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EPSON

Receipt Printer

TM-T81

Specification

STANDARD	
Rev. No.	A
Notes	

Copied Date	, ,
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SEIKO EPSON CORPORATION

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REVISION SHEET

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

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

TITLE	Front Part							
	Cover	Rev. Sheet	Confidentiality Agreement	General Features	Table of Contents	Contents	Appendix	Total
TM-T81 Specification (STANDARD)	1	3	1	1	4	114	13	137

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Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				67	A	92	A	App.1	A
					68	A	93	A	App.2	A
					69	A	94	A	App.3	A
					70	A	95	A	App.4	A
					71	A	96	A	App.5	A
					72	A	97	A	App.6	A
					73	A	98	A	App.7	A
					74	A	99	A	App.8	A
					75	A	100	A	App.9	A
					76	A	101	A	App.10	A
					77	A	102	A	App.11	A
					78	A	103	A	App.12	A
					79	A	104	A	App.13	A
					80	A	105	A		
					81	A	106	A		
					82	A	107	A		
					83	A	108	A		
					84	A	109	A		
					85	A	110	A		
					86	A	111	A		
					87	A	112	A		
					88	A	113	A		
					89	A	114	A		
					90	A				
					91	A				

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REVISION SHEET

REV.	SHEET	CHANGED CONTENTS
A	All	Newly enacted

TITLE

TM-T81
Specification
(STANDARD)

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GENERAL FEATURES

1) This specification applies to the TM-T81 printer.

* 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-T81 printer has the following features:

<Printing>

- High-speed printing (130 mm/s {5.12"/s} maximum), which enables issuing of batch receipts.

<Printer Handling>

- Easy drop-in paper loading.

<Application Software>

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

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Table of Contents

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1. GENERAL SPECIFICATIONS

1.1 Printing Specifications

1) Printing method: Thermal line printing

2) Dot density: 180 dpi × 180 dpi
[dpi: dots per 25.4 mm {1"}]

3) Printing direction: Unidirectional with friction feed

4) Paper width: 80 mm {3.15"}

5) Printing width: 72 mm {2.83"}, 512 dot positions

6) Characters per line (default): Font A: 42
Font B: 56

7) Character spacing (default): Font A: 0.28 mm {0.01"} (2 dots)
Font B: 0.28 mm {0.01"} (2 dots)
NOTE: Programmable by control command.

8) Line spacing: 4.23 mm {1/6"}
NOTE: Programmable by control command.

9) Maximum printing speed:

Normal: 130 mm/s {5.1"/s}
Approximately 30.7 lps (4.23 mm {1/6"} feed)
Page mode printing: 130 mm/s {5.1"/s}
Bit-image printing: 130 mm/s {5.1"/s}
Raster bit-image printing:
130 mm/s {5.1"/s}
Ladder bar code, 2-dimensional code printing:
100 mm/s {3.9"/s}

NOTES: 1. The print speed listed above is the value when the printer prints with the standard print density level at 24 V and 25°C {77°F}. The print speed may change automatically with the condition of the supply voltage or the head temperature.

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

3. Low transmission speed may cause intermittent printing. It is recommended to transmit data to the printer as fast as possible.

10) Paper feed speed: Approximately 130 mm/s {approximately 5.1"/s} (continuous paper feeding)

1.2 Character Specifications

1) Number of characters:
- Alphanumeric characters: 95
- Extended graphics: 128 × 11 pages (including one space page)
- International characters: 48

2) Character structure:
- Font A: 12 × 24 (including 2-dot spacing in horizontal)
- Font B: 9 × 17 (including 2-dot spacing in horizontal)

NOTE: Font A is selected as the default

3) Character size: See Table 1.2.1.

Table 1.2.1 Character Size

	Standard		Double-height		Double-width		Double-width/ Double-height	
	W×H (mm)	cpl	W×H (mm)	cpl	W×H (mm)	cpl	W×H (mm)	cpl
Font A 12×24	1.41×3.39	42	1.41×6.77	42	2.82×3.39	21	2.82×6.77	21
Font B 9×17	0.99×2.40	56	0.99×4.80	56	1.98×2.40	28	1.98×4.80	28

Space between characters is not included.
Characters can be scaled up to 64 times as large as the standard sizes.
cpl = characters per line

4) Supporting character on each model type: See Table 1.2.2.

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. Paper must be fed over 40 mm {1.57"} before cutting if the printer is stopped. This prevents a possible paper jam.

1.4 Paper Roll Supply Device

1) Supply method: Drop-in paper roll

2) Roll paper end sensor: Detects whether paper is present or not.
When the sensor detects a paper-end, the printer stops printing.
Printing resumes when paper is installed and the printer cover is closed.

a) Detection method: Microswitch

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

3) Roll paper near-end sensor: Detects a near-end of a paper roll.
If the sensor is enabled by **ESC c 4**, the printer stops printing.

a) Detection method: Microswitch

b) Near-end adjustment: Can be adjusted by changing the position of the adjusting screw.
Fixed position #1 (approximately 23 mm {0.9"})
#2 (approximately 27 mm {1.06"})

NOTE: If roll paper whose paper spool is out of the specified range is used, the roll paper near-end detection may not work correctly.

1.5 Paper Specification

1) Paper type: Specified thermal paper

2) Form and size: Roll paper

a) Roll paper diameter: 83 mm {3.27"} maximum

b) Roll paper spool: Inside: 12 mm {0.47"}
Outside: 18 mm {0.71"}
Width: Same with the paper width or less than the paper width by 1 mm {0.039"}.

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

c) Take-up roll paper width: 80 +0.5/–1.0 mm {3.15+0.02/–0.04"}

d) Paper width: 79.5 ± 0.5 mm {3.13 ± 0.02"}

3) Specified paper: NTP080-80
[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 its equivalent.

Table 1.5.1 Specified Original Paper Type No. (Single-color paper)

Original Paper Type No.	Manufacturer
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

5) Print density adjustment

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

Table 1.5.3

Original Paper No.	Density Level
TF50KS-E, PD150R, PD160R, F5041	Standard
TF60KS-E, P220AGB-1, P300, P310, P350	Medium
AF50KS-E	Medium
PD190R	Medium

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

Table 1.5.4

Original Paper No.	Density Level
TF50KS-E, PD150R, PD160R, F5041	7
TF60KS-E, P220AGB-1, P300, P310, P350	8
AF50KS-E	9
PD190R	10

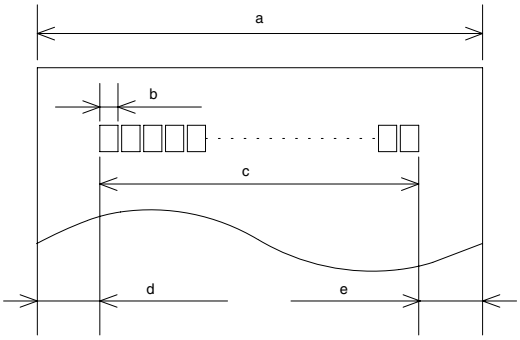
6) Notes on preprinting on the recording surface of thermal paper

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.

1.6 Printable Area

1) Paper roll

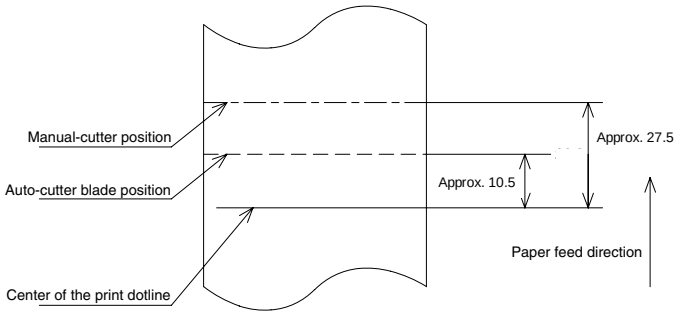
The printable area of a paper with width of 79.5 ± 0.5 mm {3.13 ± 0.02"} is 72.2 ± 0.2 mm {2.84 ± 0.008"} (512 dots) and the space on the right and left sides are approximately 3.7 ±2 mm {0.15 ± 0.079"}.



a = 79.5 ± 0.5 mm {3.13 ± 0.02"}
b = 0.141 ± 0.05 mm {0.056 ± 0.002"}
c = 72.2 ± 0.2 mm {2.84 ± 0.008"}
d = 3.7 ± 0.2 mm {0.15 ± 0.079"}
e = 3.7 ± 0.2 mm {0.15 ± 0.079"}
[All the numeric values are typical.]

Figure 1.6.1 Paper Roll Printable Area

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 this into account when setting the cutting position of the auto-cutter.

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 user-defined bit images): 12 KB
3) Macro buffer: 2 KB
4) NV (Non-volatile) bit image buffer: 256 KB
5) NV user memory: 1 KB

1.9 Electrical Characteristics

1) Supply voltage: +24 VDC ± 7%

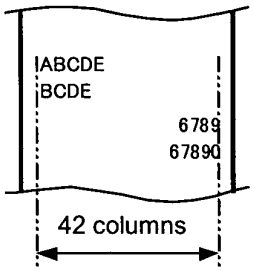
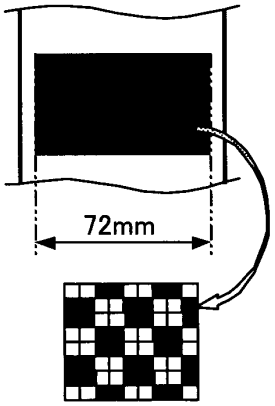
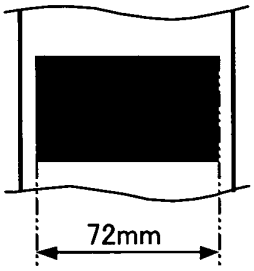
2) Current consumption (at 24V, 25°C, normal print density):

Operating: See Table 1.9.1

Standby: Mean Approximately 0.1 A

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

Table 1.9.1 Current Consumption (Operating)

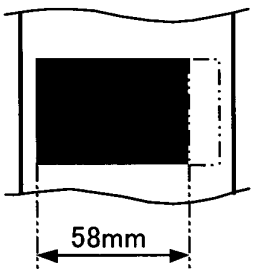
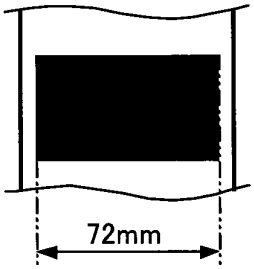
Print ratio	Approximately 18% (with the print pattern below) Font A, 42 columns, ANK rolling pattern for 100 lines (repeats 20H–7FH)	50% (Printing length: 20 mm)	100% (Printing length: 20 mm)
Print example			
Current consumption	Mean: Approximately 1.4A Peak: Approximately 5.1A	Mean: Approximately 3.3A Peak: Approximately 5.8A	Mean: Approximately 3.2A Peak: Approximately 8.4A

NOTES: 1. Notes on using the Epson PS-180 power supply unit

If the printing is continuously performed with the high print ratio, the overcurrent limitation might be operated. Therefore, the printing length must not exceed the following values when printing with high print ration.

