

[Range]

$4 \le (p_L + p_H \times 256) \le 65533$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$
$fn = 5$
a = 1, 2, 5, 6, 97, 116, 117, 118
$1 \le (n_L + n_H \times 256) \le 4$ $(1 \le n_L \le 4, n_H = 0)$ [when a = 1]
$1 \le (n_L + n_H \times 256) \le 7$ $(1 \le n_L \le 7, n_H = 0)$ [when a = 2]
$0 \le (n_L + n_H \times 256) \le 8, 65530 \le (n_L + n_H \times 256) \le 65535$
$(0 \le n_L \le 8, n_H = 0, \quad 250 \le n_L \le 255, n_H = 255)$ [when a = 5]
$1 \le (n_L + n_H \times 256) \le 9$ $(1 \le n_L \le 9, n_H = 0)$ [when a = 6]
$1 \le (n_L + n_H \times 256) \le 4$ $(1 \le n_L \le 4, n_H = 0)$ [when a = 97]
$(n_L + n_H \times 256) = 1, 257$ $(n_L = 1, n_H = 0,1)$ [when a = 116]
$38 \le (n_L + n_H \times 256) \le 80$ $(38 \le n_L \le 80, n_H = 0)$ [when a = 117]
$(n_L + n_H \times 256) = 70, 85, 100$ $(n_L = 70,85,100, n_H = 0,1)$ [when a = 118]

[Default (upon shipment)]

$(n_L + n_H \times 256) = 1$ $(n_L = 1, n_H = 0)$ [when a = 1]
$(n_L + n_H \times 256) = 7$ $(n_L = 7, n_H = 0)$ [when a = 2]
$(n_L + n_H \times 256) = 0$ $(n_L = 0, n_H = 0)$ [when a = 5]
$(n_L + n_H \times 256) = 6$ $(n_L = 6, n_H = 0)$ [when a = 6]
$(n_L + n_H \times 256) = 1$ $(n_L = 1, n_H = 0)$ [when a = 97]
$(n_L + n_H \times 256) = 1$ $(n_L = 1, n_H = 0)$ [when a = 116]
$(n_L + n_H \times 256) = 80$ $(n_L = 80, n_H = 0)$ [when a = 117]
$(n_L + n_H \times 256) = 85$ $(n_L = 85, n_H = 0)$ [when a = 118]

[Description]

- Sets the customized value specified by a to the values specified by $(n_L + n_H \times 256)$.

a	Type of customized value
1	NV user memory capacity
2	NV graphics memory capacity
5	Print density
6	Print speed
97	Number of division of thermal head energizing
116	Type of paper (single-color or two-color)
117	Width of roll paper
118	Black-color density in two-color printing

- NV user memory capacity setting (a = 1)

$(n_L + n_H \times 256)$	NV user memory capacity
1	1KB
2	64KB
3	128KB
4	192KB

• NV graphics memory capacity setting (*a* = 2)

($n_L + n_H \times 256$)	NV graphics memory capacity
1 (*)	None (0 bytes)
2	64KB
3	128KB
4	192KB
5	256KB
6	320KB
7	384KB

(*) With this setting the printer cannot use the NV graphics function.

• Print density setting (*a* = 5)

($n_L + n_H \times 256$)	Print density	
65530	70 %	light
65531	75 %	|
65532	80 %	|
65533	85 %	|
65534	90 %	|
65535	95 %	|
0	100 %	|
1	105 %	|
2	110 %	|
3	115 %	|
4	120 %	|
5	125 %	|
6	130 %	|
7	135 %	|
8	140 %	dark

- The density of printing with four-part energizing on two-color paper may not be changed.

• Print speed setting (*a* = 6)

($n_L + n_H \times 256$)	Print speed	
1	Print speed level 1.	slow
2	Print speed level 2.	|
3	Print speed level 3.	|
4	Print speed level 4.	|
5	Print speed level 5.	|
6	Print speed level 6. (120 mm/s)	|
7	Print speed level 7.	|
8	Print speed level 8.	|
9	Print speed level 9.	fast

- In the label peeler issuing mode, the print speed must be less than 120 mm/s {4.72"}.

• Number of division of thermal head energizing setting (a = 97)

($n_L + n_H \times 256$)	Number of division of thermal head energizing
1	One-part energizing.
2	Two-part energizing.
3	Three-part energizing.
4	Four-part energizing.

- To improve the quality of two-color printing, it is recommended to print with two-part energizing.

• Type of paper setting (a = 116)

($n_L + n_H \times 256$)	Type of paper
1	Single-color paper
257	Two-color paper

• Width of roll paper setting (a = 117)

($n_L + n_H \times 256$)	Roll paper width
38	38 mm {1.50"}
39	39 mm {1.54"}
|	|
79	79 mm {3.11"}
80	80 mm {5.15"}

- Total 43 kinds of paper width that is from 38 mm {1.50"} to 80 mm {3.15"} can be set for the selection of the paper width, however the range of 71 to 79 m {2.80 to 3.11"} of the paper width cannot be used because of the thickness of the paper roll spacer.

• Black-color density in two-color printing setting (a = 118)

($n_L + n_H \times 256$)	Black-color density in two-color printing
70	Light
85	Medium
100	Dark

- The black-color density is affected only in two-color printing.

[Notes]

- If the either one of the setting values a = 1 or a = 2 is changed, the data in both areas (the NV user memory and the NV graphics memory) is cleared.
- The combinations that can be specified for the NV user memory capacity and the NV graphic memory capacity with a = 1 and a = 2 are as shown in the table below. Even if the printer receives an impossible combination, the printer automatically sets a possible combination for each memory size.

Memory size of NV user memory	Memory size of NV graphic memory
1KB	384KB or less
64KB	256KB or less
128KB	128KB or less
192KB	0

<Function 6> **GS (E *pL pH fn a*** (*fn* = 6)

[Name] Transmit the customized setting values

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 6
a = 1, 2, 5, 6, 97, 116, 117, 118

[Description] • Transmits the customized value specified by *a*.

a	Type of customized value
1	NV user memory capacity
2	NV graphics memory capacity
5	Print density
6	Print speed
97	Number of division of thermal head energizing
116	Type of paper (single-color or two-color)
117	Width of roll paper
118	Black-color density in two-color printing

<Function 7> **GS (E *pL pH fn a d1 d2*** (*fn* = 7)

[Name] Copy the user-defined page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*	*d1*	*d2*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*	*d1*	*d2*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*	*d1*	*d2*

[Range] ($p_L + p_H \times 256) = 4$ ($p_L = 4$, $p_H = 0$)
fn = 7
a = 10, 12 [for ANK model]
a = 12, 17, 18 [for Japanese model]
d1 = 30, 31
d2 = 30, 31 [where $d1 \neq d2$]

[Description]
- Copies the data in the user-defined code page.
- *a* specifies the font no.

(*a*) Font No.	Font Type	Code Page	Data Configuration	
			Dots in Horizontal Direction	Dots in Vertical Direction
10	9 × 17	Font B: Page 255	9	17
12	12 × 24	Font A: Page 255	12	24
17	8 × 16	Font C: Page 255	8	16
18	10 × 24	Font B: Page 255	10	24

- Copy operation is specified by *d1* and *d2*.

d1	*d2*	Function
31	30	Loads the character code page data for font no. (*a*) from the storage area (Flash ROM) to the work area (RAM).
30	31	Saves the character code page data in the work area (RAM) to the storage area (Flash ROM) specified by font no. (*a*).

<Function 8> **GS (E *pL pH fn y c1 c2 [x d1...d(y × x)]k*** (*fn* = 8)

[Name] Define the data (column format) for the character code page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*y*	*c1*	*c2*	*[x*	*d1...d(y × x)]k*
Hex	1D	28	45	*pL*	*pH*	*fn*	*y*	*c1*	*c2*	*[x*	*d1...d(y × x)]k*
Decimal	29	40	69	*pL*	*pH*	*fn*	*y*	*c1*	*c2*	*[x*	*d1...d(y × x)]k*

[Range] $5 \le (p_L + p_H \times 256) \le 65535 \quad (0 \le p_L \le 255, 0 \le p_H \le 255)$
$fn = 8$
$y = 3$ [when Font no.10, 12, or 18 is selected]
$y = 2$ [when Font no.17 is selected]
$128 \le c1 \le c2 \le 255$
$0 \le x \le 9$ [when Font no.10 is selected]
$0 \le x \le 12$ [when Font no.12 is selected]
$0 \le x \le 8$ [when Font no.17 is selected]
$0 \le x \le 10$ [when Font no.18 is selected]
$0 \le d \le 255$
$k = c2 - c1 + 1$

[Description]
- Defines the character pattern (column format) for the character code page in the work area (RAM).
  - *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* specifies the defined data (column format).

<Function 9> **GS (E *pL pH fn x c1 c2 [y d1...d(x × y)]k*** (*fn* = 9)

[Name] Define the data (raster format) for the character code page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y*	*d1...d(x × y)]k*
Hex	1D	28	45	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y*	*d1...d(x × y)]k*
Decimal	29	40	69	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y*	*d1...d(x × y)]k*

[Range] $5 \le (p_L + p_H \times 256) \le 65535$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$
$fn = 9$
$x = 2$ [when Font no.10, 12, or 18 is selected]
$x = 1$ [when Font no.17 is selected]
$128 \le c1 \le c2 \le 255$
$0 \le y \le 17$ [when Font no.10 is selected]
$0 \le y \le 24$ [when Font no.12 or 18 is selected]
$0 \le y \le 16$ [when Font no.17 is selected]
$0 \le d \le 255$
$k = c2 - c1 + 1$

[Description]
- Defines the character pattern (raster format) for the character code page in the work area (RAM).
  - *x* specifies the number of bytes in the horizontal direction.
  - *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.
  - *y* specifies the number of dots in the vertical direction.
  - *d* specifies the defined data (raster format).

<Function 10> **GS (E *pL pH fn c1 c2*** (*fn* = 10)

[Name] Delete the data for the character code page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*c1*	*c2*
Hex	1D	28	45	*pL*	*pH*	*fn*	*c1*	*c2*
Decimal	29	40	69	*pL*	*pH*	*fn*	*c1*	*c2*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$fn = 10$
$128 \le c1 \le c2 \le 255$

[Description]
- Deletes the character pattern for the character code page in the work area (RAM).
  - *c1* specifies the beginning character code for the deletion, and *c2* specifies the final code.

<Function 11> **GS (E *pL pH fn a d1...dk*** (*fn* = 11)

[Name] Set the configuration item for the serial interface

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*	*d1 ... dk*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*	*d1 ... dk*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*	*d1 ... dk*

[Range] $3 \le (p_L + p_H \times 256) \le 65535$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$ [when *a*=1]
$(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$ [when *a*=2,3,4]
fn = 11
$1 \le a \le 4$
$48 \le d \le 57$

[Default (upon shipment)]
19200 bps, no parity, DTR/DSR control, 8 bits
d1...dk = “19200” [when *a* = 1]
d1 = 48 [when *a* = 2]
d1 = 48 [when *a* = 3]
d1 = 56 [when *a* = 4]

[Description]
- Sets the configuration item for the serial interface specified by *a* to the values specified by *d*.

a	Configuration item
1	Transmission speed
2	Parity
3	Flow control
4	Data length

- Transmission speed setting (*a* = 1)

d1...dk	Transmission speed
“2400”	2400 bps
“4800”	4800 bps
“9600”	9600 bps
“19200”	19200 bps
“38400”	38400 bps
“57600”	57600 bps
“115200”	115200 bps

- Parity setting (*a* = 2)

d1	Parity
48	No parity
49	Odd parity
50	Even parity

• Flow control setting (*a* = 3)

d1	Flow control
48	DTR/DSR
49	XON/XOFF

• Data length setting (*a* = 4)

d1	Data length
55	7 bits
56	8 bits

[Note] • The configuration item set by this function is enabled by executing **GS (E** <Function 2> or restarting the printer. Note that the host computer must be set to enable the printer to communicate with the host computer.

<Function 12> **GS (E *pL pH fn a*** (*fn* = 12)

[Name] Transmit the configuration item for the serial interface

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] ($p_L + p_H \times 256) = 2$ ($p_L = 2, p_H = 0$)
fn = 12
$1 \le a \le 4$

[Description] • Transmits the configuration item for the serial interface specified by *a*.

a	Configuration item
1	Transmission speed
2	Parity
3	Flow control
4	Data length

<Function 48> **GS (E *pL pH fn d1 d2 d3*** (*fn* = 48)

[Name] Delete the paper layout

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
Hex	1D	28	45	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
Decimal	29	40	69	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*

[Range] ($p_L + p_H \times 256) = 4$ ($p_L = 4, p_H = 0$)
fn = 48
d1 = 67
d2 = 76
d3 = 82

[Description] • Deletes all the setting values for the paper layout (no paper layout is set).

