

Confidential

EPSON

Receipt Printer

TM-T70

Specification

STANDARD	
Rev. No.	D
Notes	

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REVISION SHEET

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Revisions		Design Section			Sheet Rev. No.						
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.	
A	Enactment	Yamada	--	Murata	I	D	17	D	42	D	
B	Change	Yamada	--	Murata	II	D	18	D	43	D	
C	Change	Takeuchi	Takagi	Shinohara	III	D	19	D	44	D	
D	Change	Azegami	Koakutsu	Shinohara	IV	D	20	D	45	D	
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					VI	D	22	D	47	D	
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					15	D	40	D	65	D	
					16	D	41	D	66	D	
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				Cover	Rev. Sheet	Confidentiality Agreement	General Features	Table of Contents			
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A	Enactment				67	D	91	D	115	D
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A	Enactment				App.1	D					
B	Change				App.2	D					
C	Change				App.3	D					
D	Change				App.4	D					
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REV.	SHEET	CHANGED CONTENTS
A	All	Newly enacted.
B	All	Added the content regarding the Japanese 80 mm, 203 dpi model.
C	8	1.6 Printable Area Added "With printing with two-part energizing," to NOTE above Figure 1.6.2. Added "With printing with four-part energizing," to NOTE above Figure 1.6.3.
	81	ESC R [Default] Corrected "n = 0 [ANK model]" to "n = 0 [Other than the following models]." Corrected "n = 8 [Japanese 58mm model/80 mm model]" to "n = 15 [Simplified Chinese model]."
	96	GS (E fn=5 [Range] [Japanese 80 mm model] Corrected " $0 \leq (nL + nH \times 256) \leq 2$ " to " $0 \leq (nL + nH \times 256) \leq 4$."
	118	GS * [Range] Corrected " $1 \leq y \leq 255$ " to " $1 \leq y \leq 48$."
	120	GS I [Description] [Type ID] Corrected "Bit1 Reserved" to "Autocutter installed." Corrected "Bit 2,3,6 Reserved" to "Not used."
D	All	Added the content related to the TM-T88IV-compatible command functions.
	5	1.3 Autocutter NOTE 2. Changed "To avoid paper jams in the autocutter unit, paper must be fed over 40 mm {1.57"} before cutting if the printer is stopped." to "When operating the autocutter after leaving the printer unused for some time, feed paper 40 mm {1.57"} or longer to prevent paper jams in the autocutter unit." 1.4 Roll Paper Supply Device 2) Roll paper end sensor: Changed "If the printer cover is closed after loading the paper, the printer restarts printing." to "The printer resumes printing when paper is loaded and the roll paper cover is closed." 3) Changed "When the paper roll diameter becomes sufficiently small, the printer detects..." to "When the paper roll diameter becomes sufficiently small, this sensor detects..." Changed "If the sensor is enabled by ESC c 4 , the printer stops printing." to "Enabling/disabling of this sensor to stop printing on detection of a paper near-end can be selected by a command (ESC c 4)." a) Corrected "23 mm {0.9}" to "{0.91}." b) NOTE 1. Changed "If roll paper with a paper spool that is out of the specified range,..." to "If the roll paper with a paper core that is out of the specified range is used,..."
	6, 7	1.5 Paper Specification 2) Form and size Added "The chromogenic side must face outside." 5) Print density adjustment (Table 1.5.2) P300: Changed "More dark than standard density" to "Darker than standard density."
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REV.	SHEET	CHANGED CONTENTS
D	7	6) Notes on preprinting on the recording surface of thermal paper Changed "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" to "If such paper must be used, conduct preprinting tests under the conditions (type of ink/print conditions) recommended by the paper manufacturer and confirm that no faulty printing, print density,..."
	8, 9, 10	1.6 Printable Area <ANK model> Figure 1.6.1, Figure 1.6.4, Figure 1.6.6 Removed "[All the numeric values are typical]." <Japanese model (58 mm model)> NOTE: Changed "The print position within the printable area of the thermal elements for dots 225 to 416 is shifted approximately 0.06 mm {0.0024"} as shown in Figure 1.6.5 in the paper feed direction from the position for dots 1 to 224." to "With printing with two-part energizing, the print position within the printable area of the thermal elements for dots 225 to 416 is shifted approximately 0.06 mm {0.0024"} in the paper feed direction as shown in Figure 1.6.3 from the position for dots 1 to 224."
	11	1.9 Electrical Characteristics Table 1.9.3 Current Consumption (Operating) NOTE 1: Added "Printing with this product is assumed to use receipt or the equivalent."
	30	2.1.3 USB (Universal Serial Bus) Interface Outline 1. Corrected "High-speed transmission at 480 Mbps" to "Full-speed transmission at 12 Mbps."
	55	3.3.4 Customized value NOTE 3. Added "Also, the Japanese model (80 mm model) does not support automatic control."
	58	3.6 Hexadecimal Dumping 2) Changed "Starting hexadecimal dumping" to "Running hexadecimal dumping." Divided the procedures into 3 steps. Itemized the two options of Step 1. Itemized the three options of Step 3. Removed "3) Ending Hexadecimal Dumping." NOTES 3.: Changed "Insufficient print data ... by setting the printer offline." to "Insufficient print data ... by pressing down the FEED button."
	59	3.7.1 Error Types Added "NOTE: When a paper jam occurs, turn the printer off, remove the jammed paper, and then turn the printer back on."
	82	ESC R [Range] Removed "[Other than the following models]," "n = 15 [Simplified Chinese model]."
	105	<Function 67> GS (L [Notes] Added "• NV graphics and NV bit image (FS q) cannot be defined simultaneously. When this function is executed, all NV bit images are deleted."
	App.2	A.4 Other Notes Changed "• Do not use the roll paper cover open button except when necessary." to "Do not open the printer cover during printing operation or the printing mechanism may become damaged."
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REV.	SHEET	CHANGED CONTENTS
D	App.5	APPENDIX C: PRINT HEAD CLEANING 2) Changed "(ethanol, methanol, IPA)" to "(ethanol, IPA)." 3) Changed "Insert a roll paper and close the print head." to "Insert a roll paper and close the printer cover."
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GENERAL FEATURES

1) This specification applies to the following products in the TM-T70 printer:

The following models are available for each product above.

- 1) Alphanumeric (ANK) model
- 2) Japanese models (58 mm model, 80 mm model)

* 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 see the ESC/POS APG (Application Programming Guide) that is separately issued.

2) Features

The TM-T70 is a receipt printer with high speed printing and a small footprint. With its compact design, it can be placed in a narrow space, such as under a counter, and it also has full front access for easy operability.

The TM-T70 printer has the following features:

<Printing>

- High-speed printing, which enables issuing of batch receipts.
Maximum print speed: 170 mm/s (Japanese model (80 mm model), ANK model)
200 mm/s (Japanese model (58 mm model))
- Graphics are also printed with a high-speed printing.

<Printer handling>

- Easy drop-in paper loading.
- Front access operation for receipt ejection (horizontal direction) and roll paper exchange
- Front access operation of the power button and operation panel

<Software>

- Command protocol is based on the ESC/POS Proprietary Command System.
- OPOS ADK and Windows® printer drivers are available.
- In addition to supporting several kinds of bar code printing, two-dimensional code (PDF417 (only for ANK model), QR code) printing is possible.
- Various layouts are possible by using page mode.
- A maintenance counter function is supported.

<General>

- Various interface boards (EPSON UB series) can be used.

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1. GENERAL SPECIFICATIONS**1.1 Printing Specifications**

	ANK Model	Japanese Model	
	80-mm width paper, 180 dpi model	58-mm width paper, 203 dpi model	80 mm width paper, 203 dpi model
1) Printing method	Thermal line printing		
2) Dot density	0.141 × 0.141 mm/dot (180 × 180 dpi)	0.125 × 0.125 mm/dot (203 × 203 dpi)	
	[dpi: dots per 25.4 mm {1"}]		
3) Printing direction	Unidirectional with friction feed (Reverse feed is not supported)		
4) Paper width	Standard	Standard	
	80 mm	58 mm	80 mm (416 dots)
5) Maximum printable area	72.2 mm (512 dots)	52 mm (416 dots)	72 mm (576 dots)
6) Character per line			
Font A (12×24)	42	34	48
Font B	56 (9 × 17)	52 (8 × 16)	72 (8 × 16)
Kanji font A (24 × 24)	--	17	24
Kanji font B (16 × 16)	--	26	36

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	ANK Model	Japanese Model	
	80-mm width paper, 180 dpi model	58-mm width paper, 203 dpi model	80-mm width paper, 203 dpi model
7) Print speed			
High speed mode			
Normal	170 mm/s	200 mm/s	170 mm/s
Page mode	170 mm/s	200 mm/s	170 mm/s
NV graphics bit image	170 mm/s	200 mm/s	170 mm/s
Transmissive graphics	170 mm/s	200 mm/s	170 mm/s
Ladder bar code or two-dimensional code printing	100 mm/s	100 mm/s	100 mm/s
Low power consumption mode			
Normal	150 mm/s	--	--
Page mode	60 mm/s	--	--
NV graphics bit image	60 mm/s	--	--
Transmissive graphics	60 mm/s	--	--
Ladder bar code or two-dimensional code printing	60 mm/s	--	--
	<p>NOTES: 1. The print speed listed in high speed mode above is the value when the printer prints with the default print density level at 24 V and 25°C {77°F}. However, the print speed listed in the low power consumption mode (standard) is the value when the printer prints with the default print density level at 24V and 34°C {93.2°F}. The print speed may change automatically with the condition of the supply voltage or the head temperature.</p> <p>2. Printing speed may be slower, depending on the data transmission speed and the combination of control commands.</p> <p>3. Low transmission speed may cause intermittent printing. It is recommended to transmit data to the printer as quickly as possible.</p> <p>4. High speed mode or low power consumption mode (supported in ANK model only) is selected by a DIP switch. (See Table 3.3.4 and 3.3.7.)</p>		
8) Line spacing (default)	4.23 mm {1/6"}	3.75 mm {30/203"}	
	NOTE: Programmable by command.		

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1.2 Character Specifications

- 1) Number of characters: Alphanumeric characters: 95
- Extended graphics: 128 × 11 pages
(including user-defined page)
- International characters: 48
- Japanese model: JIS (JIS X 0208-1990): 6879
Special font: 845 (See Table below)

JIS Code	Shift JIS Code
2D21 ~ 2D7E	8740 ~ 879D
7921 ~ 7C7E	ED40 ~ EEFC
	FA40 ~ FC4E

See “Character Code Table (for Japanese font)” for details.

Table 1.2.1 Supporting Characters on Each Model Type

Product Specifications	Supported Characters	
ANK model	<ul style="list-style-type: none"> • Alphanumeric • Extended graphics • International characters 	--
Japanese models (58 mm model, 80 mm model)		Japanese characters

(ANK = alphanumeric)

- 2) Character structure: Font A: 12 × 24 (including 2-dot spacing in horizontal)
- Font B: 9 × 17 (including 2-dot spacing in horizontal)
- for ANK model
- 8 × 16 (including 2-dot spacing in horizontal)
- for Japanese models (58 mm model, 80 mm model)
- Kanji font A: 24 × 24 for Japanese models (58 mm model, 80 mm model)
- Kanji font B: 16 × 16 for Japanese models (58 mm model, 80 mm model)

NOTE: The supported fonts are different on each model type. Font A is selected as the default.

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3) Character size:
<ANK model>

Table 1.2.2 Character Size for ANK Model

		Standard	Double-height	Double-width	Double-width / Double-height
		W × H (mm)	W × H (mm)	W × H (mm)	W × H (mm)
Font A	12 × 24	1.69 × 3.38	1.69 × 6.77	3.38 × 3.38	3.38 × 6.77
Font B	9 × 17	1.27 × 2.40	1.27 × 4.79	2.54 × 2.40	2.54 × 4.79

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): 1.41 (W) × 3.384 (H) mm
 Font B (9 × 17): 0.987 (W) × 2.397 (H) mm
 (ANK = alphanumeric)

<Japanese models (58 mm model, 80 mm model)>

Table 1.2.3 Character Size for Japanese Models (58 mm model, 80 mm model)

		Standard	Double-height	Double-width	Double-width / Double-height
		W × H (mm)	W × H (mm)	W × H (mm)	W × H (mm)
Font A	12 × 24	1.5 × 3.0	1.5 × 6.0	3.0 × 3.0	3.0 × 6.0
Font B	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	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 (8 × 16): 0.75 (W) × 2.0 (H) mm

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1.3 Autocutter

- 1) Cutting method: Scissors type with separated blades
- 2) Cutting type: Partial cut (cutting with one point in left edge left uncut)

NOTES: 1. To prevent dot displacement, after cutting, feed paper approximately 1 mm {14/360"} or more before printing.
 2. When operating the autocutter after leaving the printer unused for some time, feed paper 40 mm {1.57"} or longer to prevent paper jams in the autocutter unit.

1.4 Roll Paper Supply Device

- 1) Supply method: Drop-in roll paper
- 2) Roll paper end sensor: Detects whether paper is present or not. Detects a roll paper-end during printing, and stops printing if detects a paper-end. The printer resumes printing when paper is loaded and the roll paper cover is closed.

Detection method: Photo interrupter

NOTE: If paper other than the specified paper is used, the roll paper end sensor may not work correctly.

- 3) Roll paper near-end sensor: The sensor that detects a near-end of a roll paper. When the roll paper diameter becomes sufficiently small, the sensor detects a near-end of the roll paper and lights the PAPER OUT LED. Enabling/disabling of this sensor to stop printing on detection of a paper near-end can be selected by a command (**ESC c 4**).

Detection method: Microswitch

Near-end adjustment: Outside diameter of the roll paper: approximately 23 mm {0.91"}

NOTES: 1. If the roll paper with a paper core that is out of the specified range is used, the roll paper near-end detection may not work correctly.
 2. 23 mm listed above in the outside diameter of the roll paper to detect the near-end is a calculated value. Therefore, the value may vary depending on the products.

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1.5 Paper Specification

- 1) Paper type: Specified thermal paper
- 2) Form and size: Roll paper
The chromogenic side must face outside.
 - a) Roll paper diameter: 83 mm {3.27"} maximum
 - b) Roll paper core: Inside: 12 mm {0.47"}
Outside: 18 mm {0.71"}
Width: Same with the paper width or less than the paper width for 1 mm.

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

- c) Take-up roll paper width: For Japanese model (80 mm model), ANK model: 80 +0.5/-1.0 mm {3.15+0.02/-0.04"}
For Japanese model (58 mm model): 58 +0.5/-1.0 mm {2.28+0.02/-0.04"}
 - d) Paper width: For Japanese model (80 mm model), ANK model: 79.5 ± 0.5 mm {3.13 ± 0.02"}
For Japanese model (58 mm model): 57.5 ± 0.5 mm {2.26 ± 0.02"}
 - 3) Specified paper: Specified thermal roll paper:
For Japanese model (80 mm model), ANK model: NTP080-80
For Japanese model (58 mm model): NTP058-80
[Original paper: TF50KS-E Nippon Paper Industries Co., Ltd.]
In Japan: Nakagawa Manufacturing Co., Ltd.
In U.S.A.: Nakagawa Mfg. (USA) Inc.
In Europe: Nakagawa Mfg. (Europe) GmbH
In Southeast Asia: N.A.K. Mfg. (Malaysia) SDN BHD
- 4) Specified original paper type no.:

The following original paper can be used:

NOTE: If paper other than the specified paper is used, the print head may be damaged or the print quality may be poor. Therefore, it is recommended to use the specified paper or the equivalent.

Table 1.5.1 Specified Original Paper Type No.

Original Paper Type No.	Manufacture
TF50KS-E, TF60KS-E	NIPPON Paper Industries Co., Ltd.
PD150R, PD160R, PD190R	OJI Paper Mfg. Co., Ltd.
P220AGB-1	Mitsubishi Paper Mills Limited.
P300, P310, P350	Kanzaki Specialty Papers
AF50KS-E	Jujo Thermal Oy
F5041	Mitsubishi HiTec Paper Flensburg GmbH

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5) Print density adjustment

- It is recommended to set the print density depending on the paper type to keep the print quality as shown in the table below. The print density can be set with the DIP switch.

Table 1.5.2 Relation between the Original Paper and Density Level (ANK model)

Original Paper No.	Density Level
TF50KS-E, P310, P350, AF50KS-E, F5041	Standard
P300	Darker than standard density

Table 1.5.3 Relation between the Original Paper and Density Level (Japanese models (58 mm model, 80 mm model))

Original Paper No.	Density Level
TF50KS-E, TF60KS-E, PD150R, PD160R, PD190R, P220AGB-1	Standard

- The print density can be also set with the **GS (E command**.

Table 1.5.4 Relation between the Original Paper and Density Level (ANK model)

Original Paper No.	Density Level
TF50KS-E, P310, P350, AF50KS-E, F5041	8
P300	10

Table 1.5.5 Relation between the Original Paper and Density Level (Japanese models (58 mm model, 80 mm model))

Original Paper No.	Density Level
TF50KS-E, TF60KS-E, PD150R, PD160R, PD190R, P220AGB-1	7

6) 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. 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 any other problems occur before you use it for actual printing.

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1.6 Printable Area

<ANK model>

The printable area of a paper with width of 79.5 ± 0.5 mm { 3.13 ± 0.02 " } is 72.2 ± 0.2 mm { 2.84 ± 0.008 " } (512 dots) and the space on the right and left sides are approximately 3.7 mm {0.15"}.

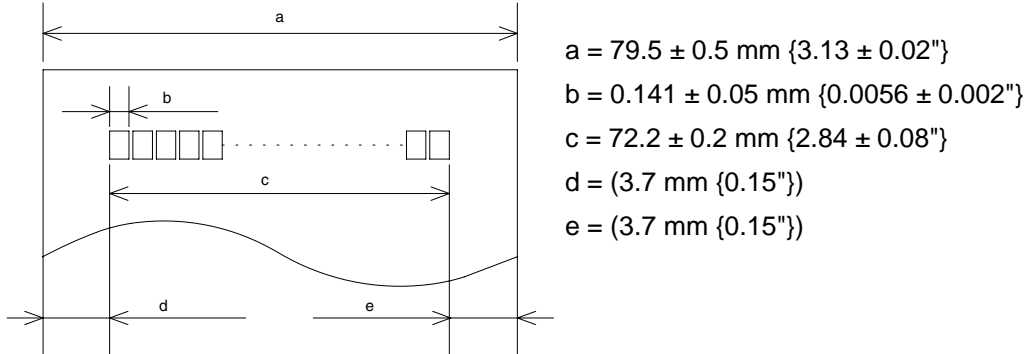


Figure 1.6.1 Roll Paper Printable Area

NOTE: With printing with two-part energizing, the print position within the printable area of the thermal elements for dots 257 to 512 is shifted approximately 0.07 mm {0.0028"} as shown in Figure 1.6.2 in the paper feed direction from the position for dots 1 to 256.

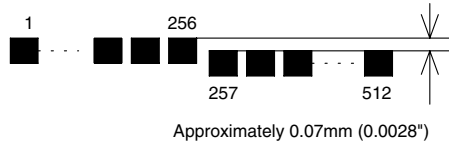


Figure 1.6.2 Shifting of the Print Position

NOTE: With printing with four-part energizing, the print position within the printable area of the thermal elements for each block 1 to 96, 97 to 240, 241 to 368, and 369 to 512 is shifted approximately 0.04 mm {0.0016"} as shown in Figure 1.6.3 in the paper feed direction.

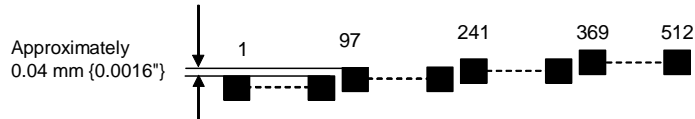


Figure 1.6.3 Shifting of the Print Position

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<Japanese model (58 mm model)>

The printable area of a paper with width of 57.5 ± 0.5 mm { 2.26 ± 0.02 " } is 52 ± 0.2 mm { 2.05 ± 0.008 " } (416 dots) and the space on the right and left sides are approximately 2.75 mm {0.108"}.

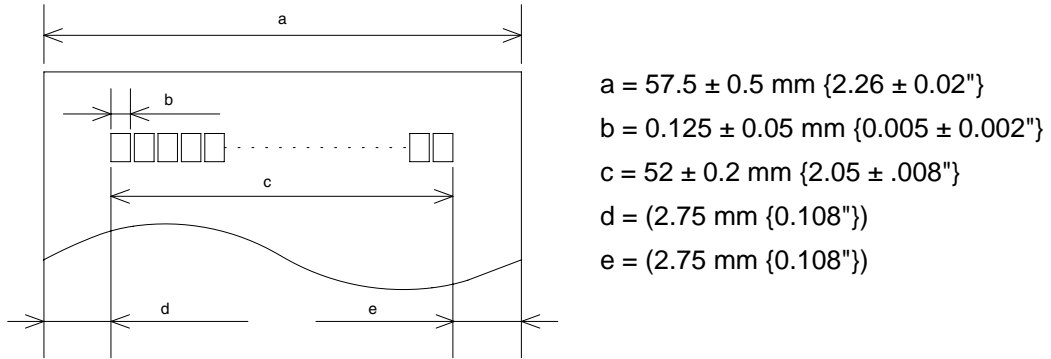


Figure 1.6.4 Roll Paper Printable Area

NOTE: With printing with two-part energizing, the print position within the printable area of the thermal elements for dots 225 to 416 is shifted approximately 0.06 mm {0.0024"} in the paper feed direction as shown in Figure 1.6.3 from the position for dots 1 to 224.

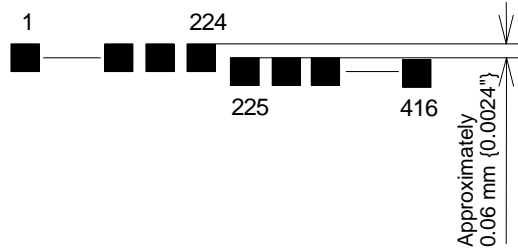


Figure 1.6.5 Shifting of the Print Position

EPSON	TITLE	TM-T70 Specification (STANDARD)	SHEET REVISION	NO.	
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<Japanese model (80 mm model)>

The printable area of a paper with width of 79.5 ± 0.5 mm { 3.13 ± 0.02 " } is 72 ± 0.2 mm { 2.83 ± 0.008 " } (576 dots) and the space on the right and left sides are approximately 3.8 mm {0.15"}.

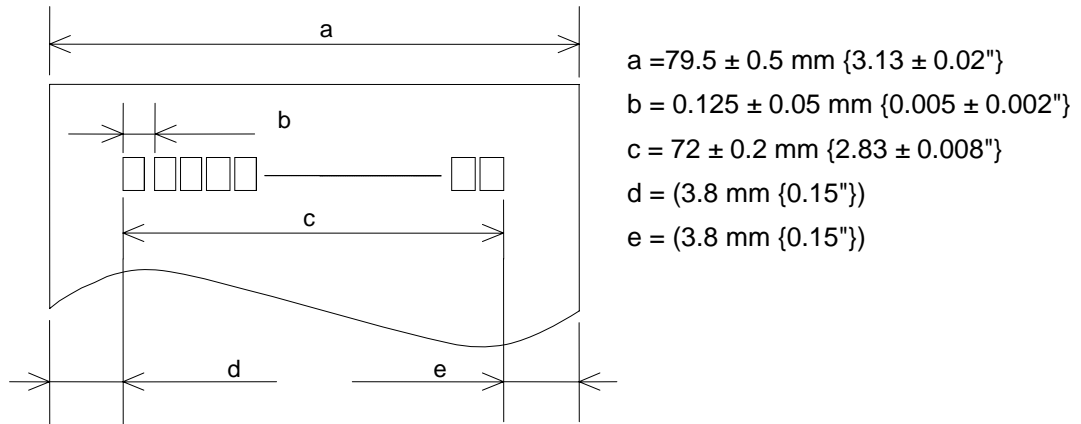


Figure 1.6.6 Roll Paper Printable Area

NOTE: The print position within the printable area of the thermal elements for dots 289 to 576 is shifted approximately 0.06 mm {0.0024"} as shown in Figure 1.6.7 in the paper feed direction from the position for dots 1 to 288.

