RP-E10 SERIES
THERMAL PRINTER
TECHNICAL REFERENCE

U00127424207

Seiko Instruments Inc.

U00127424200	May 2012
U00127424201	July 2012
U00127424202	September 2012
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PREFACE

This technical reference describes about RP-E10 SERIES THERMAL PRINTER (hereinafter referred to as "printer").

See USER'S GUIDE in the CD-ROM packed with the printer for operation.

[Product Name]

RP-E10-K3FJ1-U1C3
(1) (2) (3) (4)

(1)	: Paper Eject Direction	0: From the top / 1: From the front
(2)	: Case Color	W: White / K: Black
(3)	: Interface	S: Serial / U: USB / E: Ethernet / 1: USB + Serial
(4)	: Optional Package Code	Contact us for details.

The printer complies with EU RoHS Directive (2011/65/EU).

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CHAPTER 1
TERMS USED IN THIS MANUAL

This chapter describes the terms used in this manual.

- **INPUT BUFFER AND LINE BUFFER**

  When the RP-E10 (hereinafter referred to as "printer") receives data (character codes and commands) from the host devices, it stores the data in the printer input buffer. The input buffer has a capacity of 16384 bytes. Then, the printer retrieves data which is stored to the input buffer. When data is character code, data is mapped to the line buffer. The normal command is executed immediately when the data is retrieved from the input buffer. Meanwhile, for the realtime command, the command is executed when the data is stored to the input buffer from the host.

  The data capacity of the line buffer is one line. The printer inputs character codes to the line buffer until the amount of character codes reaches the amount to be printed on one line, then prints the characters. The printer repeats this operation to print all the character code.

  The relationship between the input buffer and line buffer is illustrated in Figure 1-1.

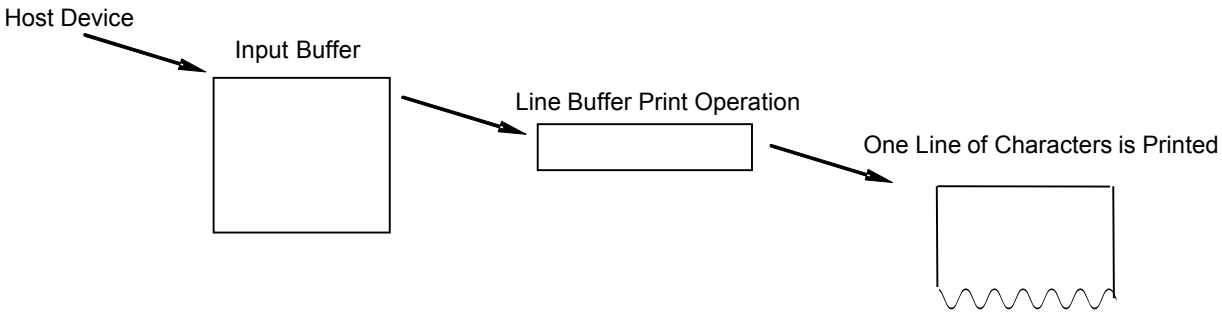


Figure 1-1 Relationship between Input Buffer and Line Buffer

- **Line Spacing**

  Line spacing is the space between the lines of printed characters (See Figure 1-2).

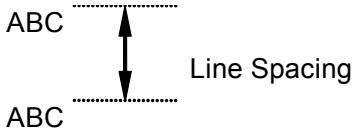


Figure 1-2 Line Spacing

This printer use a line thermal print mechanism, therefore, a paper feed step is necessary before printing characters or bit images. The line feed with printing feeds the paper for height of characters or bit images. Therefore, a paper feed amount which is smaller than character or bit image height is ignored. Printing with underline feeds the paper 3 dot-lines in addition to the character height.

Line feeding without printing feeds the paper for specified line feed amount.

- **Character Spacing**

  Character spacing is the space between each character in the horizontal direction (See Figure 1-3).

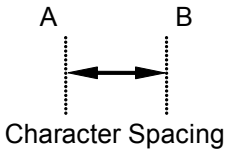


Figure 1-3 Character Spacing

- **Line**

  The word "line" in this manual indicates a line of characters.
  For example, the sentence "the printer feeds paper one line" indicates that the printer feeds paper a line of characters.

- **Dot-Line**

  The word "dot-line" in this manual indicates a line of dots in the vertical direction.
  For example, the sentence "the printer feeds paper by 1 dot-line" indicates that the printer feeds paper by the space of 1 dot.

- **Fixed Division Drive and Dynamic Division Drive of Thermal Head**

  Logical blocks (physical blocks to be driven at the same time) are predetermined for the fixed division method. In this method, high quality printing is available because the physical blocks are always driven in the same order.
  Logical blocks are predetermined so that number of dots of the physical block does not exceed the specified maximum number of simultaneously activated dots for every 1 dot-line printing for the dynamic division drive.

- **Notation in the Technical Reference**

  Hexadecimal: the character 'H' which indicates hexadecimal is added behind a number.
  Example: 0AH

  Character: a character is enclosed with single quotation marks.
  Example: 'G'

CHAPTER 2
SPECIFICATIONS

2.1 PRINTER SPECIFICATIONS

Table 2-1 Printer Specifications

(1/2)

Specifications		Paper Width: 80mm[*1]	Paper Width: 58mm[*1]
Printing method		Thermal	
Dot density		8 dots/mm	
Number of effective dots		576 dots/line (512 dots/line[*2])	432 dots/line (360 dots/line[*2])
Printing width		72 mm (64 mm[*2])	54 mm (45 mm[*2])
Operating environment	Temperature	5°C to 45°C	
	Relative humidity	10 %RH to 90 %RH (non-condensing)	
Storage environment	Temperature	-20°C to 60°C	
	Relative humidity	10 %RH to 90 %RH (non-condensing)	
Printing speed		350 mm/sec max.[*3]	
Paper-feed pitch		0.125 mm	
Dimensions (excluding projections)		W 129 mm × D 129 mm × H 129 mm	
Mass (excluding the thermal paper)		Approx. 1.3 kg	
Input voltage		DC24.0 V ±5%	
Mounting type		RP-E10 (top paper discharge): place as countertop RP-E11 (front paper discharge): place as countertop or wall-mount[*4]	
Communication system	USB	V2.0 FULL SPEED (12 Mbps)	
	Serial	RS-232C (9600 bps to 115200 bps)	
	Ethernet	10BASE-T/100BASE-TX	
Character size	1-byte character font A	24 dots × 12 dots	
	1-byte character font B	16 dots × 8 dots	
	2-byte character font A	24 dots × 24 dots	
	2-byte character font B	16 dots × 16 dots	

Specifications		Paper Width: 80mm[*1]	Paper Width: 58mm[*1]
Font type	1-byte character	Codepage 437: USA, Standard Europe Katakana character set Codepage 850: Multilingual Codepage 860: Portuguese Codepage 863: Canadian-French Codepage 865: Nordic Codepage 1252: Latin Codepage 852: Eastern Europe Codepage 858: Euro Codepage 864: Arabic[*5] Codepage 1250: Central European Codepage 1251: Cyrillic Codepage 1253: Greek Codepage 1254: Turkish User-defined character set Downloaded character, optional font	
	2-byte character	Kanji (JIS 1st and 2nd levels, NEC special character, NEC selection of IBM extension, IBM extension), user-defined character	
Characters per line	1-byte character font A	48 (42[*2])	36 (30[*2])
	1-byte character font B	72 (64[*2])	54 (45[*2])
	2-byte character font A	24 (21[*2])	18 (15[*2])
	2-byte character font B	36 (32[*2])	27 (22[*2])
Barcode	Barcode	UPC-A / UPC-E / JAN-13(EAN-13) / JAN-8(EAN-8) / ITF / CODABAR / CODE39 / CODE93 / CODE128	
	Two-dimensional barcode	QR Code (Model 2) / PDF417 Maxi code / Data matrix	
Print mode		Standard mode / Page mode	
Input buffer		16384 bytes	
Autocutter	Paper cutting type	Full cut Partial cut (a tab left at the center)	
Drawer kick port	Drawer drive output	DC24 V, 1 A max., 2 circuits[*6]	
	Drawer switch input	1 circuit	
LED		Three-color LED	
Operation switch		POWER Switch / FEED Switch	
Reliance[*7]	Abrasion resistance	150 km or more	
	Activation pulse resistance	200 million pulses or more	
	Cutting thermal paper	2 million cut or more	
	MTBF / MCBF	360000 hours / 70 million lines	

*1: Select the paper width by MS4-4 (Paper Width Selection).
*2: When selecting 512/360 dots by MS4-5 (Number of Effective Dots Selection).
*3: The maximum print speed is ensured only when drive voltage is 24V, print rate is 50% or less, and the head temperature is 25°C or higher. However, it may change depending on the connecting time and the printer settings.
*4: Use dedicated wall mounting kit (WLK-B01-1).
*5: Font B cannot be used when this character set is selected.
*6: Two circuits cannot be driven concurrently.
*7: Reliance is a value at average print ratio 12.5%, print density 100%, 25°C, and using specified thermal paper.

2.1.1 Countries in Which the Product Is Intended to Be Sold

The optional product is intended to be sold in the countries listed below.

Table 2-2 Countries in Which the Product Is Intended to Be Sold and Optional Products

<table>
<tr><th>Countries in Which the Product Is Intended to Be Sold</th><th>AC Adapter</th><th>AC Cable</th></tr>
<tr><td>Japan</td><td rowspan="10">PW-E2427-W1</td><td>CB-JP07-20A</td></tr>
<tr><td>USA</td><td rowspan="2">CB-US05-20A</td></tr>
<tr><td>Canada</td></tr>
<tr><td>EU (except United Kingdom), EFTA</td><td rowspan="3">CB-CE04-20A</td></tr>
<tr><td>Russia</td></tr>
<tr><td>Turkey</td></tr>
<tr><td>United Kingdom</td><td>CB-UK03-20A</td></tr>
<tr><td>Australia
New Zealand</td><td>CB-AU03-20A</td></tr>
<tr><td>Brazil</td><td>*1</td></tr>
</table>

*1: Use the AC cable of 2.0 meters long that complies with Brazil safety standards.

2.1.2 Precautions For Use

- When the two-dimensional barcode and ladder barcode is printed at high speed, it may reduce the bar code's reading accuracy. In that case, print after reducing the print speed. Use Memory Switch or "Print Speed Specify" command (GS 's') to change the print speed.

- When printing the line such as a ruler line, at least 2 dots configuration is needed. In case of a 1 dot configuration, the printed lines may be invisible.

- Always use the printer within the shadowed range depicted in figure below for the relationship between temperature and humidity.

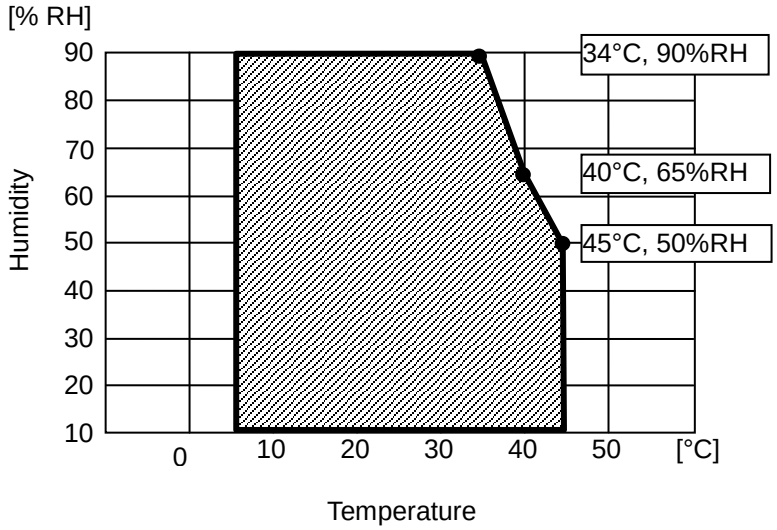


Figure 2-1 Operating Temperature and Humidity Range

- When handling this product, be aware of static electricity. When the static electricity is discharged, this could cause communication failure. When this problem occurs, disconnect the USB connector that is connected to the host device and wait a few seconds before connecting it again.

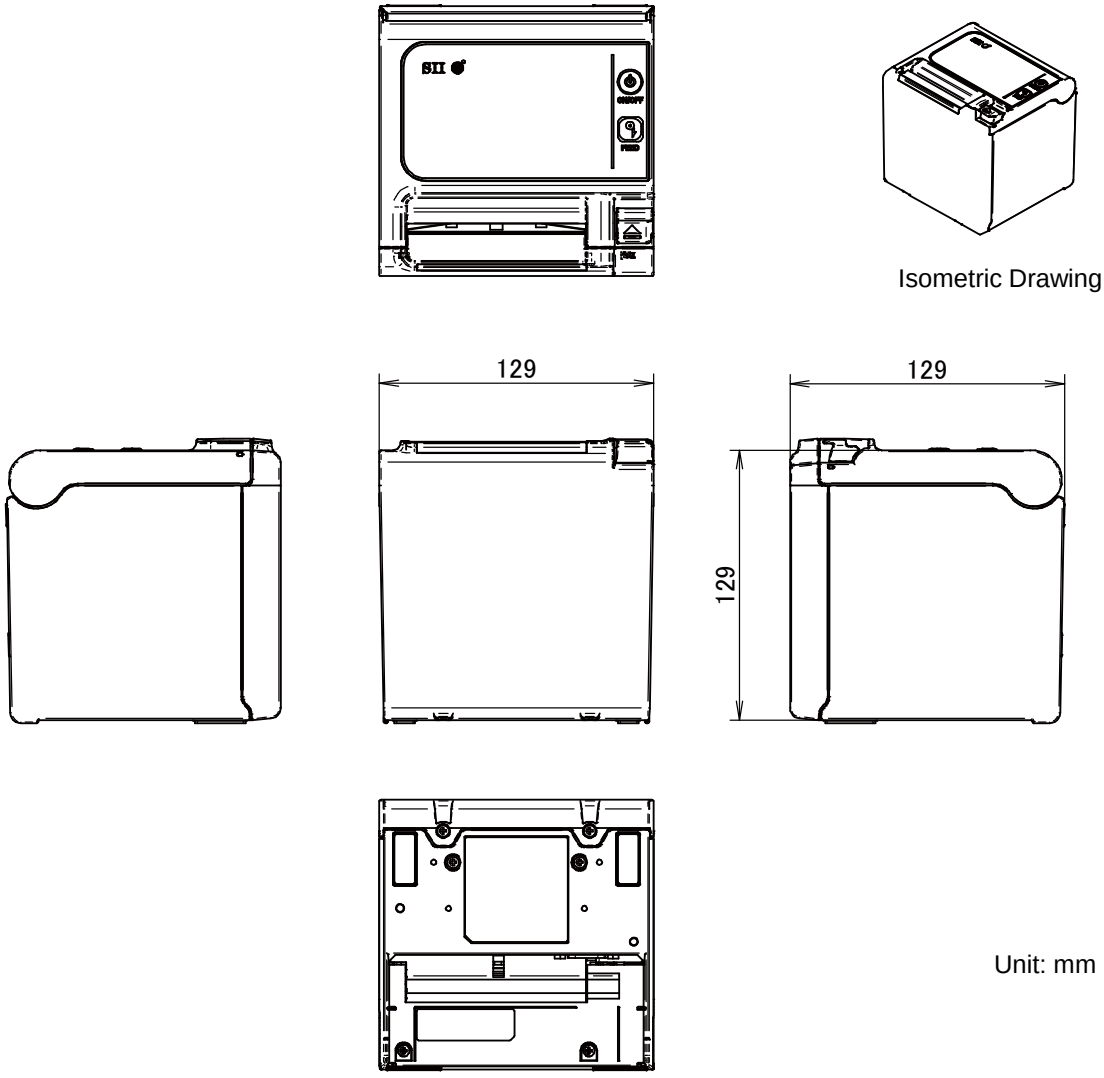
- When the printer is left unused for a long period of time, a white powder appears to the surface of platen. (This is the powder by which an ingredient of a thermal paper was recrystallized.)
  When the powder appears to the platen, wipe the platen with ethanol and use the printer after ethanol has dried completely.
  Also, do not use ethanol on the parts except the platen. When ethanol adheres on the parts except the platen, wipe it off immediately.