<Function 49> **GS (E *pL pH fn sa ; sb ; sc ; sd ; se ; sf ; sg ; sh ;*** (*fn* = 49)

[Name] Set the paper layout

[Format]

ASCII	GS	(	E	*pL pH fn sa ; sb ; sc ; sd ; se ; sf ; sg ; sh ;*
Hex	1D	28	45	*pL pH fn sa 3B sb 3B sc 3B sd 3B se 3B sf 3B sg 3B sh 3B*
Decimal	29	40	69	*pL pH fn sa 59 sb 59 sc 59 sd 59 se 59 sf 59 sg 59 sh 59*

[Range] $9 \le (p_L + p_H \times 256) \le 36$ $(9 \le p_L \le 36, p_H = 0)$
fn = 49
sa = “48”, “49”, “64”
”135” ≤ *sb* ≤ “3000”
”25” ≤ *sc* ≤ “100”
”0” ≤ *sd* ≤ “3000”
”0” ≤ *se* ≤ “3000”
”38” ≤ *sf* ≤ “3000”
”27” ≤ *sg* ≤ “507” [when *sa*="48" or "49"]
”47” ≤ *sg* ≤ “507” [when *sa*="64"]
”240” ≤ *sh* ≤ “720” [when *sa*="48" or "49"]
”240” ≤ *sh* ≤ “700” [when *sa*="64"]
If any one of the following cases occurs, this command is ignored because the parameter is improper:
When *sa* = “49” is specified:
sb ≤ *sd*
sb ≤ *se*
sb < *sf*
sb – *sc* ≤ 200
paper width < *sg* + *sh* + 53 [when paper width is set to 80 mm]
paper width < *sg* + *sh* + 43 [when paper width is set to 79 mm]
paper width < *sg* + *sh* + 33 [when paper width is set to 78 mm or less]
When *sa* = “64” is specified:
sd < *sc*
se ≥ *sc*
sb < *sd* + *sf*
sb – *sc* ≤ 200
paper width < *sg* + *sh* + 53

[Default (upon shipment)]
No paper layout is set.

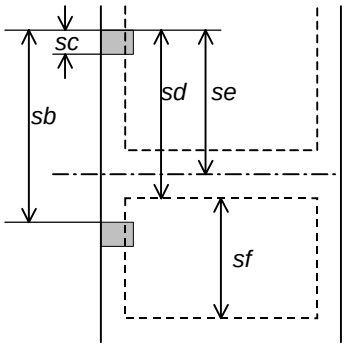
[Description]
- Sets the paper layout (origin of layout, layout in the vertical direction and horizontal direction) in the NV memory by using character strings.
  - Sets the origin of the layout by *sa*.

sa	Origin of layout	Remarks (usable paper)
“48”	None (does not use the layout)	Receipt (without black mark)
“49”	Top of a black mark (BM)	Receipt or die-cut label (with black mark)
“64”	Bottom of a label	Die-cut label (without black mark)

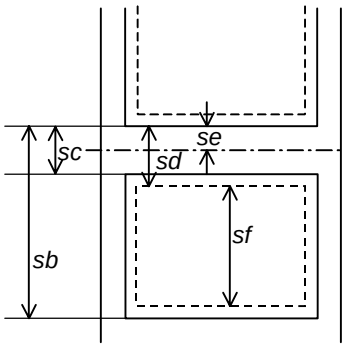
- Sets the layout in the vertical direction by *sb* to *sf*. The setting unit is 0.1 mm {0.004"}. (BM = black mark).

	when *sa* = "49"	when *sa* = "64"
sb	The distance between the top of the BM and the top of the next BM.	The distance between the bottom of a label and the bottom of the next label.
sc	The distance between the top and bottom of the BM.	The distance between the bottom of a label and the top of the next label.
sd	The distance between the top of the BM and the print starting position.	The distance between the bottom of a label and the print starting position.
se	The distance between the top of the BM and the cutting position.	The distance between the bottom of a label and the cutting position.
sf	The distance between the print starting position and the bottom of the print area.	The distance between the print starting position and the bottom of the print area.

(when *sa* = "49" is specified)



(when *sa* = "64" is specified)

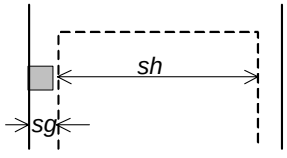


- Sets the layout in the horizontal direction by *sg* and *sh*. The setting unit is 0.1 mm {0.004"}.

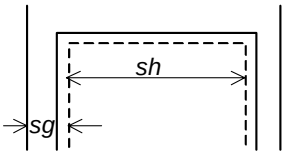
	when *sa* = "49"	when *sa* = "64"
sg	The distance between the left edge of the paper and the left edge of the print area.	The distance between the left edge of the paper and the left edge of the print area.
sh	The distance between the left edge of the print area and the right edge of the print area.	The distance between the left edge of the print area and right edge of the print area.

- For the paper dimensions that can be used, refer to Section 1.7, Paper Specifications.

(when *sa* = "49" is specified)

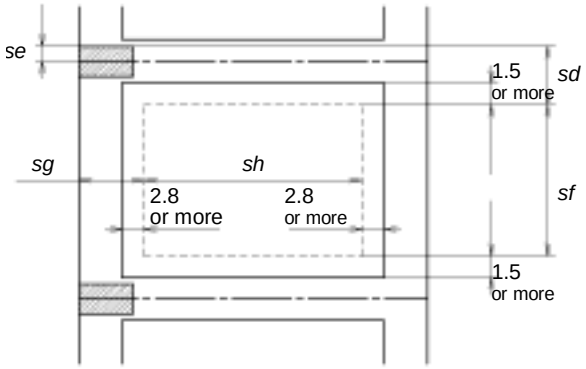


(when *sa* = "64" is specified)



[Notes]

- Take the following into consideration if die-cut labels are used:
  - The cutting position *se* must be set between the labels. It is also recommended to cut the label as far as possible from the top or the bottom of the label.
  - The print position – *sd* and *sf* (top and bottom margin) must be set over 1.5 mm {0.059"} from the top and the bottom of the label, respectively.
  - The print position – *sg* and *sh* (left and right margin) must be set over 2.8 mm {0.11"} from the left and the right of the label, respectively.
  - When *sa* = “49” is specified, die-cut label printing (with black marks) is possible. However, there is no way that the printer can differentiate the type of paper – die-cut label (with black marks) or receipt (with black marks). Therefore, the user must consider carefully the print position and the cutting position.



  - If the distance between the cutting position and the next print starting position is set to 2.75 mm {0.11"} or less, the printer cannot perform feeding in reverse to set the print starting position on the current label during standby at label peeling position.
- If the paper layout is set with *sa*="49" or "64," the printer feeds paper to the print starting position on the next label when the printer executes either one of the following operations first.
  - **GS (E** <Function 2> is executed.
  - The power is turned on again or the printer is reset.

<Function 50> **GS (E *pL pH fn n*** (*fn* = 50)

[Name] Transmit the paper layout information

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*n*
Hex	1D	28	45	*pL*	*pH*	*fn*	*n*
Decimal	29	40	69	*pL*	*pH*	*fn*	*n*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 50
n = 64, 80

[Description]
- Transmits the paper layout information.

n	Function
64	Transmits setting values of the paper layout (unit: 0.1 mm {0.004"}).
80	Transmits actual values of the paper layout (units: dots).

GS (H *pL pH fn [parameters]*

[Name] Request response transmission

[Description]
- Various processes are performed as the response.
  - *pL*, *pH* specify ($pL + pH \times 256$) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**GS (H *pL pH fn m d1 d2 d3 d4***	48	Set the process ID response.
49	**GS (H *pL pH fn m d***	49	Enable/disable the offline response transmission.

[Note]
- Do not use this command in a system that uses the printer with the OPOS driver or the JavaPOS driver provided by Seiko Epson Corporation.

<Function 48> **GS (H *pL pH fn m d1 d2 d3 d4*** (*fn* = 48)

[Name] Set the process ID response

[Format]

ASCII	GS	(	H	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*
Hex	1D	28	48	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*
Decimal	29	40	72	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*

[Range] ($pL + pH \times 256$) = 6 (pL =6, pH = 0)
fn = 48
m = 48
$32 \le d \le 126$

[Description]
- Saves the process ID specified by (*d1*, *d2*, *d3*, *d4*) for the data processed just before this function.

<Function 49> **GS (H *pL pH fn m d*** (*fn* = 49)

[Name] Enable/disable the offline response transmission

[Format]

ASCII	GS	(	H	*pL*	*pH*	*fn*	*m*	*d*
Hex	1D	28	48	*pL*	*pH*	*fn*	*m*	*d*
Decimal	29	40	72	*pL*	*pH*	*fn*	*m*	*d*

[Range] ($p_L + p_H \times 256$) = 3 (p_L =3, p_H = 0)
fn = 49
m = 48
$0 \le d \le 2$, $48 \le d \le 50$

[Default] *d* = 0

[Description] • Enables or disables the offline response transmission.

d	Function
0, 48	Disables the offline response transmission.
1, 49	Enables the offline response transmission (not including the offline cause).
2, 50	Enables the offline response transmission (including the offline cause).

- When offline response is enabled (*d* = 1, 2, 49, 50), offline response is transmitted when the printer goes offline with the following cause.
  - Roll paper cover is open.
  - Printing stopped by paper end.
  - Recoverable error occurred.
  - Unrecoverable error occurred.
- When (*d* = 2, 50) is specified, the offline cause to be transmitted is the five bytes that follow:
  - First byte

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	No CPU execution error.
	On	01	1	CPU execution error.
1	Off	00	0	No read/write error in memory.
	On	02	2	Read/write error in memory.
2	Off	00	0	No read/write error in the gate array.
	On	04	4	Read/write error in the gate array.
3 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

• Second byte

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	No high voltage error.
	On	01	1	High voltage error.
1	Off	00	0	No low voltage error.
	On	02	2	Low voltage error.
2	Off	00	0	No overcurrent error.
	On	04	4	Overcurrent error.
3 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

• Third byte

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	No thermistor error.
	On	01	1	Thermistor error
1 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

• Fourth byte

Bit	Off/On	Hex	Decimal	Contents
0	--	--	--	Reserved.
1	Off	00	0	No roll paper cover open error (when [Msw 8-8] is on).
	On	02	2	Roll paper cover open error (when [Msw 8-8] is on).
2	Off	00	0	No paper layout error.
	On	04	4	Paper layout error.
3 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

• Fifth byte

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	No roll paper cover open error (when [Msw 8-8] is off).
	On	01	1	Roll paper cover open error (when [Msw 8-8] is off).
1	Off	00	0	No print head high temperature error.
	On	02	2	Print head high temperature error.
2 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

GS (K *pL pH fn [parameters]*

[Name] Select print control method(s)

[Description]
- Selects the print control methods.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**GS (K *pL pH fn m***	48	Select the print control mode.
49	**GS (K *pL pH fn m***	49	Select the print density.
50	**GS (K *pL pH fn m***	50	Select the print speed.
97	**GS (K *pL pH fn m***	97	Select the number of parts for the thermal head energizing.

<Function 48> **GS (K *pL pH fn m*** (*fn* = 48)

[Name] Select the print control mode

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 48
0 ≤ *m* ≤ 4 , 48 ≤ *m* ≤ 52

[Default] *m* = 1

[Description]
- Selects the print control mode.

m	Print control mode
0, 48 1, 49	Print control mode 1 (standard).
2, 50	Print control mode 2 (fence bar code).
3, 51	Print control mode 3 (ladder bar code).
4, 52	Print control mode 4 (2-dimensional code).

[Note]
- When (*m* = 3, 4, 51, or 52), the paper may be fed for the maximum 10 dot lines.

<Function 49> **GS (K *pL pH fn m*** (*fn* = 49)

[Name] Select the print density

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] $(p_L + p_H \times 256) = 2$ $(p_L = 2, p_H = 0)$
$fn = 49$
$0 \le m \le 8$, $250 \le m \le 255$

[Default] $m = 0$ (setting values of **GS (E** <Function 5: *a* = 5>)

[Description]
- Selects the print density.

m	Print density	
250	Standard print density × 70%.	light
251	Standard print density × 75%.	|
252	Standard print density × 80%.	|
253	Standard print density × 85%.	|
254	Standard print density × 90%.	|
255	Standard print density × 95%.	|
0	Standard print density (setting values of **GS (E** <Function 5: *a* = 5>).	|
1	Standard print density × 105%.	|
2	Standard print density × 110%.	|
3	Standard print density × 115%.	|
4	Standard print density × 120%.	|
5	Standard print density × 125%.	|
6	Standard print density × 130%.	|
7	Standard print density × 135%.	|
8	Standard print density × 140%.	dark

[Notes]
- The print density specified by this function is relative to the print density specified with the customized value of **GS (E** <Function 5: *a* = 5>.
- The range of the absolute ratio of the print density that can be set with the combination of this function and the customized value of **GS (E** <Function 5: *a* = 5> is 140% maximum to 70% minimum.
- The density of printing with four-part energizing on two-color paper may not be changed.
- The density of printing with four-part energizing on two-color paper may not be changed.