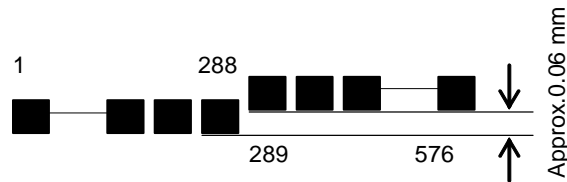
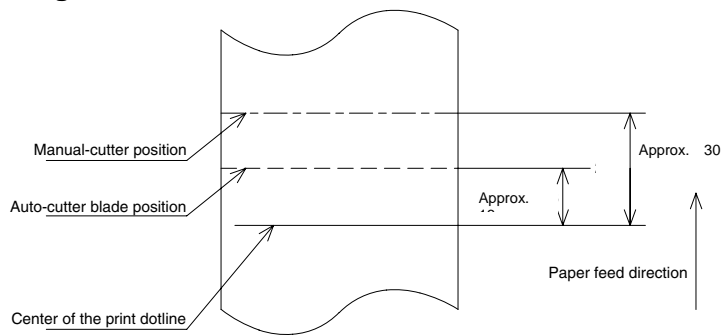


Figure 1.6.7 Shifting of the Print Position

1.7 Printing and Cutting Positions



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

Figure 1.7.1 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 the notice into account when setting the cutting position of the auto-cutter.

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1.8 Internal Buffer

- 1) Receive buffer selectable as 45 bytes or 4 KB using the DIP switch.
- 2) User-defined buffer (both for user-defined characters and downloaded bit images): 12 KB
- 3) Macro buffer: 2 KB (ANK model only)
- 4) NV (Non-volatile) graphics memory: 256 KB
- 5) NV user memory: 1 KB

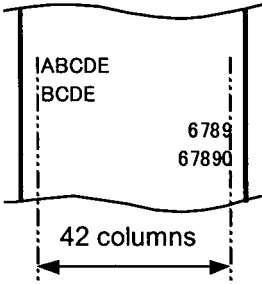
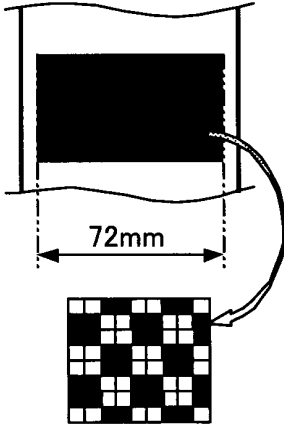
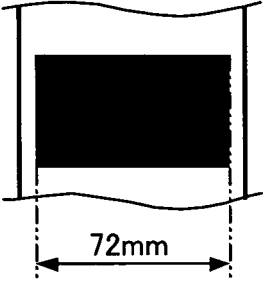
1.9 Electrical Characteristics

- 1) Supply voltage: DC+24V ± 7%
- 2) Current consumption (at 24V, 25°C, normal print density):
 - Operating: See Table 1.9.1.
 - Standby: Mean: Approximately 0.1 A

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

<ANK model>

Table 1.9.1 Current Consumption (Operating)

Print ratio	Approximately 18% (with the print pattern below) Font A, 42 columns, ANK rolling pattern for 100 lines (repeats 20H-7FH)	50% (Printing length: 20 mm)	100% (Printing length: 20 mm)
Print example			
High speed mode	Mean: Approximately 1.8A Peak: Approximately 6.3A	Mean: Approximately 3.8A Peak: Approximately 7.7A	Mean: Approximately 3.1A Peak: Approximately 11.4A
Low current consumption mode	Mean: Approximately 1.2A Peak: Approximately 3.5A	Mean: Approximately 1.8A Peak: Approximately 2.6A	Mean: Approximately 2.0A (See NOTE.) Peak: Approximately 2.6A (See NOTE.)

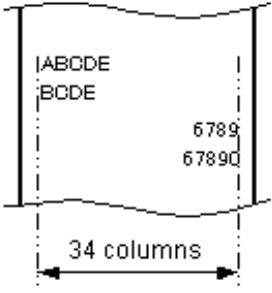
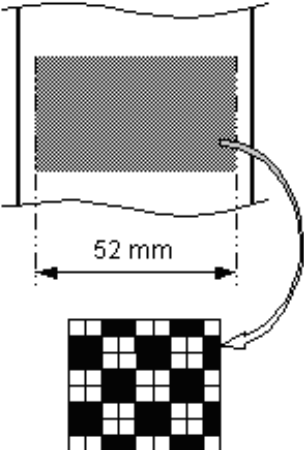
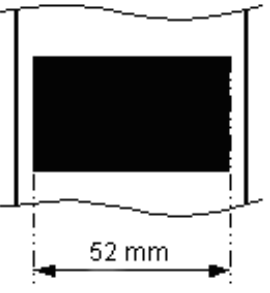
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NOTE: 42-columns printing with Font A by the DBH character.
 In graphics printing with 100% print ratio:
 Mean: Approximately 3.0A
 Peak: Approximately 4.5A

<Japanese model (58 mm model)>

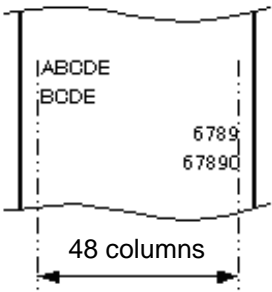
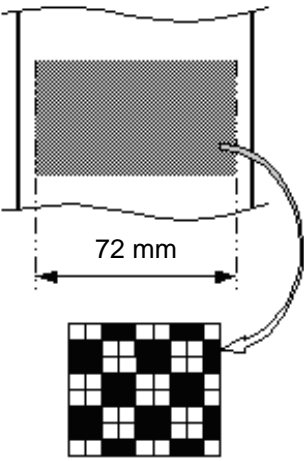
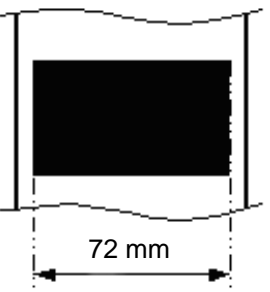
Table 1.9.2 Current Consumption (Operating)

Print ratio	Approximately 18% (with the print pattern below) Font A, 34 columns, ANK rolling pattern for 100 lines (repeats 20H-7FH)	50% (Printing length: 20 mm)	100% (Printing length: 20 mm)
Print example			
High speed mode	Mean: Approximately 1.4A Peak: Approximately 5A	Mean: Approximately 3.1A Peak: Approximately 6.4A	Mean: Approximately 2.6A Peak: Approximately 9.8A

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<Japanese model (80 mm model)>

Table 1.9.3 Current Consumption (Operating)

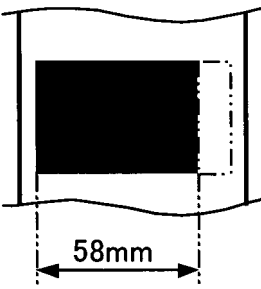
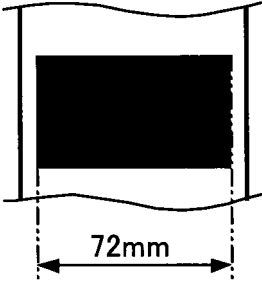
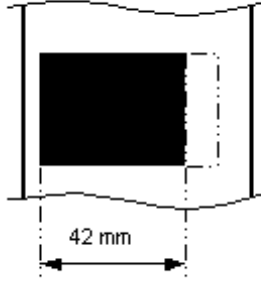
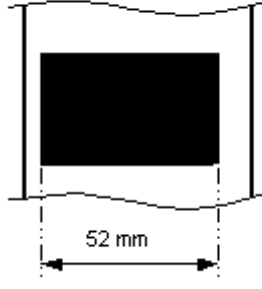
Print ratio	Approximately 18% (with the print pattern below) Font A, 48 columns, ANK rolling pattern for 100 lines (repeats 20H-7FH)	50% (Printing length: 20 mm)	100% (Printing length: 20 mm)
Print example			
High speed mode	Mean: Approximately 1.8A Peak: Approximately 5.3A	Mean: Approximately 4.2A Peak: Approximately 7.1A	Mean: Approximately 3.8A Peak: Approximately 10.5A

NOTES: 1. Notes on using Epson PS-180 power supply unit
 Printing with this product is assumed to use receipt or the equivalent. If the printing is continuously performed with the high print ratio, the overcurrent limitation may be operated. Therefore, the printing length must not exceed the following values when printing with high print ratio.

Print ratio: Number of dots being energized per one dotline / Total number of dots per one dotline (512 dots for ANK model, 416 dots for Japanese model (58 mm model), and 576 dots for Japanese model (80 mm model)).

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Table 1.9.4 Limitation of the Printing Length on Print Ratio

Print ratio	80%	100% (See*1.)
Print example 1 (Japanese model (80 mm model), ANK model)		
Print example 2 (Japanese model (58 mm model))		
Print length	30 mm or less	20 mm or less

If the overcurrent limitation is operated when printing is continuously performed with a high print ratio, uneven print density or a low voltage error may occur.

*1: Note on using PS-180 manufactured in 2002 or earlier in Japan (100 VAC)
When printing with a print ratio of 90% or higher, uneven print density may occur.
The serial numbers of the PS-180 units manufactured in 2002 or earlier are 13 digits that start with CYYZ or D73Z.

2. Notes on using the power supply unit other than the Epson specified one (PS-180)
- The current consumption of this printer is as shown in Figure 1.9.1. User must consider these values when the user provides the power supply unit other than the Epson specified one.
Note that the current consumption may be increased if the printer is used in a low temperature or the print density is set to "dark".
 - The power supply unit with a small power capacity may not operate the printer correctly.
 - Contact Epson if you need more detailed information.

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1.10 EMI and Safety Standards Applied

EMC is measured using SEIKO EPSON's AC adapter.

<Japanese model (58 mm model), ANK model>

- | | |
|-----------|---|
| 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: EN60950-1

- | | |
|------------------|---|
| 2) North America | EMI: FCC/ICES-003 Class A
Safety standards: UL60950-1/CSA C22.2 No.60950-1 |
| 3) Japan | EMC: VCCI Class A |
| 4) Oceania | EMC: AS/NZS CISPR22 class B |

Conditions of Acceptability

1. The supply source shall be SELV and non-hazardous energy level (less than 240VA).
2. When this product is installed in the product which has a total mass not exceeding 18kg, the enclosure of this product were evaluated as a fire enclosure.
3. The interface connectors except for input connector shall be described in installation or safety instruction to identify Non-LPS at end product.

<Japanese model (80 mm model)>

- | | |
|----------|------------------|
| 1) Japan | EMC VCCI Class A |
|----------|------------------|

NOTE: Safety standards and EMC for Europe, North America and Oceania do not apply to the Japanese model (80 mm model).

1.11 Reliability

- | | |
|---------------|---|
| 1) Life: | Mechanism: 15,000,000 lines
NOTE: Assumed in the condition that printing repeats for 10 lines feeding for 15 lines (30 dot/line per line.) |
| Thermal head: | 100 million pulses,
100 km |
| Auto cutter: | 1,500,000 cuts
(End of life is defined to have reached the end of its life when it reaches the beginning of the Wearout Period.) |
| 2) MTBF: | 360,000 hours
(Failure is defined as Random Failure occurring at the time of the Random Failure Period.) |
| 3) MCBF: | 52,000,000 lines
(This is an average failure interval based on failures relating to wearout and random failures up to the life of 15 million lines.) |

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1.12 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)

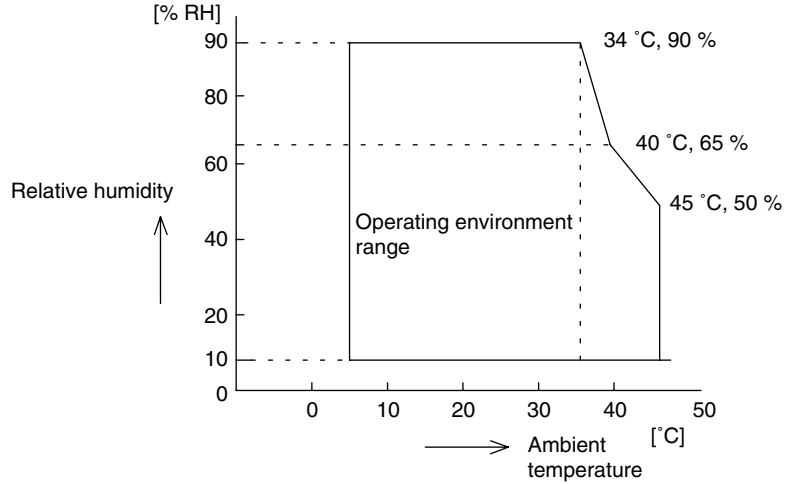


Figure 1.12.1 Operating Temperature and Humidity Range

NOTE: 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 40 mm {1.57"} before printing.

- 3) Vibration resistance: When Packed: Frequency: 5 to 55 Hz
 Acceleration: Approximately 19.6 m/s² {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 {23.6"}
 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.

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5) Acoustic noise(Operating): Approximately 55 dB (Bystander position)

NOTE: The values above are measured in the Epson evaluation condition.

The acoustic noise differs depending on the paper used, printing contents, or the setting values such as print speed or print density.

1.13 Installation direction

The TM-T70 printer must be installed horizontally. (allowable range of the tilting angle: within $\pm 3^\circ$)
 Vibration during paper cutting and using a drawer should be considered. Take measures to prevent the printer from moving. Affixing tapes are provided as an option.

If the printer is installed at a tilt more than $\pm 3^\circ$, the following problems may occur.

- 1) Cannot detect the near-end
- 2) Cannot close the printer cover after loading the new roll paper
- 3) Cannot remove the roll paper from the printer

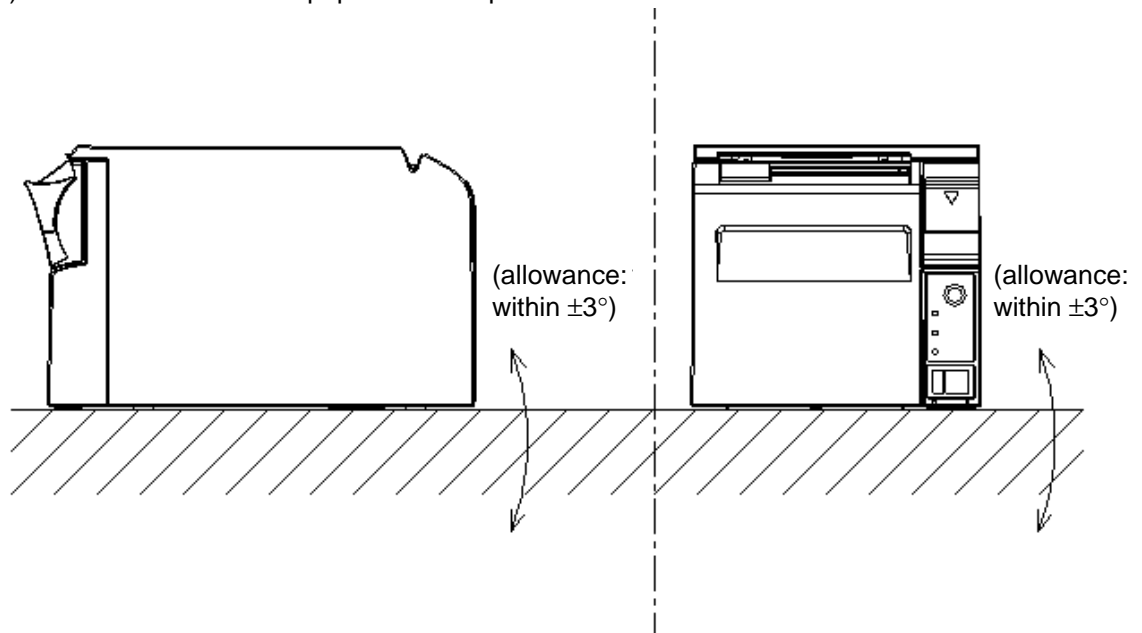


Figure 1.13.1 Allowance Range of Printer Installation

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1.13.2 Installation under a shelf

NOTE: If the printer installation does not fit within the specifications shown in Figure 1.13.2, the following problems may occur.

- 1) Cannot set the roll paper in the printer
- 2) Cannot cut the paper with the manual cutter.

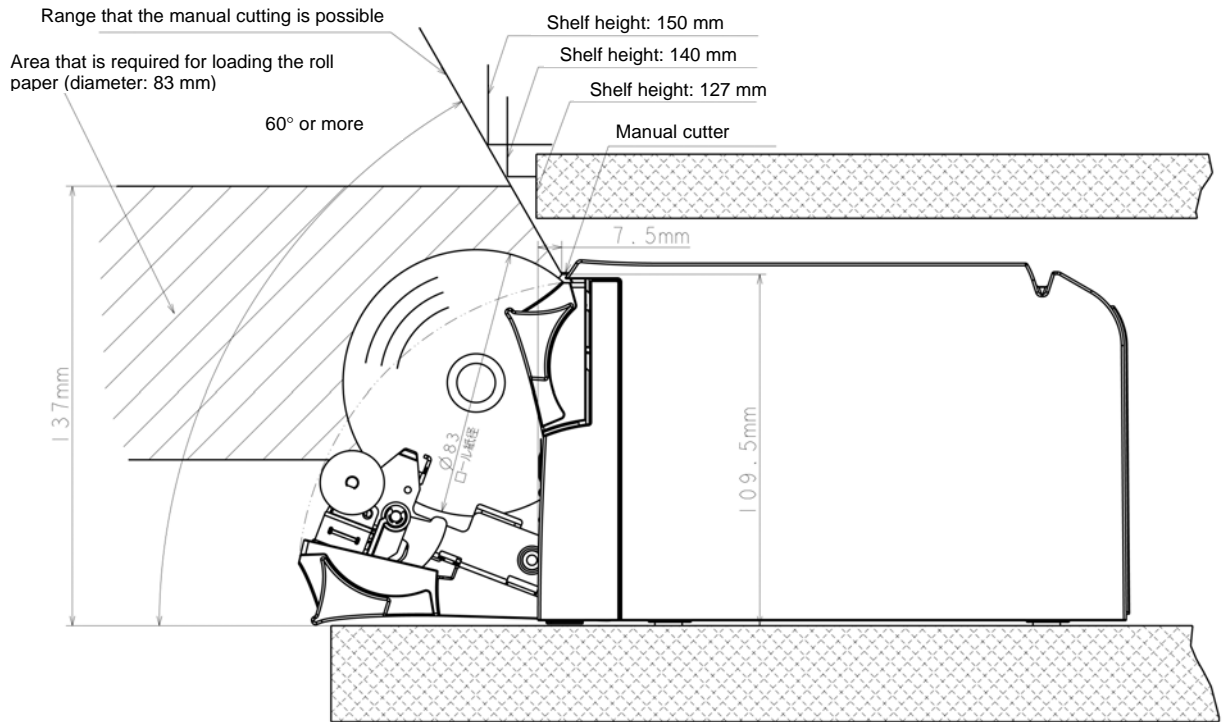


Figure 1.13.2 Printer Installation under a Shelf

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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
Transmission speed:	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps [bps: bits per second]
Data word length:	7 or 8 bits
Parity Settings:	None, even, odd
Stop bits:	1 or more
Connector (printer side):	Female DSUB-25 pin connector

- NOTES: 1. The handshaking, data word length, and parity depend on the DIP switch settings.
(See Section 3.3.3.)
2. The transmission speed depends on the DIP switch setting or the command.
3. The stop bit for 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 (including reset using the interface) and when the printer is ready to receive data.
- 2) During the self-test.
- 3) When the 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 roll paper end detector or the roll paper near-end detector with a printing halt feature by **ESC c 4**).
- 6) When waiting for the paper FEED button to be pressed before macro execution. (Applied to the ANK model only).
- 7) When an error has occurred.

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2.1.1.3 Interface connector terminal assignments and signal functions

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

Table 2.1.1 TM-T70 Printer Status and Signals

Pin number	Signal name	Signal direction	Function																															
1	FG	—	Frame ground																															
2	TXD	Output	Transmit data																															
3	RXD	Input	Receive data																															
4	RTS	Output	Same as DTR signal																															
6	DSR	Input	<p>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.</p> <p>When DTR/DSR control is selected, the printer transmits data after confirming this signal (except when transmitting data by DLE EOT, and GS a).</p> <p>When XON/XOFF control is selected, the printer does not check this signal.</p> <p>Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. (See Section 3.3.3.)</p> <p>The printer is reset when the signal remains MARK for 1 ms or more. (See Section 2.1.1.7.)</p>																															
7	SG	—	Signal ground																															
20	DTR	Output	<p>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 DIP SW 2-1 as follows (See Section 3.3.3):</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2"></th> <th rowspan="2">Printer status</th> <th colspan="2">DIP SW 2-1 status</th> </tr> <tr> <th>ON</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td rowspan="8" style="writing-mode: vertical-rl; transform: rotate(180deg); text-align: center;">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. When waiting for the FEED button to be pressed before macro execution. (Applied to the ANK model only)</td> <td>—</td> <td>BUSY</td> </tr> <tr> <td>7. When an error has occurred.</td> <td>—</td> <td>BUSY</td> </tr> <tr> <td>8. When the receive buffer becomes full.(*1)</td> <td>BUSY</td> <td>BUSY</td> </tr> </tbody> </table>		Printer status	DIP SW 2-1 status		ON	OFF	Offline	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.	BUSY	BUSY	2. During the self-test.	BUSY	BUSY	3. When the cover is open.	—	BUSY	4. During paper feeding using the paper feed button.	—	BUSY	5. When the printer stops printing due to a paper-end.	—	BUSY	6. When waiting for the FEED button to be pressed before macro execution. (Applied to the ANK model only)	—	BUSY	7. When an error has occurred.	—	BUSY	8. When the receive buffer becomes full.(*1)	BUSY	BUSY
	Printer status	DIP SW 2-1 status																																
		ON	OFF																															
Offline	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.	BUSY	BUSY																															
	2. During the self-test.	BUSY	BUSY																															
	3. When the cover is open.	—	BUSY																															
	4. During paper feeding using the paper feed button.	—	BUSY																															
	5. When the printer stops printing due to a paper-end.	—	BUSY																															
	6. When waiting for the FEED button to be pressed before macro execution. (Applied to the ANK model only)	—	BUSY																															
	7. When an error has occurred.	—	BUSY																															
	8. When the receive buffer becomes full.(*1)	BUSY	BUSY																															

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Table 2.1.1 TM-T70 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: <ul style="list-style-type: none"> • During the period from when the power is turned on to when the printer is ready to receive data • During the self-test
25	INIT	Input	Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains SPACE for 1 ms or more.

*1 • Definition of “receive buffer full”

<ANK model>

- 1) When the receive buffer capacity is specified to 4 KB (DIP SW1-2 is Off):

[TM-T88IV command-compatible mode is enabled]

- (1) When DIP switch 2-5 is OFF:

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.

- (2) When DIP switch 2-5 is ON:

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 138 bytes.

[TM-T88IV command-compatible mode is inenabled]

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.

- 2) When the receive buffer capacity is specified to 45 bytes (DIP SW1-2 is ON):

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.

<Japanese models (58 mm model, 80 model)>

- 1) When the receive buffer capacity is specified to 4 KB (DIP SW1-2 is Off):

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.

- 2) When the receive buffer capacity is specified to 45 bytes (DIP SW1-2 is On):

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.

- The printer ignores the data received when the remaining space in the receive buffer is 0 byte.

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2.1.1.4 XON/XOFF transmit timing

When XON/XOFF control is selected, the printer transmits XON or XOFF signals as follows. Transmit timing differs depending on the DIP SW2-1 setting.

Table 2.1.2 XON/XOFF Transmit Timing

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

- NOTES: 1. The XON code is <11>H and the XOFF code is <13>H.
 2. In case (3), XON is not transmitted when the receive buffer is full.
 3. In case (6), XOFF is not transmitted when the receive buffer is full.

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2.1.1.5 Serial interface connection example

Host side (DTE ex.8251)	Printer side
TXD.....	RXD
DSR.....	DTR
CTS.....	RTS
RXD.....	TXD
DTR.....	DSR
FG.....	FG
SG.....	SG

- NOTES: 1. Set the handshaking so that the transmit data can be received.
 2. Transmit data to the printer after turning on the power and initializing the printer.

2.1.1.6 Notes on setting DIP switch 2-1 to ON

- 1) The printer mechanism stops but does not become busy when: an error has occurred, the cover is open, printing stops due to a paper-end, or paper is fed using the paper feed button.
- 2) When 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, **DLE EOT**, **DLE ENQ** or **DLE DC4** used while sending the bit-image data 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 4 KB receive buffer. Transmit one line of data so that the receive buffer does not become full.

2.1.1.7 Notes on Resetting the Printer Using the Interface

The printer can be reset using interface pins 6 and 25 by changing the DIP switch setting (See Section 3.3.3, DIP switch 2).