Print ratio: Number of dots being energized per one dotline / Total number of dots per one dotline (512 dots)

Table 1.9.2 Limitation of the Printing Length on Print Ratio

Print ratio	80%	100%
Print example		
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.

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 increase 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.

1.10 EMI and Safety Standards Applied

EMC is measured using Seiko Epson's AC adapter.

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

2) North America
EMI: FCC/ICES-003 Class A
Safety standards: UL1950/CSA C22.2 No.950

Conditions of Acceptability

1) This component has been judged on the basis of the required spacing in the Standard for Information Technology equipment, Including Electrical Business Equipment, UL 1950 and CSA C22.2 No. 950, Sub-clause 2.9, which would cover the component itself if submitted for Listing.
2) This unit is intended to be supplied by a SELV circuit only.
3) The terminals and connectors have not been evaluated for field wiring.

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 with 4.23 mm line spacing.

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.)

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)

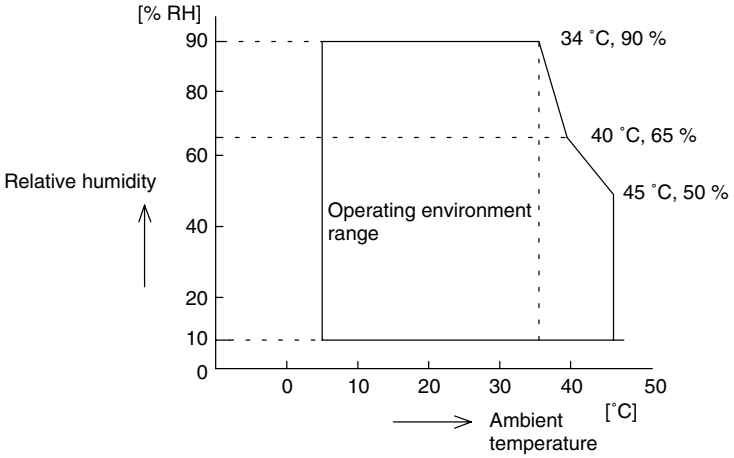


Figure 1.12.1 Operating Temperature and Humidity Range

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/s^2 {2 G}
Sweep: 10 minutes (half cycle)
Duration: 1 hour
Directions: x, y, and z

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

4) Impact resistance:

When Packed:
Package: EPSON standard package
Height: 60 cm {23.6"}
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.

5) Acoustic noise (Operating): Approximately 51 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

The TM-T81 printer must be installed horizontally.

(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.)

2. CONFIGURATION

2.1 Interface

2.1.1 RS-232 serial interface

2.1.1.1 Specifications

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15 V: Logic "1"/ OFF SPACE = +3 to +15 V: Logic "0"/ ON
Baud rate:	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 data word length, baud rate, and parity depend on the DIP switch settings. (See Section 3.3.3.)
2. 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 paper roll end detector or the paper roll near-end detector with a printing halt feature by **ESC c 4**).
6) When an error has occurred.

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-T81 Printer Status and Signals

<table>
<tr><th>Pin number</th><th>Signal name</th><th>Signal direction</th><th>Function</th></tr>
<tr><td>1</td><td>FG</td><td>—</td><td>Frame ground</td></tr>
<tr><td>2</td><td>TXD</td><td>Output</td><td>Transmit data</td></tr>
<tr><td>3</td><td>RXD</td><td>Input</td><td>Receive data</td></tr>
<tr><td>4</td><td>RTS</td><td>Output</td><td>Same as DTR signal</td></tr>
<tr><td>6</td><td>DSR</td><td>Input</td><td>This signal indicates whether the host computer can receive data.
SPACE indicates that the host computer can receive data, and MARK indicates that the host computer cannot receive data.
When DTR/DSR control is selected, the printer transmits data after confirming this signal (except when transmitting data by DLE EOT, and GS a).
When XON/XOFF control is selected, the printer does not check this signal.
Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. (See Section 3.3.3.)
The printer is reset when the signal remains MARK for 1 ms or more. (See Section 2.1.1.7.)</td></tr>
<tr><td>7</td><td>SG</td><td>—</td><td>Signal ground</td></tr>
<tr><td>20</td><td>DTR</td><td>Output</td><td>1) When DTR/DSR control is selected, this signal indicates whether the printer is busy. SPACE indicates that the printer is ready to receive data, and MARK indicates that the printer is busy. The busy condition can be changed by using DIP SW 2-1 as follows (See Section 3.3.3.):
<table>
<tr><th></th><th>Printer status</th><th>DIP SW 2-1 status ON</th><th>DIP SW 2-1 status OFF</th></tr>
<tr><td rowspan="7">Offline</td><td>1. During the period from when the power is turned on (including resetting using the interface) to when the printer is ready to receive data.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>2. During the self-test.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>3. When the cover is open.</td><td>—</td><td>BUSY</td></tr>
<tr><td>4. During paper feeding using the paper feed button.</td><td>—</td><td>BUSY</td></tr>
<tr><td>5. When the printer stops printing due to a paper-end.</td><td>—</td><td>BUSY</td></tr>
<tr><td>6. During macro executing standby status.</td><td>—</td><td>BUSY</td></tr>
<tr><td>7. When an error has occurred.</td><td>—</td><td>BUSY</td></tr>
<tr><td></td><td>8. When the receive buffer becomes full.(*1)</td><td>BUSY</td><td>BUSY</td></tr>
</table></td></tr>
</table>

Table 2.1.1 TM-T81 Printer Status and Signals (Continued)

Pin number	Signal name	Signal direction	Function
			2) When XON/XOFF control is selected: The signal indicates whether the printer is correctly connected and is ready to receive data. SPACE indicates that the printer is ready to receive data. The signal is always SPACE except in the following cases: • During the period from when the power is turned on to when the printer is ready to receive data • During the self-test
25	INIT	Input	Changing 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”
- When the receive buffer capacity is specified to 4 KB (DIP SW1-2 is Off):
  - If the DIP SW2-5 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.
  - If the DIP SW2-5 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.
- When the receive buffer capacity is specified to 45 bytes (DIP SW1-2 is On):
  - Regardless of the DIP SW2-5 setting, 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 bytes.

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	When the printer goes online after turning on the power (or reset using interface)	Transmit	Transmit
	When the receive buffer is released from the buffer full state	Transmit	Transmit
	When the printer switches from offline to online	—	Transmit
	When the printer recovers from an error using the **DLE ENQ 1** or **DLE ENQ 2** commands	—	Transmit
XOFF Transmission	When the receive buffer becomes full	Transmit	Transmit
	When the printer switches from online to offline	—	Transmit

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

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.
(DTE: Data Terminal Equipment) (DCE: Data Circuit Terminating Equipment)
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 setting DIP switch 2-1 to ON to enable handshaking with the printer, be sure to check the printer status using the **GS a** command and the ASB function. In this setting, the default value of n for **GS a** is 2. The printer automatically transmits the printer status, depending on online/offline changes.
3) When using **DLE EOT**, **DLE ENQ**, and **DLE DC4** be sure that the receive buffer does not become full.
   - When using a host that cannot transmit data when the printer is busy:
     If an error has occurred, **DLE EOT**, **DLE ENQ**, and **DLE DC4** cannot be used when the printer is busy due to a receive buffer-full state.
   - When using a host that can transmit data when the printer is busy:
     When the receive buffer becomes full while transmitting bit-image data, **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

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: T_{RS} 1 ms (minimum)
  - When using pin 6 (DSR) (DIP switch 2-7 is ON):

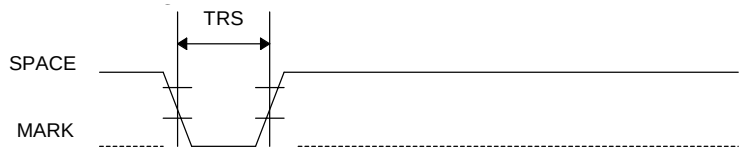


Figure 2.1.1 Minimum Reset Pulse Width (pin 6)

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

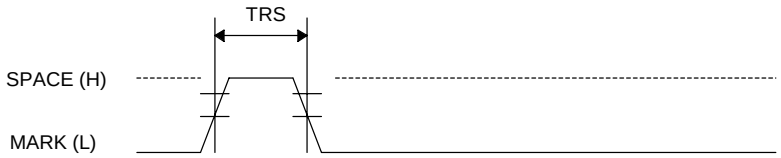


Figure 2.1.2 Minimum Reset Pulse Width (pin 25)

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.

2.1.2 USB (Universal Serial Bus) Interface

Outline

1. High-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.

2.2 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	N.C
SHELL	F.G.

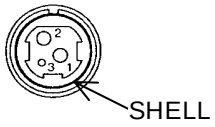


Figure 2.2.1 Power Supply Connector

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.

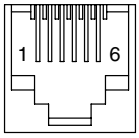


Figure 2.2.2 Drawer Kick-out Connector

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.
t1 (ON time) and *t2* (OFF time) are specified by **ESC p** or **DLE DC4**.