<Function 50> **GS (K *pL pH fn m*** (*fn* = 50)

[Name] Select the print speed

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 50
0 ≤ *m* ≤ 9 , 48 ≤ *m* ≤ 57

[Default] *m* = 0 (setting values of **GS (E** <Function 5: *a* = 6>)

[Description] • Selects the print speed.

m	Print speed	
0, 48	Setting values of **GS (E** <Function 5: *a* = 6>.	
1, 49	Print speed level 1.	slow
2, 50	Print speed level 2.	|
3, 51	Print speed level 3.	|
4, 52	Print speed level 4.	|
5, 53	Print speed level 5.	|
6, 54	Print speed level 6. (120 mm/s)	|
7, 55	Print speed level 7.	|
8, 56	Print speed level 8.	|
9, 57	Print speed level 9.	fast

• In the label peeler issuing mode, the print speed must be less than 120 mm/s {4.72"}.

<Function 97> **GS (K *pL pH fn m*** (*fn* = 97)

[Name] Select the number of parts for the thermal head energizing

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 97
0 ≤ *m* ≤ 4 , 48 ≤ *m* ≤ 52

[Default] *m* = 0 (setting values of **GS (E** <Function 5: *a* = 97>)

[Description] • Selects the number of parts for the thermal head energizing.

m	Number of parts for energizing
0, 48	Setting values of **GS (E** <Function 5: *a* = 97>.
1, 49	One-part energizing.
2, 50	Two-part energizing.
3, 51	Three-part energizing.
4, 52	Four-part energizing.

[Note] • To improve the quality of two-color printing, it is recommended to print with two-part energizing.

GS (L *pL pH m fn [parameters]*
GS 8 L *p1 p2 p3 p4 m fn [parameters]*

[Name] Set graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*[parameters]*		
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*[parameters]*		
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*[parameters]*		
ASCII	GS	8	L	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*
Hex	1D	38	4C	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*
Decimal	29	56	76	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*

- In the description below, only **GS (L** is used for explanation.
  - Note that **GS (L** and **GS 8 L** have the same function.
  - If the *[parameters]* in the Format column in the table below exceed 65533 bytes, use **GS 8 L**.
- The only difference between **GS (L** and **GS 8 L** is as listed below. The format for **GS 8 L** is not provided in the following descriptions; however, [Range], [Default], [Description], and [Notes] for parameters other than those listed in the table below are the same as for **GS (L**.

<Parameters specifying the number of parameters after *pH* or *p4*>

Command	Parameters	Structure	Maximum value
GS (L	*pL*, *pH*	2 bytes	65,535
GS 8 L	*p1*, *p2*, *p3*, *p4*	4 bytes	4,294,967,295

[Description]
- Processes graphics data.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*m*, *fn*, and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
0, 48	**GS (L *pL pH m fn***	48	Transmit the NV graphics memory capacity.
2, 50	**GS (L *pL pH m fn***	50	Print the graphics data in the print buffer.
3, 51	**GS (L *pL pH m fn***	51	Transmit the remaining capacity of the NV graphics memory.
64	**GS (L *pL pH m fn d1 d2***	64	Transmit the key code list for defined NV graphics.
65	**GS (L *pL pH m fn d1 d2 d3***	65	Delete all NV graphics data.
66	**GS (L *pL pH m fn kc1 kc2***	66	Delete the specified NV graphics data.
67	**GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1... [c d1...dk]b***	67	Define the NV graphics data (raster format).
69	**GS (L *pL pH m fn kc1 kc2 x y***	69	Print the specified NV graphics data.
112	**GS (L *pL pH m fn a bx by c xL xH yL yH d1…dk***	112	Store the graphics data in the print buffer (raster format).

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 48, 51, or 64> is transmitted, the data following must not be transmitted until the status is received. And, it will be necessary to perform the ESC/POS Handshaking Protocol procedures when using <Function 64>.

<Function 48> **GS (L *pL pH m fn*** (*fn* = 0, 48)

[Name] Transmit the NV graphics memory capacity

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] ($p_L + p_H \times 256$) = 2 (p_L = 2 , p_H = 0)
m = 48
fn = 0, 48

[Description]
- Transmits the entire capacity of the NV graphics area (number of bytes in the NV graphics area).

<Function 50> **GS (L *pL pH m fn*** (*fn* = 2, 50)

[Name] Print the graphics data in the print buffer

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] ($p_L + p_H \times 256$) = 2 (p_L = 2, p_H = 0)
m = 48
fn = 2, 50

[Description]
- Prints the buffered graphics data stored by the process of **GS (L** <Function 112>.

<Function 51> **GS (L *pL pH m fn*** (*fn* = 3, 51)

[Name] Transmit the remaining capacity of the NV graphics memory

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] ($p_L + p_H \times 256$) = 2 (p_L = 2, p_H = 0)
m = 48
fn = 3, 51

[Description]
- Transmits the number of bytes of remaining memory (unused area) in the NV graphics area.

<Function 64> **GS (L *pL pH m fn d1 d2*** (*fn* = 64)

[Name] Transmit the key code list for defined NV graphics

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*

[Range] ($p_L + p_H \times 256$) = 4 (p_L = 4, p_H = 0)
m = 48
fn = 64
d1 = 75
d2 = 67

[Description]
- Transmits the defined NV graphics key code list.

<Function 65> **GS (L *pL pH m fn d1 d2 d3*** (*fn* = 65)

[Name] Delete all NV graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*

[Range] ($p_L + p_H \times 256$) = 5 (p_L = 5, p_H = 0)
m = 48
fn = 65
d1 = 67
d2 = 76
d3 = 82

[Description]
- Deletes all NV graphics data.

<Function 66> **GS (L *pL pH m fn kc1 kc2*** (*fn* = 66)

[Name] Delete the specified NV graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*

[Range] ($p_L + p_H \times 256$) = 4 (p_L = 4, p_H = 0)
m = 48
fn = 66
$32 \le kc1 \le 126$
$32 \le kc2 \le 126$

[Description]
- Deletes the NV graphics data defined by the key codes (*kc1* and *kc2*).

<Function 67>

GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1…dk]1…[c d1....dk]b* (*fn* = 67)

[Name] Define the NV graphics data (raster format)

[Format]

ASCII	GS	(	L	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*
Hex	1D	28	4C	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*
Decimal	29	40	76	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*

[Range] (*pL*, *pH*) for **GS (L**:

$12 \le (p_L + p_H \times 256) \le 65535 \quad (0 \le p_L \le 255, 0 \le p_H \le 255)$

(*p1*, *p2*, *p3*, *p4*) for **GS 8 L**:

$12 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$

$(0 \le p1 \le 255, 0 \le p2 \le 255, 0 \le p3 \le 255, 0 \le p4 \le 255)$

Common parameters for **GS (L** and **GS 8 L**:

$m = 48$

$fn = 67$

$a = 48$

$32 \le kc1 \le 126$

$32 \le kc2 \le 126$

$b = 1$ [when single-color paper]

$b = 1, 2$ [when two-color paper]

$1 \le (x_L + x_H \times 256) \le 8192 \quad (0 \le x_L \le 255, 0 \le x_H \le 32)$

$1 \le (y_L + y_H \times 256) \le 2304 \quad (0 \le y_L \le 255, 0 \le y_H \le 9)$

$c = 49$ [when single-color paper]

$c = 49, 50$ [when two-color paper]

$0 \le d \le 255$

$k = (\text{int}((x_L + x_H \times 256) + 7) / 8) \times (y_L + y_H \times 256)$

The total capacity of the NV graphics memory is selectable as any one of [0, 64K, 128K, 192K, 256K, 320K, 384K] bytes with **GS (E** <Function 5: *a* = 2>. The default value is 384KB.

[Description]

- Defines the NV graphics data (raster format) as a record specified by the key codes (*kc1*, *kc2*) in the NV graphics area.
- *b* specifies the number of the color of the defined data.
- x_L, x_H specify the number of dots in the horizontal direction as $(x_L + x_H \times 256)$.
- y_L, y_H specify the number of dots in the vertical direction as $(y_L + y_H \times 256)$.
- *c* specifies the color of the defined data.

c	Defined data color
49	Color 1
50	Color 2

- *d* specifies the defined data (raster format).

[Notes]

- In cases where there is insufficient capacity available for storing NV graphics data specified by $(x_L + x_H \times 256)$ and $(y_L + y_H \times 256)$, this function is ignored.
- The defined data colors are as follows:
  - Color 1 means black (a high level of energy) on the specified two-color thermal paper.
  - Color 2 means red (a low level of energy) on the specified two-color thermal paper.

<Function 69> **GS (L *pL pH m fn kc1 kc2 x y*** (*fn* = 69)

[Name] Print the specified NV graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*	*x*	*y*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*	*x*	*y*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*	*x*	*y*

[Range] ($p_L + p_H \times 256) = 6$ ($p_L = 6$, $p_H = 0$)
$m = 48$
$fn = 69$
$32 \le kc1 \le 126$
$32 \le kc2 \le 126$
$x = 1, 2$
$y = 1, 2$

[Description]
- Prints the NV graphics data defined by the key codes (*kc1* and *kc2*).
- The graphics data is enlarged by *x* and *y* in the horizontal and vertical directions.

x, *y*	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	203/2 dpi	203/2 dpi

<Function 112> **GS (L *pL pH m fn a bx by c xL xH yL yH d1...dk*** (*fn* = 112)

[Name] Store the graphics data in the print buffer (raster format)

[Format]

ASCII	GS	(	L	*pL pH m fn a bx by c xL xH yL yH d1...dk*
Hex	1D	28	4C	*pL pH m fn a bx by c xL xH yL yH d1...dk*
Decimal	29	40	76	*pL pH m fn a bx by c xL xH yL yH d1...dk*

[Range] (*pL*, *pH*) for **GS (L**:

$11 \le (pL + pH \times 256) \le 65535 \quad (0 \le pL \le 255, 0 \le pH \le 255)$

(*p1*, *p2*, *p3*, *p4*) for **GS 8 L**:

$11 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$

$(0 \le p1 \le 255, 0 \le p2 \le 255, 0 \le p3 \le 255, 0 \le p4 \le 255)$

Common parameters for **GS (L** and **GS 8 L**:

m = 48

fn = 112

a = 48

bx = 1, 2

by = 1, 2

c = 49 [when single-color paper]

c = 49, 50 [when two-color paper]

$1 \le (xL + xH \times 256) \le 1024 \quad (0 \le xL \le 255, 0 \le xH \le 4)$

When single-color paper

$1 \le (yL + yH \times 256) \le 1662 \quad (0 \le yL \le 255, 0 \le yH \le 6)$ [when *by*=1]

$1 \le (yL + yH \times 256) \le 831 \quad (0 \le yL \le 255, 0 \le yH \le 3)$ [when *by*=2]

When two-color paper

$1 \le (yL + yH \times 256) \le 831 \quad (0 \le yL \le 255, 0 \le yH \le 3)$ [when *by*=1]

$1 \le (yL + yH \times 256) \le 415 \quad (0 \le yL \le 255, yH = 0,1)$ [when *by*=2]

$0 \le d \le 255$

$k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$

[Description]

- Stores the graphics data (raster format) in the print buffer.
- The graphics data is enlarged by *bx* and *by* in the horizontal and vertical directions.

bx, *by*	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	203/2 dpi	203/2 dpi

- *c* specifies the color for the stored data.

c	Stored data color
49	Color 1
50	Color 2

- *xL*, *xH* specify the number of dots in the horizontal direction as $(xL + xH \times 256)$.
- *yL*, *yH* specify the number of dots in the vertical direction as $(yL + yH \times 256)$.
- *d* specifies the stored data (raster format).

[Notes]

- Each color can be defined once respectively in standard mode.
- The stored data colors are as follows:
  - Color 1 means black (a high level of energy) on the specified two-color thermal paper.
  - Color 2 means red (a low level of energy) on the specified two-color thermal paper.

GS (M *pL pH fn m*

[Name] Customize printer control value(s)

[Description]
- Customizes the printer control value(s).
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *m*).
  - *fn* specifies the function.
  - *m* specifies the process of each function.

fn	Format	Function No.	Function name
1, 49	**GS (M *pL pH fn m***	1	Save the setting values from the work area into the storage area.
2, 50	**GS (M *pL pH fn m***	2	Load the setting values stored in the storage area to the work area.
3, 51	**GS (M *pL pH fn m***	3	Select the setting values loaded to the work area after the initialization process.

- Applied setting values for this command

Setting value	Command
Status	**GS a**
Characters	**ESC SP**, **ESC !**, **ESC –**, **ESC E**, **ESC G**, **ESC M**, **ESC R**, **ESC V**, **ESC t**, **ESC {**, **GS !**, **GS (N** <Function 48>, **GS B**, **GS b**, **FS !**, **FS &**, **FS (A** <Function 48>, **FS –**, **FS .**, **FS C**, **FS S**, **FS W**
Line spacing	**ESC 2**, **ESC 3**
Print position	**ESC D**, **ESC T**, **ESC a**, **GS L**, **GS W**
Bar code	**GS H**, **GS f**, **GS h**, **GS w**
2-dimensional code	**GS (k** <Function 065 ~ 070 and 165, 167, 169, 265>
Other characteristics	**ESC c 3**, **ESC c 4**, **ESC c 5**, **GS (D**, **GS (H** <Function 49>, **GS :**, **GS P**, **GS z 0**

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.