Table 2.1.3 Reset Switching

Signal Line	DIP Switch	Reset Condition
Pin 6 (DSR)	DSW 2-7: ON	MARK level input
Pin 25 (INIT)	DSW 2-8: ON	SPACE or TTL-HIGH level input

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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) (DIP switch 2-7 is ON):



Figure 2.1.1 Minimum Reset Pulse Width (pin 6)

- When using pin 25 (INIT) (DIP switch 2-8 is ON):

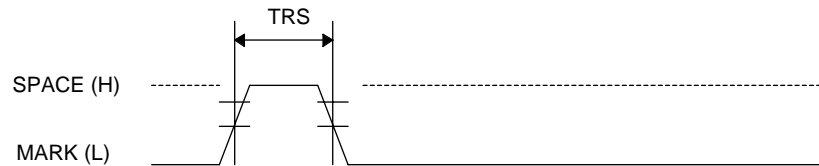


Figure 2.1.2 Minimum Reset Pulse Width (pin 25)

- NOTES: 1. 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.
2. When pin 6 (DSR) and pin 25 (INIT) are open, the printer is operating.

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2.1.2 IEEE 1284 Bidirectional Parallel Interface

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2.1.2.1 Compatibility Mode

(Data Transmission from Host to Printer: Centronics compatible)

1) Outline

Compatibility mode supports the compatibility with 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 either of the followings:

- 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 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 empty paper supply is detected by either the roll paper end detector or the roll paper near-end detector with a printing halt due to paper shortage enabled by **ESC c 4**).
- 6) When waiting for the FEED button to be pressed before macro execution. (Applied to the ANK model only)."
- 7) When an error has occurred.

2.1.2.2 Reverse Mode (Data Transmission from Printer to Host)

The STATUS data transmission from the printer to the host is proceeded 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 (Nibble). In the Byte Mode, data transmissions are proceeded by making the eight-bits data lines bidirectional.

The both modes fail to be proceeded concurrently with the Compatibility Mode, thereby causing half duplex transmission.

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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	PErrror	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

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- NOTES:
1. A prefix “n” to signal names refers to “L” active signals. To the host provided with none of 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. Follow the IEEE Std 1284 for the specifications of the interface cable.
 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 μ s 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 minimum required 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	VOH	*2.4 V	5.5 V	*IOH=0.32 mA
Output LOW voltage	VOL	-0.5 V	*0.4 V	*IOL=-12 mA
Output HIGH current	IOH	0.32 mA	-	VOH=2.4 V
Output LOW current	IOL	-12 mA	-	VOL=0.4 V
Input HIGH voltage	VIH	2.0 V	-	
Input LOW voltage	VIL	-	0.8 V	
Input HIGH current	IiH	-	-0.32 mA	VIH=2.0 V
Input LOW current	IiL	-	12 mA	VIL=0.8 V

Logic-H Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	VOH	3.0 V	5.5 V	While the power is OFF
Output LOW voltage	VOL	-	2.0 V	

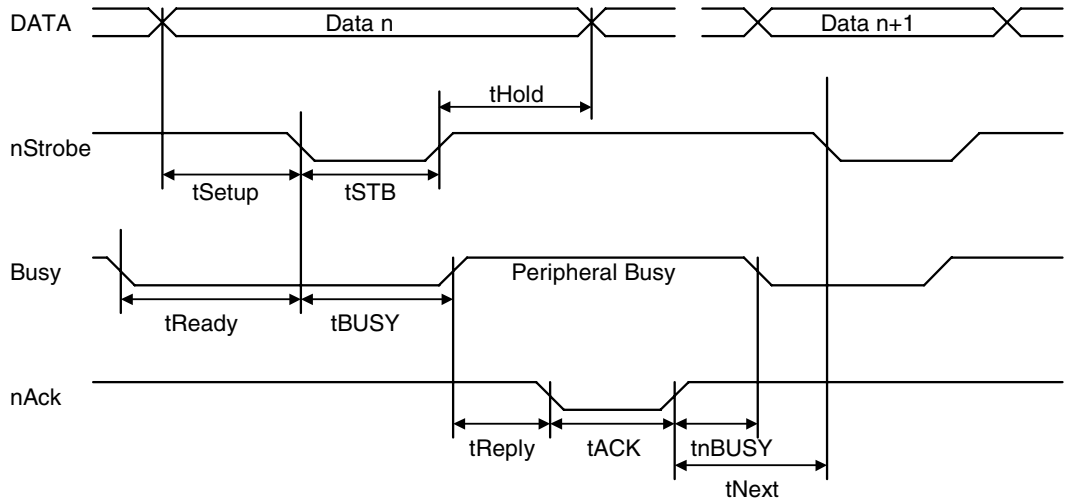
+5 V Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	VOH	*2.4 V	5.5 V	*IOH=0.32 mA
Output LOW voltage	VOL	-	- **	While the power is OFF
Output HIGH current	IOH	-	0.32 mA	VOH=2.4 V
Output LOW current	IOL	- **	-	While the power is OFF

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

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2.1.2.5 Data Receiving Timing (Compatibility Mode)



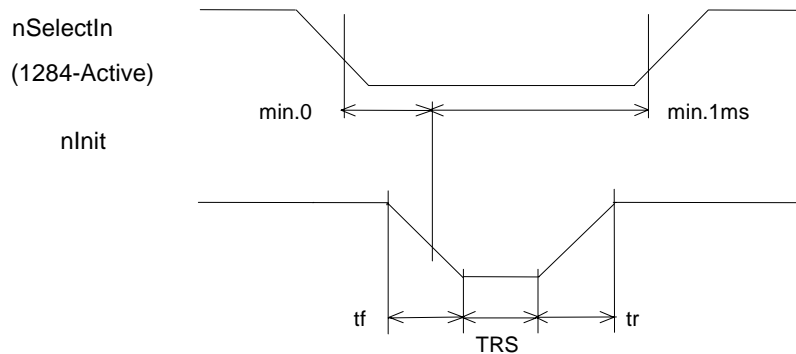
Characteristics	Symbol	Specifications	
		Min[ns]	Max[ns]
Data Hold Time (host)	tHold	750	--
Data Setup Time	tSetup	750	--
STROBE Pulse Width	tSTB	750	--
READY Cycle Idle Time	tReady	0	--
BUSY Output Delay Time	tBUSY	0	500
Data Processing Time	tReply	0	∞
ACKNLG Pulse Width	tACK	500	10μs
BUSY Release Time	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 satisfied. However, the printer reset is ignored when the signal nSelectIn (pin #36, 1284-Active HIGH) is active in reverse mode.

- DC characteristic:
TTL level
- AC characteristics:
 Minimum reset pulse width: TRS 50 μ s (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, different from in the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled and thus precautions must be taken to the followings.

- 1) Allowable capacity of the printer internal buffer is 99 bytes (except ASB status). The status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data acceptance (Reverse Mode).
- 2) When ASB is used, the host is preferably in the wait state for data acceptance (Reverse Idle Mode). When this state is not available, the host shall enter the Reverse Mode to always 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 DIP switch 2-1 to ON

See Section 2.1.1.6.

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2.1.3 USB (Universal Serial Bus) Interface

When the UB series interface board below is used, the USB controller that is built-in the printer operates:

UB-U05, UB-U06, UB-U19

* The USB interface specifications for other UB-U** series cannot be used.

- Outline
1. Full-speed transmission at 12 Mbps [bps: bits per second]
 2. Plug&Play, Hot Insertion & Removable

2.1.3.1 USB transmission specifications

1) USB function

- Overall specifications: according to USB 2.0 specifications
- Transmission speed: USB Full-Speed (12 Mbps)
- Transmission method: USB bulk transmission method
- Power supply specifications: USB self power supply function
- Current consumed by USB bus: 0 mA (provided entirely from the unit)
- USB packet size
 - With Full-Speed connection: USB bulk OUT (TM) 64 bytes
 - USB bulk IN (TM) 64 bytes

2) Status transmission from printer with USB interface

With this interface, the status of the printer is transmitted to the host computer via the USB bulk transmission method.

The USB bulk transmission method is a host-controlled transmission method. Unlike RS232 transmission, it cannot spontaneously interrupt data transmission to the host computer.

The printer has a 128-byte status data buffer. Statuses that exceed the buffer capacity are cancelled. In order to ensure that there is no lack of status data, it is necessary to periodically retrieve status data at the host computer.

2.1.4 Other Interfaces

Various interface boards (EPSON UB series) can be used.

However, the following models with the buzzer function cannot be used.

- UB-E02A
- UB-R02A

Otherwise, the printer or the interface board may be damaged.

As for the combination of the printer and the UB series, please See "TM-UIB combination specifications."

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2.2 Connectors

2.2.1 Interface Connectors

See Section 2.1, Interface.

2.2.2 Power Supply Connector

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

1) Pin assignments: See 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	F.G.

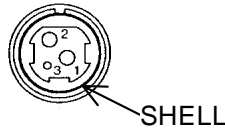


Figure 2.2.1 Power Supply Connector

NOTE: Be sure to ground the metal of the interface using the 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: See 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.

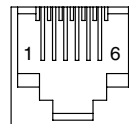


Figure 2.2.2 Drawer Kick-out Connector

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- 2) Connector model: Printer side: MOLEX 52065-6615 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 waveform: Outputs the waveforms in Figure 2.2.3 to the points A and B in Figure 2.2.4.
 t_1 (ON time) and t_2 (OFF time) are specified by **ESC p** or **DLE DC4**.

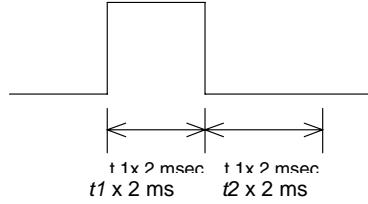


Figure 2.2.3 Drawer Kick-out Drive Signal Output Waveform

4) Drawer open/close signal

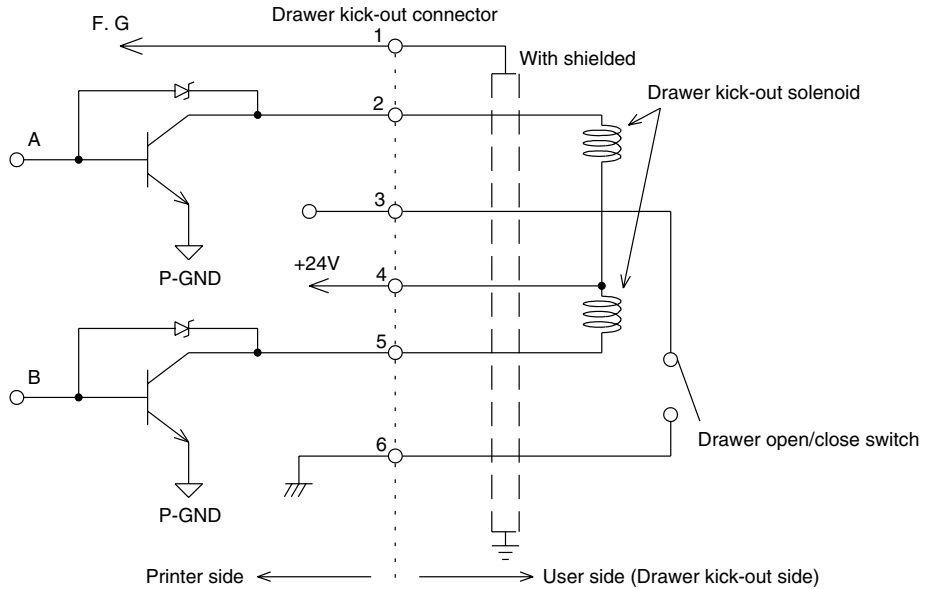


Figure 2.2.4 Drawer Circuitry

- 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.

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

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. Otherwise, an overcurrent could damage the solenoid.
 6. Do not connect telecommunication network to the drawer kick-out connector.

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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 (<i>fn</i> = 1)
	Execute power-off sequence (<i>fn</i> = 2)
	Clear buffer(s) (<i>fn</i> = 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 (Available to the ANK model only)
ESC W	Set print area in page mode
ESC \	Set relative print position

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Command	Name
ESC a	Select justification
ESC c 3	Select paper sensor(s) to output paper-end signals
ESC c 4	Select paper sensor(s) to stop printing
ESC c 5	Enable/disable panel buttons
ESC d	Print and feed <i>n</i> lines
ESC p	Generate pulse
ESC t	Select character code table
ESC {	Turn upside-down print mode on/off
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 5> Set the customized setting values. <Function 6> Transmit the customized setting values. <Function 11> Set the configuration item for the serial interface. <Function 12> Transmit the configuration item for the serial interface.
GS (H	Request transmission of response or status <Function 48> Set the process ID response.
GS (K	Select print control method(s) <Function 50> Select the print speed. <Function 97> Select the number of parts for the thermal head energizing.
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).

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Command	Name
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.
GS *	Define downloaded bit image
GS /	Print downloaded bit image
GS :	Start/end macro definition (Available to the ANK model only)
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 V	Select cut mode and cut paper
GS W	Set print area width
GS \	Set relative vertical print position in page mode
GS ^	Execute macro (Available to the ANK model only)
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

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List of Multi-byte Code Characters Commands (Available to the Japanese models (58 mm model, 80 mm 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 to use.

Obsolete command		Upward-compatible command
ESC i	Partial cut (one point left uncut)	GS V
ESC m	Partial cut (three points left uncut)	GS V
ESC u	Transmit peripheral device status	GS r
ESC v	Transmit paper sensor status	GS r
FS q 1	Write data to NV user memory	<Function 1> GS (C
FS q 2	Read data from NV user memory	<Function 2> GS (C
FS p	Print NV bit image	GS (L <Function 69>
FS q	Define NV bit image	GS (L <Function 67>
GS v 0	Print raster bit image	GS (L <Function 112 + 50>

(*) “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.

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3.2 Character Code Tables









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

3.2.1 Common to all pages (International Character Set: USA)

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

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3.2.2 Page 0 [PC437: USA, Standard Europe]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	 176	L 192	ll 208	α 224	≡ 240
1	ü 129	æ 145	í 161	 177	l 193	fl 209	β 225	± 241
2	é 130	Æ 146	ó 162	 178	T 194	π 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	| 179	f 195	ll 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	f 180	- 196	l 212	Σ 228	| 244
5	à 133	ò 149	Ñ 165	f 181	† 197	F 213	σ 229	J 245
6	â 134	û 150	ª 166	ll 182	f 198	π 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	π 183	ll 199	fl 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	f 184	ll 200	fl 216	Φ 232	° 248
9	ë 137	Ö 153	Γ 169	ll 185	fl 201	J 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	ll 186	ll 202	Γ 218	Ω 234	· 250
B	ï 139	ç 155	½ 171	f 187	fl 203	 219	ð 235	√ 251
C	î 140	£ 156	¼ 172	J 188	fl 204	 220	∞ 236	ⁿ 252
D	ì 141	¥ 157	í 173	ll 189	= 205	 221	Φ 237	² 253
E	Ä 142	Pt 158	« 174	J 190	fl 206	 222	ε 238	■ 254
F	Å 143	f 159	» 175	f 191	ll 207	 223	∩ 239	SP 255

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3.2.3 Page 1 [Katakana]

HEX	8	9	A	B	C	D	E	F
0	— 128	⊥ 144	SP 160	— 176	夕 192	ミ 208	= 224	× 240
1	■ 129	⊥ 145	。 161	ア 177	チ 193	ム 209	ト 225	円 241
2	■ 130	⊥ 146	「 162	イ 178	ツ 194	メ 210	キ 226	年 242
3	■ 131	⊥ 147	」 163	ウ 179	テ 195	モ 211	フ 227	月 243
4	■ 132	— 148	、 164	エ 180	ト 196	ヤ 212	▲ 228	日 244
5	■ 133	— 149	・ 165	オ 181	ナ 197	ユ 213	▲ 229	時 245
6	■ 134	| 150	ヲ 166	カ 182	ニ 198	ヨ 214	▼ 230	分 246
7	■ 135	| 151	ア 167	キ 183	ヌ 199	ラ 215	▼ 231	秒 247
8	| 136	「 152	イ 168	ク 184	ネ 200	リ 216	♠ 232	千 248
9	| 137	「 153	ウ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	| 138	「 154	エ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	| 139	」 155	オ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	| 140	「 156	ヤ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	 141	「 157	ユ 173	ス 189	ハ 205	ン 221	○ 237	人 253
E	■ 142	「 158	ヨ 174	セ 190	ホ 206	ゝ 222	/ 238	■ 254
F	+143	」 159	ツ 175	ソ 191	マ 207	。 223	\ 239	SP 255

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






3.2.4 Page 2 [PC850: Multilingual]

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

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3.2.5 Page 3 [PC860: Portuguese]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	 176	L 192	ll 208	α 224	≡ 240
1	ü 129	À 145	í 161	 177	l 193	fl 209	β 225	± 241
2	é 130	È 146	ó 162	 178	T 194	π 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	| 179	f 195	ll 211	π 227	≤ 243
4	ã 132	ö 148	ñ 164	f 180	- 196	l 212	Σ 228	| 244
5	à 133	ò 149	Ñ 165	f 181	f 197	F 213	σ 229	J 245
6	Á 134	Ú 150	ª 166	ll 182	f 198	π 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	π 183	ll 199	fl 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	f 184	ll 200	fl 216	Φ 232	° 248
9	Ê 137	Ï 153	Ò 169	ll 185	fl 201	J 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	ll 186	ll 202	Γ 218	Ω 234	· 250
B	Í 139	ç 155	½ 171	f 187	fl 203	 219	ð 235	√ 251
C	Ô 140	£ 156	¼ 172	J 188	fl 204	 220	∞ 236	ⁿ 252
D	ì 141	Ù 157	í 173	ll 189	= 205	 221	Φ 237	² 253
E	Ã 142	Pt 158	« 174	J 190	fl 206	 222	ε 238	■ 254
F	Â 143	Ó 159	» 175	f 191	ll 207	 223	∩ 239	SP 255

EPSON	TITLE TM-T70 Specification (STANDARD)	SHEET REVISION D	NO.	
			NEXT 42	SHEET 41









3.2.6 Page 4 [PC863: Canadian-French]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	Ï 160	⋯ 176	Ł 192	Ⓔ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	⋮ 177	Ⓕ 193	Ⓕ̄ 209	β 225	± 241
2	é 130	Ê 146	Ó 162	⋱ 178	Ⓖ 194	Ⓖ̄ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	| 179	ƒ 195	Ⓖ̄ 211	Π 227	≤ 243
4	Â 132	Ë 148	¨ 164	‡ 180	— 196	ƒ̄ 212	Σ 228	∫ 244
5	à 133	Ï 149	˙ 165	‡ 181	† 197	ƒ̄ 213	σ 229	∫ 245
6	¶ 134	û 150	³ 166	‡ 182	ƒ̄ 198	π 214	μ 230	÷ 246
7	ç 135	ù 151	— 167	π 183	‡ 199	‡ 215	τ 231	≈ 247
8	ê 136	α 152	Î 168	ƒ̄ 184	Ⓖ̄ 200	≠ 216	Φ 232	° 248
9	ë 137	Ô 153	ƒ̄ 169	‡ 185	ƒ̄ 201	∫ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	‡ 186	Ⓔ̄ 202	ƒ̄ 218	Ω 234	· 250
B	ï 139	ç̄ 155	½ 171	‡ 187	‡ 203	■ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	‡ 188	‡ 204	■ 220	∞ 236	ⁿ 252
D	= 141	Ù 157	¾ 173	‡ 189	= 205	■ 221	Φ 237	² 253
E	À 142	Û 158	« 174	‡ 190	‡ 206	■ 222	ε 238	■ 254
F	§ 143	f 159	» 175	ƒ̄ 191	Ⓔ̄ 207	■ 223	∩ 239	SP 255

EPSON	TITLE TM-T70 Specification (STANDARD)	SHEET REVISION D	NO.	
			NEXT 43	SHEET 42

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3.2.7 Page 5 [PC865: Nordic]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	 176	L 192	ll 208	α 224	≡ 240
1	ü 129	æ 145	í 161	 177	l 193	ƚ 209	β 225	± 241
2	é 130	Æ 146	ó 162	 178	ƚ 194	π 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	| 179	ƚ 195	ll 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	ƚ 180	— 196	ƚ 212	Σ 228	| 244
5	à 133	ò 149	Ñ 165	ƚ 181	ƚ 197	F 213	σ 229	J 245
6	å 134	û 150	ª 166	ll 182	ƚ 198	π 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	π 183	ll 199	ll 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	ƚ 184	ll 200	ƚ 216	Φ 232	° 248
9	ë 137	Ö 153	ƒ 169	ll 185	ll 201	J 217	Θ 233	• 249
A	è 138	Ü 154	ƒ 170	ll 186	ll 202	ƒ 218	Ω 234	· 250
B	ï 139	ø 155	½ 171	ll 187	ll 203	 219	ð 235	√ 251
C	î 140	£ 156	¼ 172	ll 188	ll 204	 220	∞ 236	ⁿ 252
D	ì 141	Ø 157	ì 173	ll 189	= 205	 221	Φ 237	² 253
E	Ä 142	Pt 158	« 174	ll 190	ll 206	 222	ε 238	■ 254
F	Å 143	f 159	α 175	ƚ 191	ll 207	 223	∩ 239	SP 255

EPSON	TITLE	TM-T70 Specification (STANDARD)	SHEET REVISION	NO.	
			D	NEXT 44	SHEET 43

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






3.2.8 Page 16 [WPC1252]

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

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3.2.9 Page 17 [PC866: Cyrillic #2]

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

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3.2.10 Page 18 [PC852: Latin2]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	☐ 176	Ł 192	đ 208	Ó 224	- 240
1	ü 129	Í 145	í 161	☐ 177	Ł 193	Đ 209	β 225	“ 241
2	é 130	Í 146	ó 162	☐ 178	Т 194	Ǿ 210	Ô 226	˘ 242
3	â 131	ô 147	ú 163	| 179	ƒ 195	Ě 211	Ń 227	ˇ 243
4	ä 132	ö 148	Ą 164	† 180	— 196	ď 212	ň 228	ˇ 244
5	ů 133	Ĺ 149	ą 165	Á 181	† 197	Ň 213	ň 229	§ 245
6	ć 134	ĭ 150	ž 166	Â 182	Ǻ 198	Í 214	Š 230	÷ 246
7	ç 135	Ś 151	ž 167	Ě 183	ǻ 199	Î 215	š 231	˘ 247
8	ł 136	ś 152	Ę 168	Ş 184	Ł 200	ě 216	Ř 232	° 248
9	ë 137	Ö 153	ę 169	|| 185	Ɔ 201	Ј 217	Ú 233	¨ 249
A	Ő 138	Ü 154	SP 170	|| 186	Ł 202	Г 218	ř 234	• 250
B	ő 139	Ť 155	ž 171	|| 187	Ɔ 203	■ 219	Ú 235	ú 251
C	î 140	ť 156	č 172	|| 188	Ɔ 204	■ 220	ý 236	Ř 252
D	ž 141	ł 157	ş 173	Ž 189	= 205	Т 221	Ý 237	ř 253
E	Ä 142	× 158	« 174	ž 190	 206	Ů 222	ţ 238	■ 254
F	Ć 143	č 159	» 175	Г 191	α 207	■ 223	’ 239	SP 255

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3.2.11 Page 19 [PC858: Euro]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	☐ 176	Ł 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	☐ 177	Ł 193	Ð 209	β 225	± 241
2	é 130	Æ 146	ó 162	☐ 178	Т 194	Ê 210	Ô 226	= 242
3	â 131	ô 147	ú 163	| 179	† 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	† 180	- 196	È 212	ö 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	† 197	€ 213	Ö 229	§ 245
6	â 134	û 150	ª 166	Â 182	ã 198	Í 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	ℒ 200	Ï 216	þ 232	° 248
9	ë 137	Ö 153	® 169	¶ 185	℞ 201	Ј 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	¶ 186	℔ 202	Г 218	Û 234	· 250
B	ï 139	ø 155	½ 171	¶ 187	¶ 203	■ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	¶ 188	¶ 204	■ 220	Ý 236	³ 252
D	ì 141	Ø 157	ì 173	¢ 189	= 205	¡ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	¶ 206	Ì 222	- 238	■ 254
F	Å 143	f 159	» 175	‡ 191	α 207	■ 223	' 239	SP 255

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

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3.2.13 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	\$	@	ı	Ñ	ı	^	`	¨	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	ı	Ñ	ı	é	`	ı	ñ	ó	ú
Latin America	#	\$	á	ı	Ñ	ı	é	ü	ı	ñ	ó	ú
Korea	#	\$	@	[₩]	^	`	{		}	~
Slovenia/ Croatia	#	\$	Ž	Š	Đ	Ć	Č	ž	š	đ	ć	č
China	#	¥	@	[\]	^	`	{		}	~

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3.3 Switches and Buttons

3.3.1 Power Button

The power button (a rocker switch) located on the lower right front of the printer turns the power on or off.