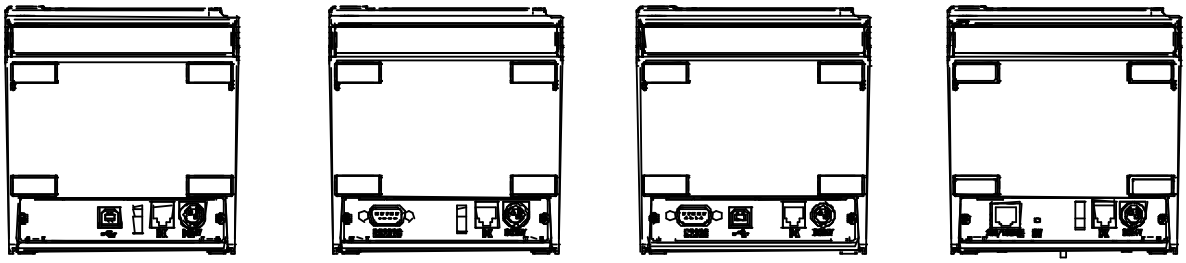
- When printing at high print ratio under low temperature or high-humidity environment, steam may be generated from thermal paper. This may cause the thermal paper to be contaminated or condensation may occur on the printer.
  Stop printing when there are water drops on the thermal head. It causes galvanic corrosion of the thermal head. Should condensation occurs, do not apply current until dewdrops disappear.

- To ensure the operability of the front panel, the RP-E11 (front paper discharge) model printer uses rubber feet that adhere to the printer installation surface. Install the printer on the smooth surface. When it is installed on the uneven surface, the printer may move during operation, or their surfaces may peel.

- When moving the RP-E11 (front paper discharge) model printer from the installation site, lift it upward slowly to leave the rubber feet from the installation surface. Lifting it rapidly or moving it horizontally may peel the entire rubber feet or their surfaces.
- Refer to "SAFETY PRECAUTIONS" and "OPERATING PRECAUTIONS" on "RP-E10 SERIES USER'S GUIDE" which is included with the printer for other precautions.

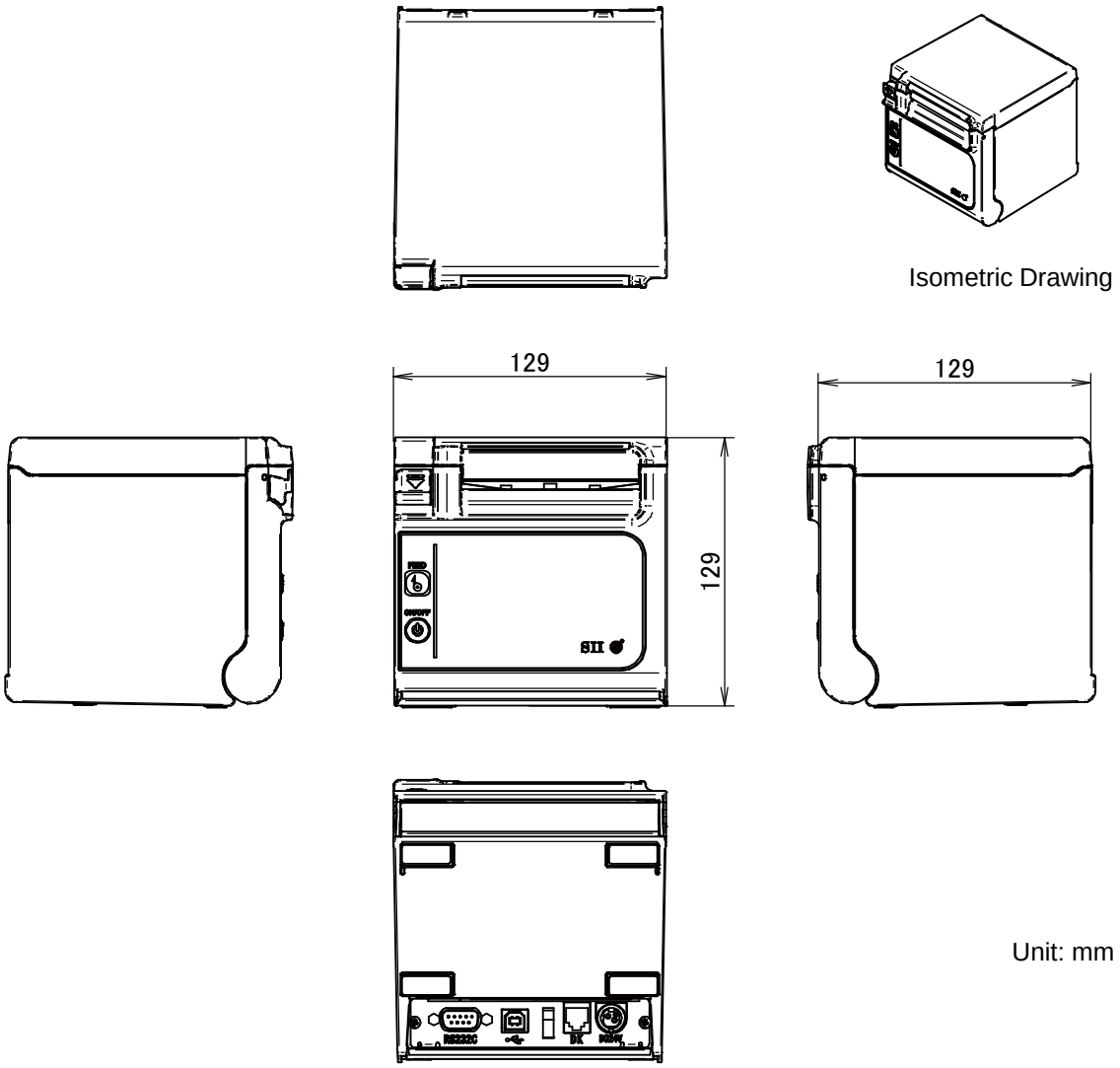
2.1.3 Dimensions

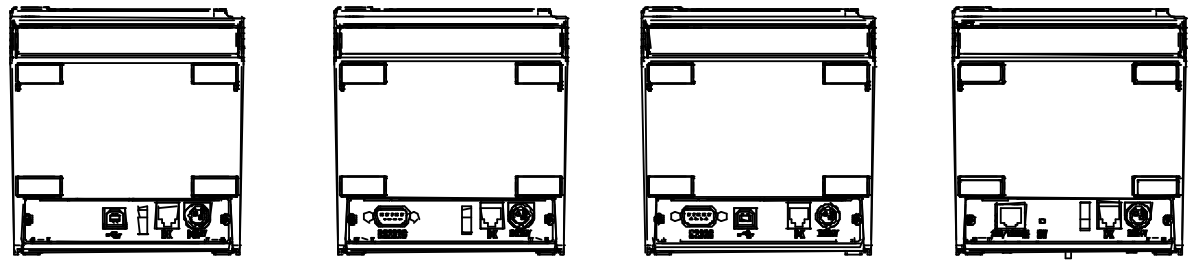




USB Model | Serial Model | USB+ Serial Model | Ethernet Model

Figure 2-2 RP-E10 Dimensions





USB Model　　Serial Model　　USB+ Serial Model　　Ethernet Model

Figure 2-3　RP-E11 Dimensions

2.1.4 Thermal Paper Specifications

Table 2-3 Thermal Paper Specifications

Item	Specifications
Type	Paper roll
Paper width	80^{0}_{-1} mm or 58^{0}_{-1} mm
Paper thickness	53 µm to 86 µm
Outside diameter	83 mm max.
Paper roll width	80.5 mm max.
Paper roll core	Internal diameter of core: 12.0 mm Outer diameter of core: 18.0 mm
Printing surface	Outside

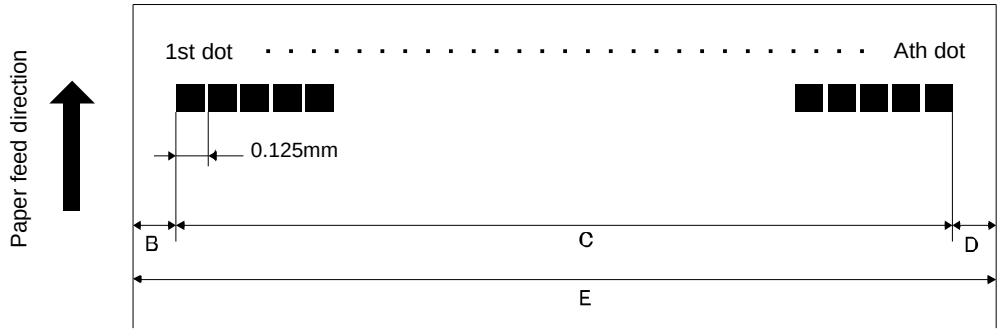
(NOTE)
- **Do not use the paper roll with glued end and taped end.**
- **Do not use the paper roll with the deformed paper core.**
- **Do not use the paper roll whose paper core is protruded from the paper end.**
- **Do not store the paper roll in high-temperature and humidity.**

Table 2-4 Specified Thermal Paper Specifications

Model	Manufacture
TF60KS-E	Nippon Paper Industries Co., Ltd.
PD160R-N	Oji Paper Co., Ltd.
F220VP	Mitsubishi Paper Mills Ltd.
P220VBB-1	Mitsubishi Paper Mills Ltd.
F5041	Mitsubishi HiTec Paper
KT48FA	Papierfabrik August Koehler
Alpha400-2.1	Appvion
Alpha820-3.4	Appvion

(NOTE)
- **Set MS7-1 to 8 (Thermal Paper Selection) for the thermal paper to be used.**
- **Use only specified thermal paper.**

2.1.5 Printing Area



MS4-5 (Number of Effective Dots Selection): ON

Symbol	Item	Paper Width: 80 mm	Paper Width: 58 mm
A	Printable dots per line	576 dots	432 dots
B	Left margin	4 ±1 mm	2 ±1 mm
C	Printing area	72 ±0.2 mm	54 ±0.2 mm
D	Right margin	4 ±1 mm	2 ±1 mm
E	Paper width	80^{0}_{-1} mm	58^{0}_{-1} mm

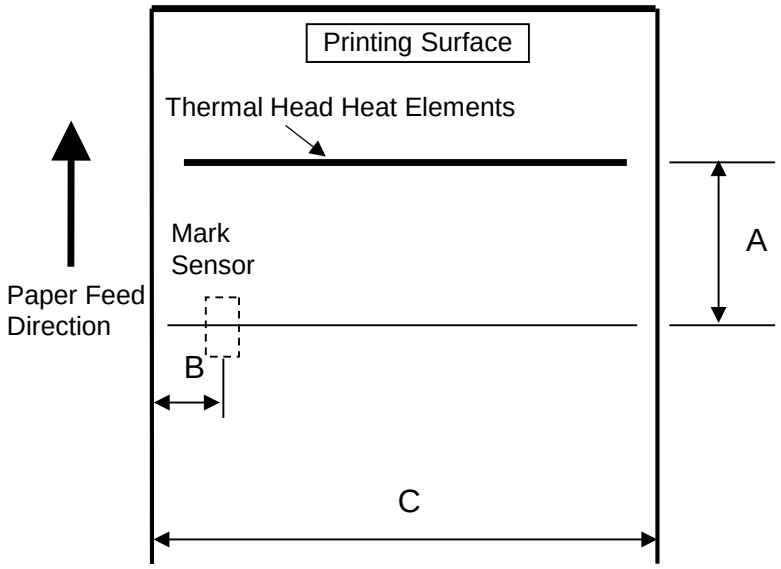
MS4-5 (Number of Effective Dots Selection): OFF

Symbol	Item	Paper Width: 80 mm	Paper Width: 58 mm
A	Printable dots per line	512 dots	360 dots
B	Left margin	8 ±1 mm	6 ±1 mm
C	Printing area	64 ±0.2 mm	45 ±0.2 mm
D	Right margin	8 ±1 mm	7 ±1 mm
E	Paper width	80^{0}_{-1} mm	58^{0}_{-1} mm

Figure 2-4 Printing Area

2.1.6 Mark Sensor Specifications

(1) Mark Sensor Position



(NOTE)
- **The mark sensor sees back side/non-printable side of the thermal paper for detecting the mark.**
- **Remove the dust such as paper powder regularly on the mark sensor.**
- **The detection accuracy of the mark sensor is ±2mm.**

Symbol	Item	Paper Width: 80 mm	Paper Width: 58 mm
A	Distance from Thermal Head Heat Elements to Mark Sensor	10 mm	
B	Distance from Paper Edge to Mark Sensor	5.7 mm	3.7 mm
C	Paper width	80^{0}_{-1} mm	58^{0}_{-1} mm

Figure 2-5 Mark Sensor Position

(2) Mark Print Specifications

Table 2-5 Mark Print Specifications

Item	Specifications
Mark print position	Based on the center position of the mark sensor
Mark width (Min.)	5 mm right and left from the reference position (Position B)
Mark height	5 mm min. to 10 mm max. (Mark height is the length from the top to bottom of the mark.)
Print surface	Non-printing side
PCS	0.9
Reflectivity	900 nm Infrared reflectance should be 8% and below.
Limited area for pre-print	Paper edge (left side) and 10 mm (right side) from the reference position (Position B) cannot be used for pre-printing with dark color. In case of pre-printed thermal paper, evaluate it well before using.

(3) How to Use Marked Paper

(a) Enable (ON) the MS1-3 (Mark Mode Selection).

(b) To change the default settings of the mark position correction, the mark detection maximum feeding length setting, and the mark detection threshold value at power on, use the "Function Setting Change" command (DC2 'w'). (Optional setting)

(c) The above default settings can be changed with "Marked Paper Form Feed Position Correct" command (GS 'A') after power on. (Optional setting. The settings are not affected to the default settings at power on.)

(d) When "Marked Paper Form Feed" command (GS FF) is entered before/after printing, at the timing of determining the feeding position on the marked paper, the marked paper is fed for the amount specified by the above setting after detecting the mark.