<Function 1> **GS (M *pL pH fn m*** (*fn* = 1,49)

[Name] Save the setting values from the work area into the storage area

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 1, 49
m = 1, 49

[Description]
- Saves the setting values of commands listed in the table on the previous page and stored in the work area (RAM) in the storage area (Flash ROM).

<Function 2> **GS (M *pL pH fn m*** (*fn* = 2,50)

[Name] Load the setting values stored in the storage area to the work area

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 2, 50
m = 0, 1, 48, 49

[Description]
- Loads the command setting values stored in storage area specified by *m* to the work area.

m	Function
0, 48	The default values described in this specification are applied.
1, 49	The setting values are stored in the storage area.

[Note]
- Values not listed among the above commands are not affected.

<Function 3> **GS (M *pL pH fn m*** (*fn* = 3,51)

[Name] Select the setting values loaded to the work area after the initialization process

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 3, 51
m = 0, 1, 48, 49

[Default (upon shipment)]
m = 0

[Description]
- Selects the command setting values loaded to the work area after the printer performs the initialization process.

m	Function
0, 48	The default values described in this specification are applied.
1, 49	The setting values are stored in the storage area.

[Note]
- For values not listed among the above commands, the default values described in this specification are applied.

GS (N *pL pH fn [parameters]*

[Name] Select character style(s)

[Description]
- Selects the character style(s).
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**GS (N *pL pH fn m***	48	Select character color.

[Note]
- This command setting affects only in two-color printing.

<Function 48> GS (N *pL pH fn m* (*fn* = 48)

[Name] Select character color

[Format]

ASCII	GS	(	N	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4E	*pL*	*pH*	*fn*	*m*
Decimal	29	40	78	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 48
m = 49, 50

[Default] *m* = 49

[Description]
- Selects character color.

m	Character color
49	Color 1
50	Color 2

[Notes]
- The character colors are as follows:
  - Color 1 means black (a high level of energy) on the specified two-color thermal paper.
  - Color 2 means red (a low level of energy) on the specified two-color thermal paper.

GS (k *pL pH cn fn [parameters]*

[Name] Set up and print symbol

[Description]
- Processes the data for two-dimensional codes.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*cn*, *fn*, and *[parameters]*).
  - *cn* specifies the type of symbol.
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

cn	Type of Symbol
48	PDF417
49	QR Code
50	MaxiCode

fn	Format	Function No.	Function name
65	**GS (k *pL pH cn fn n***	065	PDF417: Set the number of columns in the data region.
66	**GS (k *pL pH cn fn n***	066	PDF417: Set the number of rows.
67	**GS (k *pL pH cn fn n***	067	PDF417: Set the width of the module.
68	**GS (k *pL pH cn fn n***	068	PDF417: Set the row height.
69	**GS (k *pL pH cn fn m n***	069	PDF417: Set the error correction level.
70	**GS (k *pL pH cn fn m***	070	PDF417: Select the options.
80	**GS (k *pL pH cn fn m d1...dk***	080	PDF417: Store the data in the symbol storage area.
81	**GS (k *pL pH cn fn m***	081	PDF417: Print the symbol data in the symbol storage area.
82	**GS (k *pL pH cn fn m***	082	PDF417: Transmit the size information of the symbol data in the symbol storage area.
65	**GS (k *pL pH cn fn n1 n2***	165	QR Code: Select the model.
67	**GS (k *pL pH cn fn n***	167	QR Code: Set the size of module.
69	**GS (k *pL pH cn fn n***	169	QR Code: Select the error correction level.
80	**GS (k *pL pH cn fn m d1...dk***	180	QR Code: Store the data in the symbol storage area.
81	**GS (k *pL pH cn fn m***	181	QR Code: Print the symbol data in the symbol storage area.
82	**GS (k *pL pH cn fn m***	182	QR Code: Transmit the size information of the symbol data in the symbol storage area.

fn	Format	Function No.	Function name
65	**GS (k *pL pH cn fn n***	265	MaxiCode: Select the mode.
80	**GS (k *pL pH cn fn m d1...dk***	280	MaxiCode: Store the data in the symbol storage area.
81	**GS (k *pL pH cn fn m***	281	MaxiCode: Print the symbol data in the symbol storage area.
82	**GS (k *pL pH cn fn m***	282	MaxiCode: Transmit the size information of the symbol data in the symbol storage area.

- "Symbol data" refers to the data received with <Function 080, 180, or 280> before encoding.
- "Symbol storage area" refers to the range for storing data received with <Function 080, 180, or 280> before encoding.

[Note]
- When <Function 082, 182, or 282> is transmitted, the data following must not be transmitted until the status is received.

<Function 065> **GS (k *pL pH cn fn n*** (*cn* = 48, *fn* = 65)

[Name] PDF417: Set the number of columns in the data region

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range]
$(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 48$
$fn = 65$
$0 \le n \le 30$

[Default] $n = 0$

[Description]
- Sets the number of columns in the data region for PDF417.
- When $n = 0$, specifies automatic processing. In this case, the number of columns in the data region is calculated with the number of codewords or the range of print area.
- When $n \neq 0$, sets the number of columns in the data region to *n* codewords.

[Notes]
- The following data are not included in the number of columns.
  - Start pattern and stop pattern
  - Left-row indicator codewords and right-row indicator codewords

<Function 066> **GS (k *pL pH cn fn n*** (*cn* = 48, *fn* = 66)

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 48$
$fn = 66$
$n = 0$, $3 \le n \le 90$

[Default] $n = 0$

[Description]
- Sets the number of rows for PDF417.
- When $n = 0$, specifies automatic processing. In this case, the number of rows is calculated with the number of codewords or the range of print area.
- When $n \neq 0$, sets the number of rows to n rows.

<Function 067> **GS (k *pL pH cn fn n*** (*cn* = 48, *fn* = 67)

[Name] PDF417: Set the width of the module

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 48$
$fn = 67$
$2 \le n \le 8$

[Default] $n = 3$

[Description]
- Sets the width of the module for PDF417 to n dots.

<Function 068> **GS (k *pL pH cn fn n*** (*cn* = 48, *fn* = 68)

[Name] PDF417: Set the row height

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 48$
$fn = 68$
$2 \le n \le 8$

[Default] $n = 3$

[Description]
- Sets the row height for PDF417 to [$n \times$ (the width of the module)].

<Function 069> **GS (k *pL pH cn fn m n*** (*cn* = 48, *fn* = 69)

[Name] PDF417: Set the error correction level

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*n*

[Range] $(p_L + p_H \times 256) = 4$ $(p_L = 4, p_H = 0)$
$cn = 48$
$fn = 69$
$m = 48, 49$
$48 \le n \le 56$ [when $m = 48$]
$1 \le n \le 40$ [when $m = 49$]

[Default] $m = 49$, $n = 1$

[Description]
- Sets the error correction level for PDF417.
- When $m = 48$, the error correction level is set by the "Level Setting" and the "Proportional Setting" is canceled. The number of error correction codewords are as follows:

n	Function	Number of error correction codewords
48	Select error correction level 0	2
49	Select error correction level 1	4
50	Select error correction level 2	8
51	Select error correction level 3	16
52	Select error correction level 4	32
53	Select error correction level 5	64
54	Select error correction level 6	128
55	Select error correction level 7	256
56	Select error correction level 8	512

- When $m = 49$, the error correction level is set by the "Proportional Setting" to the level indicated by the number for encoded data, and the "Level Setting" is canceled. The rate is set to [$n \times 10\%$]. The error correction levels in the following table are determined by the calculation [Data codeword $\times n \times 0.1$ = (A)] (fractions of 0.5 and over are rounded up, and others are truncated.)

Result (A)	Use the error correction level	Number of error correction codeword
0 ~ 3	Error correction level 1	4
4 ~ 10	Error correction level 2	8
11 ~ 20	Error correction level 3	16
21 ~ 45	Error correction level 4	32
46 ~ 100	Error correction level 5	64
101 ~ 200	Error correction level 6	128
201 ~ 400	Error correction level 7	256
401 or more	Error correction level 8	512

<Function 070> **GS (k *pL pH cn fn m*** (*cn* = 48, *fn* = 70)

[Name] PDF417: Select the options

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
cn = 48
fn = 70
m = 0, 1

[Default] *m* = 0

[Description] • Selects the options for PDF417.

m	Function
0	Selects the standard PDF417.
1	Selects the truncated PDF417.

<Function 080> **GS (k *pL pH cn fn m d1…dk*** (*cn* = 48, *fn* = 80)

[Name] PDF417: Store the data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 65535$ $(0 \le p_L \le 255, 0 \le p_H \le 255)$
cn = 48
fn = 80
m = 48
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description] • Stores the PDF417 symbol data (*d1...dk*) in the symbol storage area.

<Function 081> **GS (k *pL pH cn fn m*** (*cn* = 48, *fn* = 81)

[Name] PDF417: Print the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 48
fn = 81
m = 48

[Description]
- Encodes and prints the PDF417 symbol data in the symbol storage area using the process of **GS (k** <Function 080>.

[Notes]
- Consider that a quiet zone (left, right, upward, and downward space areas, depending on the PDF417 symbol specifications) must be ensured for PDF417 printing.
- In standard mode, a symbol higher than 831 dots cannot be printed with this printer.

<Function 082> **GS (k *pL pH cn fn m*** (*cn* = 48, *fn* = 82)

[Name] PDF417: Transmit the size information of the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 48
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded PDF417 symbol data in the symbol storage area using the process of **GS (k** <Function 080>.

[Notes]
- This function does not print.
- The size information does not include a quiet zone (left, right, upward, and downward space areas, depending on the PDF417 symbol specifications).

<Function 165> **GS (k *pL pH cn fn n1 n2*** (*cn* = 49, *fn* = 65)

[Name] QR Code: Select the model

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*

[Range] ($p_L + p_H \times 256$) = 4 (p_L = 4, p_H = 0)
cn = 49
fn = 65
n1 = 49, 50
n2 = 0

[Default] *n1* = 50 , *n2* = 0

[Description] • Selects the model for QR Code.

n1	Function
49	Selects model 1 conversion processing.
50	Selects model 2 conversion processing.

<Function 167> **GS (k *pL pH cn fn n*** (*cn* = 49, *fn* = 67)

[Name] QR Code: Set the size of module

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0)
cn = 49
fn = 67
$1 \le n \le 16$

[Default] *n* = 3

[Description] • Sets the size of the module for QR Code to *n* dots.

<Function 169> **GS (k *pL pH cn fn n*** (*cn* = 49, *fn* = 69)

[Name] QR Code: Select the error correction level

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 49$
$fn = 69$
$48 \le n \le 51$

[Default] $n = 48$

[Description] • Selects the error correction level for QR Code.

n	Function	Reference: Approximate figure for recovery (%)
48	Select error correction level L	7%
49	Select error correction level M	15%
50	Select error correction level Q	25%
51	Select error correction level H	30%

<Function 180> **GS (k *pL pH cn fn m d1…dk*** (*cn* = 49, *fn* = 80)

[Name] QR Code: Store the data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 7092$ $(0 \le p_L \le 255, 0 \le p_H \le 27)$
$cn = 49$
$fn = 80$
$m = 48$
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description] • Stores the QR Code symbol data (*d1...dk*) in the symbol storage area.

<Function 181> **GS (k *pL pH cn fn m*** (*cn* = 49, *fn* = 81)

[Name] QR Code: Print the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0)
cn = 49
fn = 81
m = 48

[Description]
- Encodes and prints the QR Code symbol data in the symbol storage area using the process of **GS (k** <Function 180>.

[Notes]
- Consider that a quiet zone (left, right, upward, and downward space areas, depending on the QR Code symbol specifications) must be ensured for QR Code printing.
- In standard mode, a symbol higher than 831 dots cannot be printed with this printer.

<Function 182> **GS (k *pL pH cn fn m*** (*cn* = 49, *fn* = 82)

[Name] QR Code: Transmit the size information of the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0)
cn = 49
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded QR Code symbol data in the symbol storage area using the process of **GS (k** <Function 180>.

[Notes]
- This function does not print.
- The size information does not include a quiet zone (left, right, upward, and downward space areas, depending on the QR Code symbol specifications).

<Function 265> **GS (k *pL pH cn fn n*** (*cn* = 50, *fn* = 65)

[Name] MaxiCode: Select the mode

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3, p_H = 0)$
$cn = 50$
$fn = 65$
$50 \le n \le 54$

[Default] $n = 50$

[Description] • Selects the mode for MaxiCode.

n	Function
50	Selects the Mode 2 conversion processing.
51	Selects the Mode 3 conversion processing.
52	Selects the Mode 4 conversion processing.
53	Selects the Mode 5 conversion processing.
54	Selects the Mode 6 conversion processing.