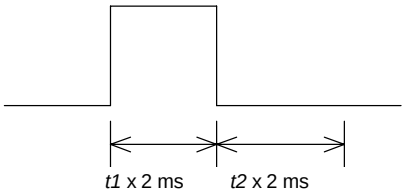


Figure 2.2.3 Drawer Kick-out Drive Signal Output Waveform

4) Drawer open/close signal

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

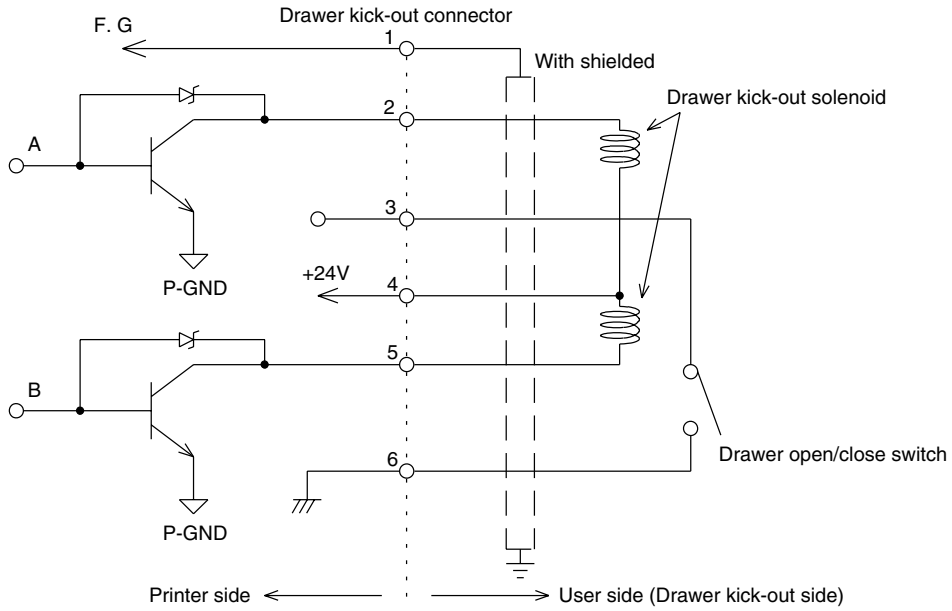


Figure 2.2.4 Drawer Circuitry

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

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

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

3. FUNCTIONS

3.1 List of Commands

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

Command	Name
ESC a	Select justification
ESC c 4	Select paper sensor(s) to stop printing
ESC c 5	Enable/disable panel buttons
ESC d	Print and feed *n* lines
ESC p	Generate pulse
ESC t	Select character code table
ESC {	Turn upside-down print mode on/off
FS g 1	Write to NV user memory
FS g 2	Read from NV user memory
GS !	Select character size
GS $	Set absolute vertical print position in page mode
GS (A	Execute test print
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).

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 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 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

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

Obsolete command		Upward-compatible command
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 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>

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

3.2 Character Code Tables

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

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

3.2.3 Page 1 [Katakana]

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

3.2.4 Page 2 [PC850: Multilingual]

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

3.2.5 Page 3 [PC860: Portuguese]

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

3.2.6 Page 4 [PC863: Canadian-French]

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

3.2.7 Page 5 [PC865: Nordic]

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

3.2.8 Page 16 [WPC1252]

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	À 192	Đ 208	à 224	ð 240
1	SP 129	‘ 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	‚ 130	’ 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	ƒ 131	“ 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	„ 132	” 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	… 133	• 149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	† 134	– 150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	ˆ 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

3.2.9 Page 17 [PC866: Cyrillic #2]

HEX	8	9	A	B	C	D	E	F
0	А 128	Р 144	а 160	░ 176	└ 192	╨ 208	р 224	Ё 240
1	Б 129	С 145	б 161	▒ 177	┴ 193	╤ 209	с 225	ё 241
2	В 130	Т 146	в 162	▓ 178	┬ 194	╥ 210	т 226	Є 242
3	Г 131	У 147	г 163	│ 179	├ 195	╙ 211	у 227	є 243
4	Д 132	Ф 148	д 164	┤ 180	─ 196	╘ 212	ф 228	Ї 244
5	Е 133	Х 149	е 165	╡ 181	┼ 197	╒ 213	х 229	ї 245
6	Ж 134	Ц 150	ж 166	╢ 182	╞ 198	╓ 214	ц 230	Ў 246
7	З 135	Ч 151	з 167	╖ 183	╟ 199	╫ 215	ч 231	ў 247
8	И 136	Ш 152	и 168	╕ 184	╚ 200	╪ 216	ш 232	° 248
9	Й 137	Щ 153	й 169	╣ 185	╔ 201	┘ 217	щ 233	• 249
A	К 138	Ъ 154	к 170	║ 186	╩ 202	┌ 218	ъ 234	· 250
B	Л 139	Ы 155	л 171	╗ 187	╦ 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	¤ 253
E	О 142	Ю 158	о 174	╛ 190	╬ 206	▐ 222	ю 238	■ 254
F	П 143	Я 159	п 175	┐ 191	╧ 207	▀ 223	я 239	SP 255

3.2.10 Page 18 [PC852: Latin2]

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

3.2.11 Page 19 [PC858: Euro]

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

3.2.12 Page 255 [User-defined page]

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

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	β
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{	|	}	~
Slovenia/ Croatia	#	$	Ž	Š	Đ	Ć	Č	ž	š	đ	ć	č
China	#	¥	@	[	\	]	^	`	{	|	}	~

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 G.

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 feed 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.

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

3.3.3 DIP Switches

3.3.3.1 Serial interface specification

1) DIP switch 1: 8 switches

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				OFF

Table 3.3.2 Transmission Speed

Transmission Speed (bps)	SW 1-7	SW 1-8
38400 (See *1)	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

bps: bits per second

NOTES:
1. The default value of the transmission speed is 9600 bps.
2. *1: The transmission speed can be selected by setting the transmission condition of the serial interface.
3. 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.
4. 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.

2) DIP switch 2: 8 switches

Table 3.3.3 DIP Switch 2

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				OFF
5	Setting the release condition of the receive buffer BUSY state (this function is effective when the capacity of the receive buffer is set to 4 KB.)	Releases the BUSY state when the remaining capacity of the receive buffer reaches 138 bytes.	Releases the BUSY state when the remaining capacity of the receive buffer reaches 256 bytes.	OFF
6	Reserved (Do not change settings)	---	Fixed to Off	OFF
7	I/F pin 6 reset signal (*1)	Enabled	Disabled	OFF
8	IF pin 25 reset signal (*2)	Enabled	Disabled	OFF

Table 3.3.4 DIP Switch 2-3 and 2-4

Switch No.		Function
3	4	
OFF	OFF	Print density (Standard)
ON	OFF	Print density (Medium)
OFF	ON	Print density (Dark)
ON	ON	Print density (Standard)

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 “medium”/”dark” level, printing speed is inclined to be low speed.

3.3.3.2 USB interface specification

Table 3.3.5 DIP Switch 1

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	Undefined	---	---	OFF
4	Undefined	---	---	OFF
5	Undefined	---	---	OFF
6	Undefined	---	---	OFF
7	Undefined	---	---	OFF
8	Setting of USB power-saving feature	Disabled	Disabled	OFF

Table 3.3.6 DIP Switch 2

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				OFF
5	Setting the release condition of the receive buffer BUSY state (this function is effective when the capacity of the receive buffer is set to 4 KB.)	Releases the BUSY state when the remaining capacity of the receive buffer reaches 138 bytes.	Releases the BUSY state when the remaining capacity of the receive buffer reaches 256 bytes.	OFF
6	Reserved (Do not change settings.)	---	Fixed to Off.	OFF
7	Reserved (Do not change settings.)	---	Fixed to Off.	OFF
8	Reserved (Do not change settings.)	Fixed to On	---	OFF

Table 3.3.7 DIP Switch 2-3 and 2-4

3	4	Function
OFF	OFF	Print density (Standard)
ON	OFF	Print density (Medium)
OFF	ON	Print density (Dark)
ON	ON	Print density (Standard)

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 “medium”/”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	Value
Selection of print density	13 levels in the print density level 1 to 13
Selection of print speed	Level 1–9 (9 levels)

3.4 Panel LED Indicators

1) Power LED: Green

On: Power is stable.

Off: Power is not stable.

2) Error (ERROR) LED: Orange

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

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 a 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.

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

4) Ending the self-test

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

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) Starting hexadecimal dumping

Open the cover and turn the power on while pressing the FEED button or executing **GS (A** command, then close the cover. The printer first prints "Hexadecimal Dump To terminate ….." on roll paper and prints the received print data in hexadecimal numbers and in its corresponding characters.

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 setting the printer offline.