- NOTES:
1. Turn on the power only after connecting the power supply.
 2. Press the power button after the LED lights go off if the power is turned on immediately after the power is turned off.
 3. If the power is turned off without the execution of the **DLE DC4** (*fn = 2*) command, the values of the maintenance counter are not updated correctly.
To use the maintenance counter correctly, see APPENDIX E.

3.3.2 Panel Buttons

1) FEED button: Non-locking push button

- [Function] • If you push this button once and release it, the printer feeds paper for 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:

The roll paper end sensor detects a paper end

When the printer cover is open.

- During self-test printing, you can stop the self test temporarily by pressing this button and restart it by pressing the button again.

NOTE: This button is disabled by **ESC c 5**.

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3.3.3 DIP Switches

3.3.3.1 Serial interface specification

Table 3.3.1 DIP Switch 1

SW 1	Function	ON	OFF	Factory setting
1	Data reception error	Ignored	Prints '?'	OFF
2	Receive buffer capacity	45 bytes	4K bytes	OFF
3	Handshaking	XON/XOFF	DTR/DSR	OFF
4	Word length	7 bits	8 bits	OFF
5	Parity check	Yes	No	OFF
6	Parity selection	Even	Odd	OFF
7	Transmission speed selection	See Table 3.3.2.		ON
8				ON

Table 3.3.2 Transmission Speed

Transmission Speed (bps)	SW 1-7	SW 1-8
(See *1.)	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

bps: bits per second

- *1: • The transmission speed can be selected by setting the transmission condition of the serial interface.

<ANK model>

One of the transmission speed is selectable from seven setting values – 2400, 4800, 9600, 19200, 38400, 57600, and 115200. The default value of the transmission speed is 38400 bps when the TM-T88IV-compatible mode is enabled and is 115200 bps when the TM-T88IV-compatible mode is disabled.

<Japanese models (58 mm model, 80 mm model)>

- One of the transmission speed is selectable from seven setting values – 2400, 4800, 9600, 19200, 38400, 57600, and 115200. The default value of the transmission speed is 115200 bps.
- The setting of the communication condition of the serial interface is performed with **GS (E**. As for each setting value, see **GS (E** for details.

NOTE: The communication condition of the serial interface set by **GS (E** is enabled only when DIP switches 1-7 and 1-8 are on. For other settings, the setting values by DIP switch 1 are enabled.

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Table 3.3.3 DIP Switch 2

<ANK model>

SW 2	Function	ON	OFF	Factory setting
1	Handshaking (BUSY condition)	• Receive buffer full	• Offline • Receive buffer full	OFF
2	Reserved (Do not change settings)	---	Fixed to Off	OFF
3	Selects print density /	See Table 3.3.4.		OFF
4	Low power consumption mode			OFF
5	[When TM-T88IV-compatible mode is enabled] Setting the conditions that cancels the receive buffer BUSY state (This function is enabled when the receive buffer capacity is set to 4 KB.)	Cancels the BUSY state when the remaining capacity of the receive buffer reaches 138 bytes.	Cancels the BUSY state when the remaining capacity of the receive buffer reaches 256 bytes.	OFF
	[When TM-T88IV-compatible mode is disabled] Reserved	---	---	
6	Reserved (Do not change settings)	Fixed to Off		OFF
7	I/F pin 6 reset signal	Enabled	Disabled	OFF
8	IF pin 25 reset signal	Enabled	Disabled	OFF

<Japanese models (58 mm model, 80 mm model)>

SW 2	Function	ON	OFF	Factory setting
1	Handshaking (BUSY condition)	• Receive buffer full	• Offline • Receive buffer full	OFF
2	Reserved (Do not change settings)	Fixed to Off		OFF
3	Selects print density /	See Table 3.3.4.		OFF
4	Low power consumption mode			OFF
5	Reserved	---	---	OFF
6	Reserved (Do not change settings)	Fixed to Off		OFF
7	I/F pin 6 reset signal	Enabled	Disabled	OFF
8	IF pin 25 reset signal	Enabled	Disabled	OFF

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Table 3.3.4 DIP Switch 2-3 and 2-4

<ANK model>

Switch No.		Function
3	4	
OFF	OFF	Print density (Standard)
ON	OFF	Print density (Darker than standard)
OFF	ON	Print density (Darker)
ON	ON	Low power consumption mode

<Japanese models (58 mm model, 80 mm model)>

Switch No.		Function
3	4	
OFF	OFF	Print density (Standard)
ON	ON	Print density (Standard)
ON	OFF	Print density (Darker than standard)
OFF	ON	Print density (Darker)

- NOTES:
1. Change the DIP switch when the printer power is turned off.
 2. Changes in DIP switch settings are recognized only when the printer power is turned on or when the printer is reset by using the interface. If the DIP switch setting is changed after the printer power is turned on, the change does not take effect until the printer is turned on again or is reset.
 3. If the print density is set to "Darker than standard"/" More dark" level, printing speed is inclined to be low speed.

3.3.3.2 Interface specification other than serial interface

Table 3.3.5 DIP Switch 1

<ANK model>

SW	Function	ON	OFF	Factory setting
1	Auto line feed	Always enabled	Always disabled	OFF
2	Receive buffer capacity	45 bytes	4 KB	OFF
3	[When the TM-T88IV command-compatible mode is enabled] Selection of paper sensor that outputs paper out signal (Default of ESC c3)	Disabled	Roll paper end sensor: Enabled, roll paper near-end sensor: Enabled	OFF
	[When the TM-T88IV command-compatible mode is disabled] Reserved	---	---	
4	Setting error signals	Disabled	Enabled	OFF
5-8	Reserved	---	---	OFF

<Japanese models (58 mm model, 80 mm model)>

SW	Function	ON	OFF	Factory setting
1	Auto line feed	Always enabled	Always disabled	OFF
2	Receive buffer capacity	45 bytes	4 KB	OFF
3	Reserved	---	---	OFF
4	Error signal output	Disabled	Enabled	OFF
5-8	Reserved	---	---	OFF

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Table 3.3.6 DIP Switch 2

<ANK model>

SW	Function	ON	OFF	Factory setting
1	Handshaking (BUSY condition)	• Receive buffer full	• Offline • Receive buffer full	OFF
2	Reserved (Do not change settings)	---	Fixed to Off	OFF
3	Selects print density /	See Table 3.3.7.		OFF
4	Low power consumption mode			OFF
5	[When the TM-T88IV command-compatible mode is enabled] Setting the conditions that cancel the receive buffer BUSY state (This function is effective when the capacity of the receive buffer is set to 4 KB.)	Cancels the BUSY state when the remaining capacity of the receive buffer reaches 138 bytes.	Cancels the BUSY state when the remaining capacity of the receive buffer reaches 256 bytes.	OFF
	[When the TM-T88IV command-compatible mode is disabled] Reserved			
6	Reserved (Do not change settings)	---	Fixed to Off	OFF
7	Reserved (Do not change settings)	---	Fixed to Off	OFF
8	I/F pin 31 reset signal (Do not change settings)	Fixed to On	---	ON

<Japanese models (58 mm model, 80 mm model)>

SW	Function	ON	OFF	Factory setting
1	Handshaking (BUSY condition)	• Receive buffer full	• Offline • Receive buffer full	OFF
2	Reserved (Do not change settings)	---	Fixed to Off	OFF
3	Selects print density /	See Table 3.3.7.		OFF
4	Low power consumption mode			OFF
5	Reserved	---	---	OFF
6	Reserved (Do not change settings)	---	Fixed to Off	OFF
7	Reserved (Do not change settings)	---	Fixed to Off	OFF
8	I/F pin 31 reset signal (Do not change settings)	Fixed to On	---	ON

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Table 3.3.7 DIP Switch 2-3 and 2-4

<ANK model>

Switch No.		Function
3	4	
OFF	OFF	Print density (Standard)
ON	OFF	Print density (More dark than standard)
OFF	ON	Print density (More dark)
ON	ON	Low power consumption mode

<Japanese models (58 mm model, 80 mm model)>

Switch No.		Function
3	4	
OFF	OFF	Print density (Standard)
ON	ON	Print density (Standard)
ON	OFF	Print density (More dark than standard)
OFF	ON	Print density (More dark)

- NOTES:
1. Change the DIP switch when the printer power is turned off.
 2. Changes in DIP switch settings are recognized only when the printer power is turned on or when the printer is reset by using the interface. If the DIP switch setting is changed after the printer power is turned on, the change does not take effect until the printer is turned on again or is reset.
 3. If the print density is set to "More dark than standard"/" More dark" level, printing speed is inclined to be low speed.

3.3.4 Customized value

The customized value is set with **GS (E** command. See **GS (E** for details.

Table 3.3.8 Types of the Customized Value

Function	Setting values that can be selected		
	ANK model	Japanese models	
		58 mm model	80 mm model
Selection of print density	13 levels in the print density level 1 to 13	9 levels in the print density level 1 to 9	11 levels in the print density level 1 to 11
Selection of print speed	9 levels in the print speed level 1 to 9	9 levels in the print speed level 1 to 9	9 levels in the print speed level 1 to 9
Number of head energizing	One-part energizing, two-part energizing, four-part energizing, or auto energizing	One-part energizing, two-part energizing, or auto energizing	One-part energizing or two-part energizing
Setting the TMT88IV-compatible mode	TMT88IV-compatible mode disabled/enabled	---	---

- NOTES:
1. Print speed is controlled depending on the number of the head energizing.
 2. In the low power consumption mode, all settings are ignored.
 3. The Japanese model (58 mm model) does not support the four-part energizing mode. Also, the Japanese model (80 mm model) does not support automatic control.

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3.4 Panel LED Indicators

- 1) Power LED: Green
 - On: Power is stable.
 - Off: Power is not stable.

- 2) Roll paper end (PAPER OUT) LED: Red
 - On: The roll paper near end is detected.
 - Off: Paper is loaded (Normal condition)
 - Flashing:
 - Self-test standby state (See Section 3.5.)
 - Macro execution standby state when the macro execution command is used. (Applied to the ANK model only)

Table 3.4.1 Standby State Indication

State	PAPER LED Flashing Pattern	Recovery Conditions
<ul style="list-style-type: none"> • Waiting state for self-test printing to be continued. • Macro execution standby state [Applied to the ANK model only] 	PAPER OUT 	<ul style="list-style-type: none"> • Pressing the FEED button causes self-test printing to be continued. • Execute macro. [Applied to the ANK model only]

NOTE: 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 FEED button. If the macro is executed by pressing the FEED button, the PAPER OUT LED flashes to indicate the macro execution standby state. (See Section 6, Commands.) [Applied to the ANK model only]

- 3) Error (ERROR) LED: Red
 - On: Offline (except during paper feeding using the FEED button and during test printing, and the error state). (See Section 2.1.1.2, Switching between online and offline.)
 - Flashing: Error (See Section 3.7.)
 - Off: Normal condition



Figure 3.4.1 Panel Switches and Indicators

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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

2) Starting the self-test

To start the self-test on a roll paper, hold down the FEED button and turn on the printer with the cover closed, then the current printer status (*1) is printed. (Do not release the FEED button until the printing starts.)

- (*1)
- Control software version
 - DIP switch settings

3) 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 blinks and the printer enters the test printing (*2) standby state. Press the FEED button to start test printing.

- (*2)
- A rolling pattern using only the built-in character set
 - A partial cut after completing the test printing

4) Ending the self-test

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

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3.6 Hexadecimal Dumping

1) Hexadecimal dumping function

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

2) Running hexadecimal dumping

1. Start hexadecimal dumping by executing either of the following:
 - a. Open the cover and turn the power on while pressing the FEED button, and then close the roll paper cover.
 - b. Execute the **GS (A** command.
2. The printer first prints "Hexadecimal Dump To terminate" on roll paper, and then prints the received print data in hexadecimal numbers and in its corresponding characters.
3. After printing has finished, Hexadecimal dumping ends by executing any of the following:
 - a. Turn the power off.
 - b. Press the FEED button three times.
 - c. Reset the printer.

- NOTES:
1. If no characters correspond to the data received, the printer prints ".".
 2. During hexadecimal dumping, any commands other than **DLE EOT** do not function.
 3. Insufficient print data to fill the last line can be printed by pressing down the FEED button.