<Function 280> **GS (k *pL pH cn fn m d1…dk*** (*cn* = 50, *fn* = 80)

[Name] MaxiCode: Store the data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 141$ $(4 \le p_L \le 141, p_H = 0)$
$cn = 50$
$fn = 80$
$m = 48$
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description] • Stores the MaxiCode symbol data (*d1...dk*) in the symbol storage area.

<Function 281> **GS (k *pL pH cn fn m*** (*cn* = 50, *fn* = 81)

[Name] MaxiCode: Print the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 50
fn = 81
m = 48

[Description]
- Encodes and prints the MaxiCode symbol data in the symbol storage area using the process of **GS (k** <Function 280>.

[Note]
- Consider that a quiet zone (left, right, upward, and downward space areas, depending on the MaxiCode symbol specifications) must be ensured for MaxiCode printing.

<Function 282> **GS (k *pL pH cn fn m*** (*cn* = 50, *fn* = 82)

[Name] MaxiCode: Transmit the size information of the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 50
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded MaxiCode symbol data in the symbol storage area using the process of **GS (k** <Function 280>.

[Notes]
- This function does not print.
- The size information does not include a quiet zone (left, right, upward, and downward space areas, depending on the MaxiCode symbol specifications).

GS ∗ *x y d1...dk* [obsolete command]

[Name] Define downloaded bit image

[Format]

ASCII	GS	∗	*x*	*y*	*d1...dk*
Hex	1D	2A	*x*	*y*	*d1...dk*
Decimal	29	42	*x*	*y*	*d1...dk*

[Range] $1 \le x \le 255$
$1 \le y \le 46$ [where $1 \le x \times y \le 1536$]
$0 \le d \le 255$
$k = x \times y \times 8$

[Description]
- Defines the downloaded bit image in the downloaded graphic area.
- *x* specifies the number of bytes in the horizontal direction as *x* bytes.
- *y* specifies the number of bytes in the vertical direction as *y* bytes.
- *d* specifies the defined data (column format).

GS / *m* [obsolete command]

[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 downloaded bit image using the process of **GS ∗** and using the mode specified by *m*.

m	Mode	Vertical direction	Horizontal direction
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	203/2 dpi
2, 50	Double-height	203/2 dpi	203 dpi
3, 51	Quadruple	203/2 dpi	203/2 dpi

GS :

[Name] Start/end macro definition

[Format]

ASCII	GS	:
Hex	1D	3A
Decimal	29	58

[Description]
- Starts or ends macro definition.

[Note]
- The contents of the macro can be defined up to 2048 bytes.

GS B *n*

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

[Format]

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

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

[Default] $n = 0$

[Description]
- Turns white/black reverse print mode on or off.
  - When the LSB of *n* is 0, white/black reverse mode is turned off.
  - When the LSB of, *n* is 1, white/black reverse mode is turned on.

GS H *n*

[Name] Select print position of HRI characters

[Format]

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

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

[Default] $n = 0$

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

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

GS I *n*

[Name] Transmit printer ID

[Format]

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

[Range] *n* = 1, 2, 49, 50 [the printer ID]
n = 33 [printer information A]
65 ≤ *n* ≤ 69 , *n* = 112 [printer information B]

[Description] • Transmits the printer ID or printer information.

• Transmits the printer ID specified.

n	Type of printer ID	ID
1, 49	Printer model ID	Hexadecimal: 4D / Decimal: 77
2, 50	Type ID	See table [Type ID].

[Type ID]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Multi-byte code characters not supported.
	On	01	1	Multi-byte code characters supported.
1 ~ 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5	--	--	--	Reserved.
7	Off	00	0	Fixed.

• Transmits the printer information A specified.

n	Type of printer information	Contents
33	Type information	See table [Type information].

The type information is the three bytes that follow:

[Type information (First byte)]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Multi-byte code characters not supported.
	On	01	1	Multi-byte code characters supported.
1 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[Type information (Second byte)]

Bit	Off/On	Hex	Decimal	Contents
0 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[Type information (Third byte)]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Peeler not installed or the continuous issuing mode is selected.
	On	01	1	Peeler installed and the peeling issuing mode is selected.
1 ~ 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

• Transmits the printer information B specified.

n	Type of printer information	Contents
65	Firmware version	Depends on firmware version.
66	Manufacturer	“EPSON”
67	Printer name	“TM-L90”
68	Product ID	Serial number.
69	Type of mounted additional fonts	Japanese model: “KANJI JAPANESE”
112	Status of DIP switches	See table [DIP switch status information].

The DIP switch status information is the tow bytes that follow:

[DIP switch status information (First byte)]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	DIP SW 1-1: Off
	On	01	1	DIP SW 1-1: On
1	Off	00	0	DIP SW 1-2: Off
	On	02	2	DIP SW 1-2: On
2	Off	00	0	DIP SW 1-3: Off
	On	04	4	DIP SW 1-3: On
3	Off	00	0	DIP SW 1-4: Off
	On	08	8	DIP SW 1-4: On
4, 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[DIP switch status information (Second byte)]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	DIP SW 1-5: Off
	On	01	1	DIP SW 1-5: On
1	Off	00	0	DIP SW 1-6: Off
	On	02	2	DIP SW 1-6: On
2	Off	00	0	DIP SW 1-7: Off
	On	04	4	DIP SW 1-7: On
3	Off	00	0	DIP SW 1-8: Off
	On	08	8	DIP SW 1-8: On
4, 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[Note] • When this command is transmitted, the data following must not be transmitted until the status is received.

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] $0 \le (n_L + n_H \times 256) \le 65535$ $(0 \le n_L \le 255, 0 \le n_H \le 255)$

[Default] $(n_L + n_H \times 256) = 0$ $(n_L = 0, n_H = 0)$

[Description]
- In standard mode, sets the left margin to [$(n_L + n_H \times 256) \times$ (horizontal motion unit)].

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] $0 \le x \le 255$
$0 \le y \le 255$

[Default] $x = 203$, $y = 406$

[Description]
- Sets the horizontal and vertical motion units to approximately 25.4/*x* mm {1/*x*"} and approximately 25.4/*y* mm {1/*y*"}, respectively.
- When *x* = 0, the default value of the horizontal motion unit is used.
- When *y* = 0, the default value of the vertical motion unit is used.

GS T *n*

[Name] Set print position to the beginning of the print line

[Format]

ASCII	GS	T	*n*
Hex	1D	54	*n*
Decimal	29	84	*n*

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

[Description]
- In standard mode, moves the print position to the beginning of the print line after performing the operation specified by *n*.

n	Function
0, 48	Cancel data in the current print buffer.
1, 49	Print data in the current print buffer.

GS W *nL nH*

[Name] Set print area width

[Format]

ASCII	GS	W	*nL*	*nH*
Hex	1D	57	*nL*	*nH*
Decimal	29	87	*nL*	*nH*

[Range] $0 \le (n_L + n_H \times 256) \le 65535$ $(0 \le n_L \le 255, 0 \le n_H \le 255)$

[Default] When the paper layout (the origin of the layout) is set to “does not use the layout” or “top of the black mark”:

$(n_L + n_H \times 256) = 576$ $(n_L = 64, n_H = 2)$ [for 80 – 78 mm of the paper width]

$(n_L + n_H \times 256) = (256 + (\text{paper width} - 38) \times 8)$ [for 77 – 38 mm of the paper width]

When the paper layout (the origin of the layout) is set to “bottom of the label”:

$(n_L + n_H \times 256) = 560$ $(n_L = 48, n_H = 2)$ [for 80 mm of the paper width]

$(n_L + n_H \times 256) = (224 + (\text{paper width} - 38) \times 8)$ [for 79 – 38 mm of the paper width]

[Description]
- In standard mode, sets the print area width to [$(n_L + n_H \times 256) \times$ (horizontal motion unit)].

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] $-32768 \le (n_L + n_H \times 256) \le 32767$

[Description]
- In page mode, moves the vertical print position to [$(n_L + n_H \times 256) \times$ (vertical or horizontal motion unit)] from the current position.
- A positive number specifies downward movement, and a negative number specifies upward movement.

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] $1 \le r \le 255$
$0 \le t \le 255$
$m = 0, 1$

[Description]
- Executes the macro that was defined with **GS :**.

m	Operation
0	Executes the macro *r* times continuously at an interval of [$t \times 100$ ms].
1	After waiting for [$t \times 100$ ms], flashes the LED indicator and waits for the FEED button to be pressed. After the button is pressed, executes the macro once. Then 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] $0 \le n \le 255$

[Default] *n* = 0 [when memory switch [Msw 1-3] is off.]
n = 2 [when memory switch [Msw 1-3] is on.]

[Description]

- Enables or disables basic ASB (Automatic Status Back).

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick out connector status disabled.
	On	01	1	Drawer kick out connector status enabled.
1	Off	00	0	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Roll paper sensor status disabled.
	On	08	8	Roll paper sensor status enabled.
4, 5	Off	00	0	Reserved.
6	Off	00	0	Panel button status disabled.
	On	40	64	Panel button status enabled.
7	Off	00	0	Reserved.

- While basic ASB is active, the selected enabled basic ASB status is transmitted whenever the status changes.
- The basic ASB status to be transmitted is the four bytes that follow:
  - First byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Fixed.
2	Off	00	0	Drawer kick out connector pin 3 is LOW.
	On	04	4	Drawer kick out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	Off	00	0	Roll paper cover is closed.
	On	20	32	Roll paper cover is open.
6	Off	00	0	Paper is not being fed by the paper FEED button.
	On	40	64	Paper is being fed by the paper FEED button.
7	Off	00	0	Fixed.

• Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Not waiting for online recovery.
	On	01	1	Waiting for online recovery.
1	Off	00	0	Paper FEED button is turned off.
	On	02	2	Paper FEED button is turned on.
2	Off	00	0	No recoverable error. (Autocutter error is excluded.)
	On	04	4	Recoverable error occurred. (Autocutter error is excluded.)
3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Fixed.

Bit 0: While waiting for the FEED button to be pressed, if **GS ^** is executed or the label peeler issuing mode is selected, the bit indicates “waiting for online recovery.”

• Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Roll paper near-end sensor: paper adequate.
	On	03	3	Roll paper near-end sensor: paper near end.
2, 3	Off	00	0	Roll paper end sensor: paper present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the roll paper cover is opening, this shows the state when the cover was still closed.

• Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Not waiting for label removal.
	On	01	1	Waiting for label removal.
1	--	--	--	Reserved.
2	Off	00	0	Label peeling sensor: paper present.
	On	04	4	Label peeing sensor: paper not present.
3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bit 0: When the continuous issuing mode is selected, the bit is fixed to “0.”

Bit 2: When the peeling issuing mode is selected, the bit changes during feeding of paper or during standby at the label peeling position.
When the continuous issuing mode is selected, the bit is fixed to “1.”

GS b *n*

[Name] Turn smoothing mode on/off

[Format]

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

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

[Default] $n = 0$

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

GS f *n*

[Name] Select font for HRI characters

[Format]

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

[Range] $n = 0, 1, 48, 49$ [for ANK model]
$0 \le n \le 2$, $48 \le n \le 50$ [for Japanese model]

[Default] $n = 0$

[Description] • Selects a font for the HRI characters when printing a bar code.

For ANK model:

n	Character font
0, 48	Character font A (12×24)
1, 49	Character font B (9×17)

For Japanese model:

n	Character font
0, 48	Character font A (12×24)
1, 49	Character font B (10×24)
2, 50	Character font C (8×16)

GS g 0 *m nL nH*

[Name] Initialize maintenance counter

[Format]

ASCII	GS	g	0	*m*	*nL*	*nH*
Hex	1D	67	30	*m*	*nL*	*nH*
Decimal	29	103	48	*m*	*nL*	*nH*

[Range] $m = 0$
$(n_L + n_H \times 256) = 20, 21, 70$ ($n_L = 20, 21, 70$, $n_H = 0$)

[Description] • Sets the resettable maintenance counter specified by $(n_L + n_H \times 256)$ to 0.

$(n_L + n_H \times 256)$		
Hex	Decimal	Maintenance counter [Units]
14	20	Number of line feeds. [Lines]
15	21	Number of times head is energized. [Times]
46	70	Printer operation time. [Hours].

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands while the printer is BUSY.

GS g 2 *m nL nH*

[Name] Transmit maintenance counter

[Format]

ASCII	GS	g	2	*m*	*nL*	*nH*
Hex	1D	67	32	*m*	*nL*	*nH*
Decimal	29	103	50	*m*	*nL*	*nH*

[Range] $m = 0$

$(n_L + n_H \times 256) = 20, 21, 70 \quad (n_L = 20, 21, 70, \quad n_H = 0)$

$(n_L + n_H \times 256) = 148, 149, 198 \quad (n_L = 148, 149, 198, \quad n_H = 0)$

[Description] • Transmits the value of the maintenance counter specified by $(n_L + n_H \times 256)$.