3) Ending hexadecimal dumping

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

<Printing example>

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



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

                    *** completed ***
```

3.7 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

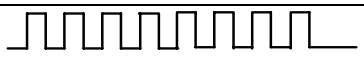
Turn the power off.

3.8 Error Processing

3.8.1 Error Types

1) Errors that automatically recover

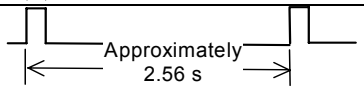
Table 3.8.1 Errors That Automatically Recover

Error	Description	ERROR LED Flashing Pattern (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	Printing on the roll paper is not performed correctly due to a cover-open		Recovers automatically when cover is closed. The printer restarts printing with the line being printed when the cover was opened.

NOTE: Print head temperature error is not an abnormality.

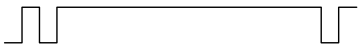
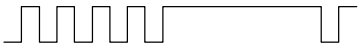
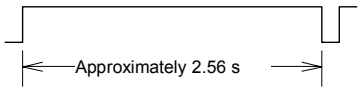
2) Errors that have the possibility of recovery

Table 3.8.2 Errors That Can Possibly Recover

Error	Description	ERROR LED Flashing Pattern (160 ms)	Recovery
Autocutter error	The autocutter does not work correctly.		Recovers by **DLE ENQ 1** or **DLE ENQ 2**.

3) Errors that are impossible to recover

Table 3.8.3 Unrecoverable Errors

Error	Description	ERROR LED Flashing Pattern ⇹ 160 ms	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 or I/F board is not connected.		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.

3.8.2 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.

3.8.3 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

3.9 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.

3.10 Print Buffer-full Printing

- When printing in standard mode

  When subsequent data is received after the printer processes one line of data in the print buffer, the printer automatically prints the processed line and feeds the paper by one line (in standard mode).

- When printing in page mode

  When subsequent data is received after the printer processes one line of data in the print buffer, the printer automatically moves the printing position to the line after the processed one.

4. CASE SPECIFICATIONS

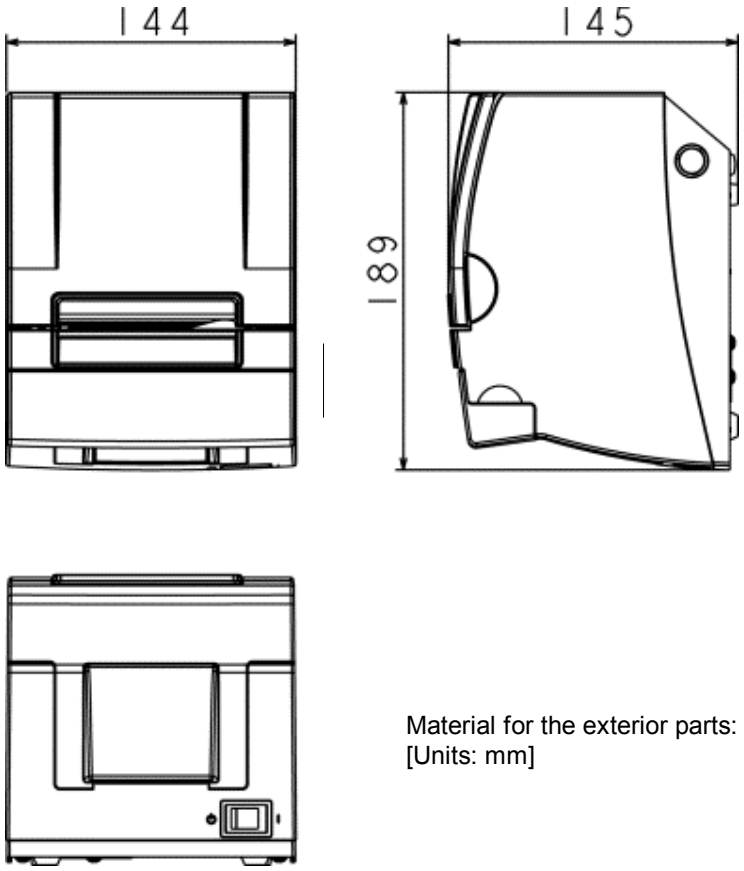
4.1 External Dimensions and Mass

Height:	Approximately 145 mm {5.71"}	
Width:	Approximately 144 mm {5.67"}	
Depth:	Approximately 189 mm {7.44"}	
Mass:	Approximately 1.7 kg {3.74 lb}	(roll paper excluded)

4.2 Color

EPSON standard color (ECW, EDG)

4.3 External Appearance



Material for the exterior parts: 94V-0
[Units: mm]

Figure 4.3.1 External Appearance

5. OPTIONS AND CONSUMABLES

5.1 Standard Accessories

- Roll paper
- User's Manual (Languages: English, German, French, Spanish, Portuguese, Italian, Dutch)
- Power switch cover
- External power supply
  Model: PS-180

5.2 Options

- Affixing tapes
  Model: DF-10

5.3 Consumables

- Specified paper
  Thermal roll paper: NTP080-80 (for 80 mm paper width 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

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 (E <some functions>, **GS (L** / **GS 8 L** <some functions>, **GS g 0**, **FS g 1**, **FS q**

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

5) Print buffer

The print buffer is used to store image data for printing

6) Receive buffer

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

7) Maximum printable area

The maximum printable area of this printer is as follows:

- Standard Mode (Horizontal direction): 72.25 mm {512/180"}
- Page Mode (Horizontal direction): 72.25 mm {512/180"}
- Page Mode (Vertical direction): 234.53 mm {3324/360"}

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 ($n_L + n_H \times 256$) = 0 is specified with **ESC $**.

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

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.

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

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

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

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.

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.

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] $1 \le n \le 4$

[Description]
- Transmits the real-time status.

n	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.

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

[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

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

n	Function
1	Recovers from a recoverable error and restarts printing from the line where the error occurred. • This command is ignored unless a recoverable error has occurred.
2	Recovers from a recoverable error after clearing the receive and print buffers. • This command is ignored unless a recoverable error has occurred.

[Notes]
- 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.

[Reference] Appendix C

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

[Name] Generate pulse in real-time

[Format]

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

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

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

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

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

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

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

[Name] Execute power-off sequence

[Format]

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

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

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

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

[Reference] Appendix G

DLE DC4 *fn d1…d7* (*fn* = 8)

[Name] Clear buffer(s)

[Format]

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

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

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

[Notes]
- Do not use this command in a system that uses the printer with the OPOS driver or the JavaPOS driver provided by Seiko Epson Corporation.
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- When this command is transmitted, the data following must not be transmitted until the status is received.

ESC FF

[Name] Print data in page mode

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

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

ESC SP *n*

[Name] Set right-side character spacing

[Format]

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

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

[Default] *n* = 0

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

[Note]
- The maximum is 35.98 mm {255/180"}.

ESC ! *n*

[Name] Select print mode(s)

[Format]

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

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

[Default] $n = 0$

[Description]

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

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

ESC $ *nL nH*

[Name] Set absolute print position

[Format]

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

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

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

ESC % *n*

[Name] Select/cancel user-defined character set

[Format]

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

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

[Default] $n = 0$

[Description]
- Selects or cancels the user-defined character set.
  - When the LSB of *n* is 0, the user-defined character set is canceled.
  - When the LSB of *n* is 1, the user-defined character set is selected.

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

[Name] Define user-defined characters

[Format]

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

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

[Description]
- Defines the user-defined character pattern for the specified character codes.
  - *y* specifies the number of bytes in the vertical direction.
  - *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.
  - *x* specifies the number of dots in the horizontal direction from the left edge.
  - *d* specifies the defined data (column format).

[Note]
- User-defined characters and a downloaded bit image (**GS** ∗) cannot be defined simultaneously. When this command is executed, the downloaded bit image is deleted.

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

[Name] Select bit-image mode

[Format]

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

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

$1 \le (n_L + n_H \times 256) \le 2047 \quad (0 \le n_L \le 255 , 0 \le n_H \le 7)$

$0 \le d \le 255$

$k = n_L + n_H \times 256$ [when $m = 0,1$]

$k = (n_L + n_H \times 256) \times 3$ [when $m = 32,33$]

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

m	Bit image mode	Vertical direction	Horizontal direction
0	8-dot single-density	60 dpi	90 dpi
1	8-dot double-density	60 dpi	180 dpi
32	24-dot single-density	180 dpi	90 dpi
33	24-dot double-density	180 dpi	180 dpi

• n_L, n_H specify the number of dots in the horizontal direction as $(n_L + n_H \times 256)$.

• *d* specifies the bit image data (column format).

ESC – *n*

[Name] Turn underline mode on/off

[Format]

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

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

[Default] $n = 0$

[Description] • Turns underline mode on or off.

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

ESC 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] • Sets the line spacing to approximately 4.23 mm {1/6"}.

ESC 3 *n*

[Name] Set line spacing

[Format]

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

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

[Default] Equivalent to approximately 4.23 mm {1/6"}.

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

[Note]
- The maximum is 1016 mm {40"}.

ESC = *n*

[Name] Select peripheral device

[Format]

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

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

[Default] $n = 1$

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

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

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

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

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

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

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

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description]
- Clears the data in the print buffer and resets the printer modes to the modes that were in effect when the power was turned on.
  Keeps the following data:
  - Macro definition data.
  - 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	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

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

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

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

ESC E *n*

[Name] Turn emphasized mode on/off

[Format]

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

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

[Default] $n = 0$

[Description]
- Turns emphasized mode on or off.
  - When the LSB of *n* is 0, emphasized mode is turned off.
  - When the LSB of *n* is 1, emphasized mode is turned on.

ESC G *n*

[Name] Turn double-strike mode on/off

[Format]

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