<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 ***
    
```



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3.7 Error Processing

3.7.1 Error Types

1) Errors that automatically recover

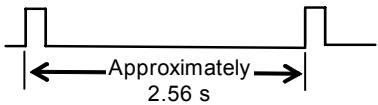
Table 3.7.1 Errors That Automatically Recover

Error	Description	ERROR LED Flashing Pattern ≥ 1 ≤ 160 ms	Recovery
Print head temperature error	The temperature of the print head is extremely high.		Recovers automatically when the print head cools.
Roll paper cover open error	Roll paper cover is opened while printing is performed.		Recovers automatically when cover is closed.

NOTE: Print head temperature error is not an abnormality.

2) Errors that have the possibility of recovery

Table 3.7.2 Errors That Can Possibly Recover

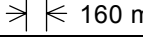

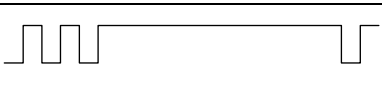
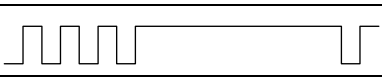
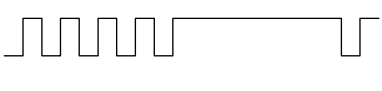
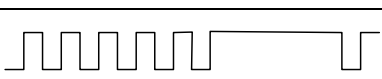
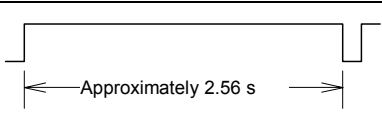
Error	Description	ERROR LED Flashing Pattern ≥ 1 ≤ 160 ms	Recovery
Autocutter error	The autocutter does not work correctly.		Recovers by executing DLE ENQ 1 and DLE ENQ 2 . [DLE ENQ 1 is available to the ANK model only.]

NOTE: When a paper jam occurs, turn the printer off, remove the jammed paper, and then turn the printer back on.

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3) Errors that are impossible to recover

Table 3.7.3 Unrecoverable Errors

Error	Description	ERROR LED Flashing Pattern 	Recovery
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.
CPU execution error	The CPU executes an incorrect address.		Impossible to recover.
UIB error	An abnormal operation occurs in UIB.		Impossible to recover.
Internal circuit connection error	Internal circuits are not connected correctly.		Impossible to recover.

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

3.7.2 Printer Operation When an Error Occurs

The printer executes the following operations when detecting an error.

- Stops all printer operations for the selected paper section.
- Goes offline.
- Goes BUSY. (See Section 3.3.3 DIP switches when DIP switch 2-1 is off.)
- Flashes the ERROR LED.

3.7.3 Data Receive Error (only in the serial interface specification)

If one of the following errors occurs during serial interface communication, the printer prints "?" or ignores the data, depending on the setting of DIP switch 1-1.

- Parity error
- Framing error
- Overrun error

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3.8 NV Graphics Print Mode

1) NV graphics print function

This function prints the NV graphics that are registered in the printer. The printer prints:

- Capacity of the NV graphics
- Occupied capacity of the NV graphics
- Unused capacity of the NV graphics
- Number of the NV graphics that are registered
- Key code, number of dots in X direction, number of dots in Y direction, number of color to be defined
- NV graphics data

2) Mode start

- (1) Open the paper roll cover and turn the power on while pressing the paper FEED button; then press the paper FEED button once and close the paper roll cover.
- (2) The instructions for printing the NV graphics are printed. Open the paper roll cover and press the paper FEED button once and close the paper roll cover.

3) Mode end

Turn the power off.

3.9 Cover Open Button

When the cover open button (located to the right of the cover) is pressed, the printer cover is opened. When the cover is closed, the cover open button is latched.

- NOTES:
1. Be sure to use the cover open button to open the printer cover.
 2. Do not open the cover during printing.
 3. Do not open the cover during auto-cutting operation; otherwise the mechanism may be damaged.

3.10 Cover Open Sensor

- The cover open sensor monitors the printer cover.
- When the sensor detects a cover open during printing, the error LED flashes and the printer stops printing. The printer recovers when the cover is closed.
- When the sensor detects a cover open while the printer is in the standby status, the printer goes offline. The printer recovers when the cover is closed.

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

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3.11 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 page 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 (in page mode).

3.12 Buzzer (for the model with an internal buzzer)

The buzzer beeps by a pulse signal with the **ESC p** or **DLE DC4** commands.

- NOTES:
1. Output the buzzer pulse to the connector pin number 5 of the cash drawer.
 2. Keep the pulse width for 500 ms or more as the ON time.
 3. Since the buzzer drive signal and the cash drawer drive signal are common in the printer, do not use the same connector pin numbers to output the signal for the buzzer and the cash drawer.

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4. CASE SPECIFICATIONS

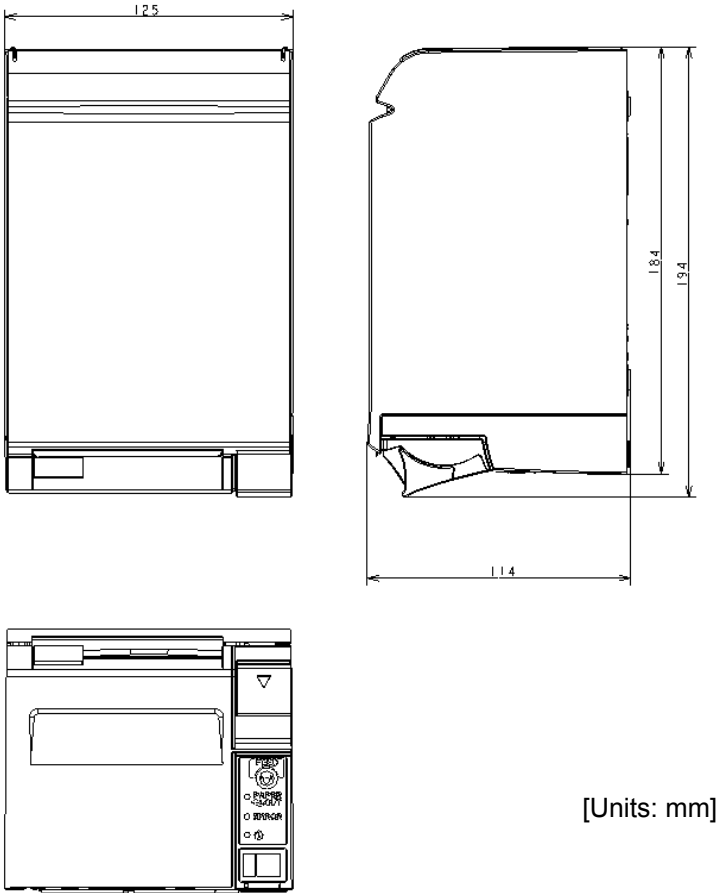
4.1 External Dimensions and Mass

- Height: Approximately 114 mm {4.49"}
- Width: Approximately 125 mm {4.92"}
- Depth: Approximately 194 mm {7.64"}
- Mass: Approximately 1.8 kg {3.96 lb} (except for a roll paper)

4.2 Color

EPSON standard color (ECW, EDG)

4.3 External Appearance



Materials for the external: 94V-0

Figure 4.3.1 External Appearance

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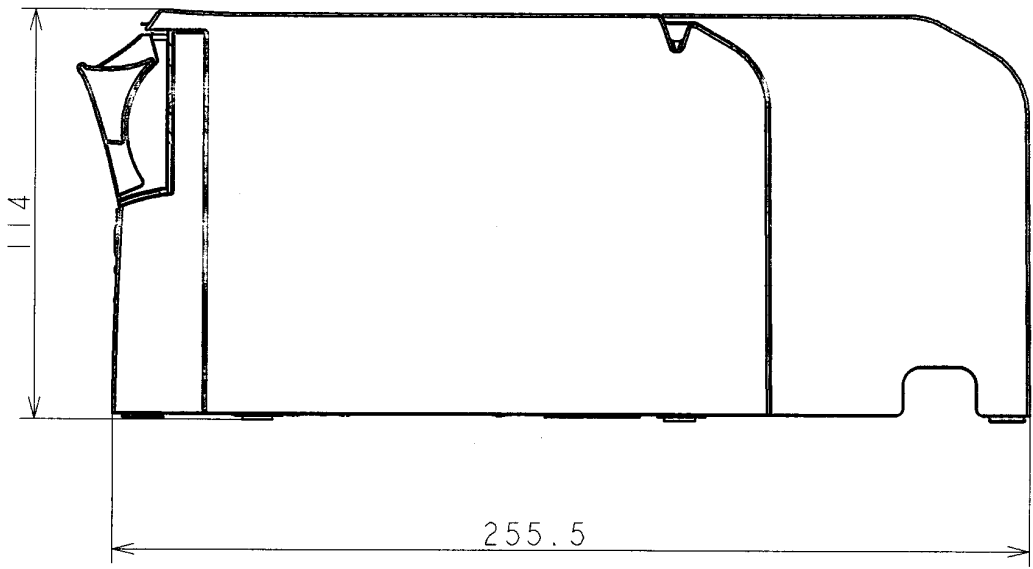


Figure 4.3.2 External Appearance (when the optional connector cover OT-CC70 is installed)

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4.4 Permittable Load

Do not put anything that has a force of more than 32.7 N {3 kgf} on the top of the printer.

NOTE: The user should take this into consideration so that the printer will not be crushed.

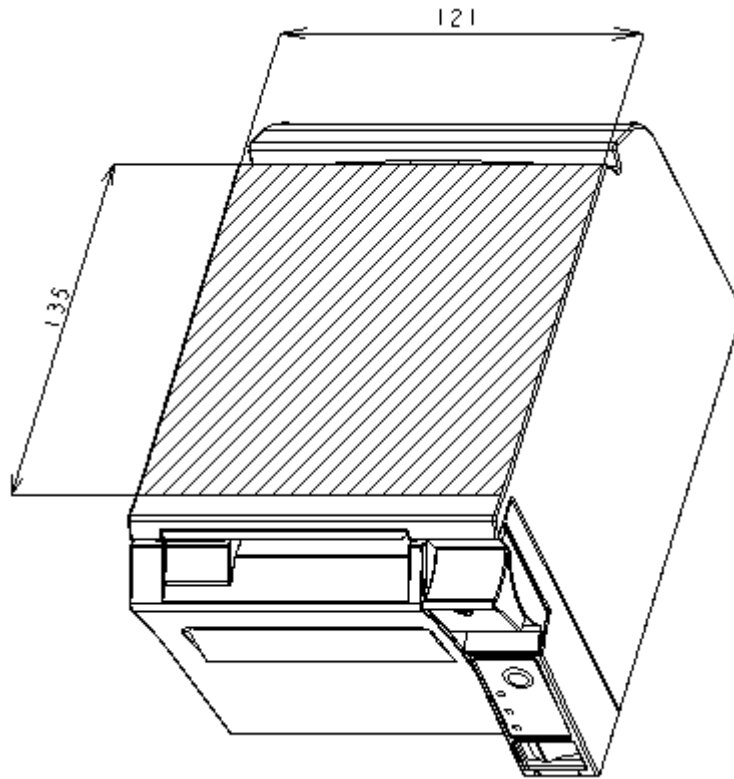


Figure 4.4.1 Regulation Area (Oblique line: Regulation area)

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5. OPTIONS AND CONSUMABLES

5.1 Standard Accessories

- Roll paper (40 mm) × 1 roll
- User's Manual (Languages: English, German, French, Spanish, Portuguese, Italian, Dutch, Japanese)
- Power switch cover
- External power supply (for the model with the power supply unit)
Model: PS-180

5.2 Options

- Affixing tapes (See APPENDIX I for the affixing position.)
Model: DF-10
- External power supply
Model: PS-180
- Connector cover
Model: OT-CC70

5.3 Consumables

- Specified paper
Thermal roll paper: NTP080-80 (for Japanese model (80 mm model), ANK model)
NTP058-80 (for Japanese model (58 mm model))
[Original paper: TF50KS-E Nippon Paper Industries Co., Ltd.]
In Japan: Nakagawa Manufacturing Co., Ltd.
In U.S.A.: Nakagawa Mfg. (USA) Inc.
In Europe: Nakagawa Mfg. (Europe) GmbH
In Southeast Asia: N.A.K. Mfg. (Malaysia) SDN BHD

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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 (C <some functions>, **GS (E <some functions>**, **GS (L / GS 8 L <some functions>**,
GS g 0. FS g 1 (Available to the ANK model only), **FS q** (Available to the ANK model only).

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.

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7) Maximum printable area

The maximum printable area of this printer is as follows:

Model	Standard Mode (Horizontal direction)	Page Mode	
		Horizontal direction	Vertical direction
ANK model (When TM-T88IV command-compatible mode is disabled)	72.25 mm {512/180"}	72.25 mm {512/180"}	234.53 mm {1662/180"}
ANK model (When TM-T88IV command-compatible mode is enabled)	72.25 mm {512/180"}	72.25 mm {512/180"}	234.53 mm {3324/360"}
Japanese model (58 mm model)	52 mm {416/203"}	52 mm {416/203"}	207.75 mm {1662/203"}
Japanese model (80 mm model)	72 mm {576/203"}	72 mm {576/203"}	184.5 mm {1476/203"}

8) 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**.

9) 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 $(nL + nH \times 256) = 0$ 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.

10) Column format / Raster format

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

<i>d1</i>	<i>d4</i>	<i>d7</i>	MSB
			LSB
<i>d2</i>	<i>d5</i>	<i>d8</i>	MSB
			LSB
<i>d3</i>	<i>d6</i>	<i>d9</i>	MSB
			LSB

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

<i>d1</i>	<i>d2</i>	<i>d3</i>
<i>d4</i>	<i>d5</i>	<i>d6</i>
<i>d7</i>	<i>d8</i>	<i>d9</i>
MSB	LSB	MSB
		LSB
MSB	LSB	MSB
		LSB

11) Inch

A unit of length. One inch is 25.4 mm.

12) dpi

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

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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.

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.

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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*

[Name] Transmit real-time status
[Format] ASCII DLE EOT *n*
Hex 10 04 *n*
Decimal 16 4 *n*

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

[Description] • Transmits the real-time status.

<i>n</i>	Function
1	Transmits printer status.
2	Transmits offline cause status.
3	Transmits error cause status.
4	Transmits roll paper sensor status.

- 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, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

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• 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	Cover is closed.
	On	04	4	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	--	--	--	Reserved.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
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 2, 3, 5, and 6: While the cover is opening, this shows the state when the cover was still closed.

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- [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.
 - Transmit this command using the following method:
 - When this command is transmitted, the data following must not be transmitted until the status is received.
 - However, if this command must be transmitted continuously, it is possible to transmit up to 4 commands at once.
In this case, the data following must not be transmitted until the all status is received.
If this command is transmitted without using the above method, the status may not be 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] *n* = 1, 2 [ANK model]
n = 2 [Japanese models (58 mm model, 80 mm model)]

[Description] • Responds to a request in real-time from the host computer.

<i>n</i>	Function
1	Recovers from a recoverable error and restarts printing from the line where the error occurred. <ul style="list-style-type: none">• This command is ignored unless a recoverable error has occurred.
2	Recovers from a recoverable error after clearing the receive and print buffers. <ul style="list-style-type: none">• This command is ignored unless a recoverable error has occurred.

- [Notes]
- Use this command after removing the cause of the error.
 - 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.

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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 ≤ *t* ≤ 8

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

<i>m</i>	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* × 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.

[Reference] APPENDIX D, "3.11 Buzzer (for the model with an internal buzzer)"

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

[Name]	Execute power-off sequence
[Format]	ASCII DLE DC4 <i>fn a b</i> Hex 10 14 <i>fn a b</i> Decimal 16 20 <i>fn a b</i>
[Range]	<i>fn = 2</i> <i>a = 1</i> <i>b = 8</i>
[Description]	<ul style="list-style-type: none"> • 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]	<ul style="list-style-type: none"> • Take the following into consideration: <ul style="list-style-type: none"> • 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.
[Reference]	APPENDIX E

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DLE DC4 *fn d1...d7* (*fn* = 8)

[Name]	Clear buffer(s)
[Format]	ASCII DLE DC4 <i>fn d1...d7</i> Hex 10 14 <i>fn d1...d7</i> Decimal 16 20 <i>fn d1...d7</i>
[Range]	<i>fn</i> = 8 <i>d1</i> = 1, <i>d2</i> = 3, <i>d3</i> = 20, <i>d4</i> = 1, <i>d5</i> = 6, <i>d6</i> = 2, <i>d7</i> = 8
[Description]	<ul style="list-style-type: none">• 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]	<ul style="list-style-type: none">• 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.• Take the following into consideration:<ul style="list-style-type: none">• 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]	<ul style="list-style-type: none">• 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 <i>n</i> Hex 1B 20 <i>n</i> Decimal 27 32 <i>n</i>
[Range]	$0 \leq n \leq 255$
[Default]	$n = 0$
[Description]	<ul style="list-style-type: none">• Sets the right-side character spacing to [$n \times$ (horizontal or vertical motion unit)].
[Notes]	<ul style="list-style-type: none">• The maximum right-side spacing is as follows:<ul style="list-style-type: none">• 35.98 mm {255/180"} [ANK model]• 31.88 mm {255/203"} [Japanese models (58 mm model, 80 mm model)]

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ESC ! *n*

[Name] Select print mode(s)

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

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

[Default] $n = 0$

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

(<i>n</i>) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 × 24) selected.
	On	01	1	[ANK model] Character font B (9 × 17) selected. [Japanese models (58 mm model, 80 mm model)] Character font B (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] $0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255$, $0 \leq nH \leq 255$)

[Description] • Moves the print position to $[(nL + nH \times 256) \times (\text{horizontal or vertical motion unit})]$ from the left edge of the print area.

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ESC % n

[Name]	Select/cancel user-defined character set			
[Format]	ASCII	ESC	%	<i>n</i>
	Hex	1B	25	<i>n</i>
	Decimal	27	37	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	<ul style="list-style-type: none">• Selects or cancels the user-defined character set.• When the LSB of <i>n</i> is 0, the user-defined character set is canceled.• When the LSB of <i>n</i> is 1, the user-defined character set is selected.			

ESC & y c1 c2 [x1 d1...d(yxx1)]...[xk d1...d(yxxk)]

[Name]	Define user-defined characters				
[Format]	ASCII	ESC	&	<i>y c1 c2 [x1 d1...d(yxx1)]...[xk d1...d(yxxk)]</i>	
	Hex	1B	26	<i>y c1 c2 [x1 d1...d(yxx1)]...[xk d1...d(yxxk)]</i>	
	Decimal	27	38	<i>y c1 c2 [x1 d1...d(yxx1)]...[xk d1...d(yxxk)]</i>	
[Range]	$y = 3$ [when Font A (12 × 24) is selected] $y = 3$ [when Font B (9 × 17) is selected] [ANK model] $y = 2$ [when Font B (8 × 16) is selected] [Japanese models (58 mm model, 80 mm model)] $32 \leq c1 \leq c2 \leq 126$ $0 \leq x \leq 12$ [when Font A (12 × 24) is selected] $0 \leq x \leq 9$ [when Font B (9 × 17) is selected] [ANK model] $0 \leq x \leq 8$ [when Font B (8 × 16) is selected] [Japanese models (58 mm model, 80 mm model)] $0 \leq d \leq 255$ $k = c2 - c1 + 1$				
[Description]	<ul style="list-style-type: none">• Defines the user-defined character pattern for the specified character codes.• <i>y</i> specifies the number of bytes in the vertical direction.• <i>c1</i> specifies the beginning character code for the definition, and <i>c2</i> specifies the final code.• <i>x</i> specifies the number of dots in the horizontal direction from the left edge.• <i>d</i> specifies the defined data (column format).				
[Note]	<ul style="list-style-type: none">• User-defined characters and a downloaded bit image (GS *) cannot be defined simultaneously. When this command is executed, the downloaded bit image is deleted.				

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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] $m = 0, 1, 32, 33$
 $1 \leq (nL + nH \times 256) \leq 2047$ ($0 \leq nL \leq 255, 0 \leq nH \leq 7$)
 $0 \leq d \leq 255$
 $k = nL + nH \times 256$ [when $m = 0, 1$]
 $k = (nL + nH \times 256) \times 3$ [when $m = 32, 33$]

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

<i>m</i>	Bit image mode	ANK model		Japanese models (58 mm model, 80 mm model)	
		Vertical direction	Horizontal direction	Vertical direction	Horizontal direction
0	8-dot single-density	60 dpi	90 dpi	203/3 dpi	203/2 dpi
1	8-dot double-density	60 dpi	180 dpi	203/3 dpi	203 dpi
32	24-dot single-density	180 dpi	90 dpi	203 dpi	203/2 dpi
33	24-dot double-density	180 dpi	180 dpi	203 dpi	203 dpi

- *nL, nH* specify the number of dots in the horizontal direction as $(nL + nH \times 256)$.
- *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] $0 \leq n \leq 2, 48 \leq n \leq 50$
- [Default] $n = 0$
- [Description] • Turns underline mode on or off.

<i>n</i>	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.

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ESC 2

[Name] Select default line spacing
[Format] ASCII ESC 2
Hex 1B 32
Decimal 27 50

- [Description] • Sets the following line spacing.
- Approximately 4.23 mm {1/6"} [ANK model]
 - Approximately 3.75 mm {30/203"} [Japanese models (58 mm model, 80 mm model)]

ESC 3 *n*

[Name] Set line spacing
[Format] ASCII ESC 3 *n*
Hex 1B 33 *n*
Decimal 27 51 *n*

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

[Default] Equivalent to approximately 4.23 mm {1/6"}. [ANK model]
Equivalent to approximately 3.75 mm {30/203"}. [Japanese models (58 mm model, 80 mm model)]

[Description] • Sets the line spacing to [$n \times$ (vertical or horizontal motion unit)].

- [Notes] • The maximum is as follows:
- 1016 mm {40"} [ANK model]
 - 900 mm {35.5"} [Japanese models (58 mm model, 80 mm model)]

ESC = *n*

[Name] Select peripheral device
[Format] ASCII ESC = *n*
Hex 1B 3D *n*
Decimal 27 61 *n*

[Range] $1 \leq n \leq 3$ [When ANK model and TM-T88IV command-compatible is disabled]
 $0 \leq n \leq 255$ [When ANK model and TM-T88IV command-compatible is enabled]
 $1 \leq n \leq 3$ [Japanese models (58 mm model, 80 mm model)]

[Default] $n = 1$

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

(<i>n</i>) Bit	Function	Hex	Decimal
0	Disables printer.	00	0
	Enables printer.	01	1
1 to 7	Undefined	--	--

- When the printer is disabled (n bit = 0), all data except this command and the real-time commands are ignored.

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ESC ? *n*

[Name]	Cancel user-defined characters			
[Format]	ASCII	ESC	?	<i>n</i>
	Hex	1B	3F	<i>n</i>
	Decimal	27	63	<i>n</i>
[Range]	$32 \leq n \leq 126$			
[Description]	• Deletes the user-defined character pattern specified by character code <i>n</i> .			

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: <ul style="list-style-type: none">• Contents of defined macro• Contents stored in the NV user memory.• Contents defined for the NV graphics (NV bit image).• Maintenance counter value.• Setting value specified with GS (E.		

ESC D *n1...nk* NUL

[Name]	Set horizontal tab positions				
[Format]	ASCII	ESC	D	<i>n1...nk</i>	NUL
	Hex	1B	44	<i>n1...nk</i>	00
	Decimal	27	68	<i>n1...nk</i>	0
[Range]	$1 \leq n1 \leq n2 \leq \dots \leq nk \leq 255$ $0 \leq k \leq 32$				
[Default]	$n = 8, 16, 24, 32, 40, \dots, 232, 240, 248$ [for Font A (12 × 24) in a standard character size width]				
[Description]	• Sets horizontal tab positions. <ul style="list-style-type: none">• <i>n</i> specifies the number of digits from the setting position to the left edge of the print area.• <i>k</i> is used to indicate the number of bytes set for the horizontal tab position.				

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ESC E *n*

[Name]	Turn emphasized mode on/off			
[Format]	ASCII	ESC	E	<i>n</i>
	Hex	1B	45	<i>n</i>
	Decimal	27	69	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	<ul style="list-style-type: none">• Turns emphasized mode on or off.<ul style="list-style-type: none">• When the LSB of <i>n</i> is 0, emphasized mode is turned off.• When the LSB of <i>n</i> is 1, emphasized mode is turned on.			

ESC G *n*

[Name]	Turn double-strike mode on/off			
[Format]	ASCII	ESC	G	<i>n</i>
	Hex	1B	47	<i>n</i>
	Decimal	27	71	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	<ul style="list-style-type: none">• Turns double-strike mode on or off.<ul style="list-style-type: none">• When the LSB of <i>n</i> is 0, double-strike mode is turned off.• When the LSB of <i>n</i> is 1, double-strike mode is turned on.			

ESC J *n*

[Name]	Print and feed paper			
[Format]	ASCII	ESC	J	<i>n</i>
	Hex	1B	4A	<i>n</i>
	Decimal	27	74	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Description]	<ul style="list-style-type: none">• Prints the data in the print buffer and feeds the paper [$n \times$ (vertical or horizontal motion unit)].			
[Notes]	<ul style="list-style-type: none">• The maximum paper feed amount is as follows:<ul style="list-style-type: none">• 1016 mm {40"} [ANK model]• 900 mm {35.5"} [Japanese models (58 mm model, 80 mm model)]			

ESC L

[Name]	Select page mode		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	<ul style="list-style-type: none">• Switches from standard mode to page mode.		

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ESC M *n*

[Name] Select character font
[Format] ASCII ESC M *n*
Hex 1B 4D *n*
Decimal 27 77 *n*
[Range] $n = 0, 1, 48, 49$
[Default] $n = 0$
[Description] • Selects a character font.

<i>n</i>	Character font
0, 48	Character font A (12 × 24)
1, 49	Character font B (9 × 17) [ANK model] Character font B (8 × 16) [Japanese models (58 mm model, 80 mm model)]

ESC R *n*

[Name] Select an international character set
[Format] ASCII ESC R *n*
Hex 1B 52 *n*
Decimal 27 82 *n*
[Range] $0 \leq n \leq 15$
[Default] $n = 0$
[Description] • Selects an international character set.

<i>n</i>	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
14	Slovenia / Croatia
15	China

[Reference] "3.2.13 International Character Sets"

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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	<i>n</i>
	Hex	1B	54	<i>n</i>
	Decimal	27	84	<i>n</i>
[Range]	$0 \leq n \leq 3, 48 \leq n \leq 51$			
[Default]	$n = 0$			
[Description]	• In page mode, selects the print direction and starting position.			

<i>n</i>	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	<i>n</i>
	Hex	1B	56	<i>n</i>
	Decimal	27	86	<i>n</i>
[Range]	$0 \leq n \leq 2, 48 \leq n \leq 50$			
[Default]	$n = 0$			
[Description]	• In standard mode, turns 90° clockwise rotation mode on or off for characters.			

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

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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]	$0 \leq (xL + xH \times 256) \leq 65535$ ($0 \leq xL \leq 255, 0 \leq xH \leq 255$) $0 \leq (yL + yH \times 256) \leq 65535$ ($0 \leq yL \leq 255, 0 \leq yH \leq 255$) $1 \leq (dxL + dxH \times 256) \leq 65535$ ($0 \leq dxL \leq 255, 0 \leq dxH \leq 255$) $1 \leq (dyL + dyH \times 256) \leq 65535$ ($0 \leq dyL \leq 255, 0 \leq dyH \leq 255$)
[Default]	$(xL + xH \times 256) = 0$ ($xL = 0, xH = 0$) $(yL + yH \times 256) = 0$ ($yL = 0, yH = 0$) $(dxL + dxH \times 256) = 512$ ($dxL = 0, dxH = 2$) [ANK model] $(dxL + dxH \times 256) = 416$ ($dxL = 160, dxH = 1$) [Japanese model (58 mm model)] $(dxL + dxH \times 256) = 576$ ($dxL = 64, dxH = 2$) [Japanese model (80 mm model)] $(dyL + dyH \times 256) = 1662$ ($dyL = 126, dyH = 6$)
[Description]	<ul style="list-style-type: none">• In page mode, sets the size and the logical origin of the print area.• xL, xH specify the horizontal logical origin as $[(xL + xH \times 256) \times (\text{horizontal motion unit})]$ from absolute origin.• yL, yH specify the vertical logical origin as $[(yL + yH \times 256) \times (\text{vertical motion unit})]$ from absolute origin.• dxL, dxH specify the horizontal dimension of print area as $[(dxL + dxH \times 256) \times (\text{horizontal motion unit})]$.• dyL, dyH specify the vertical dimension of print area as $[(dyL + dyH \times 256) \times (\text{vertical motion unit})]$.

ESC \ nL nH

[Name]	Set relative print position
[Format]	ASCII ESC \ nL nH Hex 1B 5C nL nH Decimal 27 92 nL nH
[Range]	$-32768 \leq (nL + nH \times 256) \leq 32767$
[Description]	<ul style="list-style-type: none">• Moves the print position to $[(nL + nH \times 256) \times (\text{horizontal or vertical motion unit})]$ from the current position.• A positive number specifies movement to the right, and a negative number specifies movement to the left.

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ESC a n

[Name] Select justification

[Format] ASCII ESC a n
Hex 1B 61 n
Decimal 27 97 n

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

[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] $0 \leq n \leq 255$

[Default] $n = 0$ [ANK model, TM-T88IV command-compatible mode disabled]
 $n = 0$ [ANK model, TM-T88IV command-compatible mode enabled, DIP switch 1-3 ON]
 $n = 15$ [ANK model, TM-T88IV command-compatible mode enabled, DIP switch 1-3 OFF]
 $n = 0$ [Japanese models (58 mm model or 80 mm model)]

[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.

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ESC c 4 n

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

[Format]	ASCII	ESC	c	4	<i>n</i>
	Hex	1B	63	34	<i>n</i>
	Decimal	27	99	52	<i>n</i>

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

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

(<i>n</i>) 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	<i>n</i>
	Hex	1B	63	35	<i>n</i>
	Decimal	27	99	53	<i>n</i>

[Range] $0 \leq n \leq 255$ [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 cover is open.

ESC d n[Name] Print and feed *n* lines

[Format]	ASCII	ESC	d	<i>n</i>
	Hex	1B	64	<i>n</i>
	Decimal	27	100	<i>n</i>

[Range] $0 \leq n \leq 255$ [Description] • Prints the data in the print buffer and feeds the paper [$n \times$ (current line spacing)].

[Notes] • The maximum paper feed amount is as follows:

- 1016 mm {40"} [ANK model]
- 900 mm {35.5"} [Japanese models (58 mm model, 80 mm model)]

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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] $m = 0, 1, 48, 49$
 $0 \leq t1 \leq 255$
 $0 \leq t2 \leq 255$

[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 ($t1 < t2$).

[Reference] APPENDIX D, "3.11 Buzzer (for the model with an internal buzzer)"

ESC t n

[Name] Select character code table

[Format] ASCII ESC t n
Hex 1B 74 n
Decimal 27 116 n

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

[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]

[Reference] "3.2 Character Code Tables"

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ESC { *n*

[Name]	Turn upside-down print mode on/off			
[Format]	ASCII	ESC	{	<i>n</i>
	Hex	1B	7B	<i>n</i>
	Decimal	27	123	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	<ul style="list-style-type: none"> • In standard mode, turns upside-down print mode on or off. • When the LSB of <i>n</i> is 0, upside-down print mode is turned off. • When the LSB of <i>n</i> is 1, upside-down print mode is turned on. 			

GS ! *n*

[Name]	Select character size			
[Format]	ASCII	GS	!	<i>n</i>
	Hex	1D	21	<i>n</i>
	Decimal	29	33	<i>n</i>
[Range]	$0 \leq n \leq 7, 16 \leq n \leq 23, 32 \leq n \leq 39, 48 \leq n \leq 55, 64 \leq n \leq 71,$ $80 \leq n \leq 87, 96 \leq n \leq 103, 112 \leq n \leq 119$ (1 ≤ Enlargement in vertical direction ≤ 8, 1 ≤ Enlargement in horizontal direction ≤ 8)			
[Default]	$n = 0$			
[Description]	• Selects character size (enlargement in vertical and horizontal directions).			

(<i>n</i>) 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

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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]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)			
[Description]	• In page mode, moves the vertical print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ 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]	$(pL + pH \times 256) = 2$ ($pL = 2, pH = 0$) $0 \leq n \leq 2, 48 \leq n \leq 50$ $1 \leq m \leq 3, 49 \leq m \leq 51$				
[Description]	• Executes a specified test print. <ul style="list-style-type: none">• pL, pH specify $(pL + pH \times 256)$ 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

[Notes]	<ul style="list-style-type: none">• 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.)
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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 ($pL + pH \times 256$) 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.

<i>fn</i>	Format	Function No.	Function name
0, 48	GS (C <i>pL pH m fn b c1 c2</i>	0	Delete the specified record.
1, 49	GS (C <i>pL pH m fn b c1 c2 d1...dk</i>	1	Store the data in the specified record.
2, 50	GS (C <i>pL pH m fn b c1 c2</i>	2	Transmit the data in the specified record.
3, 51	GS (C <i>pL pH m fn b</i>	3	Transmit capacity of the NV user memory currently being used.
4, 52	GS (C <i>pL pH m fn b</i>	4	Transmit the remaining capacity of the NV user memory.
5, 53	GS (C <i>pL pH m fn b</i>	5	Transmit the key code list.
6, 54	GS (C <i>pL pH m fn b d1 d2 d3</i>	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.
 - If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
 - 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>.
 - This command functions when the TM-T88IV command-compatible mode is disabled.

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<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]	$(pL + pH \times 256) = 5$ ($pL = 5, pH = 0$) $m = 0$ $fn = 0, 48$ $b = 0$ $32 \leq c1 \leq 126$ $32 \leq c2 \leq 126$										