$(n_L + n_H \times 256)$		Maintenance counter [Units]	Kind of counter
Hex	Decimal		
14	20	Number of line feeds. [Lines]	Resettable (can be reset)
15	21	Number of times head is energized. [Times]	
46	70	Printer operation time. [Hours].	
94	148	Number of line feeds. [Lines]	Cumulative
95	149	Number of times head is energized. [Times]	
C6	198	Printer operation time. [Hours].	

[Notes]
- The maintenance counter values are measurements; therefore, their values will be affected by the timing of errors and how and when the power is turned off.
- When this command is transmitted, the data following must not be transmitted until the status is received.

GS h *n*

[Name] Set bar code height

[Format]

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

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

[Default] $n = 162$

[Description] • Sets the height of the bar code to *n* dots.

<A> GS k *m d1...dk NUL*

<B> GS k *m n d1...dn*

[Name] Print bar code

[Format]

<A>	ASCII	GS	k	*m*	*d1...dk*	*NUL*
	Hex	1D	6B	*m*	*d1...dk*	*00*
	Decimal	29	107	*m*	*d1...dk*	*0*
<B>	ASCII	GS	k	*m*	*n*	*d1...dn*
	Hex	1D	6B	*m*	*n*	*d1...dn*
	Decimal	29	107	*m*	*n*	*d1...dn*

[Range] <A> $0 \le m \le 6$ (*k* and *d* see [Description])
<B> $65 \le m \le 73$ (*n* and *d* see [Description])

[Description] • Prints the bar code using the bar code system specified by *m*.
For <Function A>

m	Bar code system	Range of *k*	Range of *d*
0	UPC-A	$11 \le k \le 12$	$48 \le d \le 57$
1	UPC-E	$11 \le k \le 12$	$48 \le d \le 57$ [where $d1 = 48$]
2	JAN13 (EAN13)	$12 \le k \le 13$	$48 \le d \le 57$
3	JAN8 (EAN8)	$7 \le k \le 8$	$48 \le d \le 57$
4	CODE39	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 90$, d = 32,36,37,42,43,45,46,47
5	ITF	$2 \le k$ (even number)	$48 \le d \le 57$
6	CODABAR (NW7)	$2 \le k$	$48 \le d \le 57$, $65 \le d \le 68$, d = 36,43,45,46,47,58 [where $65 \le d1 \le 68$, $65 \le dk \le 68$]

For <Function B>

m	Bar code system	Range of *n*	Range of *d*
65	UPC-A	11 ≤ *n* ≤ 12	48 ≤ *d* ≤ 57
66	UPC-E	11 ≤ *n* ≤ 12	48 ≤ *d* ≤ 57 [where *d1* = 48]
67	JAN13 (EAN13)	12 ≤ *n* ≤ 13	48 ≤ *d* ≤ 57
68	JAN8 (EAN8)	7 ≤ *n* ≤ 8	48 ≤ *d* ≤ 57
69	CODE39	1≤ *n* ≤ 255	48 ≤ *d* ≤ 57 , 65≤ *d* ≤ 90 , *d* = 32,36,37,42, 43,45,46,47
70	ITF	2 ≤ *n* ≤ 254 (even number)	48 ≤ *d* ≤ 57
71	CODABAR (NW7)	2 ≤ *n* ≤ 255	48 ≤ *d* ≤ 57 , 65 ≤ *d* ≤ 68 , *d* = 36,43,45,46,47,58 [where 65 ≤ *d1* ≤ 68, 65 ≤ *dn* ≤ 68]
72	CODE93	1 ≤ *n* ≤ 255	0 ≤ *d* ≤ 127
73	CODE128	2 ≤ *n* ≤ 255	0 ≤ *d* ≤ 127 [where *d1* = 123, 65 ≤ *d2* ≤ 67]

- *k* of <Function A> is used to indicate the number of bytes of bar code data.
- *n* of <Function B> specifies the number of bytes of bar code data.
- *d* specifies the bar code data.

[Note]
- Consider that a quiet zone (left or right side space area, depending on the bar code specifications) must be ensured for bar code printing.

GS r *n*

[Name] Transmit status

[Format]

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

[Range] *n* = 1, 2, 49, 50

[Description] • Transmits the status.

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

• This printer transmits the following status.

• Paper sensor status (*n* = 1, 49)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Roll paper near-end sensor: paper adequate.
	On	03	3	Roll paper near-end sensor: paper near end.
2, 3	Off	00	0	Roll paper end sensor: paper present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the roll paper cover is opening, this shows the state when the cover was still closed (this command cannot be executed).

• Drawer kick out connector status (*n* = 2, 50)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Drawer kick out connector pin 3 is LOW.
	On	01	1	Drawer kick out connector pin 3 is HIGH.
1 ~ 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

[Note] • When this command is transmitted, the data following must not be transmitted until this status is received.

GS w *n*

[Name] Set bar code width

[Format]

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

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

[Default] $n = 3$

[Description]

- Sets the horizontal size of the bar code.

n	Multi-level bar code	Binary-level bar code	
	Module width (mm)	Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.626
3	0.375	0.375	1.001
4	0.500	0.500	1.251
5	0.626	0.626	1.627
6	0.751	0.751	2.002

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, and CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, and CODABAR

GS z 0 *t1 t2*

[Name] Set online recovery wait time

[Format]

ASCII	GS	z	0	*t1*	*t2*
Hex	1D	7A	30	*t1*	*t2*
Decimal	29	122	48	*t1*	*t2*

[Range] $t1 = 0$
$0 \le t2 \le 255$

[Default] $t1 = 0$, $t2 = 0$

[Description]

- Sets the recovery confirmation time (from waiting for the paper FEED button to be pressed in the label peeler issuing mode to online recovery) to approximately ($t2 \times$ 500 ms).
- When $t2 = 0$, the setting of the recovery confirmation time is canceled. In this case, the recovery confirmation time is set to “infinite.”

[Notes]

- This command setting affects the online recovery condition as mentioned below in the label peeler issuing mode:
  - When the paper roll cover is closed.
  - When the label peeler detector cannot detect the paper correctly while the label is waiting to be removed, due to direct sunlight or strong light.
- While the printer is in the recovery confirmation state, the PAPER OUT LED flashes. In the recovery confirmation state, it is possible to re-enter the online state by allowing ($t2 \times$ 500 ms) to elapse, by executing **DLE ENQ** (n=0), or by pressing the FEED button.

6.4 Commands of Multi-byte Code Characters (for Japanese Model)

FS ! *n*

[Name] Select print mode(s) for Kanji characters

[Format]

ASCII	FS	!	*n*
Hex	1C	21	*n*
Decimal	28	33	*n*

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

[Default] $n = 0$

[Description]

- Selects the character styles (double-height, double-width, and Kanji-underlined) together for multi-byte code character.

(*n*) Bit	Off/On	Hex	Decimal	Function
0, 1	Off	00	0	Reserved.
2	Off	00	0	Double-width canceled.
	On	04	4	Double-width selected.
3	Off	00	0	Double-height canceled.
	On	08	8	Double-height selected.
4 ~ 6	Off	00	0	Reserved.
7	Off	00	0	Kanji-underline mode is turned off.
	On	80	128	Kanji-underline mode is turned on.

FS &

[Name] Select Kanji character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description]

- Selects Kanji character mode.

FS (A *pL pH fn [parameters]*

[Name] Select Kanji character style(s)

[Description]
- Selects the multi-byte code character style.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**FS (A *pL pH fn m***	48	Select Kanji character font.

<Function 48> FS (A *pL pH fn m* (*fn* = 48)

[Name] Select Kanji character font

[Format]

ASCII	FS	(	A	*pL*	*pH*	*fn*	*m*
Hex	1C	28	41	*pL*	*pH*	*fn*	*m*
Decimal	28	40	65	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 48
0 ≤ *m* ≤ 2 , 48 ≤ *m* ≤ 50

[Default] *m* = 0

[Description]
- Selects multi-byte code character font (Kanji character font).

m	Kanji character font
0, 48	Kanji character font A (24×24)
1, 49	Kanji character font B (20×24)
2, 50	Kanji character font C (16×16)

FS – *n*

[Name] Turn underline mode on/off for Kanji characters

[Format]

ASCII	FS	–	*n*
Hex	1C	2D	*n*
Decimal	28	45	*n*

[Range] 0 ≤ *n* ≤ 2 , 48 ≤ *n* ≤ 50

[Default] *n* = 0

[Description]
- Turns on or off underline mode for multi-byte code character (Kanji-underline).

n	Function
0, 48	Turns off Kanji-underline mode.
1, 49	Turns on Kanji-underline mode, set at 1-dot width.
2, 50	Turns on Kanji-underline mode, set at 2-dot width.

FS .

[Name] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

[Description]
- Cancels Kanji character mode.

FS 2 *c1 c2 [d1...dk]*

[Name] Define user-defined Kanji characters

[Format]

ASCII	FS	2	*c1*	*c2*	*[d1...dk]*
Hex	1C	32	*c1*	*c2*	*[d1...dk]*
Decimal	28	50	*c1*	*c2*	*[d1...dk]*

[Range] The ranges of *c1* and *c2* differ, depending on the models and the character code system used.

Model	Hexadecimal	
	c1	*c2*
Japanese (JIS code)	*c1* = 77	21 ≤ *c2* ≤ 7E
Japanese (SHIFT JIS code)	*c1* = EC	40 ≤ *c2* ≤ 7E 80 ≤ *c2* ≤ 9E

$0 \le d \le 255$

$k = 72$ [when Kanji character font A (24×24) is selected]

$k = 60$ [when Kanji character font B (20×24) is selected]

$k = 32$ [when Kanji character font C (16×16) is selected]

[Description]
- Defines the user-defined Kanji character pattern (*d1...dk*) specified by the character codes (*c1* and *c2*).

FS C *n*

[Name] Select Kanji character code system

[Format]

ASCII	FS	C	*n*
Hex	1C	43	*n*
Decimal	28	67	*n*

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

[Default] *n* = 0

[Description]
- Selects a Kanji character code system for the Japanese model.

n	Kanji character code system
0, 48	JIS code
1, 49	SHIFT JIS code

FS S *n1 n2*

[Name] Set Kanji character spacing

[Format]

ASCII	FS	S	*n1*	*n2*
Hex	1C	53	*n1*	*n2*
Decimal	28	83	*n1*	*n2*

[Range] $0 \le n1 \le 255$
$0 \le n2 \le 255$

[Default] *n1* = 0 , *n2* = 0

[Description]
- Sets the left-side character spacing of the multi-byte code character to [*n1* × (horizontal or vertical motion unit)]; sets the right-side character spacing of the multi-byte code character to [*n2* × (horizontal or vertical motion unit)].

FS W *n*

[Name] Turn quadruple-size mode on/off for Kanji characters

[Format]

ASCII	FS	W	*n*
Hex	1C	57	*n*
Decimal	28	87	*n*

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

[Default] *n* = 0

[Description]
- Turns quadruple-size mode on or off for multi-byte code character.
  - When the LSB of *n* is 0, quadruple-size mode is turned off.
  - When the LSB of *n* is 1, quadruple-size mode is turned on.

6.5 Obsolete Commands

GS C 0 *n m* [obsolete command]

GS C 0 is an obsolete command in the ESC/POS® command system. There is no upward-compatible command replacing **GS C 0** of the serial number counter function.

[Name] Select counter print mode

[Format]

ASCII	GS	C	0	*n*	*m*
Hex	1D	43	30	*n*	*m*
Decimal	29	67	48	*n*	*m*

[Range] $0 \le n \le 5$
$0 \le m \le 2$, $48 \le m \le 50$

[Default] $n = 0$, $m = 0$

[Description]
- Selects the print format for the serial number counter value.
  - *n* specifies the number of digits to be printed.

n	Number of printed digits
0	The actual digits indicated by the serial number counter.
1 ~ 5	The last *n* digits of the serial number counter.

  - *m* specifies the layout within the specified range of printed digits.

m	Justification	Layout within digits less than those specified
0, 48	Align right	Adds spaces to the left if the digits are less than those specified.
1, 49	Align right	Adds 0 to the left if the digits are less than those specified.
2, 50	Align left	Adds spaces to the right if the digits are less than those specified.

GS C 1 a_L a_H b_L b_H n r [obsolete command]

GS C 1 is an obsolete command in the ESC/POS® command system. There is no upward-compatible command replacing **GS C 1** of the serial number counter function.