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

[Default] $n = 0$

[Description]
- Turns double-strike mode on or off.
- When the LSB of *n* is 0, double-strike mode is turned off.
- When the LSB of *n* is 1, double-strike mode is turned on.

ESC J *n*

[Name] Print and feed paper

[Format]

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

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

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

[Note]
- The maximum paper feed amount is 1016 mm {40"}.

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description]
- Switches from standard mode to page mode.

ESC M *n*

[Name] Select character font

[Format]

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

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

[Default] *n* = 0

[Description] • Selects a character font.

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

ESC R *n*

[Name] Select an international character set

[Format]

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

[Range] $0 \le n \le 15$

[Default] *n* = 0

[Description] • Selects an international character set.

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

[Reference] "3.2.13 International Character Sets"

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description]
- Switches from page mode to standard mode.

ESC T *n*

[Name] Select print direction in page mode

[Format]

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

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

[Default] $n = 0$

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

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

ESC V *n*

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

[Format]

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

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

[Default] $n = 0$

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

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

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

[Name] Set print area in page mode

[Format]

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

[Range]
$0 \le (x_L + x_H \times 256) \le 65535 \quad (0 \le x_L \le 255 , 0 \le x_H \le 255)$
$0 \le (y_L + y_H \times 256) \le 65535 \quad (0 \le y_L \le 255 , 0 \le y_H \le 255)$
$1 \le (dx_L + dx_H \times 256) \le 65535 \quad (0 \le dx_L \le 255 , 0 \le dx_H \le 255)$
$1 \le (dy_L + dy_H \times 256) \le 65535 \quad (0 \le dy_L \le 255 , 0 \le dy_H \le 255)$

[Default]
$(x_L + x_H \times 256) = 0 \quad (x_L = 0 , x_H = 0)$
$(y_L + y_H \times 256) = 0 \quad (y_L = 0 , y_H = 0)$
$(dx_L + dx_H \times 256) = 512 \quad (dx_L = 0 , dx_H = 2)$
$(dy_L + dy_H \times 256) = 1662 \quad (dy_L = 126 , dy_H = 6)$

[Description]
- In page mode, sets the size and the logical origin of the print area.
  - x_L, x_H specify the horizontal logical origin as $[(x_L + x_H \times 256) \times$ (horizontal motion unit)] from absolute origin.
  - y_L, y_H specify the vertical logical origin as $[(y_L + y_H \times 256) \times$ (vertical motion unit)] from absolute origin.
  - dx_L, dx_H specify the horizontal dimension of print area as $[(dx_L + dx_H \times 256) \times$ (horizontal motion unit)].
  - dy_L, dy_H specify the vertical dimension of print area as $[(dy_L + dy_H \times 256) \times$ (vertical motion unit)].

[Note]
- The vertical dimension of the print area can be set to 234.53 mm {3324/360"} maximum.

ESC \ *nL nH*

[Name] Set relative print position

[Format]

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

[Range] $-32768 \le (n_L + n_H \times 256) \le 32767$

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

ESC a *n*

[Name] Select justification

[Format]

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

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

[Default] $n = 0$

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

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

ESC c 4 *n*

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

[Format]

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

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

[Default] $n = 0$

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

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

ESC c 5 *n*

[Name] Enable/disable panel buttons

[Format]

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

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

[Default] $n = 0$

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

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

ESC d *n*

[Name] Print and feed *n* lines

[Format]

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

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

[Description]
- Prints the data in the print buffer and feeds the paper [$n \times$ (current line spacing)].

[Note]
- The maximum paper feed amount is 1016 mm {40"}.

ESC p *m t1 t2*

[Name] Generate pulse

[Format]

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

[Range]
m = 0, 1, 48, 49
$0 \le t1 \le 255$
$0 \le t2 \le 255$

[Description]
- Outputs the pulse specified by *t1* and *t2* to connector pin *m*.

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

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

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

ESC t *n*

[Name] Select character code table

[Format]

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

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

[Default] $n = 0$

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

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

[Reference] "3.2 Character Code Tables"

ESC { *n*

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

[Format]

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

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

[Default] $n = 0$

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

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

[Description]
- Stores the data (*d1...dk*) in the area from ($a1 + a2 \times 256 + a3 \times 65536 + a4 \times 16777216$) to ($nL + nH \times 256$) 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 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 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	*m*	*a1*	*a2*	*a3*	*a4*	*nL*	*nH*
Hex	1C	67	32	*m*	*a1*	*a2*	*a3*	*a4*	*nL*	*nH*
Decimal	28	103	50	*m*	*a1*	*a2*	*a3*	*a4*	*nL*	*nH*

[Range] $m = 0$
$0 \le (a1 + a2 \times 256 + a3 \times 65536 + a4 \times 16777216) \le 1023$
$(0 \le a1 \le 255 , 0 \le a2 \le 3 , a3 = 0 , a4 = 0)$
$1 \le (nL + nH \times 256) \le 80 \quad (1 \le nL \le 80 , nH = 0)$

[Description]
- Transmits the data in the area from ($a1 + a2 \times 256 + a3 \times 65536 + a4 \times 16777216$) to ($nL + nH \times 256$) bytes in the NV user memory.

[Note]
- When this command is transmitted, the data following must not be transmitted until the status is received.

GS ! *n*

[Name] Select character size

[Format]

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

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

[Default] $n = 0$

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

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

[Enlarged in vertical direction]

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

[Enlarged in horizontal direction]

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

GS $ *nL nH*

[Name] Set absolute vertical print position in page mode

[Format]

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

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

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

GS (A *pL pH n m*

[Name] Execute test print

[Format]

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

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

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

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

[Name] Enable/disable real-time command

[Format]

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

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

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

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

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

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

GS (E *pL pH fn [parameters]*

[Name] Set user setup commands

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

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

[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 *pL pH fn d1 d2*** (*fn* = 1)

[Name] Change into the user setting mode

[Format]

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

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

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

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

[Name] End the user setting mode session

[Format]

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

[Range] $(p_L + p_H \times 256) = 4$ $(p_L = 4 , p_H = 0)$
$fn = 2$
$d1 = 79$
$d2 = 85$
$d3 = 84$

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

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

[Name] Set the customized setting values

[Format]

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

[Range] $4 \le (p_L + p_H \times 256) \le 65533$ $(0 \le p_L \le 255 , 0 \le p_H \le 255)$
$fn = 5$
$a = 5, 6$
$0 \le (n_L + n_H \times 256) \le 6$, $(n_L + n_H \times 256) = 100$, $65530 \le (n_L + n_H \times 256) \le 65535$
$(0 \le n_L \le 6, n_H = 0,$ $n_L = 100 , n_H = 0 ,$ $250 \le n_L \le 255 , n_H = 255)$ [when $a = 5$]
$1 \le (n_L + n_H \times 256) \le 9$ $(1 \le n_L \le 9 , n_H = 0)$ [when $a = 6$]

[Default (upon shipment)]
$(n_L + n_H \times 256) = 100$ $(n_L = 100 , n_H = 0)$ [when $a = 5$]
$(n_L + n_H \times 256) = 9$ $(n_L = 9 , n_H = 0)$ [when $a = 6$]

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

a	Type of customized value
5	Print density
6	Print speed

• Print density setting (a = 5)

($n_L + n_H \times 256$)	Print density	
100	Density level depending on the DIP switch settings	
65530	Print density level 1.	light
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.	standard
1	Print density level 8.	|
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

• Print speed setting (a = 6)

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

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

[Name] Transmit the customized setting values

[Format]

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

[Range] $(p_L + p_H \times 256) = 2$ $(p_L = 2 , p_H = 0)$
fn = 6
a = 5, 6, 97

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

a	Type of customized value
5	Print density
6	Print speed

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

[Name] Set the configuration item for the serial interface

[Format]

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

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

[Default (upon shipment)]
d1...dk = “38400”

[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 *pL pH fn a*** (*fn* = 12)

[Name] Transmit the configuration item for the serial interface

[Format]

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

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

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

a	Configuration item
1	Transmission speed

GS (H *pL pH fn [parameters]*

[Name] Request transmission of response or status

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

fn	Format	Function No.	Function name
48	**GS (H *pL pH fn m d1 d2 d3 d4***	48	Set the process ID response.