[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]	$6 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$) $m = 0$ $fn = 1, 49$ $b = 0$ $32 \leq c1 \leq 126$ $32 \leq c2 \leq 126$ $32 \leq d \leq 254$ $k = (pL + pH \times 256) - 5$ The entire capacity size = 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 $(pL + pH \times 256) - 5$, 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]	$(pL + pH \times 256) = 5$ ($pL = 5, pH = 0$) $m = 0$ $fn = 2, 50$ $b = 0$ $32 \leq c1 \leq 126$ $32 \leq c2 \leq 126$										
[Description]	• Transmits the data for the record specified by the key codes (c1, c2) in the NV user memory.										

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<Function 3> **GS (C ρ_L ρ_H m fn b** (fn = 3, 51)

[Name]	Transmit capacity of the NV user memory currently being used								
[Format]	ASCII	GS	(	C	ρ_L	ρ_H	m	fn	b
	Hex	1D	28	43	ρ_L	ρ_H	m	fn	b
	Decimal	29	40	67	ρ_L	ρ_H	m	fn	b
[Range]	$(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3, \rho_H = 0$) 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 ρ_L ρ_H m fn b** (fn = 4, 52)

[Name]	Transmit the remaining capacity of the NV user memory								
[Format]	ASCII	GS	(	C	ρ_L	ρ_H	m	fn	b
	Hex	1D	28	43	ρ_L	ρ_H	m	fn	b
	Decimal	29	40	67	ρ_L	ρ_H	m	fn	b
[Range]	$(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3, \rho_H = 0$) 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 ρ_L ρ_H m fn b** (fn = 5, 53)

[Name]	Transmit the key code list								
[Format]	ASCII	GS	(	C	ρ_L	ρ_H	m	fn	b
	Hex	1D	28	43	ρ_L	ρ_H	m	fn	b
	Decimal	29	40	67	ρ_L	ρ_H	m	fn	b
[Range]	$(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3, \rho_H = 0$) m = 0 fn = 5, 53 b = 0								
[Description]	• Transmits the key code list in the NV user memory.								

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<Function 6> **GS (C ρ_L ρ_H m fn b $d1$ $d2$ $d3$ ($fn = 6, 54$)**

[Name] Delete all data in the NV user memory

[Format] ASCII GS (C ρ_L ρ_H m fn b $d1$ $d2$ $d3$
 Hex 1D 28 43 ρ_L ρ_H m fn b $d1$ $d2$ $d3$
 Decimal 29 40 67 ρ_L ρ_H m fn b $d1$ $d2$ $d3$

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

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

GS (D ρ_L ρ_H m [$a1$ $b1$]...[ak bk]

[Name] Enable/disable real-time command

[Format] ASCII GS (D ρ_L ρ_H m [$a1$ $b1$]...[ak bk]
 Hex 1D 28 44 ρ_L ρ_H m [$a1$ $b1$]...[ak bk]
 Decimal 29 40 68 ρ_L ρ_H m [$a1$ $b1$]...[ak bk]

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

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

[Description] • Enables or disables the real-time command specified by a .
 • ρ_L, ρ_H specify $(\rho_L + \rho_H \times 256)$ as the number of bytes after ρ_H (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.

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GS (E ρL ρH fn [parameters]

[Name] Set user setup commands

- [Description]
- Controls the user setting modes.
 - ρL , ρH specify ($\rho L + \rho H \times 256$) as the number of bytes after ρH (fn and [parameters]).
 - fn specifies the function.
 - [parameters] specify the process of each function.

<i>fn</i>	Format	Function No.	Function name
1	GS (E ρL ρH fn $d1$ $d2$	1	Change into the user setting mode.
2	GS (E ρL ρH fn $d1$ $d2$ $d3$	2	End the user setting mode session.
5	GS (E ρL ρH fn [$a1$ $n1L$ $n1H$] ... [ak nkL nkH]	5	Set the customized setting values.
6	GS (E ρL ρH fn a	6	Transmit the customized setting values.
11	GS (E ρL ρH fn a $d1$...dk	11	Set the configuration item for the serial interface.
12	GS (E ρL ρH fn a	12	Transmit the configuration item for the serial interface.

- [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.
 - If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
 - 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, 6, or 12> is transmitted, the data following must not be transmitted until the status is received.

<Function 1> **GS (E ρL ρH fn $d1$ $d2$ ($fn = 1$)**

[Name] Change into the user setting mode

[Format]

ASCII	GS	(	E	ρL	ρH	fn	$d1$	$d2$
Hex	1D	28	45	ρL	ρH	fn	$d1$	$d2$
Decimal	29	40	69	ρL	ρH	fn	$d1$	$d2$

[Range] ($\rho L + \rho H \times 256$) = 3 ($\rho L = 3$, $\rho H = 0$)
 $fn = 1$
 $d1 = 73$
 $d2 = 78$

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

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<Function 2> **GS (E ρ_L ρ_H fn $d1$ $d2$ $d3$ ($fn = 2$)**

[Name]	End the user setting mode session										
[Format]	ASCII	GS	(E	ρ_L	ρ_H	fn	$d1$	$d2$	$d3$	
	Hex	1D	28	45	ρ_L	ρ_H	fn	$d1$	$d2$	$d3$	
	Decimal	29	40	69	ρ_L	ρ_H	fn	$d1$	$d2$	$d3$	
[Range]	$(\rho_L + \rho_H \times 256) = 4$ ($\rho_L = 4, \rho_H = 0$) $fn = 2$ $d1 = 79$ $d2 = 85$ $d3 = 84$										
[Description]	<ul style="list-style-type: none"> • 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 5> **GS (E ρ_L ρ_H fn [$a1$ $n1L$ $n1H$]... [ak nkL nkH] ($fn = 5$)**

[Name]	Set the customized setting values												
[Format]	ASCII	GS	(	E	ρ_L	ρ_H	fn	[$a1$	$n1L$	$n1H$]	... [ak	nkL	nkH]
	Hex	1D	28	45	ρ_L	ρ_H	fn	[$a1$	$n1L$	$n1H$]	... [ak	nkL	nkH]
	Decimal	29	40	69	ρ_L	ρ_H	fn	[$a1$	$n1L$	$n1H$]	... [ak	nkL	nkH]
[Range]	$4 \leq (\rho_L + \rho_H \times 256) \leq 65533$ ($0 \leq \rho_L \leq 255, 0 \leq \rho_H \leq 255$) $fn = 5$ $a = 5, 6, 97$ [ANK model] $a = 5, 6, 97, 120$ $0 \leq (nL + nH \times 256) \leq 6, (nL + nH \times 256) = 100, 65530 \leq (nL + nH \times 256) \leq 65535$ $(0 \leq nL \leq 6, nH = 0, nL = 100, nH = 0, 250 \leq nL \leq 255, nH = 255)$ [when $a = 5$] $1 \leq (nL + nH \times 256) \leq 9$ ($1 \leq nL \leq 9, nH = 0$) [when $a = 6$] $(nL + nH \times 256) = 1, 2, 4, 128$ ($nL = 1, 2, 4, 128, nH = 0$) [when $a = 97$] $(nL + nH \times 256) = 0, 1$ ($nL = 0, 1, nH = 0$) [When $a = 120$] [Japanese model (58 mm model)] $a = 5, 6, 97$ $0 \leq (nL + nH \times 256) \leq 3, (nL + nH \times 256) = 100, 65530 \leq (nL + nH \times 256) \leq 65535$ $(0 \leq nL \leq 3, nH = 0, nL = 100, nH = 0, 250 \leq nL \leq 255, nH = 255)$ [when $a = 5$] $1 \leq (nL + nH \times 256) \leq 9$ ($1 \leq nL \leq 9, nH = 0$) [when $a = 6$] $(nL + nH \times 256) = 1, 2, 128$ ($nL = 1, 2, 128, nH = 0$) [when $a = 97$] [Japanese model (80 mm model)] $a = 5, 6, 97$ $0 \leq (nL + nH \times 256) \leq 4, (nL + nH \times 256) = 100, 65530 \leq (nL + nH \times 256) \leq 65535$ $(0 \leq nL \leq 4, nH = 0, nL = 100, nH = 0, 250 \leq nL \leq 255, nH = 255)$ [when $a = 5$] $1 \leq (nL + nH \times 256) \leq 9$ ($1 \leq nL \leq 9, nH = 0$) [when $a = 6$] $(nL + nH \times 256) = 1, 2$ ($nL = 1, 2, nH = 0$) [when $a = 97$]												

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[Default (upon shipment)]

[ANK model]

$$(nL + nH \times 256) = 100 \quad (nL = 100, nH = 0) \quad [\text{when } a = 5]$$

$$(nL + nH \times 256) = 9 \quad (nL = 9, nH = 0) \quad [\text{when } a = 6]$$

$$(nL + nH \times 256) = 128 \quad (nL = 128, nH = 0) \quad [\text{when } a = 97]$$

$$(nL + nH \times 256) = 0 \quad (nL = 0, nH = 0) \quad [\text{when } a = 120]$$

[Japanese model (58 mm model)]

$$(nL + nH \times 256) = 100 \quad (nL = 100, nH = 0) \quad [\text{when } a = 5]$$

$$(nL + nH \times 256) = 9 \quad (nL = 9, nH = 0) \quad [\text{when } a = 6]$$

$$(nL + nH \times 256) = 128 \quad (nL = 128, nH = 0) \quad [\text{when } a = 97]$$

[Japanese model (80 mm model)]

$$(nL + nH \times 256) = 100 \quad (nL = 100, nH = 0) \quad [\text{when } a = 5]$$

$$(nL + nH \times 256) = 9 \quad (nL = 9, nH = 0) \quad [\text{when } a = 6]$$

$$(nL + nH \times 256) = 1 \quad (nL = 1, nH = 0) \quad [\text{when } a = 97]$$

[Description] • Sets the customized value specified by a to the values specified by $(nL + nH \times 256)$.

a	Type of customized value
5	Print density
6	Print speed
97	Number of division of thermal head energizing
120	Setting the TM-T88IV command-compatible mode

• Print density setting ($a = 5$)

$(nL + nH \times 256)$	Print density			
	Japanese models			ANK model
100	58 mm	80 mm	Density level depending on the DIP switch settings	
65530	Print density level 1.	Light	↑ (Default)	↑ (Default)
65531	Print density level 2.	|	↑	↑
65532	Print density level 3.	|	↑	↑
65533	Print density level 4.	|	↑	↑
65534	Print density level 5.	|	↑	↑
65535	Print density level 6.	|	↑	↑
0	Print density level 7.	|	Density level: standard	Density level: standard
1	Print density level 8.	|	↓	Density level: standard
2	Print density level 9.	|	↓	↓
3	Print density level 10.	|	↓	↓
4	Print density level 11.		↓	↓
5	Print density level 12.		↓	↓
6	Print density level 13.	Dark	↓	↓

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- Print speed setting ($a = 6$)

$(nL + nH \times 256)$	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.	|
7	Print speed level 7.	|
8	Print speed level 8.	|
9	Print speed level 9.	fast

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

$(nL + nH \times 256)$	Number of division of thermal head energizing	Japanese models		ANK model
		58 mm	80 mm	
1	One-part energizing.	Y	Y (Default)	Y
2	Two-part energizing.	Y	Y	Y
4	Four-part energizing.	N	N	Y
128	Automatic control of thermal head energizing.	Y (Default)	N	Y (Default)

Y: Supported, N: Not supported

- (*) When automatic control ($m=128$) is selected, usual data is printed with one-part energizing and a high duty data is printed with two-part energizing.

- Setting the TM-T88IV-compatible mode ($a = 120$)

$(nL + nH \times 256)$	Mode	Japanese models		ANK model
		58 mm	80 mm	
0	Disables the TM-T88IV-compatible mode.	--	--	Y (Default)
1	Enables the TM-T88IV-compatible mode.	--	--	--

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<Function 6> **GS (E ρ_L ρ_H fn a ($fn = 6$))**

[Name] Transmit the customized setting values

[Format] ASCII GS (E ρ_L ρ_H fn a
 Hex 1D 28 45 ρ_L ρ_H fn a
 Decimal 29 40 69 ρ_L ρ_H fn a

[Range] ($\rho_L + \rho_H \times 256$) = 2 ($\rho_L = 2, \rho_H = 0$)
 $fn = 6$
 $a = 5, 6, 97, 120$ [ANK model]
 $a = 5, 6, 97$ [Japanese models (58 mm model, 80 mm model)]

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

a	Type of customized value
5	Print density
6	Print speed
97	Number of division of thermal head energizing
120	Setting TM-T88IV-compatible command

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<Function 11> **GS (E ρL ρH fn a $d1...dk$ ($fn = 11$)**

[Name] Set the configuration item for the serial interface

[Format] ASCII GS (E ρL ρH fn a $d1 ... dk$
 Hex 1D 28 45 ρL ρH fn a $d1 ... dk$
 Decimal 29 40 69 ρL ρH fn a $d1 ... dk$

[Range] $6 \leq (\rho L + \rho H \times 256) \leq 65535$ ($0 \leq \rho L \leq 255, 0 \leq \rho H \leq 255$)
 $fn = 11$
 $a = 1$
 $48 \leq d \leq 57$

[Default (upon shipment)]
 $d1...dk = "115200"$ [ANK model, TM-T88IV-compatible command mode disabled]
 $d1...dk = "38400"$ [ANK model, TM-T88IV-compatible command mode enabled]
 $d1...dk = "115200"$ [Japanese models (58 mm model, 80 mm model)]

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

a	Configuration item
1	Transmission speed

• 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

[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 ρL ρH fn a ($fn = 12$)**

[Name] Transmit the configuration item for the serial interface

[Format] ASCII GS (E ρL ρH fn a
 Hex 1D 28 45 ρL ρH fn a
 Decimal 29 40 69 ρL ρH fn a

[Range] $(\rho L + \rho H \times 256) = 2$ ($\rho L = 2, \rho H = 0$)
 $fn = 12$
 $a = 1$

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

a	Configuration item
1	Transmission speed

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GS (H ρL ρH fn [parameters])

[Name] Request transmission of response or status

- [Description]
- Various processes are performed for the response.
 - ρL , ρH specify ($\rho L + \rho H \times 256$) as the number of bytes after ρH (fn and [parameters]).
 - fn specifies the function.
 - [parameters] specify the process of each function.

fn	Format	Function No.	Function name
48	GS (H ρL ρH fn m $d1$ $d2$ $d3$ $d4$)	48	Set the process ID response.

- [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 ρL ρH fn m $d1$ $d2$ $d3$ $d4$) ($fn = 48$)

[Name] Set the process ID response

[Format]

ASCII	GS	(	H	ρL	ρH	fn	m	$d1$	$d2$	$d3$	$d4$
Hex	1D	28	48	ρL	ρH	fn	m	$d1$	$d2$	$d3$	$d4$
Decimal	29	40	72	ρL	ρH	fn	m	$d1$	$d2$	$d3$	$d4$

[Range] ($\rho L + \rho H \times 256$) = 6 ($\rho L = 6, \rho H = 0$)
 $fn = 48$
 $m = 48$
 $32 \leq d \leq 126$

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

GS (K ρL ρH fn [parameters])

[Name] Select print control method(s)

- [Description]
- Selects the print control methods.
 - $\rho L, \rho H$ specify ($\rho L + \rho H \times 256$) as the number of bytes after ρH (fn and [parameters]).
 - fn specifies the function.
 - [parameters] specify the process of each function.

fn	Format	Function No.	Function name
50	GS (K ρL ρH fn m)	50	Select the print speed.
97	GS (K ρL ρH fn m)	97	Select the number of parts for the thermal head energizing.

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<Function 50> **GS (K ρ_L ρ_H fn m ($fn = 50$)**

- [Name] Select the print speed
- [Format] ASCII GS (K ρ_L ρ_H fn m
 Hex 1D 28 4B ρ_L ρ_H fn m
 Decimal 29 40 75 ρ_L ρ_H fn m
- [Range] $(\rho_L + \rho_H \times 256) = 2$ ($\rho_L = 2, \rho_H = 0$)
 $fn = 50$
 $0 \leq m \leq 9, 48 \leq m \leq 57$
- [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.	|
7, 55	Print speed level 7.	|
8, 56	Print speed level 8.	|
9, 57	Print speed level 9.	fast

<Function 97> **GS (K ρ_L ρ_H fn m ($fn = 97$)**

- [Name] Select the number of parts for the thermal head energizing
- [Format] ASCII GS (K ρ_L ρ_H fn m
 Hex 1D 28 4B ρ_L ρ_H fn m
 Decimal 29 40 75 ρ_L ρ_H fn m
- [Range] $(\rho_L + \rho_H \times 256) = 2$ ($\rho_L = 2, \rho_H = 0$)
 $fn = 97$
 $0 \leq m \leq 2, 48 \leq m \leq 50, m = 4, 52, 128$ [ANK model]
 $0 \leq m \leq 2, 48 \leq m \leq 50, m = 128$ [Japanese model (58 mm model)]
 $0 \leq m \leq 2, 48 \leq m \leq 50$ [Japanese model (80 mm model)]
- [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	Japanese models		ANK
		58 mm	80 mm	
0, 48	Setting values of GS (E <Function 5: $a = 97$> .	Y (Default)	Y (Default)	Y (Default)
1, 49	One-part energizing.	Y	Y	Y
2, 50	Two-part energizing.	Y	Y	Y
4, 52	Four-part energizing.	--	--	Y
128	Automatic control of thermal head energizing.	Y	--	Y

- [Notes] • When automatic control ($m=128$) is selected, usual data is printed with one-part energizing and a high duty data is printed with two-part energizing.

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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	<i>pL, pH</i>	2 bytes	65,535
GS 8 L	<i>p1, p2, p3, p4</i>	4 bytes	4,294,967,295

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

<i>fn</i>	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).

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- [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.
 - If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
 - 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 | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
| Hex | 1D | 28 | 4C | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
| Decimal | 29 | 40 | 76 | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
- [Range] $(pL + pH \times 256) = 2$ ($pL = 2, pH = 0$)
 $m = 48$
 $fn = 0, 48$
- [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 | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
| Hex | 1D | 28 | 4C | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
| Decimal | 29 | 40 | 76 | <i>pL</i> | <i>pH</i> | <i>m</i> | <i>fn</i> |
- [Range] $(pL + pH \times 256) = 2$ ($pL = 2, pH = 0$)
 $m = 48$
 $fn = 2, 50$
- [Description] • Prints the buffered graphics data stored by the process of **GS (L** <Function 112>.

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<Function 51> **GS (L ρL ρH m fn (fn = 3, 51)**

[Name]	Transmit the remaining capacity of the NV graphics memory									
[Format]	ASCII	GS	(	L	ρL	ρH	m	fn		
	Hex	1D	28	4C	ρL	ρH	m	fn		
	Decimal	29	40	76	ρL	ρH	m	fn		
[Range]	$(\rho L + \rho H \times 256) = 2$ ($\rho L = 2, \rho H = 0$) 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 ρL ρH m fn d1 d2 (fn = 64)**

[Name]	Transmit the key code list for defined NV graphics									
[Format]	ASCII	GS	(	L	ρL	ρH	m	fn	d1	d2
	Hex	1D	28	4C	ρL	ρH	m	fn	d1	d2
	Decimal	29	40	76	ρL	ρH	m	fn	d1	d2
[Range]	$(\rho L + \rho H \times 256) = 4$ ($\rho L = 4, \rho H = 0$) m = 48 fn = 64 d1 = 75 d2 = 67									
[Description]	• Transmits the defined NV graphics key code list.									

<Function 65> **GS (L ρL ρH m fn d1 d2 d3 (fn = 65)**

[Name]	Delete all NV graphics data										
[Format]	ASCII	GS	(	L	ρL	ρH	m	fn	d1	d2	d3
	Hex	1D	28	4C	ρL	ρH	m	fn	d1	d2	d3
	Decimal	29	40	76	ρL	ρH	m	fn	d1	d2	d3
[Range]	$(\rho L + \rho H \times 256) = 5$ ($\rho L = 5, \rho H = 0$) m = 48 fn = 65 d1 = 67 d2 = 76 d3 = 82										
[Description]	• Deletes all NV graphics data.										

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<Function 66> **GS (L p_L p_H m fn $kc1$ $kc2$ ($fn = 66$)**

[Name]	Delete the specified NV graphics data									
[Format]	ASCII	GS	(	L	p_L	p_H	m	fn	$kc1$	$kc2$
	Hex	1D	28	4C	p_L	p_H	m	fn	$kc1$	$kc2$
	Decimal	29	40	76	p_L	p_H	m	fn	$kc1$	$kc2$
[Range]	$(p_L + p_H \times 256) = 4$ ($p_L = 4, p_H = 0$) $m = 48$ $fn = 66$ $32 \leq kc1 \leq 126$ $32 \leq kc2 \leq 126$									
[Description]	<ul style="list-style-type: none"> Deletes the NV graphics data defined by the key codes ($kc1$ and $kc2$). 									

<Function 67>

GS (L p_L p_H m fn a $kc1$ $kc2$ b x_L x_H y_L y_H [c $d1...dk$] $1...[c$ $d1...dk]$ b ($fn = 67$)

[Name]	Define the NV graphics data (raster format)									
[Format]	ASCII	GS	(	L	p_L	p_H	m	fn	a	$kc1$ $kc2$ b x_L x_H y_L y_H [c $d1...dk$] $1...[c$ $d1...dk]$ b
	Hex	1D	28	4C	p_L	p_H	m	fn	a	$kc1$ $kc2$ b x_L x_H y_L y_H [c $d1...dk$] $1...[c$ $d1...dk]$ b
	Decimal	29	40	76	p_L	p_H	m	fn	a	$kc1$ $kc2$ b x_L x_H y_L y_H [c $d1...dk$] $1...[c$ $d1...dk]$ b
[Range]	(p_L, p_H) for GS (L: $12 \leq (p_L + p_H \times 256) \leq 65535$ ($0 \leq p_L \leq 255, 0 \leq p_H \leq 255$) (p_1, p_2, p_3, p_4) for GS 8 L: $12 \leq (p_1 + p_2 \times 256 + p_3 \times 65536 + p_4 \times 16777216) \leq 4294967295$ $(0 \leq p_1 \leq 255, 0 \leq p_2 \leq 255, 0 \leq p_3 \leq 255, 0 \leq p_4 \leq 255)$ Common parameters for GS (L and GS 8 L: $m = 48$ $fn = 67$ $a = 48$ $32 \leq kc1 \leq 126$ $32 \leq kc2 \leq 126$ $b = 1$ $1 \leq (x_L + x_H \times 256) \leq 8192$ ($0 \leq x_L \leq 255, 0 \leq x_H \leq 32$) $1 \leq (y_L + y_H \times 256) \leq 2304$ ($0 \leq y_L \leq 255, 0 \leq y_H \leq 9$) $c = 49$ $0 \leq d \leq 255$ $k = (\text{int}((x_L + x_H \times 256) + 7) / 8) \times (y_L + y_H \times 256)$ The entire capacity size = 256KB.									
[Description]	<ul style="list-style-type: none"> Defines the NV graphics data (raster format) as a record specified by the key codes ($kc1, kc2$) in the NV graphics area. 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 $(y_L + y_H \times 256)$. d specifies the defined data (raster format). 									

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- [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 number of items of NV graphics registered must be within 50 to shorten the execution time of this function. The execution time is 60 seconds or less when the number of items registered is within 50. The execution time for 100 items is 120 seconds or less.
 - The [data value (k) + control information data value (24 bytes)] area of the NV graphics data domain is used when this function is executed.
 - NV graphics and NV bit image (FS q) cannot be defined simultaneously. When this function is executed, all NV bit images are deleted.

<Function 69> **GS (L p_L p_H m fn $kc1$ $kc2$ x y ($fn = 69$)**

[Name] Print the specified NV graphics data

[Format] ASCII GS (L p_L p_H m fn $kc1$ $kc2$ x y
 Hex 1D 28 4C p_L p_H m fn $kc1$ $kc2$ x y
 Decimal 29 40 76 p_L p_H m fn $kc1$ $kc2$ x y

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

- [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.
- <ANK model>

x, y	ANK model		Japanese models (58 mm model, 80 mm model)	
	Vertical direction	Horizontal direction	Vertical direction	Horizontal direction
1	180 dpi	180 dpi	203 dpi	203 dpi
2	90 dpi	90 dpi	203/2 dpi	203/2 dpi

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<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:**
 $11 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)
(p1, p2, p3, p4) for **GS 8 L:**
 $11 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$
($0 \leq p1 \leq 255, 0 \leq p2 \leq 255, 0 \leq p3 \leq 255, 0 \leq p4 \leq 255$)
Common parameters for **GS (L** and **GS 8 L:**
m = 48
fn = 112
a = 48
bx = 1, 2
by = 1, 2
c = 49
 $1 \leq (xL + xH \times 256) \leq 2047$ ($0 \leq xL \leq 255, 0 \leq xH \leq 7$)
 $1 \leq (yL + yH \times 256) \leq 1662$ ($0 \leq yL \leq 255, 0 \leq yH \leq 6$) [when by=1]
 $1 \leq (yL + yH \times 256) \leq 831$ ($0 \leq yL \leq 255, 0 \leq yH \leq 3$) [when by=2]
 $0 \leq d \leq 255$
 $k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$

- [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.
<ANK model>

bx, by	ANK model		Japanese models (58 mm model, 80 mm model)	
	Vertical direction	Horizontal direction	Vertical direction	Horizontal direction
1	180 dpi	180 dpi	203 dpi	203 dpi
2	90 dpi	90 dpi	203/2 dpi	203/2 dpi

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

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GS (k pL pH cn fn [parameters]

[Name] Set up and print symbol

- [Description]
- Processes the data for two-dimensional codes.
 - *pL*, *pH* specify ($pL + pH \times 256$) as the number of bytes after *pH* (*cn*, *fn*, and [parameters]).
 - *cn* specifies the type of symbology.
 - *fn* specifies the function.
 - [parameters] specify the process of each function.

<i>cn</i>	Type of Symbology
48	PDF417
49	QR Code

<i>cn</i>	<i>fn</i>	Format	Function No.	Function name
48	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.
49	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.

- "Symbol data" refers to the data received with <Function 080 or 180> before encoding.
- "Symbol storage area" refers to the range for storing data received with <Function 080 or 180> before encoding.

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- [Notes]
- When <Function 082 or 182> is transmitted, the data following must not be transmitted until the status is received.
 - PDF417 is supported by the ANK model.
- [Reference] APPENDIX F, APPENDIX G

<Function 065> **GS (k ρ_L ρ_H cn fn n ($cn = 48$, $fn = 65$)**

- [Name] PDF417: Set the number of columns in the data region
- [Format]
- | | | | | | | | | |
|---------|----|----|-----|----------|----------|------|------|-----|
| ASCII | GS | (| k | ρ_L | ρ_H | cn | fn | n |
| Hex | 1D | 28 | 6B | ρ_L | ρ_H | cn | fn | n |
| Decimal | 29 | 40 | 107 | ρ_L | ρ_H | cn | fn | n |
- [Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3$, $\rho_H = 0$)
 $cn = 48$
 $fn = 65$
 $0 \leq n \leq 30$
- [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 ρ_L ρ_H cn fn n ($cn = 48$, $fn = 66$)**

- [Name] PDF417: Set the number of rows
- [Format]
- | | | | | | | | | |
|---------|----|----|-----|----------|----------|------|------|-----|
| ASCII | GS | (| k | ρ_L | ρ_H | cn | fn | n |
| Hex | 1D | 28 | 6B | ρ_L | ρ_H | cn | fn | n |
| Decimal | 29 | 40 | 107 | ρ_L | ρ_H | cn | fn | n |
- [Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3$, $\rho_H = 0$)
 $cn = 48$
 $fn = 66$
 $n = 0, 3 \leq n \leq 90$
- [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.

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<Function 067> **GS (k ρ_L ρ_H cn fn n ($cn = 48$, $fn = 67$)**

[Name] PDF417: Set the width of the module

[Format] ASCII GS (k ρ_L ρ_H cn fn n
 Hex 1D 28 6B ρ_L ρ_H cn fn n
 Decimal 29 40 107 ρ_L ρ_H cn fn n

[Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3$, $\rho_H = 0$)
 $cn = 48$
 $fn = 67$
 $2 \leq n \leq 8$

[Default] $n = 3$

[Description] • Sets the width of the module for PDF417 to n dots.

<Function 068> **GS (k ρ_L ρ_H cn fn n ($cn = 48$, $fn = 68$)**

[Name] PDF417: Set the row height

[Format] ASCII GS (k ρ_L ρ_H cn fn n
 Hex 1D 28 6B ρ_L ρ_H cn fn n
 Decimal 29 40 107 ρ_L ρ_H cn fn n

[Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3$, $\rho_H = 0$)
 $cn = 48$
 $fn = 68$
 $2 \leq n \leq 8$

[Default] $n = 3$

[Description] • Sets the row height for PDF417 to $[n \times (\text{the width of the module})]$.

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<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] $(pL + pH \times 256) = 4$ (pL = 4, pH = 0)
 cn = 48
 fn = 69
 m = 48, 49
 $48 \leq n \leq 56$ [when m = 48]
 $1 \leq n \leq 40$ [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 “Ratio 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 “Ratio 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 $[\text{Data codeword} \times n \times 0.1 = (A)]$ (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 to 3	Error correction level 1	4
4 to 10	Error correction level 2	8
11 to 20	Error correction level 3	16
21 to 45	Error correction level 4	32
46 to 100	Error correction level 5	64
101 to 200	Error correction level 6	128
201 to 400	Error correction level 7	256
401 or more	Error correction level 8	512

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<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] $(pL + pH \times 256) = 3$ (pL = 3, pH = 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] $4 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)
cn = 48
fn = 80
m = 48
 $0 \leq d \leq 255$
 $k = (pL + pH \times 256) - 3$

[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] $(pL + pH \times 256) = 3$ (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.

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<Function 082> **GS (k ρ_L ρ_H 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 ρ_L ρ_H cn fn m
 Hex 1D 28 6B ρ_L ρ_H cn fn m
 Decimal 29 40 107 ρ_L ρ_H cn fn m
- [Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3, \rho_H = 0$)
 $cn = 48$
 $fn = 82$
 $m = 48$
- [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 ρ_L ρ_H cn fn $n1$ $n2$ ($cn = 49, fn = 65$)**

- [Name] QR Code: Select the model
- [Format] ASCII GS (k ρ_L ρ_H cn fn $n1$ $n2$
 Hex 1D 28 6B ρ_L ρ_H cn fn $n1$ $n2$
 Decimal 29 40 107 ρ_L ρ_H cn fn $n1$ $n2$
- [Range] $(\rho_L + \rho_H \times 256) = 4$ ($\rho_L = 4, \rho_H = 0$)
 $cn = 49$
 $fn = 65$
 $n1 = 49, 50$
 $n2 = 0$
- [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 ρ_L ρ_H cn fn n ($cn = 49, fn = 67$)**

- [Name] QR Code: Set the size of module
- [Format] ASCII GS (k ρ_L ρ_H cn fn n
 Hex 1D 28 6B ρ_L ρ_H cn fn n
 Decimal 29 40 107 ρ_L ρ_H cn fn n
- [Range] $(\rho_L + \rho_H \times 256) = 3$ ($\rho_L = 3, \rho_H = 0$)
 $cn = 49$
 $fn = 67$
 $1 \leq n \leq 16$
- [Default] $n = 3$
- [Description] • Sets the size of the module for QR Code to n dots.

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<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] $(pL + pH \times 256) = 3$ (pL = 3, pH = 0)
 cn = 49
 fn = 69
 $48 \leq n \leq 51$
- [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] $4 \leq (pL + pH \times 256) \leq 7092$ ($0 \leq pL \leq 255, 0 \leq pH \leq 27$)
 cn = 49
 fn = 80
 m = 48
 $0 \leq d \leq 255$
 $k = (pL + pH \times 256) - 3$
- [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] $(pL + pH \times 256) = 3$ (pL = 3, pH = 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.

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<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]	<table border="0"> <tr> <td>ASCII</td> <td>GS</td> <td>(</td> <td>k</td> <td>pL</td> <td>pH</td> <td>cn</td> <td>fn</td> <td>m</td> </tr> <tr> <td>Hex</td> <td>1D</td> <td>28</td> <td>6B</td> <td>pL</td> <td>pH</td> <td>cn</td> <td>fn</td> <td>m</td> </tr> <tr> <td>Decimal</td> <td>29</td> <td>40</td> <td>107</td> <td>pL</td> <td>pH</td> <td>cn</td> <td>fn</td> <td>m</td> </tr> </table>	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
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]	$(pL + pH \times 256) = 3$ (pL = 3, pH = 0) cn = 49 fn = 82 m = 48																											
[Description]	<ul style="list-style-type: none"> 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]	<ul style="list-style-type: none"> 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). 																											

GS * x y d1...dk

[obsolete command]

[Name]	Define downloaded bit image																		
[Format]	<table border="0"> <tr> <td>ASCII</td> <td>GS</td> <td>*</td> <td>x</td> <td>y</td> <td>d1...dk</td> </tr> <tr> <td>Hex</td> <td>1D</td> <td>2A</td> <td>x</td> <td>y</td> <td>d1...dk</td> </tr> <tr> <td>Decimal</td> <td>29</td> <td>42</td> <td>x</td> <td>y</td> <td>d1...dk</td> </tr> </table>	ASCII	GS	*	x	y	d1...dk	Hex	1D	2A	x	y	d1...dk	Decimal	29	42	x	y	d1...dk
ASCII	GS	*	x	y	d1...dk														
Hex	1D	2A	x	y	d1...dk														
Decimal	29	42	x	y	d1...dk														
[Range]	$1 \leq x \leq 255$ $1 \leq y \leq 48$ [where $1 \leq x \times y \leq 1536$] $0 \leq d \leq 255$ $k = x \times y \times 8$																		
[Description]	<ul style="list-style-type: none"> Defines the downloaded bit image in the downloaded graphic area. <ul style="list-style-type: none"> 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). 																		
[Note]	<ul style="list-style-type: none"> A downloaded bit image and user-defined characters (ESC &) cannot be defined simultaneously. When this command is executed, all user-defined characters are deleted. 																		

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GS / m

[obsolete command]

[Name] Print downloaded bit image
[Format] ASCII GS / m
Hex 1D 2F m
Decimal 29 47 m

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

[Description] • Prints downloaded bit image using the process of **GS** * and using the mode specified by *m*.