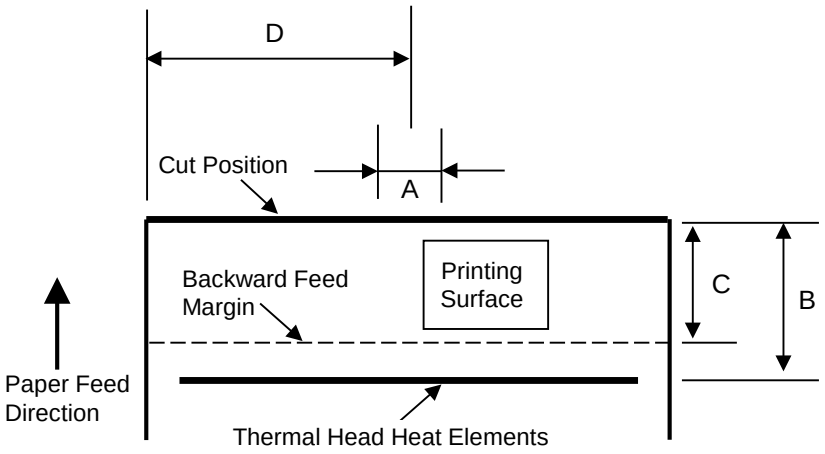
2.2 CUTTER SPECIFICATIONS

(1) Cutter Specifications

Table 2-6 Cutter Specifications

Item	Specifications
Paper cutting method	Slide cutting
Cutting frequency	1 cut / 2 s max.

(2) Cut Position



Symbol	Item	Dimension
A	Remaining part of partial cut	Approx. 1.5 mm
B	Distance from Cut Position to Thermal Head Heat Elements	Approx. 12.1 mm
C	Distance from Cut Position to Backward Feed Margin	9.25 mm
D	Distance from paper edge (1st dot side) to partial cut position	Approx. 40 mm

Figure 2-6 Cut Position

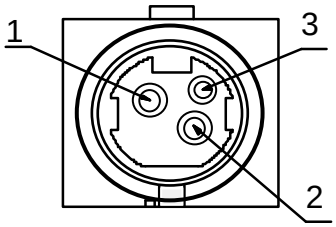
(3) Precautions for Using Cutter

Pulling the thermal paper strongly after partial cut may result in uneven pitch because stress is applied to the platen. Feed the thermal paper approx. 1mm before starting next printing.
Do not cut the thermal paper over maximum cutting frequency because it is possible to damage the cutter.

2.3 POWER SUPPLY SPECIFICATIONS

(1) Power Supply Connector Specifications

Printer side connector: TCS7960-5320177 (HOSIDEN) equivalent
Cable side connector: TCP8927-631167 (HOSIDEN) equivalent



No.	Function
1	+24 V
2	GND
3	N.C.
Shell	FG

Figure 2-7 Power Supply Connector (View from Joint Surface)

(NOTE) Check the direction of the plug of the AC adapter before inserting it.

(2) Power Supply Specifications

Table 2-7 Power Supply Specifications

Item	Specifications
Power supply voltage	DC22.8 V to DC25.2 V
Current consumption*	
Standby	Approx. 40 mA (typ.)
Print ratio 25%	Approx. 4.5 A max.
Print ratio 100%	Approx. 10.0 A max.

*: Under the condition that the driving method is dynamic division 288 dots.

(3) Specified AC Adapter Specifications (PW-E2427-W1)

Table 2-8 Specified AC Adapter Specifications (PW-E2427-W1)

Item	Specifications
Input voltage	AC100 V to AC240 V
Input frequency	50 Hz to 60 Hz
Output voltage	DC24 V
Output current	2.71 A
Dimensions	W 53 mm × D 115 mm × H 38 mm
Mass	Approx. 330 g

2.4 DRAWER KICK PORT SPECIFICATIONS

(1) Drawer Kick Port Specifications

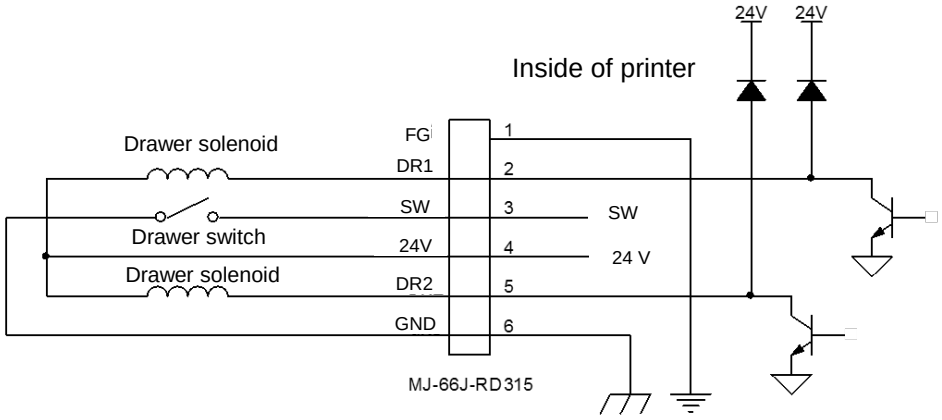
Table 2-9 Drawer Kick Port Specifications

Item	Specifications
Output voltage	24 V
Output current	1 A max.
Number of drive circuits	2 circuits
Drawer switch input	1 port
Drawer switch drive voltage	3.3 V
Drawer switch drive current	0.07 mA
Drawer switch input signal level	L: 0.0 V to 0.6 V H: 2.2 V to 3.3 V

(NOTE) • Use the coil (solenoid) whose resistance is over 24Ω for drawer (external device).
• Two circuits cannot be driven at the same time.

(2) Drawer Kick Connector Specifications

Printer side connector: MJ-66J-RD315 (JST) equivalent (6P modular jack connector)
Cable side connector: TM3P-66 (HRS) equivalent



Pin No.	Pin Name	I/O	Function
1	FG	-	Frame ground
2	DR1	O	Drive circuit 1
3	SW	I	Drawer switch input
4	24V	-	
5	DR2	O	Drive circuit 2
6	GND	-	Signal ground

Status of the Pin No.3 (SW) can be detected by using "Automatic Status Back Enable/Disable" command(GS 'a')..

Figure 2-8 Drawer Kick Connector Sample Circuit

(NOTE) • Do not connect the telephone line to this connector.

2.5 COMMUNICATION CABLE SPECIFICATIONS

2.5.1 Specified USB Cable Specifications

Table 2-10 Specified USB Cable Specifications

Item		Specifications
Product name		IFC-U02-2
Use		USB communication cable
Color		Black
Cable	Length	Approx. 1800 mm
	Outside diameter	Approx. ϕ 4.0 mm
Plug C1	Type	Series "A" plug
Plug C2	Type	Series "B" plug

Table 2-11 Connection Table for Specified USB Cable

Plug C1	Plug C2
1	1
2	2
3	3
4	4
SHELL	SHELL

2.5.2 Specified Powered USB Cable Specifications

Table 2-12 Specified Powered USB Cable Specifications

Item		Specifications
Product name		IFC-V01-1
Use		Powered USB communication cable
Color		Black
Cable	Length	Approx. 1800 mm
Plug C1	Type	Powered USB 24 V
Plug C2	Type	Series "B" plug
Plug C3	Type	Power Mini DIN 3 pin

Table 2-13 Connection Table for Specified Powered USB Cable

Plug C1	Plug C2	Plug C3
1	1	-
2	2	-
3	3	-
4	4	-
5	-	2
6	-	1
7	-	1
8	-	2
-	-	3
SHELL	SHELL	SHELL

2.5.3 Specified Serial Cable Specifications

Table 2-14 Specified Serial Cable Specifications

Item		Specifications
Product name		IFC-S02-2
Use		RS-232C communication cable
Color		Black
Cable	Length	Approx. 1800 mm
	Outside diameter	Approx. ϕ 5.5 mm
Plug C1	Type	D-SUB 9 pin F
Plug C2	Type	D-SUB 9 pin F

Table 2-15 Connection Table for Specified Serial Cable

Plug C1	Plug C2
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
SHELL	SHELL

CHAPTER 3
INTERFACE

This chapter describes specifications of each interface required for connecting host devices and peripheral equipment with the printer.

Irrespective of the interface used, amount of the input buffer in the printer is 16384 bytes.

3.1 USB MODEL

3.1.1 USB Interface

(1) General Specifications

Table 3-1 General Specifications of USB Interface

Item	Specifications
USB version	USB 2.0 Printer device class 1.1
Communication speed	Full speed (12 Mbps)
Communication protocol	Bulk transfer

(2) Pin Assignment

Table 3-2 Pin Assignment of USB Interface

Pin No.	Pin Name	I/O	Function
1	Vbus	-	USB power supply
2	D-	I/O	USB data
3	D+	I/O	USB data
4	GND	-	Signal ground
Shell	FG	-	Frame ground

(NOTE) Use a USB cable that conforms to the Full speed when you prepare a cable separately.

(3) Connector

Printer side connector: UBB-4R-D14T-4D(LF)(SN) (JST) or equivalent (Series B)

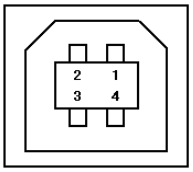


Figure 3-1 Connector

(4) Data Reception

USB data reception uses a bulk-out transfer method.
Data is received during printing. However, since printing is prioritized, the NAK response may be returned even when there is free space in the input buffer.
When the input buffer using value becomes 16128 bytes or more (the remaining capacity becomes 256 bytes or less), the NAK response continues. As the data process is progressed, and when the input buffer using value becomes 8192 bytes or less (the remaining capacity becomes 8192 bytes or more), data reception resumes.
The number of bytes that can be received with one packet is maximum 64 bytes. Data reception is available during an error.

(5) Data Transmission

USB data transmission uses a bulk-in transfer method.
The response data is stored temporarily in the output buffer, and a response is made to the bulk-in packet request from the host device. When no transmission data exists, no data response is returned when the bulk-in request is received.
The number of bytes that can be transmitted with one packet is maximum 64 bytes.

(6) iSerialNumber

USB iSerialNumber can be set.
To set iSerialNumber, use the following two ways:

- Using the Communication Settings Utility
  Use the Communication Settings Utility.

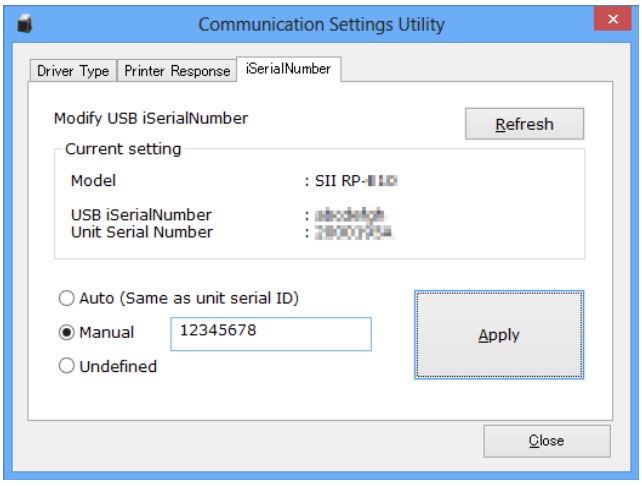


Figure 3-2 Screen of [iSerialNumber] Tab in the Communication Settings Utility

- Using the command
  See "iSerialNumber Setting" command ("6.5.10 Auxiliary Functions", DC2 'u' 0, DC2 'u' 1).

(NOTE)	・	**iSerialNumber is not initially set.**
	・	**Write an iSerialNumber value that does not duplicate others.**
	・	**Setting of iSerialNumber must be performed only when the printer is installed.**
	・	**iSerialNumber can contain 1-byte character only.**

(7) Setting of the USB Device Class

It is possible to set the USB Device Class to either "Printer Class" or "Vendor Class".
To set the USB Device Class, use the following two ways:

- Using the Communication Settings Utility
  Use the Communication Settings Utility to set the Driver Type.
  Printer Class: Printer Driver
  Vendor Class: Virtual Serial Port Driver
  See "RP Series Communication Software User's Guide" for supported OS.

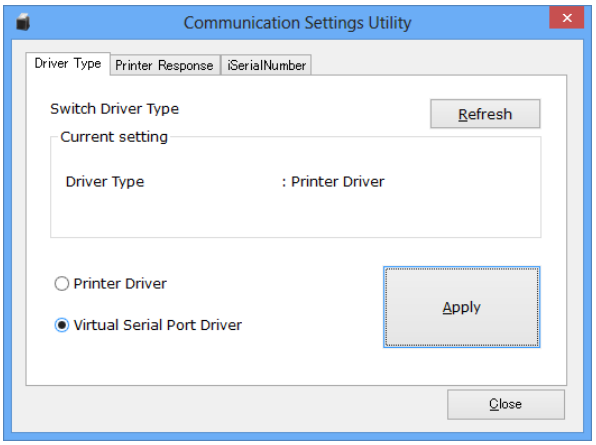


Figure 3-3 Screen of [Driver Type] Tab in the Communication Settings Utility

- Using the switch operation
  It is possible to change the settings by the switch operation.
  See "(2) How to set the Function Setting using the switch operation" in "4.1.2 Changing Memory Switch". Select [9 : USB Setting] in the Function Setting mode.

3.2 SERIAL MODEL

3.2.1 Serial Interface

(1) General Specifications

Table 3-3 General Specifications of Serial Interface

Item	Specifications
Synchronization	Asynchronous serial (RS-232C)
Signal level	MARK = -3.0 V to -15.0 V: Logic '1' SPACE = +3.0 V to +15.0 V: Logic '0'
Baud rate	9600, 19200, 38400, 115200 bps
Data bit length*1	7 bits, 8 bits
Start bit length	1 bit
Stop bit length	1 bit or more
Parity	None, odd, even
Flow control (reception)	DTR/DSR control, RTS/CTS control, Xon/Xoff
Flow control (transmission)	No control, DTR/DSR control, RTS/CTS control
Busy*2	16128 bytes or more, 30 bytes or more
Busy release*2	8192 bytes or less, 19 bytes or less

*1: When selecting 7 bits, the data transmission such as the status from a printer is not performed.
Also, the command that uses 80H and more parameters and character printing over 80H are not available.
*2: Threshold value is available to select making Busy status and Busy release status for input buffer using value.
Available to select in MS40-4 (Busy Threshold Value Selection).
・ The underlined value indicates the initial one.

(2) Pin Assignment

Table 3-4 Pin Assignment of Serial Interface

Pin No.	Pin Name	I/O	Function
1	N.C.	-	Unconnected terminal
2	TxD	O	Sends data from the printer to the host device.
3	RxD	I	Receives data from the host device.
4	DSR	I	Outputs SPACE when the host device can receive data.
5	GND	-	Signal ground
6	DTR	O	Outputs SPACE when the printer can receive data.
7	CTS	I	Outputs SPACE when the host device can receive data.
8	RTS	O	Outputs SPACE when the printer can receive data.
9	N.C.*1	-	Unconnected terminal
Shell	FG	-	Frame ground

*1: Note that this is the power supply terminal in the USB+ serial model.