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

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

[Name] Set the process ID response

[Format]

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

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

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

GS (K *pL pH fn [parameters]*

[Name] Select print control method(s)

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

fn	Format	Function No.	Function name
50	**GS (K *pL pH fn m***	50	Select the print speed.

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

[Name] Select the print speed

[Format]

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

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

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

[Description]
- Selects the print speed.

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

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

[Name] Set graphics data

[Format]

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

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

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

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

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

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

[Notes]

- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- 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	*pL*	*pH*	*m*	*fn*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

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

[Description]

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

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

[Name] Print the graphics data in the print buffer

[Format]

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

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

[Description]

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

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

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

[Format]

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

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2 , *pH* = 0)
m = 48
fn = 3, 51

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

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

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

[Format]

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

[Range] (*pL* + *pH* × 256) = 4 (*pL* = 4 , *pH* = 0)
m = 48
fn = 64
d1 = 75
d2 = 67

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

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

[Name] Delete all NV graphics data

[Format]

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

[Range] (*pL* + *pH* × 256) = 5 (*pL* = 5 , *pH* = 0)
m = 48
fn = 65
d1 = 67
d2 = 76
d3 = 82

[Description]
- Deletes all NV graphics data.

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

[Name] Delete the specified NV graphics data

[Format]

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

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

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

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

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

[Format]

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

[Range] (p_L, p_H) for **GS (L**:
$12 \le (p_L + p_H \times 256) \le 65535 \quad (0 \le p_L \le 255 , 0 \le p_H \le 255)$
(*p1*, *p2*, *p3*, *p4*) for **GS 8 L**:
$12 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$
$(0 \le p1 \le 255 , 0 \le p2 \le 255 , 0 \le p3 \le 255 , 0 \le p4 \le 255)$
Common parameters for **GS (L** and **GS 8 L**:
$m = 48$
$fn = 67$
$a = 48$
$32 \le kc1 \le 126$
$32 \le kc2 \le 126$
$b = 1$
$1 \le (x_L + x_H \times 256) \le 8192 \quad (0 \le x_L \le 255 , 0 \le x_H \le 32)$
$1 \le (y_L + y_H \times 256) \le 2304 \quad (0 \le y_L \le 255 , 0 \le y_H \le 9)$
$c = 49$
$0 \le d \le 255$
$k = (\text{int } ((x_L + x_H \times 256) + 7) / 8) \times (y_L + y_H \times 256)$
The entire capacity size = 256KB.

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

c	Defined data color (*)
49	Color 1

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

[Notes]
- In cases where there is insufficient capacity available for storing NV graphics data specified by ($x_L + x_H \times 256$) and ($y_L + y_H \times 256$), this function is ignored.
- The 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 *pL pH m fn kc1 kc2 x y*** (*fn* = 69)

[Name] Print the specified NV graphics data

[Format]

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

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

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

x, *y*	Vertical direction	Horizontal direction
1	180 dpi	180 dpi
2	90 dpi	90 dpi

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

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

[Format]

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

[Range]

(*pL*, *pH*) for **GS (L**:

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

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

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

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

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

m = 48

fn = 112

a = 48

bx = 1, 2

by = 1, 2

c = 49

$1 \le (xL + xH \times 256) \le 2047 \quad (0 \le xL \le 255 , 0 \le xH \le 7)$

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

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

$0 \le d \le 255$

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

[Description]

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

bx, *by*	Vertical direction	Horizontal direction
1	180 dpi	180 dpi
2	90 dpi	90 dpi

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

c	Stored data color (*)
49	Color 1

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

GS (k *pL pH cn fn [parameters]*

[Name] Set up and print symbol

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

cn	Type of Symbology
48	PDF417
49	QR Code

cn	*fn*	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.

[Notes] • When <Function 082 or 182> is transmitted, the data following must not be transmitted until the status is received.

[Reference] Appendix H, Appendix I

<Function 065> **GS (k *pL pH cn fn n*** (*cn* = 48 , *fn* = 65)

[Name] PDF417: Set the number of columns in the data region

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
cn = 48
fn = 65
$0 \le n \le 30$

[Default] *n* = 0

[Description] • Sets the number of columns in the data region for PDF417.
- When *n* = 0, specifies automatic processing. In this case, the number of columns in the data region is calculated with the number of codewords or the range of print area.
- When $n \neq 0$, sets the number of columns in the data region to *n* codewords.

[Notes] • The following data are not included in the number of columns.
- Start pattern and stop pattern
- Left-row indicator codewords and right-row indicator codewords

<Function 066> **GS (k *pL pH cn fn n*** (*cn* = 48 , *fn* = 66)

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
cn = 48
fn = 66
n = 0 , $3 \le n \le 90$

[Default] *n* = 0

[Description] • Sets the number of rows for PDF417.
- When *n* = 0, specifies automatic processing. In this case, the number of rows is calculated with the number of codewords or the range of print area.
- When $n \neq 0$, sets the number of rows to *n* rows.

<Function 067> **GS (k *pL pH cn fn n*** (*cn* = 48 , *fn* = 67)

[Name] PDF417: Set the width of the module

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
cn = 48
fn = 67
$2 \le n \le 8$

[Default] *n* = 3

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

<Function 068> **GS (k *pL pH cn fn n*** (*cn* = 48 , *fn* = 68)

[Name] PDF417: Set the row height

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
cn = 48
fn = 68
$2 \le n \le 8$

[Default] *n* = 3

[Description] • Sets the row height for PDF417 to [*n* × (the width of the module)].

<Function 069> **GS (k *pL pH cn fn m n*** (*cn* = 48 , *fn* = 69)

[Name] PDF417: Set the error correction level

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*n*

[Range] ($p_L + p_H \times 256) = 4$ ($p_L = 4$, $p_H = 0$)
cn = 48
fn = 69
m = 48, 49
$48 \le n \le 56$ [when *m* = 48]
$1 \le n \le 40$ [when *m* = 49]

[Default] *m* = 49 , *n* = 1

[Description]
- Sets the error correction level for PDF417.
- When *m* = 48, the error correction level is set by the “Level Setting” and the “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 [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

<Function 070> **GS (k *pL pH cn fn m*** (*cn* = 48 , *fn* = 70)

[Name] PDF417: Select the options

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3 , p_H = 0)$
cn = 48
fn = 70
m = 0, 1

[Default] *m* = 0

[Description] • Selects the options for PDF417.

m	Function
0	Selects the standard PDF417.
1	Selects the truncated PDF417.

<Function 080> **GS (k *pL pH cn fn m d1…dk*** (*cn* = 48 , *fn* = 80)

[Name] PDF417: Store the data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 65535$ $(0 \le p_L \le 255 , 0 \le p_H \le 255)$
cn = 48
fn = 80
m = 48
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description] • Stores the PDF417 symbol data (*d1...dk*) in the symbol storage area.

<Function 081> **GS (k *pL pH cn fn m*** (*cn* = 48 , *fn* = 81)

[Name] PDF417: Print the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3 , *pH* = 0)
cn = 48
fn = 81
m = 48

[Description]
- Encodes and prints the PDF417 symbol data in the symbol storage area using the process of **GS (k** <Function 080>.

[Notes]
- Consider that a quiet zone (left, right, upward, and downward space areas, depending on the PDF417 symbol specifications) must be ensured for PDF417 printing.
- In standard mode, a symbol higher than 831 dots cannot be printed with this printer.

<Function 082> **GS (k *pL pH cn fn m*** (*cn* = 48 , *fn* = 82)

[Name] PDF417: Transmit the size information of the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3 , *pH* = 0)
cn = 48
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded PDF417 symbol data in the symbol storage area using the process of **GS (k** <Function 080>.

[Notes]
- This function does not print.
- The size information does not include a quiet zone (left, right, upward, and downward space areas, depending on the PDF417 symbol specifications).

<Function 165> **GS (k *pL pH cn fn n1 n2*** (*cn* = 49 , *fn* = 65)

[Name] QR Code: Select the model

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*

[Range] ($p_L + p_H \times 256$) = 4 (p_L = 4 , p_H = 0)
cn = 49
fn = 65
n1 = 49, 50
n2 = 0

[Default] *n1* = 50 , *n2* = 0

[Description] • Selects the model for QR Code.

n1	Function
49	Selects model 1 conversion processing.
50	Selects model 2 conversion processing.

<Function 167> **GS (k *pL pH cn fn n*** (*cn* = 49 , *fn* = 67)

[Name] QR Code: Set the size of module

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] ($p_L + p_H \times 256$) = 3 (p_L = 3 , p_H = 0)
cn = 49
fn = 67
$1 \le n \le 16$

[Default] *n* = 3

[Description] • Sets the size of the module for QR Code to *n* dots.

<Function 169> **GS (k *pL pH cn fn n*** (*cn* = 49 , *fn* = 69)

[Name] QR Code: Select the error correction level

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n*

[Range] $(p_L + p_H \times 256) = 3$ $(p_L = 3 , p_H = 0)$
$cn = 49$
$fn = 69$
$48 \le n \le 51$

[Default] $n = 48$