<ANK model>

<i>m</i>	Mode	ANK model		Japanese models (58 mm model, 80 mm model)	
		Vertical direction	Horizontal direction	Vertical direction	Horizontal direction
0, 48	Normal	180 dpi	180 dpi	203 dpi	203 dpi
1, 49	Double-width	180 dpi	90 dpi	203 dpi	203/2 dpi
2, 50	Double-height	90 dpi	180 dpi	203/2 dpi	203 dpi
3, 51	Quadruple	90 dpi	90 dpi	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] $0 \leq n \leq 255$

[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.

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GS H *n*

[Name] Select print position of HRI characters

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

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

[Default] $n = 0$

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

<i>n</i>	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.

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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]
 $n = 110$ [printer information A]
 $65 \leq n \leq 69$ [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	TM-T88IV command-compatible mode disabled: Hexadecimal: 68 / Decimal: 104
		TM-T88IV command-compatible mode enabled: Hexadecimal: 20 / Decimal: 32
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	On	02	2	Autocutter installed. (Fixed)
2, 3	--	--	--	Not used.
4	Off	00	0	Fixed.
5	--	--	--	Reserved.
6	--	--	--	Not used.
7	Off	00	0	Fixed.

- Transmits the printer information A specified.

n	Type of printer information	Contents
110	Paper width and resolution	See table [Paper width and Resolution].

[Paper width and Resolution]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	80-mm paper width.
	On	01	1	58-mm paper width.
1	Off	00	0	Resolution: 180 dpi
	On	02	2	Resolution: 203 dpi
2 - 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

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- Transmits the printer information B specified.

<i>n</i>	Type of printer information	Contents
65	Firmware version	Depends on firmware version.
66	Manufacturer	"EPSON"
67	Printer name	TM-T88IV command-compatible mode disabled: "TM-T70"
		TM-T88IV command-compatible mode enabled: "TM-T88IV"
68	Product ID	Serial number
69	Type of mounted additional fonts	Japanese model: "KANJI JAPANESE"

[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] $0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)

[Default] $(nL + nH \times 256) = 0$ ($nL = 0, nH = 0$)

[Description] • In standard mode, sets the left margin to $[(nL + nH \times 256) \times (\text{horizontal motion unit})]$.

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] $0 \leq x \leq 255$
 $0 \leq y \leq 255$

[Default] $x = 180, y = 180$ [ANK model, TM-T88IV command-compatible mode disabled:]
 $x = 180, y = 360$ [ANK model, TM-T88IV command-compatible mode enabled:]
 $x = 203, y = 203$ [Japanese models (58 mm model, 80 mm model)]

[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.

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<A> GS V m

 GS V m n

[Name]	Select cut mode and cut paper				
[Format]	<A>	ASCII	GS	V	m
		Hex	1D	56	m
		Decimal	29	86	m
		ASCII	GS	V	m n
		Hex	1D	56	m n
		Decimal	29	86	m n
[Range]	<A>	m = 0, 1, 48, 49			
		m = 65, 66, 0 ≤ n ≤ 255			
[Description]	• Executes paper cutting specified by m.				

m		Function
<A>	0, 48 1, 49	Cuts paper.
	65, 66	Feeds paper to (cutting position + [n × (vertical motion unit)]) and cuts the paper.

[Note] • This printer executes a partial cut (one point left uncut).

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]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)				
[Default]	$(nL + nH \times 256) = 512$ ($nL = 0, nH = 2$) [ANK model] $(nL + nH \times 256) = 416$ ($nL = 160, nH = 1$) [Japanese model (58 mm model)] $(nL + nH \times 256) = 576$ ($nL = 64, nH = 2$) [Japanese model (80 mm model)]				
[Description]	• In standard mode, sets the print area width to $[(nL + nH \times 256) \times (\text{horizontal motion unit})]$.				

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]	$-32768 \leq (nL + nH \times 256) \leq 32767$				
[Description]	• In page mode, moves the vertical print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ from the current position. • A positive number specifies downward movement, and a negative number specifies upward movement.				

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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] $1 \leq r \leq 255$
 $0 \leq t \leq 255$
 $m = 0, 1$

[Description] • Executes the macro that was defined with **GS** .

<i>m</i>	Operation
0	Executes the macro <i>r</i> 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 <i>r</i> times.

[Note] This command functions only with the ANK model.

GS a n

[Name] Enable/disable Automatic Status Back (ASB)
[Format] ASCII GS a n
Hex 1D 61 n
Decimal 29 97 n

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

[Default] $n = 0$ [when DIP switch [SW 2-1] is off.]
 $n = 2$ [when DIP switch [SW 2-1] is on.]

[Description] • Enables or disables basic ASB (Automatic Status Back).

(<i>n</i>) 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 - 7	Off	00	0	Reserved.

• While basic ASB is active, the selected enabled basic ASB status is transmitted whenever the status changes.

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- 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	Cover is closed.
	On	20	32	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 - 2	--	--	--	Reserved.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
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.

- 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 0 to 3: While the 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 - 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

[Reference] APPENDIX H

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GS b n

- [Name] Turn smoothing mode on/off
- [Format] ASCII GS b n
Hex 1D 62 n
Decimal 29 98 n
- [Range] $0 \leq n \leq 255$
- [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] $n = 0, 1, 48, 49$
- [Default] $n = 0$
- [Description] • Selects a font for the HRI characters when printing a bar code.

n	Font for the HRI characters
0, 48	Character font A (12 × 24)
1, 49	Character font B (9 × 17) [ANK model] Character font B (8 × 16) [Japanese models (58 mm model, 80 mm model)]

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] $m = 0$
 $(nL + nH \times 256) = 20, 21, 50, 70$ ($nL = 20, 21, 50, 70$, $nH = 0$)
- [Description] • Sets the resettable maintenance counter specified by $(nL + nH \times 256)$ to 0.

$(nL + nH \times 256)$		Maintenance counter [Units]
Hex	Decimal	
14	20	Number of line feeds. [Lines]
15	21	Number of times head is energized. [Times]
32	50	Number of autocutter operations. [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.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn

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the power off or let the printer be reset via an interface while this command is being executed.

- 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.

[Reference] APPENDIX E

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] $m = 0$

$(nL + nH \times 256) = 20, 21, 50, 70, 148, 149, 178, 198$

$(nL = 20, 21, 50, 70, 148, 149, 178, 198, nH = 0)$

[Description] • Transmits the value of the maintenance counter specified by $(nL + nH \times 256)$.

$(nL + nH \times 256)$		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]	
32	50	Number of autocutter operations. [Times].	
46	70	Printer operation time. [Hours].	
94	148	Number of line feeds. [Lines]	Cumulative
95	149	Number of times head is energized. [Times]	
B2	178	Number of autocutter operations. [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.

[Reference] APPENDIX E

GS h n

[Name] Set bar code height

[Format] ASCII GS h n
Hex 1D 68 n
Decimal 29 104 n

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

[Default] $n = 162$

[Description] • Sets the height of the bar code to n dots.

<A> GS k m d1...dk NUL

 GS k m n d1...dn

[Name] Print bar code

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[Format] <A> ASCII GS k m d1...dk NUL
 Hex 1D 6B m d1...dk 00
 Decimal 29 107 m d1...dk 0

 ASCII GS k m n d1...dn
 Hex 1D 6B m n d1...dn
 Decimal 29 107 m n d1...dn

[Range] <A> $0 \leq m \leq 6$ (k and d see [Description])
 $65 \leq m \leq 73$ (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	k = 11, 12	$48 \leq d \leq 57$
1	UPC-E	k = 11, 12	$48 \leq d \leq 57$ [where d1 = 48]
2	JAN13 / EAN13	k = 12, 13	$48 \leq d \leq 57$
3	JAN8 / EAN8	k = 7, 8	$48 \leq d \leq 57$
4	CODE39	$1 \leq k$	$48 \leq d \leq 57$, $65 \leq d \leq 90$, d = 32, 36, 37, 42, 43, 45, 46, 47
5	ITF	$2 \leq k$ (even number)	$48 \leq d \leq 57$
6	CODABAR (NW-7)	$2 \leq k$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, $97 \leq d \leq 100$, d = 36, 43, 45, 46, 47, 58 [where $65 \leq d1 \leq 68$, $65 \leq dk \leq 68$, $97 \leq d1 \leq 100$, $97 \leq dk \leq 100$]

- k of <Function A> is used to indicate the number of bytes of bar code data.
- d specifies the bar code data.

For <Function B>

m	Bar code system	Range of n	Range of d
65	UPC-A	n = 11, 12	$48 \leq d \leq 57$
66	UPC-E	n = 11, 12	$48 \leq d \leq 57$ [where d1 = 48]
67	JAN13 / EAN13	n = 12, 13	$48 \leq d \leq 57$
68	JAN8 / EAN8	n = 7, 8	$48 \leq d \leq 57$
69	CODE39	$1 \leq n \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 90$, d = 32, 36, 37, 42, 43, 45, 46, 47
70	ITF	$2 \leq n \leq 254$ (even number)	$48 \leq d \leq 57$
71	CODABAR (NW-7)	$2 \leq n \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, $97 \leq d \leq 100$, d = 36, 43, 45, 46, 47, 58 [where $65 \leq d1 \leq 68$, $65 \leq dn \leq 68$, $97 \leq d1 \leq 100$, $97 \leq dn \leq 100$]
72	CODE93	$1 \leq n \leq 255$	$0 \leq d \leq 127$
73	CODE128	$2 \leq n \leq 255$	$0 \leq d \leq 127$ [where d1 = 123, $65 \leq d2 \leq 67$]

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- *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.

[Reference] APPENDIX F, APPENDIX G

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.

<i>n</i>	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 0 to 3: While the 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.

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GS w n

- [Name] Set bar code width
- [Format] ASCII GS w n
Hex 1D 77 n
Decimal 29 119 n
- [Range] $2 \leq n \leq 6$
- [Default] $n = 3$
- [Description] • Sets the horizontal size of the bar code.

<ANK model>

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

<Japanese models (58 mm model, 80 mm model)>

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	0.625
3	0.375	0.375	1.000
4	0.500	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

- 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

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6.4 Commands of Multi-byte Code Characters

(for Japanese models (58 mm model, 80 mm model))

FS ! *n*

[Name] Select print mode(s) for Kanji characters

[Format] ASCII FS ! *n*
Hex 1C 21 *n*
Decimal 28 33 *n*

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

[Default] $n = 0$

[Description] • Selects the character styles (double-height, double-width, and Kanji-underlined) together for multi-byte code character.

(<i>n</i>) 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 ($pL + pH \times 256$) as the number of bytes after *pH* (*fn* and [*parameters*]).
- *fn* specifies the function.
- [*parameters*] specify the process of each function.

<i>fn</i>	Format	Function No.	Function name
48	FS (A <i>pL pH fn m</i>	48	Select Kanji character font.

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<Function 48> **FS (A ρ_L ρ_H fn m ($fn = 48$)**

[Name]	Select Kanji character font			
[Format]	ASCII	FS	(A ρ_L ρ_H fn m
	Hex	1C	28	41 ρ_L ρ_H fn m
	Decimal	28	40	65 ρ_L ρ_H fn m
[Range]	$(\rho_L + \rho_H \times 256) = 2$ ($\rho_L = 2, \rho_H = 0$) $fn = 48$ $m = 0, 1, 48, 49$			
[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 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]	$0 \leq n \leq 2, 48 \leq n \leq 50$			
[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.		

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FS 2 *c1 c2 d1...dk*

[Name]	Define user-defined Kanji characters				
[Format]	ASCII	FS	2	<i>c1 c2 d1...dk</i>	
	Hex	1C	32	<i>c1 c2 d1...dk</i>	
	Decimal	28	50	<i>c1 c2 d1...dk</i>	
[Range]	The ranges of <i>c1</i> and <i>c2</i> differ, depending on the models and the character code system used.				

Model	Hexadecimal	
	<i>c1</i>	<i>c2</i>
Japanese models (58 mm model, 80 mm model) (JIS code)	<i>c1</i> = 77	21 ≤ <i>c2</i> ≤ 7E
Japanese models (58 mm model, 80 mm model) (SHIFT JIS code)	<i>c1</i> = EC	40 ≤ <i>c2</i> ≤ 7E 80 ≤ <i>c2</i> ≤ 9E

$0 \leq d \leq 255$

$k = 72$ [when Kanji character font A (24 × 24) is selected]

$k = 32$ [when Kanji character font B (16 × 16) is selected]

[Description]	• Defines the user-defined Kanji character pattern (<i>d1...dk</i>) specified by the character codes (<i>c1</i> and <i>c2</i>).
---------------	---

FS C *n*

[Name]	Select Kanji character code system			
[Format]	ASCII	FS	C	<i>n</i>
	Hex	1C	43	<i>n</i>
	Decimal	28	67	<i>n</i>
[Range]	<i>n</i> = 0, 1, 48, 49			
[Default]	<i>n</i> = 0			
[Description]	• Selects a Kanji character code system for the Japanese models (58 mm model, 80 mm model).			

<i>n</i>	Kanji character code system
0, 48	JIS code
1, 49	SHIFT JIS code

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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]	$0 \leq n1 \leq 255$ $0 \leq n2 \leq 255$				
[Default]	$n1 = 0, n2 = 0$				
[Description]	<ul style="list-style-type: none">• Sets the left-side character spacing of the multi-byte code character to [$n1 \times$ (horizontal or vertical motion unit)]; sets the right-side character spacing of the multi-byte code character to [$n2 \times$ (horizontal or vertical motion unit)].				
[Note]	<ul style="list-style-type: none">• The maximum of the left- and the right-side character spacing is 31.88 mm {255/203"} respectively.				

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]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	<ul style="list-style-type: none">• Turns quadruple-size mode on or off for multi-byte code character.<ul style="list-style-type: none">• 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.			

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6.5 Obsolete Commands

ESC i

[obsolete command]

GS V, which is the upward-compatible command replacing **ESC i**, is recommended to use, since **ESC i** is an obsolete command in the ESC/POS command system.

[Name] Partial cut (one point left uncut)

[Format] ASCII ESC i
Hex 1B 69
Decimal 27 105

[Description] • Executes a partial cut of the roll paper.

[Note] • This printer executes a partial cut (one point left uncut).

ESC m

[obsolete command]

GS V, which is the upward-compatible command replacing **ESC m**, is recommended to use, since **ESC m** is an obsolete command in the ESC/POS command system.

[Name] Partial cut (three points left uncut)

[Format] ASCII ESC m
Hex 1B 6D
Decimal 27 109

[Description] • Executes a partial cut of the roll paper.

[Note] • This printer executes a partial cut (one point left uncut)

ESC u n

[obsolete command]

GS r, which is the upward-compatible command replacing **ESC u**, is recommended to use, since **ESC u** is an obsolete command in the ESC/POS command system.

[Name] Transmit peripheral device status

[Format] ASCII ESC u n
Hex 1B 75 n
Decimal 27 117 n

[Range] n = 0, 48

[Description] • Transmits the peripheral device status as 1 byte of data, as follows.

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, do not transmit the subsequent data until the status is received.

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ESC v

[obsolete command]

GS r, which is the upward-compatible command replacing **ESC v**, is recommended to use, since **ESC v** is an obsolete command in the ESC/POS command system.

[Name] Transmit paper sensor status

[Format] ASCII ESC v
 Hex 1B 76
 Decimal 27 118

[Description] • Transmits the status of paper sensor(s) as 1 byte of data, as follows:

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 sensor): paper present.
	On	0C	12	Roll paper end sensor (paper sensor): paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the cover is open, this shows the state when the cover was still closed. (This command is not executed.)

[Note] • When this command is transmitted, do not transmit the subsequent data until the status is received.

FS g 1 m a1 a2 a3 a4 nL nH d1...dk

[obsolete command]

[Name] Write to NV user memory

[Format] ASCII FS g 1 m a1 a2 a3 a4 nL nH d1...dk
 Hex 1C 67 31 m a1 a2 a3 a4 nL nH d1...dk
 Decimal 28 103 49 m a1 a2 a3 a4 nL nH d1...dk

[Range] $m = 0$
 $0 \leq (a1 + a2 \times 256 + a3 \times 65536 + a4 \times 16777216) \leq 1023$
 $(0 \leq a1 \leq 255, 0 \leq a2 \leq 3, a3 = 0, a4 = 0)$
 $1 \leq (nL + nH \times 256) \leq 1024 \quad (0 \leq nL \leq 255, 0 \leq nH \leq 4)$
 $32 \leq d \leq 255$
 $k = (nL + nH \times 256)$
 The entire capacity size = 1 KB.

[Description] • Stores the data (d1...dk) in the area from (a1 + a2 × 256 + a3 × 65536 + a4 × 16777216) to (nL + nH × 256) bytes 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 limit writing the commands into the NV memory to less than 10 times a day.
 • If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.

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- While processing this command, the printer may become 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.

FS g 2 m a1 a2 a3 a4 nL nH

[obsolete command]

[Name]	Read from NV user memory										
[Format]	ASCII	FS	g	2	<i>m</i>	<i>a1</i>	<i>a2</i>	<i>a3</i>	<i>a4</i>	<i>nL</i>	<i>nH</i>
	Hex	1C	67	32	<i>m</i>	<i>a1</i>	<i>a2</i>	<i>a3</i>	<i>a4</i>	<i>nL</i>	<i>nH</i>
	Decimal	28	103	50	<i>m</i>	<i>a1</i>	<i>a2</i>	<i>a3</i>	<i>a4</i>	<i>nL</i>	<i>nH</i>
[Range]	<i>m</i> = 0										
	$0 \leq (a1 + a2 \times 256 + a3 \times 65536 + a4 \times 16777216) \leq 1023$										
	$(0 \leq a1 \leq 255, 0 \leq a2 \leq 3, a3 = 0, a4 = 0)$										
	$1 \leq (nL + nH \times 256) \leq 80 \quad (1 \leq nL \leq 80, nH = 0)$										
[Description]	• Transmits the data in the area from (<i>a1</i> + <i>a2</i> × 256 + <i>a3</i> × 65536 + <i>a4</i> × 16777216) to (<i>nL</i> + <i>nH</i> × 256) bytes in the NV user memory.										
[Note]	• When this command is transmitted, do not transmit the subsequent data until the status is received.										

FS p n m

[obsolete command]

GS (L <Function 69>, which is the upward-compatible command replacing **FS p**, is recommended to use, since **FS p** is an obsolete command in the ESC/POS command system.

[Name]	Print NV bit image			
[Format]	ASCII	FS	<i>p</i>	<i>n m</i>
	Hex	1C	70	<i>n m</i>
	Decimal	28	112	<i>n m</i>
[Range]	$1 \leq n \leq 255$			
	$0 \leq m \leq 3, 48 \leq m \leq 51$			
[Description]	• Prints NV bit image <i>n</i> using the process of FS q and using the mode specified by <i>m</i> .			

<i>m</i>	Mode	Vertical direction	Horizontal direction
0, 48	Normal	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

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FS q n [xL xH yL yH d1...dk]1 ... [xL xH yL yH d1...dk]n

[obsolete command]

GS (L <Function 67>, which is the upward-compatible command replacing **FS q**, is recommended to use, since **FS q** is an obsolete command in the ESC/POS command system.

[Name] Define NV bit image

[Format] ASCII FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
 Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
 Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Range] $1 \leq n \leq 255$
 $1 \leq (xL + xH \times 256) \leq 1023$ ($0 \leq xL \leq 255, 0 \leq xH \leq 3$)
 $1 \leq (yL + yH \times 256) \leq 288$ ($0 \leq yL \leq 255, yH = 0,1$)
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
 The entire capacity size = 256 KB.

[Description] • Defines the NV bit image in the NV graphics area.
 • n specifies the number of defined NV bit images.
 • xL, xH specify the number of bytes in the horizontal direction as $(xL + xH \times 256)$.
 • yL, yH specify the number of bytes in the vertical direction as $(yL + yH \times 256)$.
 • d specifies the defined data (column format).

[Notes] • Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to limit writing the commands into the NV memory to less than 10 times a day.
 • If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or do not reset the printer via an interface while this command is being executed.
 • While processing this command, the printer may become BUSY while writing data to the NV memory and stops receiving data. Therefore, do not to transmit data from the host computer while the printer is BUSY.
 • 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, user-defined characters, and others) that were in effect at power on. (The data in the NV memory are not reset.)
 • NV bit image and NV graphics (**GS (L / GS 8 L**) cannot be defined simultaneously. When this command is executed, all NV graphics are deleted.

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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 to 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] $0 \leq m \leq 3, 48 \leq m \leq 51$
 $1 \leq (xL + xH \times 256) \leq 65535$ ($0 \leq xL \leq 255, 1 \leq xH \leq 255$)
 $1 \leq (yL + yH \times 256) \leq 2303$ ($0 \leq yL \leq 255, 0 \leq yH \leq 8$)
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (yL + yH \times 256)$

[Description] • Prints a raster bit image using the mode specified by *m*.

<i>m</i>	Mode	Vertical direction	Horizontal direction
0, 48	Normal	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

- *xL, xH* specify the number of bytes 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 defined data (raster format).

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APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

- 1) Because the TM-T70 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 (10/180 inches) 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. (See Table A.1.)
 When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1.

Table A.1 Paper Feeding Amount

		Required Paper Feeding Amount (dots)
Normal Characters	Font A	24 × number of times enlarged in vertical
	Font B	17 × number of times enlarged in vertical (ANK model)
		Japanese models (58 mm model, 80 mm model)
	Kanji font A	24 × number of times enlarged in vertical Japanese models (58 mm model/80 mm model)
Kanji font B	16 × number of times enlarged in vertical Japanese models (58 mm model, 80 mm model)	
Rotated Characters	Font A	12 × number of times enlarged vertically (ANK model)
	Font B	9 × number of times enlarged vertically (ANK model)
Bit image (ESC *)		24

- 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.
- 3) To avoid paper jams in the auto cutter unit, paper must be fed over 40 mm {1.57"} before cutting if the printer is stopped.

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A.2 Notes on Supplying the Power to the Printer

- Connect the external power supply to the power supply connector of the printer. 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 of 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 3.7.3. The blinking patterns are shown in the table.
- When either a high or low voltage error occurs, turn off the power as soon as possible.
- The interface connectors are supplied from NON-LPS.

A.3 Notes on use environment

Using in the presence of silicon gas (silicon adhesive, silicon oil, silicon powder, etc.) including siloxane and of malignant gas (nitric acid, hydrosulfuric, ammonia, chlorine, etc.) may cause contact failure at contact points in a mechanical switch and a DC motor etc. in a short time because of adhesion or oxidization of the insulation film.

A.4 Other Notes

1) Printer mechanism handling

- Do not pull the paper out when the roll paper cover is closed.
- 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 open the printer cover during printing operation or the printing mechanism may become damaged.
- 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 Na⁺, K⁺, and Cl⁻ ions can harm the print head thermal elements. Therefore, be sure to use only the specified paper.
- Label paper cannot be used.

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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 temperature, humidity, and light, both before and after printing.

- a) Store paper away from high temperature 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.

3) Others

- Because this printer uses plated steel, the cutting edges may be subject to rust. However, this does not affect the printer performance.

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APPENDIX B: PAPER ROLL SETUP

B.1 Replacing the Paper Roll

- 1) Open the printer cover by pressing the printer cover open lever down.
- 2) Remove the spool of the used roll paper from the paper holder and load the new roll paper.
- 3) Pull out some of the paper from the roll paper and close the printer cover.

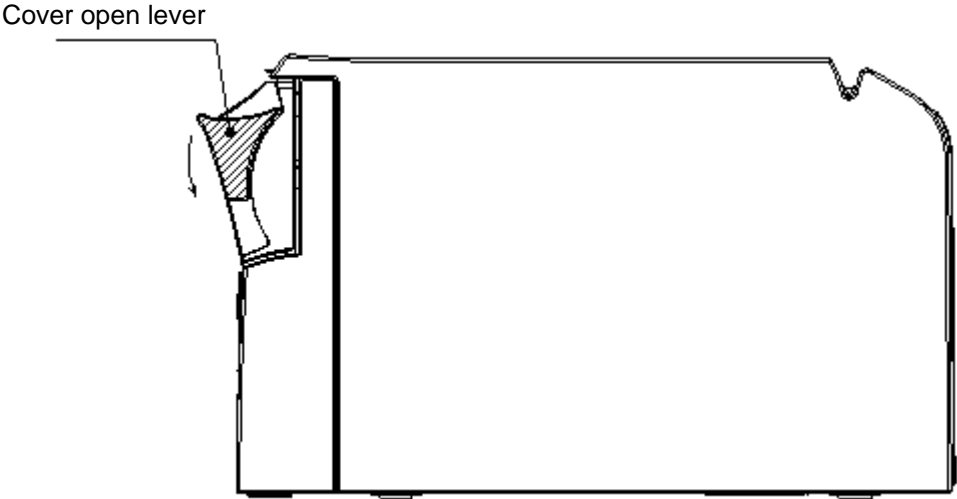


Figure B.1 Operating Printer Cover Open Lever

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APPENDIX C: PRINT HEAD CLEANING

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

- 1) Open the printer cover.
- 2) Clean the thermal elements of the print head using a cotton swab moistened with alcohol solvent (ethanol, IPA).

NOTES: 1. Do not touch the print head thermal elements.
 2. Do not scratch the print head.

- 3) Insert a roll paper and close the printer cover.

NOTES: 1. The print head becomes very hot just after printing and is very dangerous.
 2. Be sure to allow the print head to cool down (after printing) before cleaning it.
 3. Be sure to turn off the printer power before cleaning the print head.
 4. Pay attention to the fixed blade that is located near the print head.

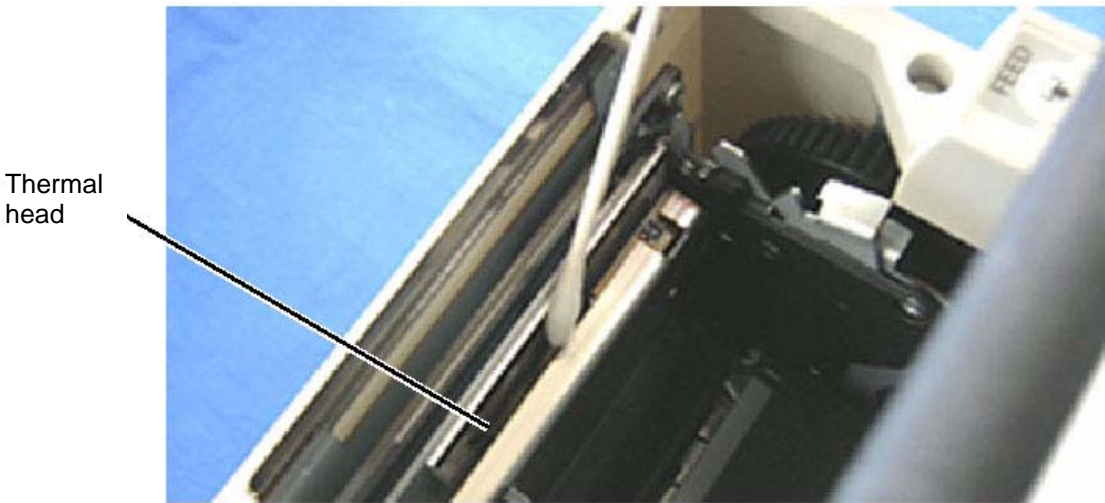


Figure C.1 Print Head Thermal Elements

(*) 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.

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APPENDIX D: NOTES ON USING THE DRAWER KICK-OUT CONNECTOR

1) Drawer specifications (See Section 2.2.3, Drawer kick-out connector.)

Drawer specifications differ significantly depending on manufacturer and model number. Make sure that the specifications of the drawer used meet the following conditions when connected to the drawer kick-out connector. These conditions also apply to any equipment (other than a drawer) that is connected to the drawer kick-out connector.

Never use a drawer (or other equipment) that does not meet all of the following conditions:

- The load, such as a drawer kick-out solenoid, must be connected between pins 4 and 2 or pins 4 and 5 of the drawer kick-out connector. (*1)
- When the drawer open/close signal (indicating the state of the drawer) is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (*2)
- The resistance of the load, such as a drawer kick-out solenoid, must be 24 Ω or more or the input current must be 1A or less. (*3)
- Make sure to use the 24 V power output on drawer kick-out connector pin 4 for driving the equipment. Never connect any other power supply to the drawer kick-out connector. (*4) The peak current is 1 A. See item 2) below for drive signal duty.

NOTES: (*1): Proper operation is not guaranteed with different connections.

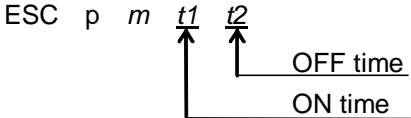
(*2): Proper operation is not guaranteed with different connections or connection to a component other than a switch.

(*3): Connection to equipment whose resistance is 24 Ω or less or whose input current is 1 A or more may damage the connected equipment as well as the printer.

(*4): Operation is not guaranteed with other power supplies.

2) Notes on the pulse generating command (**ESC p**)

When using **ESC p** to drive the drawer connected to the drawer kick-out connector, set the command parameters to meet the following conditions:



$$\frac{\text{ON time}}{\text{ON time} + \text{OFF time}} \leq 0.2 \dots\dots\dots \text{Formula D-1}$$

or, $\text{OFF time} \geq \text{ON time} \times 4 \dots\dots\dots \text{Formula D-2}$

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The drive signal waveform generated when the drawer is driven according to the above conditions is shown in Figure D-1.

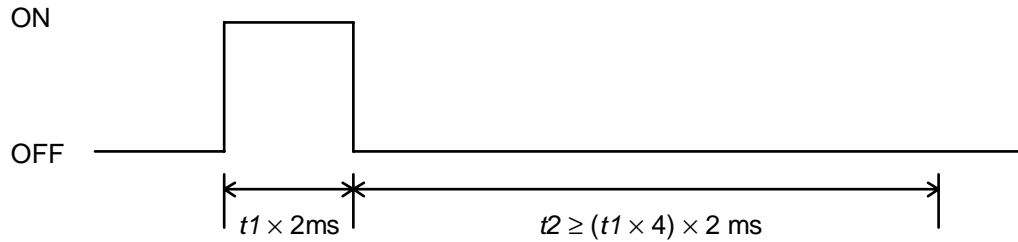


Figure D-1 Drawer Drive Signal Waveform (Formulas D-1 and D-2)

The ON time depends on the specifications of the drawer used. Be sure to check the drawer specifications and set a suitable time. To use a drawer that does not meet the conditions of Formulas D-1 and D-2, see the following section.

3) Using a drawer that does not meet the conditions in 2) (**ESC p, DLE DC4**)

i. For **ESC p**

Setting the values of $t1$ and $t2$ according to the conditions in 2) results in a maximum ON time of 126 ms ($0 \leq t1 \leq 63$), since the setting ranges of $t1$ and $t2$ are 0 to 255. To use a drawer that requires an ON time exceeding 126 ms, the following conditions must be met:

$$\frac{\text{ON time}}{\text{ON time} + (\text{OFF time} + \alpha)} \leq 0.2 \dots\dots\dots \text{Formula D-3}$$

α : other sequence processing time

NOTE: α is the drawer-driving prohibited period from the OFF time until the next ON time.

ii. For **DLE DC4**

Since **DLE DC4** sets ON time equals to OFF time, use α so that Formula D-3 is met.

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An example program in which the drawer connected to drive signal 1 is driven with an ON time of 200 ms is shown below.