(3) Connector

Printer side connector: XM2C-0942-132L (OMRON) or equivalent (D-sub 9P M, fixing screw: #4-40UNC)

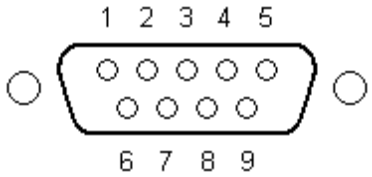


Figure 3-4 Connector

(4) Examples of Connection with the Host Device

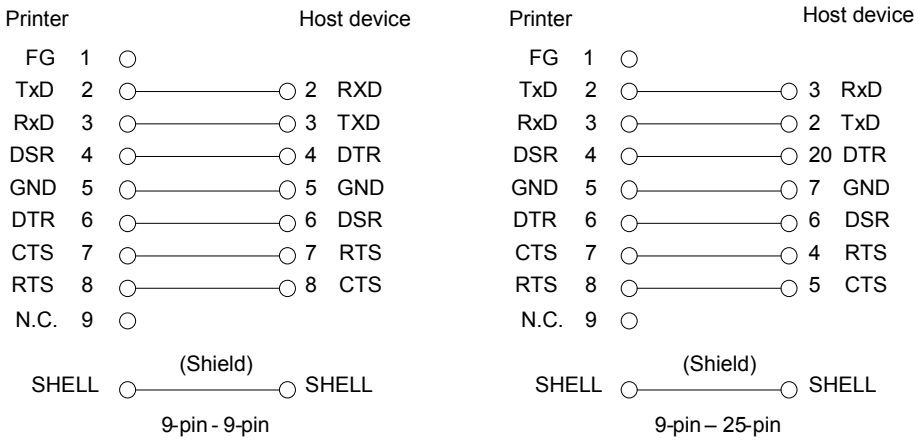


Figure 3-5 Connection

(5) Data Reception

・ When the DTR/DSR control is set

(a) DTR outputs MARK during initialization after power on reset. It indicates that the printer is not ready to receive data.

(b) Signal of DTR changes after the initialization.
The signal change is different depending on the MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-5.

Table 3-5 Signal of DTR After Initializing Serial Interface

MS40-3 Setting	Printer Status	Signal of DTR
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data.
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.

(c) Signal of DTR changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on the MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-6.

Table 3-6 Signal of DTR When Serial Interface Input Buffer Becomes Busy Threshold Value or More

MS40-3 Setting	Printer Status	Signal of DTR
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of DTR changes.
The signal change is different depending on the MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are described in Table 3-7.

Table 3-7 Signal of DTR When Data Process of Serial Interface Is Progressed

MS40-3 Setting	Printer Status	Signal of DTR
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

Do not transmit data while MARK is output from DTR.
The Figure 3-6 shows signals of DTR and RTS output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

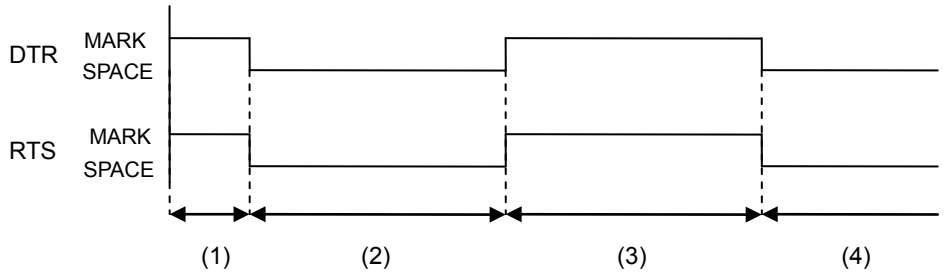


Figure 3-6 DTR, RTS Output Example

・ When the RTS/CTS control is set

(a) RTS outputs MARK during initialization after power on reset. It indicates that the printer is not ready to receive data.

(b) Signal of RTS changes after the initialization.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-8.

Table 3-8 Signal of RTS After Initializing Serial Interface

MS40-3 Setting	Printer Status	Signal of RTS
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data.
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(c) Signal of RTS changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-9.

Table 3-9 Signal of RTS When Serial Interface Input Buffer Becomes Busy Threshold Value or More

MS40-3 Setting	Printer Status	Signal of RTS
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of RTS changes.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-10.

Table 3-10 Signal of RTS When Data Process of Serial Interface is progressed

MS40-3 Setting	Printer Status	Signal of RTS
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

Do not transmit data while MARK is output from RTS.
The Figure 3-7 shows signals of DTR and RTS output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

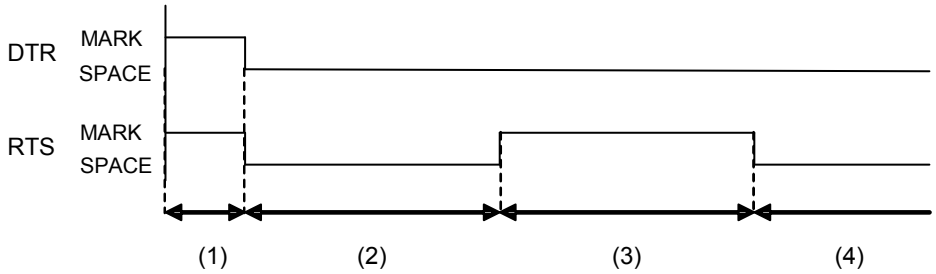


Figure 3-7 DTR, RTS Output Example

・ When the Xon/Xoff control is set

(a) The printer cannot receive data during initialization after power on reset. Do not transmit data.

(b) Signal of TxD changes after the initialization.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-11.

Table 3-11 Signal of TxD After Initializing Serial Interface

MS40-3 Setting	Printer Status	Signal of TxD
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xon code (11H) and indicates that the printer is ready to receive data.
0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data.

(c) Signal of TxD changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-12.

Table 3-12 Signal of TxD When Serial Interface Input Buffer Becomes Busy Threshold Value or More

MS40-3 Setting	Printer Status	Signal of TxD
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of TxD changes.
The signal change is different depending on MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-13.

Table 3-13 Signal of TxD When Data Process of Serial Interface Is Progressed

MS40-3 Setting	Printer Status	Signal of TxD
0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xon code (11H) and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (the remaining capacity≥16365 bytes)
0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (the remaining capacity≥16365 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

When Xoff code (13H) is received, stop data transmission immediately and do not transmit data until Xon code (11H) is received.
The Figure 3-8 shows signals of TxD and DTR output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

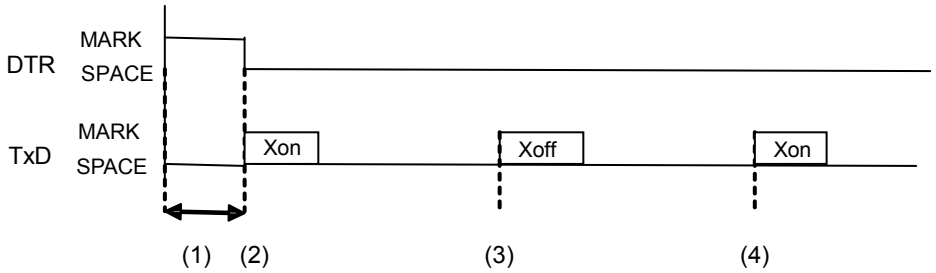


Figure 3-8 DTR, Xon/Xoff Output Example

(6) Data Transmission

- When the DTR/DSR control is set

  Data transmission is suspended when MARK is input in DSR, and TxD sends data when SPACE is input in DSR.

- When the RTS/CTS control is set

  Data transmission is suspended when MARK is input in CTS, and TxD sends data when SPACE is input in CTS.

- When No control is set

  The printer sends data from TxD regardless of the state of the host device.

3.3 USB + SERIAL MODEL

The USB + Serial model provides both USB and serial interfaces, and it can be used in the following ways:

- The USB interface is used for data communication from the host device, and the serial interface is used for data communication from peripheral equipment such as the barcode reader. Peripheral equipment can transmit data with the host device through the printer.
- The serial interface is used for data communication from the host device. The USB interface cannot be used in this setting.

See "4.1.1 Changing DIP Switch" for details about communication settings.

3.3.1 USB Interface

The USB interface specifications are the same as those of the USB interface model. See "3.1.1 USB Interface" in "3.1 USB MODEL" for details.

3.3.2 Serial Interface

(1) General Specifications

Table 3-14 General Specifications of USB + Serial Interface

Item		Specifications
Synchronization		Asynchronous serial (RS-232C conformity)
Signal level		MARK = -3.0 V to -15.0 V: Logic '1' SPACE = +3.0 V to +15.0 V: Logic '0'
Baud rate		9600, 19200, 38400, <u>115200</u> bps
Data bit length		8 bits
Start bit length		1 bit
Stop bit length		1 bit or more
Parity		<u>None</u>, odd, even
Flow control (reception)		DTR/DSR control, <u>RTS/CTS control</u>, Xon/Xoff
Flow control (transmission)		<u>No control</u>, DTR/DSR control, RTS/CTS control
Power supply		<u>No output</u>, 5 V, 12 V
Power supply voltage and output current	12 V	DC12 V ±5%, 500 mA max.
	5 V	DC5 V ±5%, 500 mA max.
Busy[*1]		<u>16128 bytes or more</u>, 30 bytes or more
Busy release[*1]		<u>8192 bytes or less</u>, 19 bytes or less

*1: Threshold value is available to select making Busy status and Busy release status for input buffer using value. Enable when both DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection) are ON. Available to select in MS40-4 (Busy Threshold Value Selection).

・ The underlined value indicates the initial one.

(NOTE) Be sure to check if the power supply terminal setting is correct before connecting to peripheral equipment or the host device.

(2) Pin Assignment

Table 3-15 Pin Assignment of USB + Serial Interface

Pin No.	Pin Name	I/O	Function
1	N.C.	-	Unconnected terminal
2	TxD	O	Sends data from the printer to the host device.
3	RxD	I	Receives data from the host device.
4	DSR	I	Outputs SPACE when the host device can receive data.
5	GND	-	Signal ground
6	DTR	O	Outputs SPACE when the printer can receive data.
7	CTS	I	Outputs SPACE when the host device can receive data.
8	RTS	O	Outputs SPACE when the printer can receive data.
9	PWR	-	Power supply terminal
Shell	FG	-	Frame ground

(3) Connector

Printer side connector: XM2C-0942-132L (OMRON) or equivalent (D-sub 9P M, fixing screw: #4-40UNC)

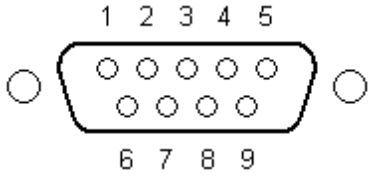


Figure 3-9 Connector

(4) Examples of Connection with Peripheral Equipment

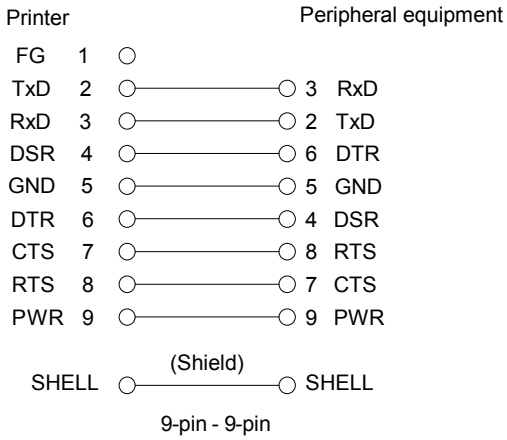


Figure 3-10 Connection

(5) Examples of Connection with the Host Device

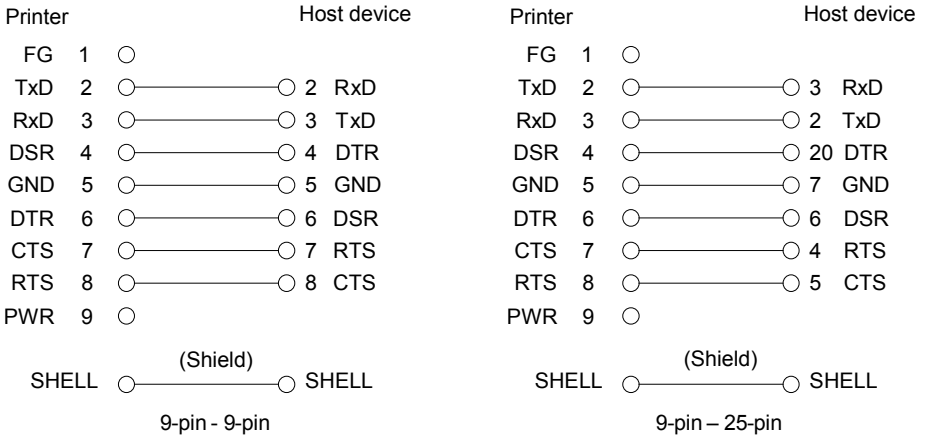


Figure 3-11 Connection

(6) Data Reception

・ When the DTR/DSR control is set

(a) DTR outputs MARK during initialization after power on reset. It indicates that the printer is not ready to receive data.

(b) Signal of DTR changes after the initialization.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-16.

Table 3-16 Signal of DTR After Initializing USB + Serial Interface

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of DTR
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data.
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(c) Signal of DTR changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-17.

Table 3-17 Signal of DTR When USB + Serial Interface Input Buffer Becomes Busy Threshold Value or More

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of DTR
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in the following status. ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of DTR changes.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-18.

Table 3-18 Signal of DTR When Data Process of USB + Serial Interface Is Progressed

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of DTR
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in the following status. ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

Do not transmit data while MARK is output from DTR.
The Figure 3-12 shows signals of RTS and DTR output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

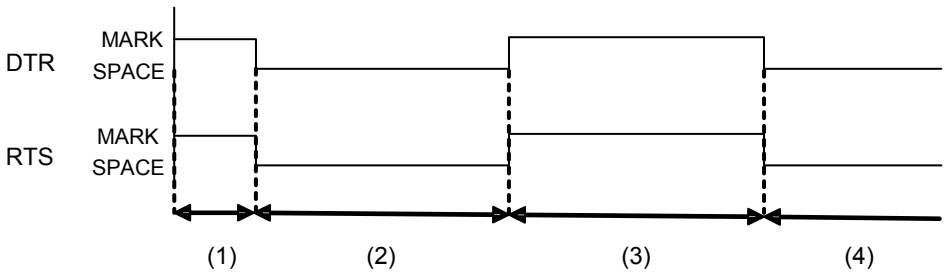


Figure 3-12 DTR, RTS Output Example

・ When the RTS/CTS control is set

(a) RTS outputs MARK during initialization after power on reset. It indicates that the printer is not ready to receive data.

(b) Signals of RTS changes after the initialization.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-19.

Table 3-19 Signal of RTS After Initializing USB + Serial Interface

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of RTS
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data.
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data.

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(c) Signal of RTS changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-20.

Table 3-20 Signal of RTS When USB + Serial Interface Input Buffer Becomes Busy Threshold Value or More

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of RTS
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs MARK and indicates that the printer is not ready to receive data in the following status. ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of RTS changes.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-21.