[Description] • Selects the error correction level for QR Code.

n	Function	Reference: Approximate figure for recovery
48	Select error correction level L	7 %
49	Select error correction level M	15 %
50	Select error correction level Q	25 %
51	Select error correction level H	30 %

<Function 180> **GS (k *pL pH cn fn m d1…dk*** (*cn* = 49 , *fn* = 80)

[Name] QR Code: Store the data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 7092$ $(0 \le p_L \le 255 , 0 \le p_H \le 27)$
$cn = 49$
$fn = 80$
$m = 48$
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description] • Stores the QR Code symbol data (*d1...dk*) in the symbol storage area.

<Function 181> **GS (k *pL pH cn fn m*** (*cn* = 49 , *fn* = 81)

[Name] QR Code: Print the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 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>.

[Note]
- 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.

<Function 182> **GS (k *pL pH cn fn m*** (*cn* = 49 , *fn* = 82)

[Name] QR Code: Transmit the size information of the symbol data in the symbol storage area

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3 , *pH* = 0)
cn = 49
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded QR Code symbol data in the symbol storage area using the process of **GS (k** <Function 180>.

[Notes]
- This function does not print.
- The size information does not include a quiet zone (left, right, upward, and downward space areas, depending on the QR Code symbol specifications).

GS * *x y d1...dk* [obsolete command]

[Name] Define downloaded bit image

[Format]

ASCII	GS	*	*x*	*y*	*d1...dk*
Hex	1D	2A	*x*	*y*	*d1...dk*
Decimal	29	42	*x*	*y*	*d1...dk*

[Range]
$1 \le x \le 255$
$1 \le y \le 48$ [where $1 \le x \times y \le 1536$]
$0 \le d \le 255$
$k = x \times y \times 8$

[Description]
- Defines the downloaded bit image in the downloaded graphic area.
  - *x* specifies the number of bytes in the horizontal direction as *x* bytes.
  - *y* specifies the number of bytes in the vertical direction as *y* bytes.
  - *d* specifies the defined data (column format).

[Note]
- A downloaded bit image and user-defined characters (**ESC &**) cannot be defined simultaneously. When this command is executed, all user-defined characters are deleted.

GS / *m* [obsolete command]

[Name] Print downloaded bit image

[Format]

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

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

[Description]
- Prints downloaded bit image using the process of **GS** * and using the mode specified by *m*.

m	Mode	Vertical direction	Horizontal direction
0, 48	Normal	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

GS :

[Name] Start/end macro definition

[Format]

ASCII	GS	:
Hex	1D	3A
Decimal	29	58

[Description]
- Starts or ends macro definition.

[Note]
- The contents of the macro can be defined up to 2048 bytes.

GS B *n*

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

[Format]

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

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

[Default] $n = 0$

[Description]
- Turns white/black reverse print mode on or off.
- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of, *n* is 1, white/black reverse mode is turned on.

GS H *n*

[Name] Select print position of HRI characters

[Format]

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

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

[Default] $n = 0$

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

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

GS I *n*

[Name] Transmit printer ID

[Format]

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

[Range] *n* = 1, 2, 49, 50 [the printer ID]
65 ≤ *n* ≤ 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	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 - 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

- Transmits the printer information B specified.

n	Type of printer information	Contents
65	Firmware version	Depends on firmware version.
66	Manufacturer	“EPSON”
67	Printer name	“TM-T81”
68	Product ID	Serial number.

[Note]
- When this command is transmitted, the data following must not be transmitted until the status is received.

GS L *nL nH*

[Name] Set left margin

[Format]

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

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

[Default] $(n_L + n_H \times 256) = 0$ $(n_L = 0 , n_H = 0)$

[Description]
- In standard mode, sets the left margin to $[(n_L + n_H \times 256) \times$ (horizontal motion unit)].

GS P *x y*

[Name] Set horizontal and vertical motion units

[Format]

ASCII	GS	P	*x*	*y*
Hex	1D	50	*x*	*y*
Decimal	29	80	*x*	*y*

[Range] $0 \le x \le 255$
$0 \le y \le 255$

[Default] $x = 180 , \quad y = 360$

[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.

<A> GS V *m*
<B> 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*	
<B>	ASCII	GS	V	*m*	*n*
	Hex	1D	56	*m*	*n*
	Decimal	29	86	*m*	*n*

[Range] <A> $m = 0, 1, 48, 49$
<B> $m = 65, 66 , \quad 0 \le n \le 255$

[Description]
- Executes paper cutting specified by *m*.

	m	Function
<A>	0, 48 1, 49	Cuts paper.
<B>	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] $0 \le (n_L + n_H \times 256) \le 65535$ $(0 \le n_L \le 255 , 0 \le n_H \le 255)$

[Default] $(n_L + n_H \times 256) = 512$ $(n_L = 0 , n_H = 2)$

[Description]
- In standard mode, sets the print area width to [$(n_L + n_H \times 256) \times$ (horizontal motion unit)].

GS \ *nL nH*

[Name] Set relative vertical print position in page mode

[Format]

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

[Range] $-32768 \le (n_L + n_H \times 256) \le 32767$

[Description]
- In page mode, moves the vertical print position to [$(n_L + n_H \times 256) \times$ (vertical or horizontal motion unit)] from the current position.
- A positive number specifies downward movement, and a negative number specifies upward movement.

GS ^ *r t m*

[Name] Execute macro

[Format]

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

[Range] $1 \le r \le 255$
$0 \le t \le 255$
$m = 0, 1$

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

m	Operation
0	Executes the macro *r* times continuously at an interval of [$t \times 100$ ms].
1	After waiting for [$t \times 100$ ms], flashes the LED indicator and waits for the FEED button to be pressed. (The printer does nothing until then.) After the button is pressed, executes the macro once. Then repeats the operation *r* times.

GS a *n*

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

[Format]

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

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

[Default] *n* = 0 [when 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).

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick out connector status disabled.
	On	01	1	Drawer kick out connector status enabled.
1	Off	00	0	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Roll paper sensor status disabled.
	On	08	8	Roll paper sensor status enabled.
4 - 7	Off	00	0	Reserved.

- While basic ASB is active, the selected enabled basic ASB status is transmitted whenever the status changes.
- The basic ASB status to be transmitted is the four bytes that follow:
  - First byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Fixed.
2	Off	00	0	Drawer kick out connector pin 3 is LOW.
	On	04	4	Drawer kick out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	Off	00	0	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 2 and 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 J

GS b *n*

[Name] Turn smoothing mode on/off

[Format]

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

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

[Default] $n = 0$

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

GS f *n*

[Name] Select font for HRI characters

[Format]

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

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

[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)

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* × 256) = 20, 21, 50, 70 (*nL* = 20, 21, 50, 70 , *nH* = 0)

[Description]

- Sets the resettable maintenance counter specified by (*nL* + *nH* × 256) to 0.

(*nL* + *nH* × 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 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 G

GS g 2 *m nL nH*

[Name] Transmit maintenance counter

[Format]

ASCII	GS	g	2	*m*	*nL*	*nH*
Hex	1D	67	32	*m*	*nL*	*nH*
Decimal	29	103	50	*m*	*nL*	*nH*

[Range] $m = 0$

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

$(n_L = 20, 21, 50, 70, 148, 149, 178, 198 , \quad n_H = 0)$

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

$(n_L + n_H \times 256)$		Maintenance counter [Units]	Kind of counter
Hex	Decimal		
14	20	Number of line feeds. [Lines]	Resettable (can be reset)
15	21	Number of times head is energized. [Times]	
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 G

GS h *n*

[Name] Set bar code height

[Format]

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

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

[Default] $n = 162$

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

<A> GS k *m d1...dk NUL*
<B> GS k *m n d1...dn*

[Name] Print bar code

[Format]

<A>	ASCII	GS	k	*m*	*d1...dk*	*NUL*
	Hex	1D	6B	*m*	*d1...dk*	*00*
	Decimal	29	107	*m*	*d1...dk*	*0*
<B>	ASCII	GS	k	*m*	*n*	*d1...dn*
	Hex	1D	6B	*m*	*n*	*d1...dn*
	Decimal	29	107	*m*	*n*	*d1...dn*

[Range] <A> $0 \le m \le 6$ (*k* and *d* see [Description])
<B> $65 \le m \le 73$ (*n* and *d* see [Description])

[Description]
- Prints the bar code using the bar code system specified by *m*.

For <Function A>

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

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

- *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 H, Appendix I

GS r *n*

[Name] Transmit status

[Format]

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

[Range] *n* = 1, 2, 49, 50

[Description] • Transmits the status.

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

• This printer transmits the following status.

• Paper sensor status (*n* = 1, 49)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Roll paper near-end sensor: paper adequate.
	On	03	3	Roll paper near-end sensor: paper near end.
2, 3	Off	00	0	Roll paper end sensor: paper present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the cover is opening, this shows the state when the cover was still closed (this command cannot be executed).

• Drawer kick out connector status (*n* = 2, 50)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Drawer kick out connector pin 3 is LOW.
	On	01	1	Drawer kick out connector pin 3 is HIGH.
1 - 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

[Note] • When this command is transmitted, the data following must not be transmitted until this status is received.

GS w *n*

[Name] Set bar code width

[Format]

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

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

[Default] $n = 3$

[Description]

- Sets the horizontal size of the bar code.

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

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 / EAN13, JAN8 / EAN8, CODE93, and CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, and CODABAR

6.4 Obsolete Commands

ESC i [obsolete command]

GS V, which is the upward-compatible command replacing **ESC i**, is recommended for 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 for 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	6DF