[Name] Select count mode (A)

[Format]

ASCII	GS	C	1	a_L	a_H	b_L	b_H	n	r
Hex	1D	43	31	a_L	a_H	b_L	b_H	n	r
Decimal	29	67	49	a_L	a_H	b_L	b_H	n	r

[Range]
$0 \le (a_L + a_H \times 256) \le 65535 \quad (0 \le a_L \le 255, 0 \le a_H \le 255)$
$0 \le (b_L + b_H \times 256) \le 65535 \quad (0 \le b_L \le 255, 0 \le b_H \le 255)$
$0 \le n \le 255$
$0 \le r \le 255$

[Default]
$(a_L + a_H \times 256) = 1 \quad (a_L = 1, a_H = 0)$
$(b_L + b_H \times 256) = 65535 \quad (b_L = 255, b_H = 255)$
$n = 1$, $r = 1$

[Description]
- Sets the serial number counter range, the stepping amount, and the repetition number.
  - a_L, a_H and b_L, b_H specify the serial number counter ranges (maximum or minimum value).
  - n specifies the stepping amount for counting up or down.
  - r specifies the repetition number with the counter value fixed.

Count mode	Parameters	Counter range	
		Minimum	Maximum
Count-up	$((a_L + a_H \times 256) < (b_L + b_H \times 256))$ and $(n \neq 0)$ and $(r \neq 0)$	$(a_L + a_H \times 256)$	$(b_L + b_H \times 256)$
Count-down	$((a_L + a_H \times 256) > (b_L + b_H \times 256))$ and $(n \neq 0)$ and $(r \neq 0)$	$(b_L + b_H \times 256)$	$(a_L + a_H \times 256)$
Count-stop	$((a_L + a_H \times 256) = (b_L + b_H \times 256))$ or $(n = 0)$ or $(r = 0)$	--	--

GS C 2 n_L n_H [obsolete command]

GS C 2 is an obsolete command in the ESC/POS® command system. There is no upward-compatible command replacing **GS C 2** of the serial number counter function.

[Name] Set counter

[Format]

ASCII	GS	C	2	n_L	n_H
Hex	1D	43	32	n_L	n_H
Decimal	29	67	50	n_L	n_H

[Range] $0 \le (n_L + n_H \times 256) \le 65535 \quad (0 \le n_L \le 255, 0 \le n_H \le 255)$

[Default] $(n_L + n_H \times 256) = 1 \quad (n_L = 1, n_H = 0)$

[Description]
- Sets the serial number counter value to $(n_L + n_H \times 256)$.

GS C ; *sa ; sb ; sn ; sr ; sc ;* [obsolete command]

GS C ; is an obsolete command in the ESC/POS® command system. There is no upward-compatible command replacing **GS C ;** of the serial number counter function.

[Name] Select count mode (B)

[Format]

ASCII	GS	C	;	*sa*	*;*	*sb*	*;*	*sn*	*;*	*sr*	*;*	*sc*	*;*
Hex	1D	43	3B	*sa*	*3B*	*sb*	*3B*	*sn*	*3B*	*sr*	*3B*	*sc*	*3B*
Decimal	29	67	59	*sa*	*59*	*sb*	*59*	*sn*	*59*	*sr*	*59*	*sc*	*59*

[Range]
"0" ≤ *sa* ≤ "65535"
"0" ≤ *sb* ≤ "65535"
"0" ≤ *sn* ≤ "255"
"0" ≤ *sr* ≤ "255"
"0" ≤ *sc* ≤ "65535"

[Default] *sa* = "1" , *sb* = "65535" , *sn* = "1" , *sr* = "1" , *sc* = "1"

[Description]
- Sets the serial number counter range, the serial number counter value, the stepping amount, and the repetition number by using character strings.
  - *sa* and *sb* specify the serial number counter ranges (maximum and minimum values).
  - *sn* specifies the stepping amount for counting up or down.
  - *sr* specifies the repetition number with the counter value fixed.
  - *sc* specifies the serial number counter value.

Count mode	Parameters	Counter range	
		Minimum	Maximum
Count-up	(*sa* < *sb*) and (*sn* ≠ 0) and (*sr* ≠ 0)	*sa*	*sb*
Count-down	(*sa* > *sb*) and (*sn* ≠ 0) and (*sr* ≠ 0)	*sb*	*sa*
Count-stop	(*sa* = *sb*) or (*sn* = 0) or (*sr* = 0)	--	--

GS c [obsolete command]

GS c is an obsolete command in the ESC/POS® command system. There is no upward-compatible command replacing **GS c** of the serial number counter function.

[Name] Print counter

[Format]

ASCII	GS	c
Hex	1D	63
Decimal	29	99

[Description]
- Stores the serial number counter value in the print buffer and counts up or down the serial number counter value.

GS v 0 m *xL xH yL yH d1...dk* [obsolete command]

GS (L <Function 112 and 50>, which is the upward-compatible command replacing **GS v 0**, is recommended for use, since **GS v 0** is an obsolete command in the ESC/POS® command system.

[Name] Print raster bit image

[Format]

ASCII	GS	v	0	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Hex	1D	76	30	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Decimal	29	118	48	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*

[Range]
$0 \le m \le 3$, $48 \le m \le 51$
$1 \le (x_L + x_H \times 256) \le 128$ $(1 \le x_L \le 128, x_H = 0)$
$1 \le (y_L + y_H \times 256) \le 4095$ $(0 \le y_L \le 255, 0 \le y_H \le 15)$
$0 \le d \le 255$
$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256)$

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

m	Mode	Vertical direction	Horizontal direction
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	203/2 dpi
2, 50	Double-height	203/2 dpi	203 dpi
3, 51	Quadruple	203/2 dpi	203/2 dpi

- *xL*, *xH* specify the number of bytes in the horizontal direction as ($x_L + x_H \times 256$).
- *yL*, *yH* specify the number of dots in the vertical direction as ($y_L + y_H \times 256$).
- *d* specifies the defined data (raster format).

APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

1) Because the TM-L90 series printer is a line printer, it automatically feeds paper after printing the data.

   Therefore, when the line spacing for one line is set to a smaller value than the print data, paper may be fed more than the set amount just to print the data.

   For example, when the line spacing for one line is set to 10 dots and only paper feeding is executed, paper is fed for 10 dots; however, if bit-image characters are printed, paper is fed for 24 dots. (Refer to Table A.1.)

   When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1 and A.2.

Table A.1 Paper Feeding Amount (ANK/Multilingual Model)

		Required Paper Feeding Amount (dots)
Normal Characters	Font A	24 × number of times enlarged vertically
	Font B	17 × number of times enlarged vertically
	Kanji font	24 × number of times enlarged vertically
Rotated Characters	Font A	12 × number of times enlarged vertically
	Font B	9 × number of times enlarged vertically
	Kanji font	24 × number of times enlarged vertically
Bit image (**ESC ***)		24 × number of times enlarged vertically

Table A.2 Paper Feeding Amount (Japanese Model)

		Required Paper Feeding Amount (dots)
Normal Characters	Font A	24 × number of times enlarged vertically
	Font B	24 × number of times enlarged vertically
	Font C	16 × number of times enlarged vertically
	Kanji font A	24 × number of times enlarged vertically
	Kanji font B	24 × number of times enlarged vertically
	Kanji font C	16 × number of times enlarged vertically
Normal Characters	Font A	12 × number of times enlarged vertically
	Font B	10 × number of times enlarged vertically
	Font C	8 × number of times enlarged vertically
	Kanji font A	24 × number of times enlarged vertically
	Kanji font B	20 × number of times enlarged vertically
	Kanji font C	16 × number of times enlarged vertically
Bit image (**ESC ***)		24 × number of times enlarged vertically

2) When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects bit-image printing.

A.2 Notes on Printer Installation

Do not install the printer in locations that receive direct sunlight.

If the PAPER OUT LED still flashes after removing the issued label, the label peeler detector may be not able to detect the paper correctly.

To recover this, try pressing the paper FEED button once.

(Recommended installation)

- Install the printer in a location, such as at the edge of a counter, where the backing paper will not accumulate near the paper exit.
- Use the DF-10 to fix the printer.

NG

OK

A.3 Other Notes

1) Printer mechanism handling

- Do not pull the paper out when the cover is closed. Especially when it is required that the paper is pulled out after turning the power off, the power may be turned back on.
- Because the thermal elements of the print head and driver IC are easy to break, do not touch them with any metal objects.
- Since the areas around the print head become very hot during and just after printing, do not touch them.
- Do not use the cover open button except when necessary.
- Do not touch the surface of the print head because dust and dirt can stick to the surface and damage the elements.
- Thermal paper containing many of Na^+, K^+, and Cl^- ions can harm the print head thermal elements. Therefore, be sure to use only the specified paper.
- Grasp the printer's sides or the button with your hands if you transport the printer.
- To access the mode switch, open the roll paper cover.
  Since the setting of the mode switch becomes effective when the power is turned on or the roll paper cover is closed, the setting of the mode switch cannot be effective.
- Do not change the mode switch by the shaped-edge metal such as a ball-point pen. Otherwise, the switch may be broken.

2) Thermal paper handling

① Notes on using thermal paper

Chemicals and oil on thermal paper may cause discoloration and faded printing. Therefore, pay attention to the following:

a) Use water paste, starch paste, polyvinyl paste, or CMC paste when gluing thermal paper.

b) Volatile organic solvents such as alcohol, ester, and ketone can cause discoloration.

c) Some adhesive tapes may cause discoloration or faded printing.

d) If thermal paper touches anything which includes phthalic acid ester plasticizer for a long time, it can reduce the image formation ability of the paper and can cause the printed image to fade. Therefore, when storing thermal paper in a card case or sample notebook, be sure to use only products made from polyethylene, polypropylene, or polyester.

e) If thermal paper touches diazo copy paper immediately after copying, the printed surface may be discolored.

f) Thermal paper must not be stored with the printed surfaces against each other because the printing may be transferred between the surfaces.

g) If the surface of thermal paper is scratched with a hard metal object such as a nail, the paper may become discolored.

② Notes on thermal paper storage

- Since color development begins at 70°C {158°F}, thermal paper should be protected from high temperatures, humidity, and light, both before and after printing.

a) Store paper away from high temperatures and humidity.
Do not store thermal paper near a heater or in enclosed places exposed to direct sunlight.

b) Avoid direct light.
Extended exposure to direct light may cause discoloration or faded printing.

- When the printer is not used for one week or more, it is recommended not to leave the thermal paper between the platen and the print head.

3) Notes on supplying the power to the printer

- Connect the external power supply to the printer power supply connector. Then plug in the external power supply and turn it on if necessary. Be sure not to connect the external power supply with the wrong polarity. If it is connected incorrectly, the internal circuit fuse of the printer may be blown or the external power supply may be damaged.
- The power supply voltage is within the range of 24 V ± 7%. If the power supply voltage drops to the outside the range above during printing, the printer stops printing and waits until the voltage returns to normal and then automatically begins printing again. Therefore, printing speed may slow, the print pitch may not be correct, and some dots in some characters may not be printed.
- Both high and low voltage errors are shown in Table 3.9.3. The flashing patterns are shown in the table.
- When either a high or low voltage error occurs, turn off the power as soon as possible.

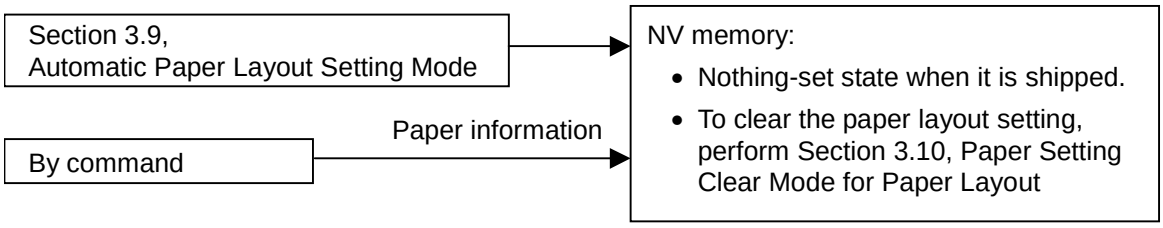
4) Others

- Because this printer uses plated steel, the cutting edges may be subject to rust. However, this does not affect the printer performance.

APPENDIX B: ROLL PAPER SETUP

B.1 Setting the Paper Information

- It is required to register the paper information to the NV memory when the printer is first used or different paper is used. Set it in either of the following two methods.

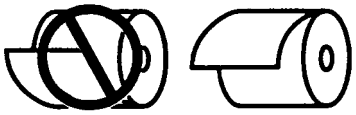


- Every time the power is turned on or the roll paper is exchanged if nothing is set in the NV memory, the automatic paper recognition function is executed. (See Section 3.8)

B.2 Setting the Paper Information

NOTE: Be sure to use roll paper that meets the specifications.

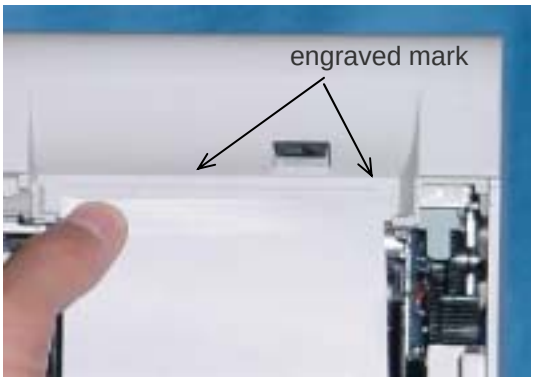
1) Make sure that the power is on.
2) Pull the peeler open lever forward and open the peeler cover.
3) Pull the roll paper cover open lever forward to open the roll paper cover.
4) Insert the roll paper, as shown below.