Table 3-21 Signal of RTS When Data Process of USB + Serial Interface Is Progressed

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of RTS
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs MARK and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs SPACE and indicates that the printer is ready to receive data in the following status. ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

Do not transmit data, while MARK is output from RTS.
The Figure 3-13 shows signals of RTS and DTR output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

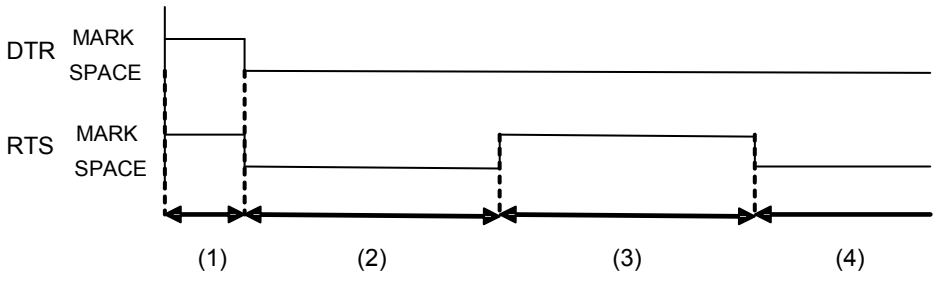


Figure 3-13 DTR, RTS Output Example

・ When the Xon/Xoff control is set

(a) The printer cannot receive data during initialization after power on reset. Do not transmit data.

(b) Signal of TxD changes after the initialization.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-22.

Table 3-22 Signal of TxD After Initializing USB + Serial Interface

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of TxD
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xon code (11H) and indicates that the printer is ready to receive data.
		0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data.
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data.

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(c) Signal of TxD changes when the input buffer using value becomes the busy threshold value or more.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-23.

Table 3-23 Signal of TxD When USB + Serial Interface Input Buffer Becomes Busy Threshold Value or More

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of TxD
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data in either of the following status.*1 ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes) ・Input buffer using value≥30 bytes (Remaining capacity≤16354 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data in the following status. ・Input buffer using value≥16128 bytes (Remaining capacity≤256 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

(d) As the data process is progressed, and when the input buffer using value becomes the busy release threshold value or less, signal of TxD changes.
The signal change is different depending on DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection), MS40-3 (Busy Status Selection) setting, and/or the printer status.
The details are shown in Table 3-24.

Table 3-24 Signal of TxD When Data Process of USB + Serial Interface Is Progressed

DS1-5	DS1-6	MS40-3 Setting	Printer Status	Signal of TxD
ON	ON	0 Busy Threshold Value or more, or Error	Print-ready status	Outputs Xon code (11H) and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
		0 Busy Threshold Value or more, or Error	Error	Outputs Xoff code (13H) and indicates that the printer is not ready to receive data.
		1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data in either of the following status.*1 ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes) ・Input buffer using value≤19 bytes (Remaining capacity≥16365 bytes)
Others		0 Busy Threshold Value or more, or Error 1 Busy Threshold Value or more	Print-ready status or Error	Outputs Xon code (11H) and indicates that the printer is ready to receive data in the following status. ・Input buffer using value≤8192 bytes (Remaining capacity≥8192 bytes)

*1: Available to select in MS40-4 (Busy Threshold Value Selection).

When the host device received Xoff code (13H), stop data transmission immediately and do not send data until Xon code (11H) is received.
The Figure 3-14 shows signals of TxD and DTR output example when the selection of MS40-3 (Busy Status Selection) is "1" (Busy Threshold Value or more).

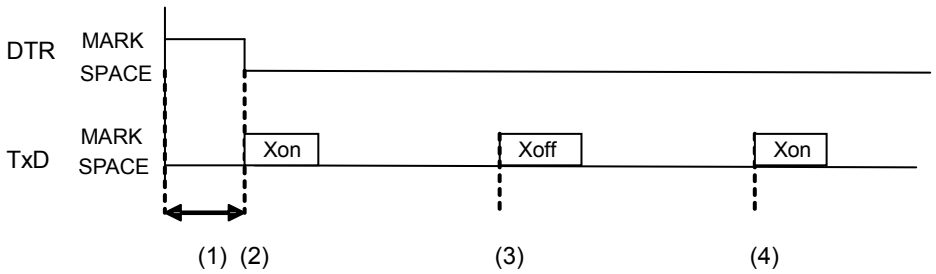


Figure 3-14 DTR, Xon/Xoff Output Example

(7) Data Transmission

- When the DTR/DSR control is set

  Data transmission is suspended when MARK is input in DSR, and TxD sends data when SPACE is input in DSR.

- When the RTS/CTS control is set

  Data transmission is suspended when MARK is input in CTS, and TxD sends data when SPACE is input in CTS.

- When No control is set

  The printer sends data from TxD regardless of the state of the host device.

3.4 ETHERNET MODEL

3.4.1 Ethernet Interface

(1) General Specifications

Table 3-25 General Specifications of Ethernet Interface

Item	Specifications
Communication standards	10BASE-T / 100BASE-TX
Communication protocol Basic protocol Print protocol	 IPv4 / ARP / ICMP / UDP / TCP LPR / TCP Socket Port

(2) Pin Assignment

Table 3-26 Pin Assignment of Ethernet Interface

Pin No.	Pin Name	I/O	Function
1	TXP	I/O	Transmission+
2	TXN	I/O	Transmission-
3	RXP	I/O	Reception+
4	N.C.	-	-
5	N.C.	-	-
6	RXN	I/O	Reception-
7	N.C.	-	-
8	N.C.	-	-

(NOTE) Use a cable that conforms to the category 5 or higher.

(3) Connector

Printer side connector: RJLDC-308TA (TAIMAG) or equivalent (RJ-45)

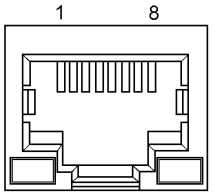


Figure 3-15 Connector

Push the LAN cable into the LAN connector until it clicks.

(NOTE)
- **Do not insert a customer display connector cable, drawer kick out connector cable, and general public line to the 10BASE-T/100BASE-TX LAN connector.**
- **Be sure to connect the aerially wired LAN cable outside through other devices where measures are taken to prevent surge. Otherwise, induced lightning may crash devices.**

(4) LED

Displays of each LED installed on both sides in the bottom of the connector mean the following:

Table 3-27 Network Communication System

Display	LED (Orange)
Full Duplex	On
Half Duplex	Off

Table 3-28 Network Status Display

Display	LED (Green)
Connected	On
Disconnected	Off
Data transferred	Blinking

(5) Switch

Hold down the switch on the side of the connector and turn the power on. When you continue to press it until the printer initialization is complete, items about Ethernet communications are initialized to the factory default settings.

(6) Protocol

Basic communication protocol

IPv4/ARP/ICMP/UDP/TCP

Print communication protocol

LPR: Transfers print data.

Table 3-29 Print Communication Protocol (LPR)

Port No.	515
Maximum number of concurrent connections	9 (including connections through other protocols such as TCP Socket Port)
Number of printable connections	1 (other users wait the completion of printing)
Timeout	Approx. 4 minutes

TCP Socket Port: Transfers print data and printer status through the bidirectional direct socket communication.

Table 3-30 Print Communication Protocol (TCP Socket Port)

Port type	Direct print TCP communication port
Port No.	9100
Port communication direction	Bidirectional
Maximum number of concurrent connections	9 (including connections through other protocols such as TCP Socket Port)
Number of printable connections	1 (other users wait the completion of printing)
Timeout	Approx. 5 minutes (it can be changed)

Protocol for getting and setting the status: Gets and changes the printer status and network parameters on the special Web page, using the HTTP protocol.

Table 3-31 Protocol for Getting and Setting the Status

Port No.	80
HTTP version	HTTP/1.1

Protocol for monitoring settings: Monitors and sets settings, using the SNMP protocol.

Table 3-32 Protocol for Monitoring Settings

SNMP version	SNMPV2
Server port No.	161
Trap transmission port No.	162
Trap destination	One IP address can be set (the initial status is not set)
Enabled PDU	Get Request, Get Next Request, Get Response, Set Request
Community name	Public
Enabled MIB	Part of MIB-II (RFC1213)

Protocol for Firmware update: Upgrades the firmware of the LAN module, using the TFTP protocol.

Table 3-33 Protocol for Firmware Update

Transfer request port No.	69
Maximum number of concurrent connections	1

CHAPTER 4
FUNCTION SETTING

4.1 FUNCTION SETTING METHOD

In this printer, you can preset initial values of items that can be selected after power on, such as communication system and thermal paper type. Preset these functions before using the printer. Details for settings of the software switches are described below.

The serial model and USB + Serial model printers mount a DIP switch (hereinafter referred to as "DS") on the interface board. The DS can be used to set serial communication and others.

The Function Setting other than the above serial communication settings are allocated to a memory switch (hereinafter referred to as "MS") that is stored in the FLASH memory. These are enabled until they are rewritten.

The Function Setting can be set by using MS1 to 40. MS14 and 17 to 39 are reserved for the system. Do not rewrite them. The value indicated by the shaded cell in the table is the default setting value at the shipping.

(NOTE)	**Be sure to set the directed value as "Fixed" according to ON or OFF in list so that the printer works correctly.**

4.1.1 Changing DS

(1) Change Procedures

DS is mounted on the interface board of the serial model and USB+ serial model printers.

1. As shown in the figure below, remove the two screws fixing the board and then grasp the cable hook in the center to pull out the board.

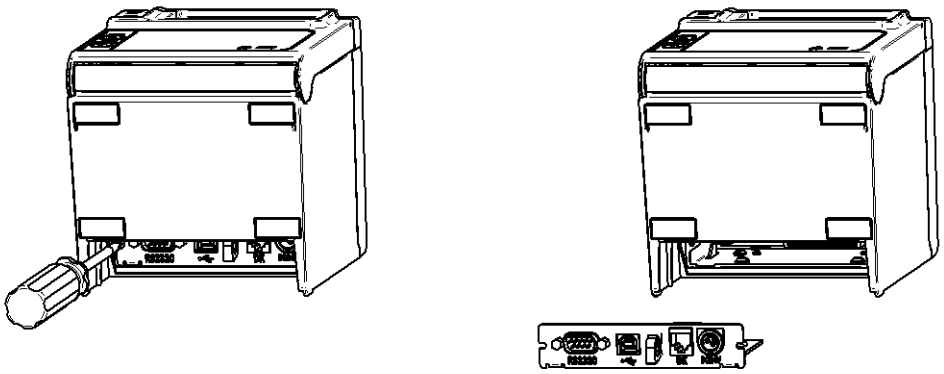
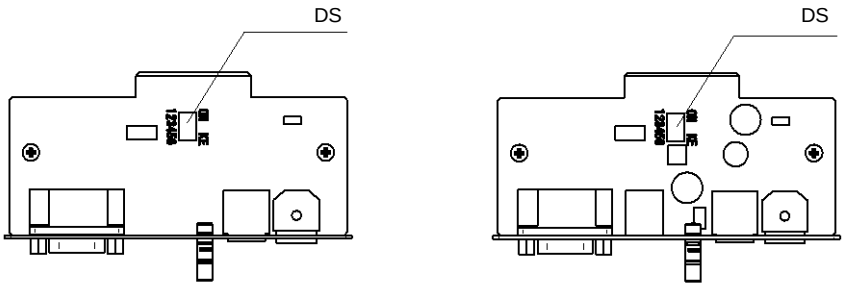


Figure 4-1 Procedures for Removing the Interface Board

2. When the board is pulled out, DS is mounted on the place shown as below. Use the tip of the driver to change the switch.



Serial Interface USB + Serial Interface

Figure 4-2 Setting of the DS

3. After setting DS, insert the board straight as far as it will go and fix it with the screws again.

(NOTE)	**DS is not mounted on the interface board of the USB model and Ethernet model printers. Do not pull out the board.**

(2) Serial Model Function Setting (DS1)

indicates the initial setting.

Table 4-1 Serial Model Function Setting (DS1)

DS	Function	Setting	
		ON	**OFF**
1-1	Baud Rate	See Table 4-2	
1-2			
1-3	Parity	See Table 4-3	
1-4			
1-5	Bit Length	7 bit	**8 bit**
1-6	Unused	-	**Fixed**

Table 4-2 Baud Rate Selection

DS1-2	DS1-1	Baud Rate
ON	ON	9600
ON	OFF	19200
OFF	ON	38400
OFF	**OFF**	**115200**

Table 4-3 Parity Selection

DS1-4	DS1-3	Parity
ON	ON	Even
ON	OFF	None
OFF	ON	Odd
OFF	**OFF**	**None**

(3) USB+ Serial Model Function Setting (DS1)

indicates the initial setting.

Table 4-4 USB + Serial Model Function Setting (DS1)

DS	Function	Setting	
		ON	OFF
1-1	Baud Rate	See Table 4-5	
1-2			
1-3	Parity	See Table 4-6	
1-4			
1-5	Interface Destination and Power Supply Terminal of Serial Interface Selection	See Table 4-7	
1-6			

Table 4-5 Baud Rate Selection

DS1-2	DS1-1	Baud Rate
ON	ON	9600
ON	OFF	19200
OFF	ON	38400
OFF	**OFF**	**115200**

Table 4-6 Parity Selection

DS1-4	DS1-3	Parity
ON	ON	Even
ON	OFF	None
OFF	ON	Odd
OFF	**OFF**	**None**

Table 4-7 Interface Destination and Power Supply Terminal of Serial Interface Selection

DS1-6	DS1-5	Destination		Power Supply Terminal of Serial Interface Selection
		Host Device	Peripheral Equipment	
ON	ON	Serial	-	Not output
ON	OFF	USB	Serial	12 V
OFF	ON	USB	Serial	5 V
OFF	**OFF**	**USB**	**Serial**	**Not output**

4.1.2 Changing Memory Switch

(1) Change Procedures

There are following three ways to change the MS.

- Using the memory switch setting tool
  As shown in the figure below, utilize the memory switch setting tool from the printer driver property.
  See "RP-E10 Series Printer Driver User's Guide" for details.

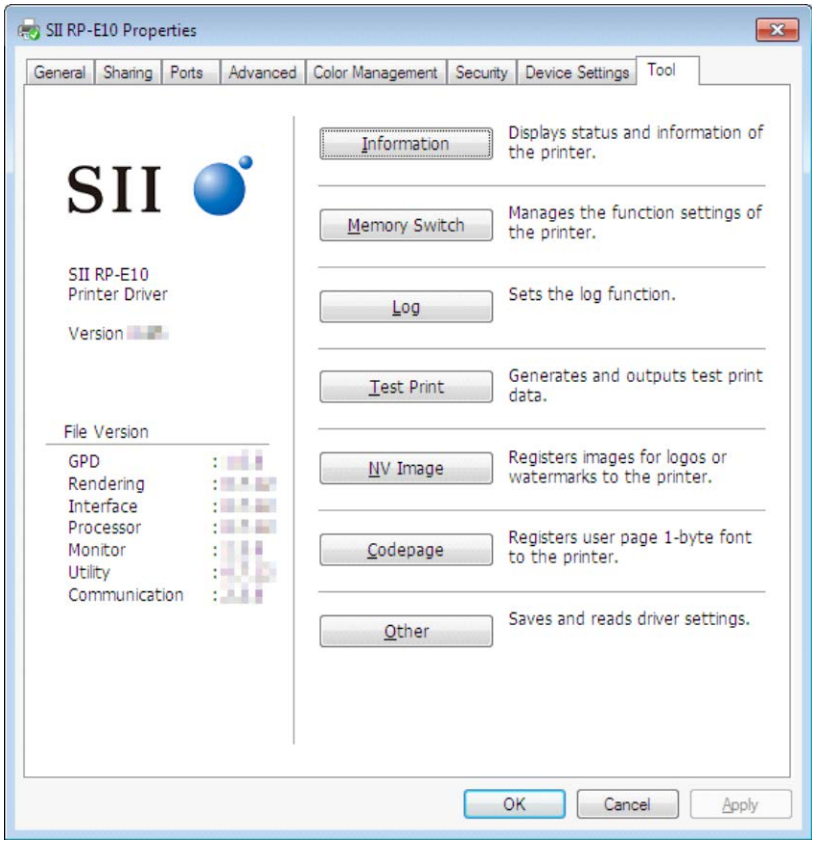


Figure 4-3 Properties of the Printer Driver

- Using the "Function Setting Change" command (DC2 'k', DC2 'w')
  See DC2 'k', DC2 'w' in "6.5.10 Auxiliary Functions".