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 for 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, the data following must not be transmitted until the status is received.

ESC v

[obsolete command]

GS r, which is the upward-compatible command replacing **ESC v**, is recommended for 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 present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the cover is opening, this shows the state when the cover was still closed (this command cannot be executed).

[Note] • When this command is transmitted, the data following must not be transmitted 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 for use, since **FS p** is an obsolete command in the ESC/POS® command system.

[Name] Print NV bit image

[Format]

ASCII	FS	p	*n*	*m*
Hex	1C	70	*n*	*m*
Decimal	28	112	*n*	*m*

[Range] $1 \le n \le 255$
$0 \le m \le 3$, $48 \le m \le 51$

[Description]
- Prints NV bit image *n* using the process of **FS q** and using the mode specified by *m*.

m	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

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 for 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] $1 \le n \le 255$
$1 \le (x_L + x_H \times 256) \le 1023$ $(0 \le x_L \le 255 , 0 \le x_H \le 3)$
$1 \le (y_L + y_H \times 256) \le 288$ $(0 \le y_L \le 255 , y_H = 0,1)$
$0 \le d \le 255$
$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256) \times 8$
The entire capacity size = 256KB.

[Description]
- Defines the NV bit image in the NV graphics area.
- *n* specifies the number of defined NV bit images.
- x_L, x_H specify the number of bytes in the horizontal direction as $(x_L + x_H \times 256)$.
- y_L, y_H specify the number of bytes in the vertical direction as $(y_L + y_H \times 256)$.
- *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 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 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.
- 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.

GS v 0 m *xL xH yL yH d1...dk* [obsolete command]

GS (L <Function 112 and 50>, which is the upward-compatible command replacing **GS v 0**, is recommended for use, since **GS v 0** is an obsolete command in the ESC/POS® command system.

[Name] Print raster bit image

[Format]

ASCII	GS	v	0	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Hex	1D	76	30	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Decimal	29	118	48	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*

[Range]

$0 \le m \le 3$, $48 \le m \le 51$

$1 \le (x_L + x_H \times 256) \le 256$ $(0 \le x_L \le 255$, $x_H = 0,1)$

$1 \le (y_L + y_H \times 256) \le 2303$ $(0 \le y_L \le 255$, $0 \le y_H \le 8)$

$0 \le d \le 255$

$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256)$

[Description]

- Prints a raster bit image using the mode specified by *m*.

m	Mode	Vertical direction	Horizontal direction
0, 48	Normal	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 $(x_L + x_H \times 256)$.
- *yL*, *yH* specify the number of dots in the vertical direction as $(y_L + y_H \times 256)$.
- *d* specifies the defined data (raster format).

APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

1) Because the TM-T81 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
Rotated Characters	Font A	12 × number of times enlarged in vertical
	Font B	9 × number of times enlarged in vertical
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) Interval of autocutting operation in the receipt section
   For driving the auto cutter of the receipt section, take the interval as a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the auto cutter).

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 flashing patterns are shown in the table.
- When either a high or low voltage error occurs, turn off the power as soon as possible.

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 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 use the cover open button except when necessary.
- Do not touch the surface of the print head because dust and dirt can stick to the surface and damage the elements.
- Thermal paper containing 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.

2) Thermal paper handling

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.

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.

APPENDIX B: PAPER ROLL SETUP

B.1 Replacing the Paper Roll

1) Open the printer cover. (Put your fingers in the dints indicated by A and lift the cover.)
2) Install a paper roll and pull out paper a little.
3) Close the printer cover.

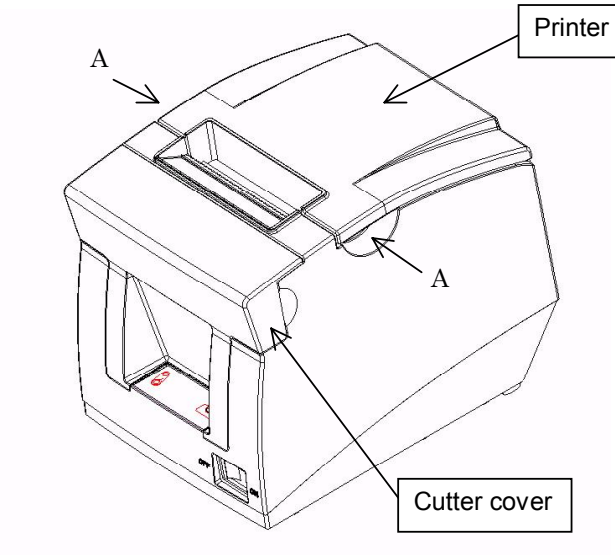


Figure B.1 Printer Upper Side Overview

APPENDIX C: RECOVERY FROM THE AUTO CUTTER ERROR

- If a foreign object such as a push pin or paper clip drops in the auto cutter and causes the auto cutter to lock up, the printer enters an error state and begins the recovery operation automatically. (The error LED flashes continuously, but it is possible for the error to be corrected automatically.)

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

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

  1) Pull the cutter cover toward you and remove it so that you can rotate the cutter motor knob.
  2) Rotate the cutter motor knob to the direction indicated by an arrow on the autocutter unit.
  3) Following the instructions on the caution label, rotate the knob until the indicator ▼ appears in the hole.

- If the motor knob cannot be rotated, rotate it in the reverse direction to loosen it; then send the **DLE ENQ *n*** command. Next, check the ERROR LED. If the ERROR LED is not off, repeat the same procedure and confirm that the ERROR LED is off. When the ERROR LED is off, the auto cutter blade has returned to its normal position and the roll paper cover can be opened. Open the roll paper cover, remove the jammed paper, and reinstall the roll paper. Then close the roll paper cover.

APPENDIX D: ADJUSTING THE PAPER ROLL NEAR-END SENSOR LOCATION

The remaining detectable amount of paper on the roll paper varies with the inside and outside diameters of the paper core. The minimum detectable amount of paper on the roll paper can be set using the following method:

1) The inside diameter of the paper spool should be 12mm {0.47"} and the outside diameter of the paper spool should be 18mm {0.71"}. Specified thermal paper should be used.
2) Loosen the adjusting screw that holds the paper near-end sensor and set the top of the positioning plate to the appropriate adjustment value and tighten the adjusting screw.
   Adjust the positioning plate to #1 if the outside diameter of a roll paper to be used is 18mm.
   Adjust the positioning plate to #2 if the outside diameter of a roll paper to be used is more than 18 mm.

Table D.1 Adjustment Positions

Adjustment Position Number	Specified Thermal Paper Dimension of A
#1	Approximately 23 mm {0.97"}
#2	Approximately 27 mm {1.06"}

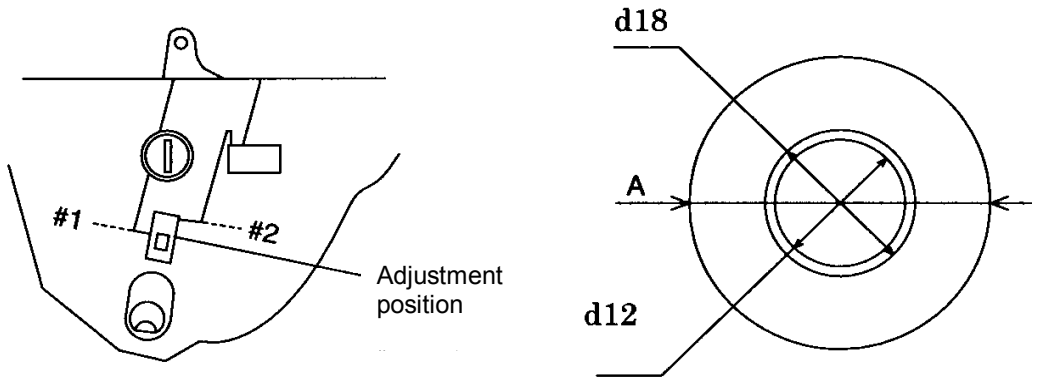


Figure D.1 Near-end Adjusting Position

NOTES: 1. Since dimension A in the table is a calculated value, there may be some variations depending on the printer.
2. Be sure that the adjustable slider operates smoothly after you finish the adjustment.

APPENDIX E: 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, methanol, 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 print head.

   NOTE: The print head becomes very hot just after printing and is very dangerous. Be sure to allow the print head to cool down (after printing) before cleaning it. Also, be sure to turn off the printer power before cleaning the print head.

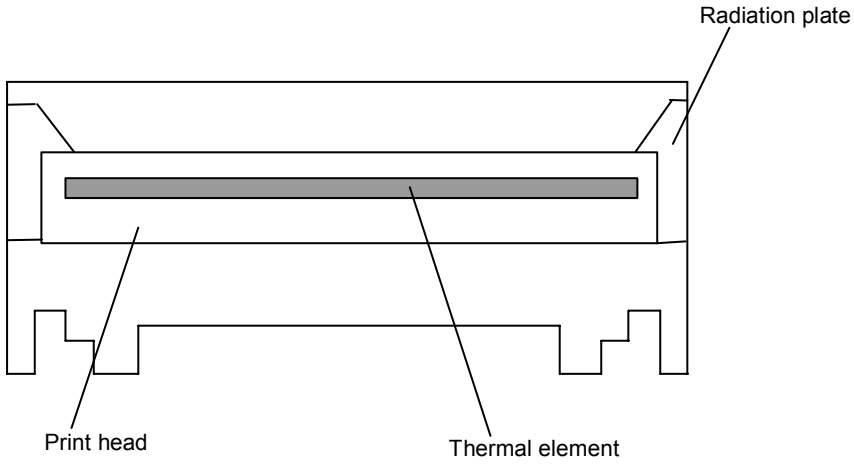


Figure E.1 Print Head Thermal Elements

(*) 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.

APPENDIX F: 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:

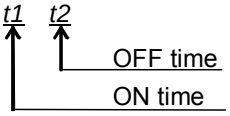
- The load, such as a drawer kick-out solenoid, must be connected between pins 4 and 2 or pins 4 and 5 of the drawer kick-out connector. (*1)
- When the drawer open/close signal (indicating the state of the drawer) is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (*2)
- 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:

ESC p *m* *t1* *t2*



$$\frac{\text{ON time}}{\text{ON time + OFF time}} \leq 0.2 \quad \text{..... Formula F-1}$$

$$\text{or, OFF time} \geq \text{ON time} \times 4 \quad \text{..... Formula F-2}$$

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

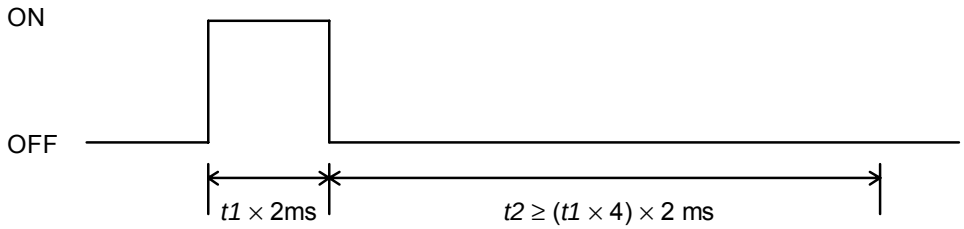


Figure F-1 Drawer Drive Signal Waveform (Formulas F-1 and F-2)

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 F-1 and F-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:

$$\frac{\text{ON time}}{\text{ON time + (OFF time + } \alpha)} \leq 0.2 \quad \text{.....Formula F-3}$$

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 F-3 is met.

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 F-3. Set the value so that it satisfies Formula F-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 F-2.

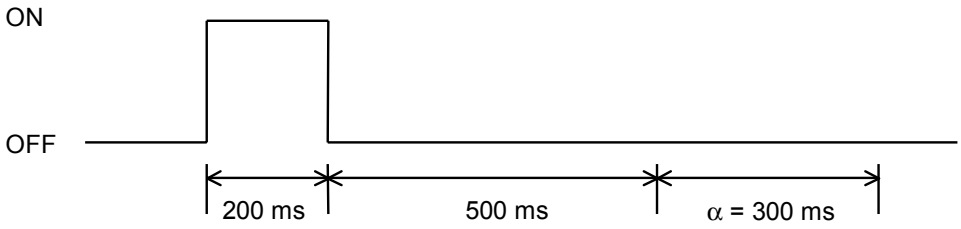


Figure F-2 Drawer Drive Signal Waveform (Formula F-3)

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

G.1 About updating the maintenance counter

- This printer has a maintenance counter function, as described in the command description for **GS g 0** and **GS g 2**.
- The values of the maintenance counter are automatically stored in the NV memory every 2 minutes (or 4 minutes maximum) when the printer is operating, except in the power save mode.
- However, if the power off is performed as described in Section G.2, the printer stores the latest values of the maintenance counter and executes the power off control, regardless of the updating interval described above.
- If the printer is not sending/receiving data or is not operating for two seconds while the power is turned on, the printer enters the power-saving mode and all of the values of the maintenance counter including the printer operation time stop counting.

G.2 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:
   ①Executes **GS (D *pL pH m a b*** (*pL*=3, *pH* =0, *m* =20, *a* =2, *b* =1)
   ②Executes **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 in 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 DLD DC4 (fn = 2).

APPENDIX H: NOTES ON PRINTING 2-DIMENSIONAL CODE

The TM-T81 supports 2-dimensional code printing.
Be sure to follow the notes below when printing 2-dimensional codes.

- 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 2-dimensional code may be affected by such items as different widths of the modules, print density, environmental temperature, type of the thermal paper, and characteristics of the reader. Therefore, the user should check the recognition rate in advance so that the limitations of the reader can be considered.

APPENDIX I: NOTES ON 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 I-1. The slant angle of the print result is within ±1.6° and it varies while printing or each receipt issue.

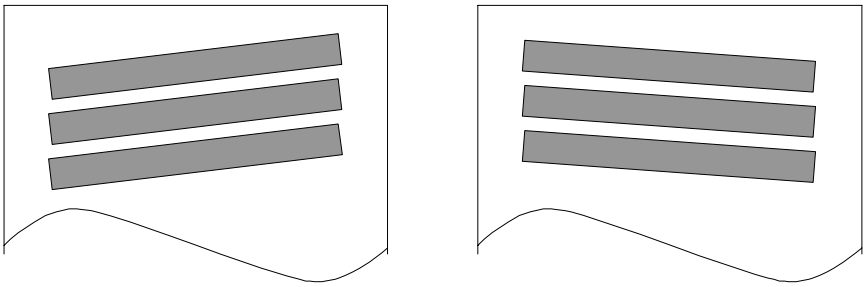


Figure I-1 Slant of the Print

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 widen.

APPENDIX J: 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 0011	0000 1111	The printer cover is opened.
②	0001 1100	0000 0000	0000 0011	0000 1111	The printer cover is closed.
③	0011 1100	0000 0000	0000 0011	0000 1111	The printer cover is opened.
④	0001 1100	0000 0000	0000 0011	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 0011	0000 1111
Fourth Status				