5) Set the mode switch to the mode you are going to use. (To the right for the label peeler issuing mode, or to the left for the label continuous issuing mode.)

6) Pull out the paper until the end is just below the label peeler detector, as shown in the illustration, and close the roll paper cover.

NOTE: If you set the top of the roll paper even with the mark, there will be only a minimum number of unprinted labels after loading the paper automatically.



7) After the paper is automatically fed and several labels come out, the PAPER OUT LED starts flashing.

NOTE: If you set the top of the roll paper even with the mark, there will be only a minimum number of unprinted labels after loading the paper automatically. Refer to 6) for details.

8) When using the label continuous issuing mode (not using the peeler), close the peeler cover now. When using the peeler (the label peeler issuing mode), pass the paper through the peeler, and close the peeler cover.

Label peeler issuing mode

Continuous issuing mode

9) Press the PAPER FEED button. The paper is automatically fed backward, and the PAPER OUT LED goes off.

NOTES:
- If the roll paper is installed an angle, the paper may not feed correctly and the paper detection may not work correctly. To recover from this, install the paper straight.
- Some labels may not be loaded as mentioned above, depending on the conditions. In this case, detach the label from the liner, and pass the liner only through the peeler path. Then, press the paper FEED button. The printer feeds the paper automatically backward and turns off the PAPER OUT LED.

APPENDIX C: ADJUSTING THE ROLL PAPER NEAR-END SENSOR LOCATION

The remaining detectable amount of paper on the roll paper varies with the inside and outside diameters of the paper core. The minimum detectable amount of paper on the roll paper can be set using the following method:

1) The inside diameter of the paper spool should be 25.4 mm {1.00"} and the outside diameter of the paper spool should be 31.4 mm {1.24"}. Specified thermal paper should be used.

2) Loosen the adjusting screw that holds the paper near-end sensor and set the top of the positioning plate to the appropriate adjustment value and tighten the adjusting screw.

Table C.1 Adjustment Positions

Adjustment position number	Specified thermal paper Dimension of outside diameter of roll paper
#1	Approximately 36 mm {1.42"}
#2	Approximately 41 mm {1.61"}

Positioning Plate #1 Vertical Positioning Plate #2 Vertical

Figure C.1 Near-end Adjusting Position

NOTES: 1) Since the specified thermal paper dimension of outside diameter of roll paper in Table C.1 is a calculated value, there may be some variations, depending on the printer.

2) Be sure that the adjustable slider operates smoothly after you finish the adjustment.

APPENDIX D: CLEANING

D.1 Print Head

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

1) Open the roll paper cover.

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

   NOTES:
   - Do not touch the print head thermal elements.
   - Do not scratch the print head.

3) Insert roll paper and close the roll paper cover.

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

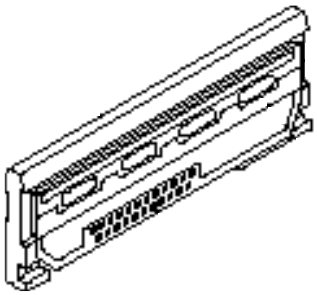


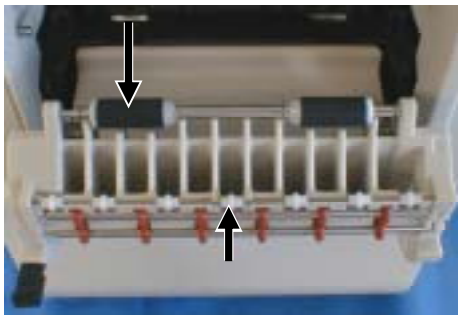
Figure D.1 Print Head Thermal Elements

(*) Depending on the roll paper used, paper dust may stick to the platen roller and roll paper end sensor. To remove the paper dust, clean the platen roller and roll paper end sensor with a cotton swab moistened with water.
Also, be sure to turn on the printer power after the water is dried out completely.

D.2 Peeler

If the glue from the labels accumulates on the rollers, clean the roller as follows:

1) Open the peeler cover.
2) Remove the glue with a wasted label.
3) Close the peeler cover.



APPENDIX E: NOTES ON USING THE DRAWER KICK-OUT CONNECTOR

1) Drawer kick-out connector use conditions (refer to Section 2.2.3, Drawer Kick-out Connector)

   Because drawer specifications differ depending the manufacturer and the part number, make sure the specifications of the drawer to be used meet the following conditions before connecting it to the drawer kick-out connector. These conditions also apply to any other devices that use the drawer kick-out connector.

   Any devices that do not satisfy all the following conditions must not be used.

   [Conditions]

   - A load must be provided between drawer kick-out connector pins 4 and 2 or between pins 4 and 5. (Operating the printer with incorrectly installed devices voids the warranty.)
   - When the drawer open/close signal is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (Connecting devices other than the drawer open/close switch voids the warranty.)
   - The resistance of the load must be 24 Ω or more, or the input current must be 1 A or less. (If a device with a resistance of less than 24 Ω or an input current of over 1 A is used, the resulting overcurrent may damage the printer and the device.)
   - Be sure to use drawer kick-out connector pin 4 (24 V power output) to drive the device. Never connect any other power supply to the drawer kick-out connector. (Connecting a power supply other than that specified voids the warranty.)

     The peak current is 1 A. When energizing the drawer kick-out drive signal, follow the conditions described in 3) of Section 2.2.3, *Drawer kick-out drive signal*.

APPENDIX F: CODE128 BAR CODE

F.1 Description of the CODE128 Bar Code

In the CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

  The following special characters are also available in CODE128:
- SHIFT characters

  In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.
- Code set selection character (CODE A, CODE B, CODE C).

  This character switches the following code set to code set A, B, or C.
- Function character (FNC1, FNC2, FNC3, FNC4).

  The usage of function characters depends on the application software. In code set C, only FNC1 is available.

F.2 Code Tables

Printable characters in code set A

Character	Transmit data		Character	Transmit data		Character	Transmit data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Printable characters in code set B

Character	Transmit data		Character	Transmit data		Character	Transmit data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
_	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,66
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	_	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Printable characters in code set C

Character	Transmit data		Character	Transmit data		Character	Transmit data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
00	00	0	40	28	40	80	50	80
01	01	1	41	29	41	81	51	81
02	02	2	42	2A	42	82	52	82
03	03	3	43	2B	43	83	53	83
04	04	4	44	2C	44	84	54	84
05	05	5	45	2D	45	85	55	85
06	06	6	46	2E	46	86	56	86
07	07	7	47	2F	47	87	57	87
08	08	8	48	30	48	88	58	88
09	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			

APPENDIX G: NOTES ON UPDATING THE MAINTENANCE COUNTER AND TURNING THE PRINTER'S POWER OFF

G.1 About updating the maintenance counter

- This printer has a maintenance counter function, as described in the command description for **GS g 0** and **GS g 2**.
- The values of the maintenance counter are automatically stored in the NV memory every 2 minutes (or 4 minutes maximum) when the printer is operating, except in the power save mode.
- However, if the power off is performed as described in Section G.2, the printer stores the latest values of the maintenance counter and executes the power off control, regardless of the updating interval described above.
- If the printer is not sending/receiving data or is not operating for two seconds while the power is turned on, the printer enters the power-saving mode and all of the values of the maintenance counter including the printer operation time stop counting.

G.2 About the printer's power off

In order to store the latest values of the maintenance counter, the print head must be capped before the printer is turned off. This is done when the power switch (front) is turned off.

If the power switch is covered by the attached power switch cover, make sure to execute the **DLE DC4** (*n* = 2) command first from the host computer to the printer. Below is the description of how to turn the power off using the power switch.

G.2.1 Printer setup by the host with printer power off

Follow the procedure below for setting up the printer first.

1) Turn the printer's power off using the power button in the front.
2) Wait until the POWER LED turns off.
3) Turn DIP switch 1-1 on.
4) Turn the printer's power on using the power button.
5) Attach the power button cover on the power button.

G.2.2 Power off procedure by the host

The following is an example of the printer power off process when the printer is turned off using the **DLE DC4** (*fn* = 2) command.

1) The host transmits the following continuous procedure before the system is turned off:
   ① Executes the last print command such as **LF, ESC d**, etc.
   ② Executes **GS (D *pL pH m a b*** (*pL*=3, *pH* =0, *m* =20, *a* =2, *b* =1)
   ③ Executes **GS r *n*** (*n* =1)
2) The host waits for the paper sensor status sent from the printer in response to the **GS r *n*** command.
3) The host transmits **DLE DC4 *fn a b*** (*fn* =2, *a* =1, *b* =8).
4) The host waits for the power off status.
   - The values of the maintenance counter are stored and the power-off sequence is performed within 10 seconds after the host transmits **DLE DC4 *fn a b***; then the power off status is transmitted.
   - If the power off status is not checked, the host waits for 10 seconds or more after transmitting **DLE DC4 *fn a b***.
   - For the serial interface model, the printer status is transmitted regardless of the condition of the host.
   - For the parallel interface model, after the host transmits **DLE DC4 *fn a b***, the printer is required to be ready for receiving data from the host.

   NOTE: The printer executes the software sequence, but the power is not cut.

5) Please turn the host power off.

   NOTE: Do not execute a reset to the printer until the printer power is turned off after transmitting **DLE DC4** (*fn* = 2).

APPENDIX H: NOTES ON PRINTING 2-DIMENSIONAL CODES

The TM-L90 supports 2-dimensional code printing.
Be sure to follow the notes below when printing 2-dimensional codes.

1) When printing PDF417 (2-dimensional code), it is recommended to set the height of one module of the symbol to three to five times the width of one module, also making sure that the total height is almost 5 mm {0.20"} or more.

2) The recognition rate of the 2-dimensional code may be affected by such items as different widths of the modules, print density, environmental temperature, type of the thermal paper, and characteristics of the reader. Therefore, the user should check the recognition rate in advance so that the limitations of the reader can be considered.

APPENDIX I: NOTES ON USING THE ASB STATUS

Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmission shall be transmitted together at a time as one ASB status showing the presence of change, followed by the latest ASB status.

Example: In the normal (wait) state, the ASB status is configured as follows.

First Status	Second Status	Third Status	Fourth Status
0001 0000	0000 0000	0000 0000	0000 1111

When a sequence of operations are performed, the near end is detected, the roll paper cover is opened, and then the roll paper cover is closed, the following pieces of data are accumulated.

	First Status	Second Status	Third Status	Fourth Status	
①	0001 0000	0000 0000	0000 0011	0000 1111	Near end detection
②	0011 1000	0000 0000	0000 0011	0000 1111	The roll paper cover is opened.
③	0001 0000	0000 0000	0000 0011	0000 1111	The roll paper cover is closed.

When the ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted, as follows.

Accumulated ASB (①+②+③)

	First Status	Second Status	Third Status	Fourth Status
Accumulated ASB (①+②+③)	0011 1000	0000 0000	0000 0011	0000 1111
+				
The latest ASB (③) Fourth Status	0001 0000	0000 0000	0000 0011	0000 1111

APPENDIX J: NOTES ON SETTING MEMORY SWITCH 8-6 "FEEDING PAPER TO THE PRINT STARTING POSITION AT POWER ON IS DISABLED"

This printer can set a paper feeding to the print starting position at power on or software resetting disabled with memory switch 8-6.
Note the following points if this setting is used.

- This setting is enabled only when the paper layout is set. The paper layout can be set with <Function 49> of **GS (E**, **GS (A**, or a panel operation (refer to section 3.8).
- This setting performs on the assumption that the paper is already fed to the print starting position at power on or software reset. If the paper has not been set to the print starting position, the print position of the first print may be misaligned or the paper layout error (recoverable error) may occur. Therefore, take in consideration the following points:

  a) Turning the power off or resetting the printer must be performed in the condition that the paper is fed to the print starting position. Please note that the software reset is activated in the following conditions:
     - When Function 2 of **GS (E** is executed by changing the memory switch.
     - With the parallel interface model, when the host PC reboots.
     - When a reset signal is sent from the host PC.

  b) Do not open the cover or exchange the paper while the power is off.

     ① If the cover is opened or the paper is exchanged while the power is off, load the paper in the paper path (peeler or continuous issuing) while the power is on; then initialize the mechanism (paper feeding operation) by pressing the paper FEED button.

     ② If printing is performed without the operation described above, a paper layout error (recoverable error) may occur. Execute the **DLE ENQ** (*n* = 2) command to recover from the error and feed the paper to the print starting position if this error occurs. (When memory switch 8-2 is set to off, recover the error and feed the paper to the print starting position so that the printer executes paper automatic recognition.)