- Using the switch operation
  You can change MS manually by using the printer POWER Switch and FEED Switch.
  The procedures are described in the pages below.

(2) How to Set the Function Setting Using the Switch Operation

To set functions using the switch, follow the procedures below.

1. Set a thermal paper, check that no error occurs, and then continue to press the printer POWER Switch to turn the power off.

2. Hold down the FEED Switch, and press the POWER Switch and release it. Test print starts, and you should still hold down the FEED Switch.

3. After the test print is complete, the printer enters the Function Setting mode or prints a message. Press the FEED Switch to enter the Function Setting mode.

```
[Enter Setting Mode]
Enter Setting Mode: Feed SW
Exit: Power SW
```

4. When the printer enters the Function Setting mode, a message for selecting MS to be set is printed. Press the FEED Switch for the number of times corresponding to the selected MS number, and then press the POWER Switch.

```
[MS Selection]
0 : Exit
1 : MS1
2 : MS2
3 : MS3
4 : MS4
5 : MS5
6 : MS6
7 : MS7
8 : MS13
9 : USB Setting
10: International Character
11: Character Code Table
12: Default Setting
Press the FEED switch an equal
number of times to the selected number.
After that, press the POWER SW.
```

5. A message for selecting the functions allocated to the selected MS is printed.
Press the FEED Switch for the number of times corresponding to the selected function number, and then press the POWER Switch.

```
[Function selection of MS1]
0 : Return to MS selection.
1 : Mark Mode
2 : Standby LED
3 : Near end sensor
4 : Auto Activation by AC
5 : Power SW
Press the FEED switch an equal
number of times to the selected number.
After that, press the POWER SW.
```

6. A message for selecting the setting value of the selected function is printed.
   Press the FEED switch for the number of times corresponding to the selected setting value number, and then press the POWER Switch.

```
[Standby LED]
0 : Return to function selection.
1 : AQUA
2 : GREEN
3 : OFF
4 : BLUE
Press the FEED switch an equal
number of times to the selected number.
After that, press the POWER SW.
```

7. A message for confirming the selected setting value is printed.
   Press the FEED Switch to write the setting value to the memory and to return to the initial screen of the Function Setting mode (step (5) in this procedure).
   Press the POWER Switch to discard the selected item and to return to the initial screen of the Function Setting mode (step (5) in this procedure).

```
[Standby LED]
Set AQUA
Save setting      : Feed SW
Discard setting   : Power SW
```

8. To exit the Function Setting mode, select 0:Exit. (Press the POWER Switch without pressing the FEED Switch.)
   After exiting from the Function Setting mode, test print starts again. Check that the function is set.

```
[MS Selection]
0 : Exit
1 : MS1
2 : MS2
3 : MS3
4 : MS4
5 : MS5
6 : MS6
7 : MS7
8 : MS13
9 : USB Setting
10: International Character
11: Character Code Table
12: Default Setting
Press the FEED switch an equal
number of times to the selected number.
After that, press the POWER SW.
```

(3) Function Setting (MS)

Details for each setting are described below. The value indicated by the shaded cell (boldface) in the table is set at the shipping.

(NOTE) Be sure to set the directed value as "Fixed" according to 0 or 1 in the table. For reserved area, be sure to set the specified value. Otherwise, the printer may not work correctly or may crash. Reserved values may be changed.

1. General Setting 1 (MS1)

Sets the printer and selects peripheral equipment.

- Mark Mode Selection (MS1-3)
  Enables or disables the mark detection.
- Standby LED Selection (MS1-4 to 5)
  Selects LED colors in the standby mode.
- Near-end Sensor Function Selection (MS1-6)
  Enables or disables the near-end sensor function.
- Auto Activation by AC Selection (MS1-7)
  When this setting is enabled, insert the AC cable of the specified AC adapter into a socket to turn the power on.
- POWER Switch Function Selection (MS1-8)
  Enables or disables the POWER Switch of the printer.

Table 4-8 General Setting 1 (MS1)

MS	Function	Value	
		0	**1**
1-1	Reserved	-	**Fixed**
1-2	Reserved	-	**Fixed**
1-3	Mark Mode Selection (Mark Mode)	**Disable**	Enable
1-4 to 5	Standby LED Selection (Standby LED)	See Table 4-9	
1-6	Near-end Sensor Function Selection (Near End Sensor)	Disable	**Enable**
1-7	Auto Activation by AC Selection (Auto Activation by AC)	Disable	**Enable**
1-8	POWER Switch Function Selection (Power SW)	Disable	**Enable**

Table 4-9 Standby LED Selection (MS1-4 to 5)

MS1-5	MS1-4	Standby LED Selection
0	0	Aqua
0	1	Green
1	0	Off
1	**1**	**Blue**

2. General Setting 2 (MS2)

Sets the buzzer behavior when an error occurs.

- Buzzer Count Selection (MS2-1 to 2)
  Selects the buzzer rumbling count.
- Buzzer Pattern Selection (MS2-3 to 4)
  Selects the buzzer pattern.
- Buzzer Volume Selection (MS2-5)
  Selects the buzzer volume.

Table 4-10 General Setting 2 (MS2)

MS	Function	Value	
		0	**1**
2-1 to 2	Buzzer Count Selection (Buzzer Count)	See Table 4-11	
2-3 to 4	Buzzer Pattern Selection (Buzzer Pattern)	See Table 4-12	
2-5	Buzzer Volume Selection (Buzzer Volume)	Low	**Loud**
2-6 to 8	Reserved	-	**Fixed**

Table 4-11 Buzzer Count Selection When an Error Occurs (MS2-1 to 2)

MS2-2	MS2-1	Buzzer Count
0	**0**	**None**
0	1	Once
1	0	Thrice
1	1	Continue

Table 4-12 Buzzer Pattern Selection When an Error Occurs (MS2-3 to 4)

MS2-4	MS2-3	Buzzer Pattern
0	**0**	**Pattern1**
0	1	Pattern2
1	0	Pattern3
1	1	Pattern4

3. General Setting 3 (MS3)

Sets the buzzer behavior when cutting is complete.

- Buzzer Count Selection (MS3-1 to 2)
  Selects the buzzer rumbling count.
- Buzzer Pattern Selection (MS3-3 to 4)
  Selects the buzzer pattern.
- Buzzer Volume Selection (MS3-5)
  Selects the buzzer volume.

Table 4-13 General Setting 3 (MS3)

MS	Function	Value	
		0	**1**
3-1 to 2	Buzzer Count Selection (Buzzer Count)	See Table 4-14	
3-3 to 4	Buzzer Pattern Selection (Buzzer Pattern)	See Table 4-15	
3-5	Buzzer Volume Selection (Buzzer Volume)	Low	**Loud**
3-6 to 8	Reserved	-	**Fixed**

Table 4-14 Buzzer Count Selection When Cutting Is Complete (MS3-1 to 2)

MS3-2	MS3-1	Buzzer Count
0	**0**	**None**
0	1	Once
1	0	Thrice
1	1	Five Times

Table 4-15 Buzzer Pattern Selection When Cutting Is Complete (MS3-3 to 4)

MS3-4	MS3-3	Buzzer Pattern
0	**0**	**Pattern1**
0	1	Pattern2
1	0	Pattern3
1	1	Pattern4

4. General Setting 4 (MS4)

Selects the printer driving method.

- Number of Dots Selection for Fixed Division and Dynamic Division (MS4-1 to 2)
  Selects the number of divisions when the fixed division is selected and the maximum number of driving dots when the dynamic division is selected.

- Division Driving Method Selection (MS4-3)
  Selects the thermal head driving method as fixed division or dynamic division.

- Paper Width Selection (MS4-4)
  Selects the paper width to be used.

- Number of Effective Dots Selection (MS4-5)
  Selects the number of printable dots per 1 dot-line.

- Maximum Print Speed Selection (MS4-7 to 8)
  Selects the maximum print speed at four levels.

  High: Drives at the maximum speed of 350mm/sec.
  Middle(Silent): Decreases the maximum print speed to 280mm/sec to print silently.
  Middle(Quality): Decreases the maximum print speed to 150mm/sec for printing of image to improve the print quality of image.
  Printing of image includes the following:
  Raster bit image, graphics data stored in print buffer, NV graphics, downloaded bit image, bit image mode, barcode, two-dimensional barcode
  Also, for print in the page mode, the whole page is regarded as image.
  Low: Decreases the maximum print speed to 150mm/sec to improve the print quality.

  The speed may be lower than the selected maximum speed due to the thermal head driving method, environmental temperature, and communication methods.

Table 4-16 General Setting 4 (MS4)

MS	Function	Value	
		0	**1**
4-1 to 2	Number of Dots Selection for Fixed Division and Dynamic Division (Division Method)	See Table 4-17	
4-3	Division Driving Method Selection (Head Drive)	Fixed	**Dynamic**
4-4	Paper Width Selection (Paper Width)	58 mm	**80 mm**
4-5	Number of Effective Dots Selection (Number of Effective Dots)	512/360 dots	**576/432 dots**
4-6	Reserved	-	**Fixed**
4-7 to 8	Maximum Print Speed Selection (Print Speed)	See Table 4-18	

Table 4-17 Number of Dots Selection for Fixed Division and Dynamic Division (MS4-1 to 2)

MS4-2	MS4-1	Fixed Division and Dynamic Division, Number of Dots Selection
0	0	Fixed four divisions/dynamic 64 dots*1 (4 div./64 dots)
0	1	Fixed four divisions/dynamic 144 dots (4 div./144 dots)
1	0	Fixed four divisions/dynamic 144 dots (4 div./144 dots)
1	**1**	**Fixed two divisions/dynamic 288 dots (2 div./288 dots)**

*1: When dynamic 64 dots is selected, the print percentage should be 50% or less. Otherwise, the print result may degrade.

Table 4-18 Maximum Print Speed Selection (MS4-7 to 8)

MS4-8	MS4-7	Maximum Print Speed Selection
0	0	Low
0	1	Middle(Quality)
1	0	Middle(Silent)
1	**1**	**High**

5. General Setting 5 (MS5)

Sets various responses, data processing, and behaviors.

- Automatic Status Response Selection (MS5-1)
  Enables or disables the automatic status response function.

- Initialized Response Selection (MS5-2)
  Enables or disables the initialization completion response function.

- Data Discard Selection When an Error Occurs (MS5-3)
  Selects whether the data discard when an error occurs or in return-waiting status is Enable or Disable.
  When the status is in an error or return-waiting status after selecting this function as Enable, printing data and the following commands are discarded.

  Paper Feed, Paper Cut, Execution Response Request

(NOTE)	**When the Data Discard Selection When an Error Occurs is Enable, and when errors occur during command processing, the command processing does not end until all the remaining data are received. When the errors occur while the data is in command processing, send all the remaining data and enter the next command.**

- Data Discard Selection When Output Buffer Full Occurs (MS5-4)
  Selects whether the subsequent response data is discarded or not when the response data of the printer is not received to the host and its data size exceeds the capacity of output buffer in the printer (256 bytes).
  When the host does not execute the data receiving from the printer, set this setting to enable.

(NOTE)	**When the response data from the printer is used by the host, and data discarding is enabled, the data missing may occur at output buffer full. Therefore, the data must be received regularly.**

- Paper-Near-End Sensor Selection (MS5-5)
  Selects whether the print stop function is enabled or disabled when the near-end detected by the near-end sensor is considered as an error.

- Initialization Performance Selection After Paper Setting (MS5-6 to 7)
  When the initial cut is selected, the initialization performance occurs after paper set in the following order: feed a paper approx. 20mm and cut the thermal paper.
  When Stamp&cut is selected, the initial process of "Stamp&cut" command (GS 'Y') occurs after paper set.
  Note that even when Standard or Stamp&cut is selected, the Stamp&cut operation does not perform when the thermal paper is set in the printer at the power on or reset.

(NOTE)	**At performance of Stamp&cut, the print result may degrade due to a printer pause and paper cutting operation during graphics printing.**

- Cutting Method After Initialization (MS5-8)
  When the Initial Process After Paper Set is enabled, partial cut or full cut can be selected as the cutting method in the initial process after paper set.

Table 4-19 General Setting 5 (MS5)

MS	Function	Value	
		0	**1**
5-1	Automatic Status Response Selection (Auto Status Back)	**Enable**	Disable
5-2	Initialized Response Selection (Init. Response)	**Enable**	Disable
5-3	Data Discard Selection When an Error Occurs (Error Through)	**Enable**	Disable
5-4	Data Discard Selection When Output Buffer Full Occurs (Response Data Discarding)	Enable	**Disable**
5-5	Paper-Near-End Sensor Selection (Near End Error)	Enable	**Disable**
5-6 to 7	Initialization Performance Selection After Paper Setting (Paper Set Handle)	See Table 4-20	
5-8	Cutting Method After Initialization (Cutting Method)	Partial cut (Partial)	**Full cut (Full)**

Table 4-20 Initialization Performance Selection After Paper Setting (MS5-6 to 7)

MS5-7	MS5-6	Initial Process After Paper Set
0	0	Disable
0	1	Stamp&cut
1	**0**	**Initial cut (Standard)**
1	1	Disable

6. General Setting 6 (MS6)

- Print Density Selection (MS6-1 to 8)
  Selects the print density to be used.

Table 4-21 General Setting 6 (MS6)

MS	Function	Value	
		0	1
6-1 to 8	Print Density Selection (Print Density)	See Table 4-22	

Table 4-22 Print Density Selection (MS6-1 to 8)

MS6-8	MS6-7	MS6-6	MS6-5	MS6-4	MS6-3	MS6-2	MS6-1	Print Density Selection
0	0	0	0	0	0	0	0	70%
0	0	0	0	0	0	0	1	75%
0	0	0	0	0	0	1	0	80%
0	0	0	0	0	0	1	1	85%
0	0	0	0	0	1	0	0	90%
0	0	0	0	0	1	0	1	95%
0	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**100%**
0	0	0	0	0	1	1	1	105%
0	0	0	0	1	0	0	0	110%
0	0	0	0	1	0	0	1	115%
0	0	0	0	1	0	1	0	120%
0	0	0	0	1	0	1	1	125%
0	0	0	0	1	1	0	0	130%
Other than those above								Prohibition

(NOTE) Excessive energy may cause shortening the life of thermal head, or may cause the paper feed problem, so specify the accurate thermal paper selection and print density selection. When the using thermal paper is different from the one specified or the print density selection is other than 100%, the reliability of the product specification may not be satisfied.