```

PRINT #1,CHR$(&H1B);"p";CHR$(0);CHR$(100);CHR$(250);
GOSUB *WAIT300MS

```

|
 ON time 200 ms OFF time 500 ms

```

*WAIT300MS
  300[ms]wait routine
RETURN

```

} (*)

(*) Corresponds to α of Formula D-3. Set the value so that it satisfies Formula D-3 (or include an internal processing time that is equal to or longer than this wait routine).

The drive signal waveform generated when the drawer is driven according to the above conditions is shown in Figure D-2.

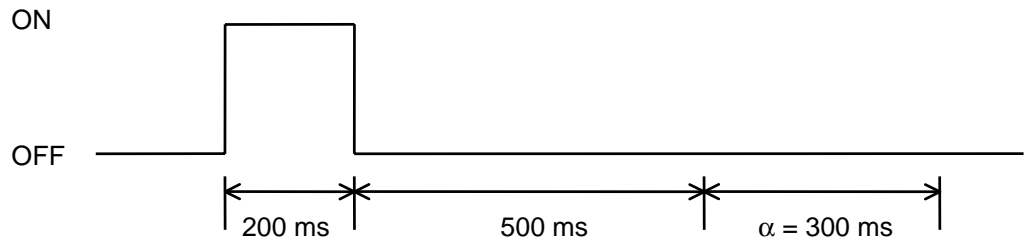


Figure D-2 Drawer Drive Signal Waveform

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APPENDIX E: NOTES ON UPDATING THE MAINTENANCE COUNTER AND TURNING THE PRINTER'S POWER OFF

E.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 E.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.

E.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:
 - Executes **GS (D pL pH m a b** ($pL=3, pH=0, m=20, a=2, b=1$)
 - 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 20 seconds after the host transmits **DLE DC4 fn a b**; then the power off status is transmitted.
 - For the USB interface model, the printer is required to be ready for receiving data from the host.
 - 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.
 - If the power off status is not confirmed, wait for 20 seconds at least after transmitting **DLE DE4 fn a b**.

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** ($fn = 2$).

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APPENDIX F: NOTES ON PRINTING BAR CODE OR 2-DIMENSIONAL CODE

- 1) Provide the quiet zone according to the code specifications by the user.
- 2) • 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.
- The recognition rate of the ladder bar code or 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.

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APPENDIX G: NOTES ON SCANNING THE PRINT RESULT ON THE RECEIPT

Take a consideration as described below to determine whether the ability of the reader (scanner) can be satisfied when the print result on the receipt, such as bar code, 2-dimensional code, or characters.

1) Print density

The print density may vary depending on the type of roll paper or the environmental conditions.

2) Slant of the print result

The print result may be slant slightly as shown in Figure G-1. The slant angle of the print result is within $\pm 1.6^\circ$ and it varies while printing or each receipt issue.

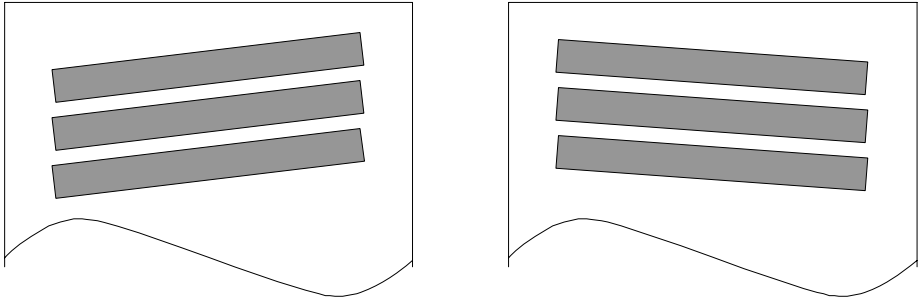


Figure G-1 Slant of the Print

NOTE: In case that the paper other than the paper described in Section 1.5 Paper Specification is used or when the paper is used out of the range in Section 1.12 Environmental conditions, the print density or the slant of print result may become wider.

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APPENDIX H: 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 0100	0000 0000	0000 0000	0000 1111

When a sequence of operations are performed, 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.	0011 1100	0000 0000	0000 0000	0000 1111	The printer cover is opened.
2.	0001 1100	0000 0000	0000 1111	0000 1111	The printer cover is closed.
3.	0011 1100	0000 0000	0000 1111	0000 1111	The printer cover is opened.
4.	0001 1100	0000 0000	0000 1111	0000 1111	The printer cover is closed.

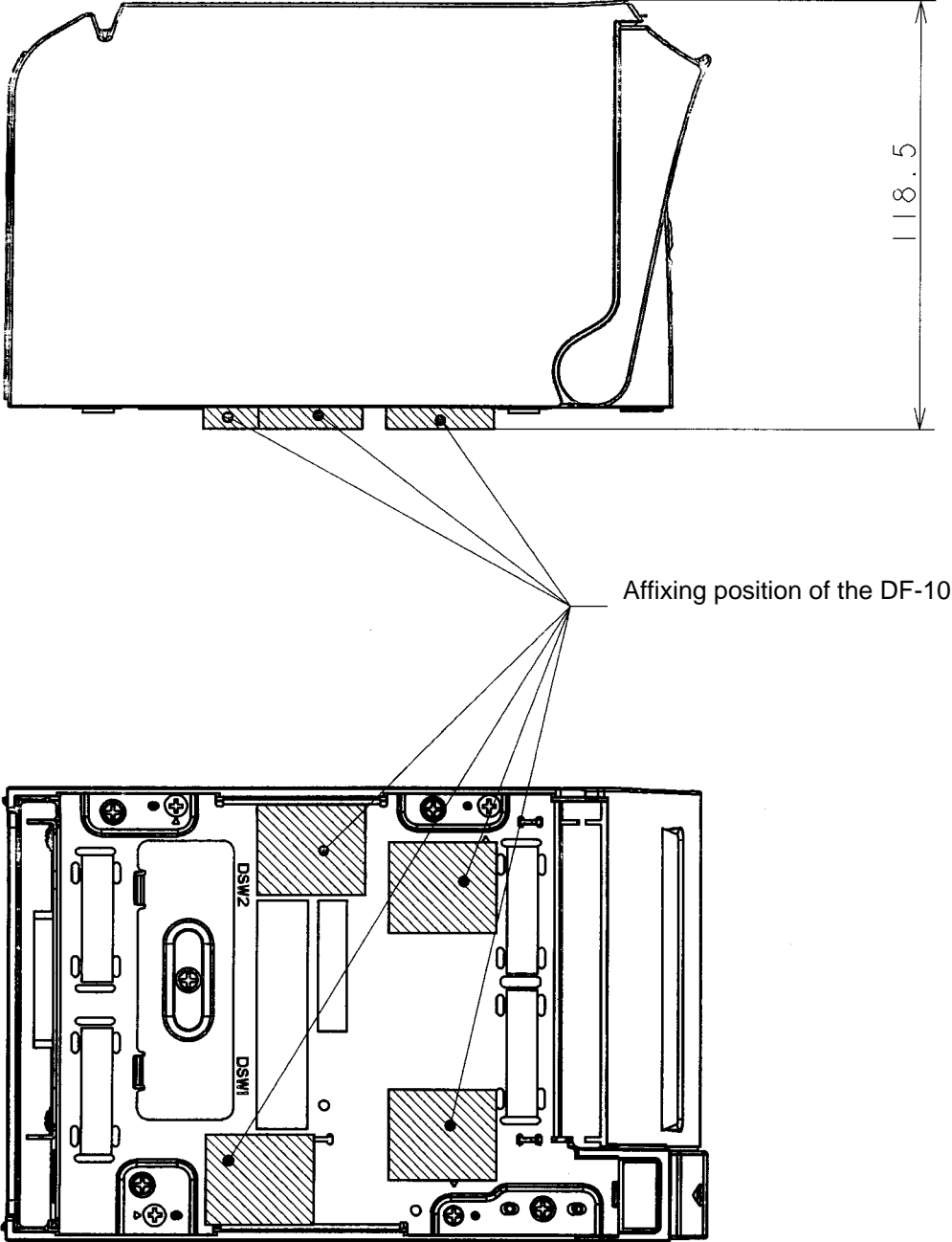
When the ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted, as follows.

Accumulated ASB (1+2+3+4)

	First Status	Second Status	Third Status	Fourth Status
Accumulated ASB (1+2+3+4)	0011 1100	0000 0000	0000 0011	0000 1111
+	First Status	Second Status	Third Status	Fourth Status
The latest ASB	0001 1100	0000 0000	0000 1111	0000 1111
Fourth Status				

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APPENDIX I: AFFIXING POSITION OF DF-10



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			D		

**APPENDIX J: COMPARISON BETWEEN TM-T70 (T88IV
COMMAND-COMPATIBLE MODE ENABLED) AND
TM-T88III ANK MODEL**

Command	TM-T70 ANK model (T88IV command-compatible mode enabled)	TM-T88III ANK model
DLE DC4 (fn=2)	Newly supported.	Not supported.
DLE DC4 (fn=8)	Newly supported.	Not supported.
ESC *	Maximum size in horizontal direction: 2048 dots	Maximum size in horizontal direction: 1024 dots
ESC R	[Range] $0 \leq n \leq 15$	[Range] $0 \leq n \leq 13$
ESC V	[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$	[Range] $n = 0, 1, 48, 49$
GS (D	Newly supported.	Not supported.
GS (E	Newly supported.	Not supported.
GS (H	Newly supported.	Not supported.
GS (K	Newly supported.	Not supported.
GS (L/ GS 8 L	Newly supported.	Not supported.
GS (k	Newly supported.	Not supported.
GS I	[Range] $n = 1, 2, 49, 50, 110, 65 \leq n \leq 69$ Product name: "TM-T88IV"	[Range] $1 \leq n \leq 3, 49 \leq n \leq 51, 65 \leq n \leq 69$ Product name: "TM-T88III"
GS V	[Range] <A> $m = 0, 1, 48, 49$ $m = 65, 66, 0 \leq n \leq 255$	[Range] <A> $m = 1, 49$ $m = 66, 0 \leq n \leq 255$
GS g0	Newly supported.	Not supported.
GS g2	Newly supported.	Not supported.
GS k	<A> $m = 6$ Bar code system: CODEBAR [Range] $2 \leq k$ $48 \leq d \leq 57, 65 \leq d \leq 68, 97 \leq d \leq 100,$ $d = 36, 43, 45, 46, 47, 58$ [Where $65 \leq d1 \leq 68, 65 \leq dk \leq 68,$ $97 \leq d1 \leq 100, 97 \leq dk \leq 100$]	<A> $m = 6$ Bar code system: CODEBAR [Range] $1 \leq k$ $48 \leq d \leq 57, 65 \leq d \leq 68,$ $d = 36, 43, 45, 46, 47, 58$
FS p	Even if the FEED button is pressed while the NV bit image is being printed, the print may be not stopped on the way.	If the FEED button is pressed while the NV bit image is being printed, the print may be stopped on the way.

EPSON	TITLE TM-T70 Specification (STANDARD)	SHEET REVISION D	NO.	
			NEXT END	SHEET App.14