7. General Setting 7 (MS7)

- Thermal Paper Selection (MS7-1 to 8)
  Selects the thermal paper to be used.

Table 4-23 General Setting 7 (MS7)

MS	Function	Value	
		0	1
7-1 to 8	Thermal Paper Selection (Thermal Paper)	See Table 4-24	

Table 4-24 Thermal Paper Selection (MS7-1 to 8)

MS7-8	MS7-7	MS7-6	MS7-5	MS7-4	MS7-3	MS7-2	MS7-1	Thermal Paper Selection
0	0	0	0	0	0	0	0	PD160R-N
0	0	0	0	0	0	0	1	P220VBB1
0	0	0	0	0	0	1	0	TF60KS-E
0	0	0	0	0	0	1	1	F5041
0	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**KT48FA**
0	0	0	0	0	1	0	1	Alpha 400-2.1
0	0	0	0	0	1	1	0	Alpha 820-3.4
0	0	0	0	0	1	1	1	F220VP
Other than those above								Prohibition

(NOTE) Excessive energy may cause shortening the life of thermal head, or may cause the paper feed problem, so specify the accurate thermal paper selection and print density selection. When the using thermal paper is different from the one specified or the print density selection is other than 100%, the reliability of the product specification may not be satisfied.

8. Mark Position Correction (MS8 to 9)

Sets the direction and length of the mark position correction in 1 dot-line.
For 1 (0001H) to 2400 (0960H), the direction is forward.
For -1 (FFFFH) to -74 (FFB6H), the direction is backward. The negative number is set in 2's complement.

Table 4-25 Mark Position Correction (MS8 to 9)

MS	Function	Number of Bytes	Definition Range	Default Setting
8 to 9	Mark Position Correction	2 bytes	-74 to 2400 (dot-line)	**0**

9. Mark Detection Maximum Feeding Length Setting (MS10 to 11)

Sets the mark detection maximum feeding length in 1mm.
When the mark cannot be detected even when a paper is fed at the specified length, stop the paper feed at that length and cut the thermal paper.

Table 4-26 Mark Detection Maximum Feeding Length Setting (MS10 to 11)

MS	Function	Number of Bytes	Definition Range	Default Setting
10 to 11	Mark Detection Maximum Feeding Length Setting	2 bytes	0 to 300 (mm)	**300 (mm)**

10. Mark Detection Threshold Value (MS12)

Sets the mark detection threshold value at 255 levels where FFH is 100%.

Table 4-27 Mark Detection Threshold Value (MS12)

MS	Function	Number of Bytes	Definition Range	Default Setting
12	Mark Detection Threshold Value	1 byte	10H to EFH	**80H**

11. Command Setting (MS13)

Selects the kanji code system and 180° reverse function.

- Kanji Code System Selection (MS13-1)
  Sets the initial kanji code system to the JIS code or Shift-JIS code system.
- 180° Reverse Function Selection (MS13-2)
  Sets the character print direction and start point in the initial page mode. When this function is enabled, the start point in the page mode is placed in the lower right.

Table 4-28 Command Setting (MS13)

MS	Function	Value	
		0	1
13-1	Kanji Code System (Kanji Code)	Shift-JIS code (Shift-JIS Code)	**JIS code (JIS Code)**
13-2	180° Reverse Function Selection (Reverse Function)	Enable	**Disable**
13-3 to 8	Reserved	-	**Fixed**

12. Reserved (MS14)

MS14 is reserved. To perform 40 bytes all writing, send FFH as a value of MS14.

13. International Character Selection (MS15)

Sets a value corresponding to the international character selection.

Table 4-29 International Character Set

n	Country	n	Country
0	USA	9	Norway
1	France	10	Denmark II
2	Germany	11	Spain II
3	United Kingdom	12	Latin America
4	Denmark I	13	Prohibition*1
5	Sweden	14	Prohibition*1
6	Italy	15	Prohibition*1
7	Spain I	16	Prohibition*1
8	Japan	17	Arabia

*1: When the Prohibition is selected, the setting is ignored.

However, when the number not registered with the international character is selected, it becomes USA. For the international character selection, see the "International Character Select" command (ESC 'R').

Table 4-30 International Character Selection (MS15)

MS	Function	Number of Bytes	Definition Range	Default Setting
15	International Character Selection (International Character Select)	1 byte	0 to 255	**0**

14. Character Code Table Setting (MS16)

Sets a value corresponding to the character code table number.
The character code table number is the number in the following table.

Table 4-31 Character Code Table

Character Code Table Number	Character Set
0	Codepage 437 (USA, Standard Europe)
1	Katakana character set
2	Codepage 850 (Multilingual)
3	Codepage 860 (Portuguese)
4	Codepage 863 (Canadian-French)
5	Codepage 865 (Nordic)
16	Codepage 1252 (Latin)
18	Codepage 852 (Eastern Europe)
19	Codepage 858 (Euro)
37	Codepage 864 (Arabic)
45	Codepage 1250 (Central European)
46	Codepage 1251 (Cyrillic)
47	Codepage 1253 (Greek)
48	Codepage 1254 (Turkish)
255	User page

However, when a number not registered with the character code table is selected, the character code table number becomes 0 (Codepage 437). For the character code table, see the "Character Code Table Select" command (ESC 't').

Table 4-32 Character Code Table Setting (MS16)

MS	Function	Number of Bytes	Definition Range	Default Setting
16	Character Code Table Setting (Character Code Table Select)	1 byte	0 to 255	**0**

15. Reserved (MS17 to 39)

MS17 to 39 are all reserved. To perform 40 bytes all writing, send FFH as a value of MS17 to 39.

16. Serial Communication Setting (MS40)

MS40 is enable only when executing data input/output by serial communication.

- Reserved (MS40-1 to 2)

- Busy Status Selection (MS40-3)
  Busy status is available to select from only when the input buffer using value becomes busy threshold value or more, or also when error occurs.
  In this case, error means hardware error, head temperature error, voltage error, cutter error, cover open error, paper jam error while detecting mark, out-of-paper error, or return-waiting, paper-near-end (only when MS1-6 and MS5-5 are enable).

- Busy Threshold Value Selection (MS40-4)
  Threshold value is available to select making Busy status and Busy release status for input buffer using value.

- Flow Control Selection (MS40-5)
  Selects the software control by Xon/Xoff signal or hardware control by signal line as a flow control.

- Printer Busy Control Selection (MS40-6)
  When the hardware control is selected, the signal of RTS or DTR can be used or selected as a flow control signal.

- Host Busy Control Selection (MS40-7)
  Selects the host busy control during data transmission.
  When the Host Busy Control Selection is set to Ignore, the printer does not control transmission through the signal of CTS and signal of DSR during data transmission. When it is set to the CTS and DSR control, the printer controls transmission through the signal of CTS and signal of DSR. When the software control is selected, the Host Busy Control is ignored.

- Break Signal Selection (MS40-8)
  The break signal is available to select.
  The following conditions are reset:
  - When the Break signal selection is set to RxD and DSR
    • Input SPACE signal to RxD 20ms or longer
    • Input MARK signal to DSR 20ms or longer
  - When the Break Signal selection is set to RxD
    • Input SPACE signal to RxD 20ms or longer

Table 4-33 Serial Communication Setting (MS40)

MS	Function	Value	
		0	**1**
40-1 to 2	Reserved	-	**Fixed**
40-3	Busy Status Selection[*1] (Busy Conditions)	Busy Threshold Value or more, or Error	**Busy Threshold Value or more**
40-4	Busy Threshold Value Selection[*1] (Busy Threshold)	Busy≥30 bytes Busy release≤19 bytes (30/19 bytes)	**Busy≥16128 bytes** **Busy release≤8192 bytes** **(16128/8192 bytes)**
40-5	Flow Control Selection (Flow Control)	Xon/Xoff Control	**Hardware Control**
40-6	Printer Busy Control Selection (Printer Busy)	DTR control	**RTS Control**
40-7	Host Busy Control Selection (Host Busy)	CTS and DSR control (CTS)	**Ignore**
40-8	Break Signal Selection[*2] (Break)	RxD&DSR	**RxD**

*1: Only serial model and USB + serial model are enable when both DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection) are ON.

*2: The communication break using the DSR is not available for USB + serial model when both DS1-5 and DS1-6 (Interface Destination and Power Supply Terminal of Serial Interface Selection) are other than ON. RxD is only enabled regardless of this setting.

4.2 TEST PRINT

The printer can print the test print.

In test print, the Firmware version and MS setting value, etc. are printed.

1. Set the thermal paper in the printer and make sure that the power is turned off.
2. Hold down the FEED Switch and press the POWER Switch. Release the FEED Switch after initializing the printer.
3. Test print is started.
4. After test print, the printer cuts the thermal paper and goes into print-ready status.

```
RP series Interface
RP-E10 [ Ver X.XX ]
  DD.MMM.YYYY
Copyright(C):SII

* MS1 *
3)  Mark Mode:Disable
4-5)Standby LED:Blue
6)  Near End Sensor:Enable
7)  Auto Activation by AC:Enable
8)  Power SW:Enable

* MS2 *
1-2)Buzzer Count:None
3-4)Buzzer Pattern:Pattern1
5)  Buzzer Volume:Loud

* MS3 *
1-2)Buzzer Count:None
3-4)Buzzer Pattern:Pattern1
5)  Buzzer Volume:Loud

* MS4 *
1-2)Division Method:288[dots]
3)  Head Drive:Dynamic
4)  Paper Width:80mm
5)  Effective Dots:576/432[dots]
7-8)Print Speed:High

* MS5 *
1)  Auto Status Back:Enable
2)  Init.Response:Enable
3)  Error Through:Enable
4)  Response Data Discarding:Disable
5)  Near End Error:Disable
6-7)Paper Set Handle:Standard
8)  Cutting Method:Full

* MS6 *
1-8)Print Density:100%

* MS7 *
1-8)Thermal Paper:KT 48 FA

* MS13 *
1)  Kanji Code:JIS Code
2)  Reverse Function:Disable

* Communication Type *
 USB Communication
 Control Model:RP-E10
 USB Device Class:Printer

* Font Information *
 JIS X 0208-1997 Font Exist
 Gaiji Font enable
 Down-load Font enable
 Character Code Table:Code Page437
 International Character:USA

* Serial Number Information *
 XXXXXXXX
```

Figure 4-4 Test Print Sample

CHAPTER 5
LED DISPLAY AND SWITCH FUNCTION

This chapter describes the printer state by LED display and functions of switches.

5.1 PRINTER STATUS LED DISPLAY

This printer shows its status with a LED.

The printer states are listed below.

Table 5-1 Printer Status Signals

Printer Status	LED (Color)	LED (Lighting Pattern)
Power off	-	Off
Power on (Print-ready)	Blue*1	On*1
Printing	Green	On
Output buffer full	Green	Blink-1
Paper-near-end*2	Blue	Blink-1
Out-of-paper error	Yellow	Blink-1
Paper jam error while detecting mark	Yellow	Blink-2
Cover open error	Yellow	On
Hardware error	Red	On
Head temperature error	Purple	On
Voltage error	Purple	Blink-1
Cutter error	Purple	Blink-2
FLASH memory rewriting	White	Blink-3
FW rewriting	White	On

*1: Default value
*2: When MS5-5 (Paper-Near-End Sensor Selection) is enabled, the LED (Color) and LED (Lighting pattern) are the same as the one for out-of-paper error.

Table 5-2 LED Flashing Pattern

Items	Pattern
Blink-1	
Blink-2	
Blink-3	

5.2 ERROR AND RECOVERY PROCEDURE

When an error except paper-near-end occurs, the printer stops printing operation. However, the data reception is operated. The table below lists errors and their recovery procedures.

Table 5-3 Error and Recovery Procedure

Error	Detail	Recovery Procedure	Priority*1
Return-waiting	The printer becomes this state after releasing out-of-paper, cover open error, cutter error, or voltage error.	Return-waiting status is released one second later, and the printer becomes print-ready status.	-
Output buffer full	Output buffer of the printer is full.	Read response data from the host device.	1
Paper-near-end	Near-end sensor detects the thermal paper is nearly end. When MS5-5 (Paper-Near-End Sensor Selection) is set to OFF (0), this function is valid.	Open the paper cover, set a thermal paper, and then close it.	2
Out-of-paper	No thermal paper.		3
Paper jam error while detecting mark	The mark cannot be detected.		
Cover open error	The paper cover is open.	Close the paper cover.	4
Cutter error	Cut failure due to the paper jam while cutting.	Open the paper cover and remove the cause of an error, and then the printer is recovered automatically after closing it. When the paper cover cannot be opened, or automatic recovery cannot be performed, refer to "Cutter Error Treatment" in the USER'S GUIDE.	5
Voltage error	The power supply voltage is out of the allowable range.	The printer is automatically recovered when the voltage is set within the allowable range.	6
Head temperature error	The thermal head temperature becomes 85°C or higher.	The printer is automatically recovered when thermal head temperature becomes 80°C or lower.	7
Hardware error	Abnormality in the thermal head or the circuit board, or the voltage does not reach 20V or more within five seconds during initialization at power on or immediately after reset.	Recovery is not possible. Request for repair.	8

*1: This indicates the priority when the multiple errors occur simultaneously. The bigger number indicates higher priority. For example, when "Paper-near-end" and "Out-of-paper" occur simultaneously, the LED displays "Out-of paper" based on the priority.

5.3 SWITCH

There are two switches, POWER Switch and FEED Switch in this printer.

5.3.1 POWER Switch

Turning on/off the printer can be performed by the POWER Switch.

(NOTE)	**Always use the POWER Switch to turn the power off. When the power is turned off by unplugging AC adapter, the memory may be damaged.**

5.3.2 FEED Switch

Paper feed can be performed by the FEED Switch.
The behavior depends on the MS1-3 (Mark Mode Selection) setting.

- **Paper roll mode (MS1-3 (Mark Mode Selection) is set to Disable)**

  The printer feeds a small amount of thermal paper by pressing the FEED Switch once and the thermal paper is fed continuously by holding the FEED Switch down.

- **Marked paper roll mode (MS1-3 (Mark Mode Selection) is set to Enable)**

  When you press the FEED Switch once, the printer feeds a paper until detecting the mark.
  When the printer cannot detect the mark even when the paper is fed at the specified length, it stops the paper feed at the time. The maximum paper feed before the mark is detected can be set with the "Function Setting Change" command (DC2 'w').

When an error except paper-near-end occurs, the printer stops feeding thermal paper by FEED Switch.

CHAPTER 6
COMMAND FUNCTIONS

6.1 CHARACTER CODES AND COMMANDS

The character code range and user-defined character codes vary when kanji mode is selected with "Kanji Mode Specify" command (FS '&') after selecting JIS code system with "Kanji Code System Selection" command (FS 'C'), and when Shift JIS code system is selected.

6.1.1 JIS Code System

In order to print 2-byte character by JIS code system, select JIS code system with "Kanji Code System Selection" command (FS 'C') and then specify 2 bytes character code after selecting kanji mode with "Kanji Mode Specify" command (FS '&').
The command functions as character code of 1-byte code system character or the 1st byte and the 2nd byte of character code of 2-byte code system character.
When a command is input in character code of 2-byte code system character, the next data is always processed as the 1st byte. However, the next data is character code of 1-byte code system character for "Kanji Mode Cancel" command (FS '.').
When a command is input in the 2nd byte of character code of 2-byte code system character, data up to the 1st byte is ignored.

(1) Character code of 1-byte code system character

00H to 1FH:	The codes listed below are processed as commands. The other codes are ignored. 09H (HT), 0AH (LF), 0CH (FF), 0DH (CR), 10H (DLE), 12H (DC2), 13H (DC3), 18H (CAN), 1BH (ESC), 1CH (FS), 1DH (GS)
20H to 7EH:	Character code.
7FH:	Ignored.
80H to FEH:	Character code.
FFH:	It differs depending on character set. When the Codepage 1250 to 1254 character sets and user-defined characters are selected, they are processed as character code. When the character set other than the above is selected, the code is ignored.

(2) Character code of 2-byte code system character

2-byte character is specified with 2 bytes character code.

(a) 1st byte

00H:	1-byte code system character area. Specify the character code of 1-byte code system character at 2nd byte.
21H to 76H:	2-byte character area.
77H:	User-defined character area.
78H to 7EH:	2-byte character area.
93H to 97H:	2-byte character area.

When the codes other than the above are not commands, these codes are ignored. The next data to be received is processed as the 1st byte.

(b) 2nd byte

(When the 1st byte is 00H)

20H to 7EH:	The codes are processed as the 1-byte code system character.
80H to FEH:	The codes are processed as the 1-byte code system character.
FFH:	It differs depending on character set. When the Codepage 1250 to 1254 and user-defined characters are selected, they are processed as the 1-byte code system character. When the character set other than the above is selected, the code is ignored with the 1st byte.

(When the 1st byte is not 00H)

21H to 7EH:	The codes are processed as the 2nd byte of a 2-byte character.

When the codes other than the above are not commands, these codes are ignored with the 1st byte. The next data to be received is processed as the 1st byte.

The codes not defined as JIS code system or special characters in the 2-byte character area are processed as 2-byte character spaces.

6.1.2 Shift JIS Code System

When Shift JIS code system is selected with "Kanji Code System Selection" command (FS 'C'), kanji can be printed with 2 bytes character code without entering "Kanji Mode Specify" command (FS '&').

The command functions as character code of 1-byte code system character or the 2nd byte of character code of 2-byte code system character.
When a command is input at the 2nd byte of character code of 2-byte code system character, the 1st byte is ignored.

(1) Character code of 1-byte code system character

00H to 1FH:	The codes listed below are processed as commands. The other codes are ignored. 09H (HT), 0AH (LF), 0CH (FF), 0DH (CR), 10H (DLE), 12H (DC2), 13H (DC3), 18H (CAN), 1BH (ESC), 1CH (FS), 1DH (GS)
20H to 7EH:	Character code.
7FH:	Ignored.
80H to FEH:	See (2).
FFH:	It differs depending on character set. When the Codepage 1250 to 1254 character sets and user-defined characters are selected, they are processed as character code. When the character set other than the above is selected, the code is ignored.

(2) Character code of 2-byte code system character

2-byte character is specified with 2 bytes character code.

(a) 1st byte

81H to 9FH:	2-byte character area.
E0H to EBH:	2-byte character area.
ECH:	User-defined character area.
EDH to EFH:	2-byte character area.
FAH to FCH:	2-byte character area.

The other codes 80H - FEH are processed as 1-byte code system character.

(b) 2nd byte

40H to 7EH:	The codes are processed as the 2nd byte of a Shift JIS code.
80H to FCH:	The codes are processed as the 2nd byte of a Shift JIS code.

When the codes other than the above are not commands, these codes are ignored with the 1st byte.

The codes not defined as Shift JIS code system or special characters in the 2-byte character area are processed as 2-byte character spaces.

6.2 FLASH MEMORY

A FLASH memory on this printer allows for using user-defined characters, downloaded characters, optional fonts, macro function, NV graphics function, downloaded bit image function, User page 1-byte font, and User page international characters. FLASH memory consists of the following area.

System area	stores data for controlling system.
Font area	stores font data such as kanji and so on.
User area	stores user-defined characters, downloaded characters, optional fonts, macro, NV graphics, downloaded bit image, User page 1-byte font, and User page international characters.

System area is rewritten using the commands such as "Function Setting Change" command (DC2 'k', DC2 'w') or "Maintenance Counter Preservation" command (GS 'g' '1'). Font area can be rewritten through the download mode selection. User area can be rewritten using registration commands such as user-defined characters, downloaded characters, optional fonts, macro, NV graphics, downloaded bit image, User page 1-byte font, and User page international characters.

The memory capacity of the user area is 1048576 bytes. When using registration commands, it is necessary to know the remaining amount of memory beforehand. Read this section before using these functions.

(1) Memory area

This printer allocates or frees memory area in order to change uses of the user area and its capacity.
Allocating the memory area means that the memory is divided into the specified capacity (the number of bytes) so as to be exclusively used for a certain function.
Freeing the memory area means that the division of the memory for the exclusive use of a certain function is abolished so that the other functions become usable. The freed memory area is not reused until the printer executes the commands "User Area Initialization" command (DC2 'R') or "User Area Defragment" command (DC2 '*' '1').
However, when using user-defined characters, downloaded characters, optional fonts, macro, NV graphics, downloaded bit image, User page 1-byte font, and User page international characters, the user must be sure not to exceed the remaining memory area.
The capacity of each memory area is limited to the value as shown in the table below for optional fonts, macro, NV graphics, and downloaded bit image. Do not exceed this limit when using these functions.

Function	Bytes
Optional font	65536
Macro	2060
NV graphics（per key code）	917504
Downloaded bit image	65536

Refer to the description of each command on how to calculate the amount of using memory.

Table 6-1 Memory Area After Initialization

Use	Bytes
User-defined characters	9784
Downloaded characters	6184
Optional font	0
Macro	0
NV graphics	0
Downloaded bit image	0
User page 1-byte font	0
User page international characters	0

For user-defined characters and downloaded characters, the memory in the user area is allocated beforehand at initialization and shipment.
This area can be freed using commands, and its empty area increased for other functions.
When defining and registering optional font, macro, NV graphics, downloaded bit image, User page 1-byte font, and User page international characters, it is necessary to check the remaining memory area constantly.
Be aware that all of the data which exceeds the remaining memory area is ignored.
For definition of optional font, macro, NV graphics, downloaded bit image, 1-byte Font Rewrite (User page), and 1-byte Font International Character Registration (User page), the area is automatically allocated when the corresponding command is input.
These commands operate as follows:

- When the parameter of the command is outside the range:
  The printer ignores the part outside and processes the remaining data as character code. However, only for NV graphics data define, all of the data including the successive data is ignored.

- When the command is normal but memory area has not been allocated (memory shortage):
  All of the data, including the successive data, is ignored.

- When the command is normal and memory area has been allocated:
  The data is registered.
  The remaining memory is confirmed by using the "Remaining User Area Response" command (DC2 '*' '2').

(2) Memory control information

After allocating the area, the memory control information is added at the beginning of the allocated area. The number of bytes of memory control information differs depending on each function.
The number of bytes of memory control information of each function is listed in Table 6-2.

Table 6-2 Number of Bytes of Memory Control Information (User Area)

Function	Number of Bytes
User-defined characters	8
Downloaded characters	104
Optional font	12
Macro	12
NV graphics	14
Downloaded bit image	12
User page 1-byte font	74
User page international characters	11

[Example]

For user-defined character, the 24×3 dots font takes 72 bytes and the 16×2 dots font takes 32 bytes. Therefore, there can be up to 94 characters, with 8 bytes of memory control information, as shown below:

(72+32)×94+8=9784 bytes

When calculating the remaining memory, include the number of bytes of memory control information.
Since one memory area is limited to 65536 bytes, the maximum number of bytes which can be registered, is as follows:

Optional font = 65536-12=65524 bytes

(3) Precautions for the macro function

Macro function cannot include the commands for allocating or freeing (up) the memory area listed in Table 6-3.

Table 6-3 Commands for Allocating or Freeing Memory Area

Command	Command Name
DC2 'P'	Optional Font Registration
DC2 'Q'	Optional Font Area Release
GS ':'	Macro Definition Start/Stop
ESC '&'	Downloaded Character Registration
DC2 'D'	Downloaded Character Area Operation
FS '2'	User-defined Character Registration
DC2 'G'	User-defined Character Area Operation
GS '(' 'L' GS '8' 'L'	NV Graphics Data Define
GS '(' 'L'	NV Graphics Data Batch Deletion
GS '(' 'L'	Specified NV Graphics Data Deletion
GS '*'	Downloaded Bit Image Registration
GS 'v'	Raster Bit Image Print
DC2 '*' '1'	User Area Defragment
DC2 'R'	User Area Initialization
GS '{' '1'	Style Sheet Registration
GS '{' '2'	Style Sheet Deletion

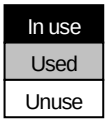
When the commands listed in Table 6-3 are input during macro definition, that is canceled and deleted.

(4) Memory management

1. About memory in the user area of FLASH memory

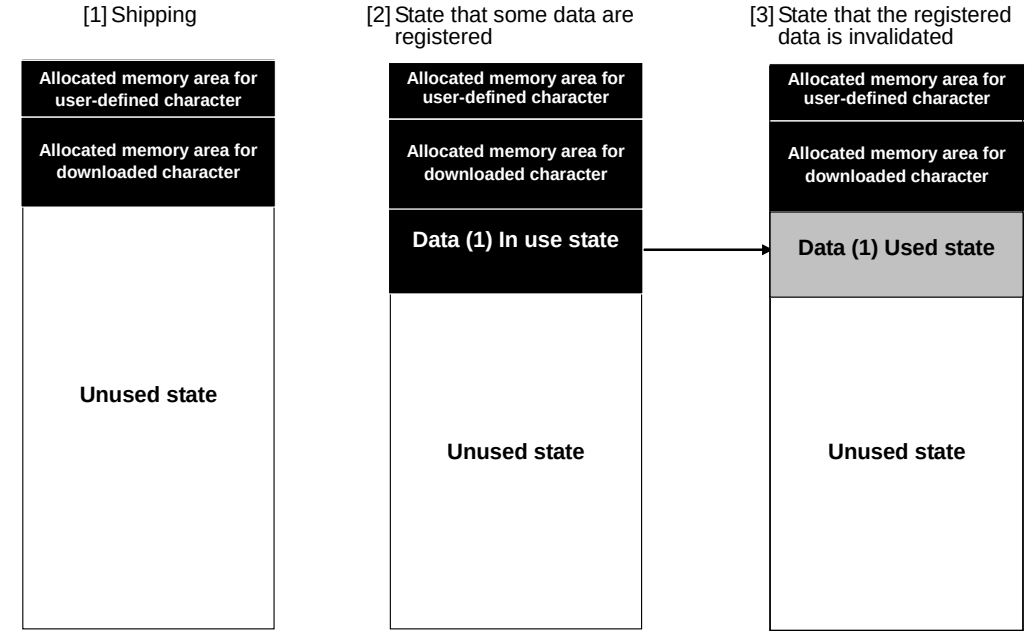
Memory in the user area of FLASH memory has the following three kinds of conditions:

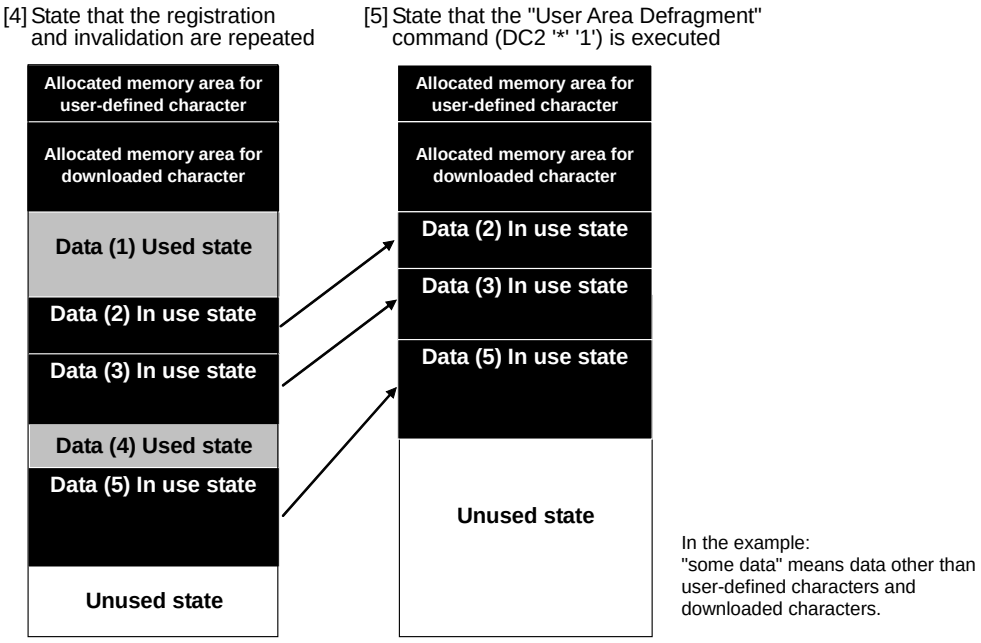
- In use state
- Used state
- Unused state



The user area other than exclusive use for user-defined character and downloaded character is in Unused state at shipping.

When some data is saved in the user area, the user area turns to In use state as described in the figure below. When the data in use state is invalidated, the invalidated area turns to Used state. The invalidated area cannot be returned to its original state again.





When data registration and invalidation are repeated, the memory state turns to the [4] state.
To use the Used state area again, execute the "User Area Defragment" command (DC2 '*' '1'). When the unused state area is less than the next data amount to be registered, issue a registration command to automatically execute the user area defragment. The [5] shows the memory state after the command is executed.

Execute "Remaining User Area Response" command (DC2 '*' '2') to be sure the current memory empty capacity.
By "Remaining User Area Response" command (DC2 '*' '2'), the current memory empty capacity is responded.

2. Precaution of the FLASH memory area rewriting, release and ensure

When defining and registering the command (user-defined character, downloaded character, optional font, macro, NV graphics, downloaded bit image, User page 1-byte font, and User page international characters), and when the data are registered in the area already, the registered data and newly registered data are compared. When all data are equal, the overwritten is not performed.
The remaining memory amount is checked by "Remaining User Area Response" command (DC2 '*' '2').

The maximum rewritable number of the FLASH memory is approximately 100000 times. Execute the "User Area Defragment" command (DC2 '*' '1') after getting low memory for restraining the numbers of the memory rewriting.

Do not turn off the printer while the command on writing or invalidation into the FLASH memory executes. When doing so, operational malfunctioning may occur. To prevent destruction of the FLASH memory, transfer the "Execution Response Request" command (DC2 'q') after command on writing or invalidation, and check a response code.

6.3 STANDARD MODE AND PAGE MODE

There are two ways for print mode: the standard mode that the printer prints the received data sequentially or the page mode that it prints the page data after received one page data can be selected.

6.3.1 Standard Mode

In the standard mode, the printer prints the received data sequentially.
When one line buffer is filled up with the character data (one line full print) or the print condition is established by the "Line Feed" command (LF) or the "Carriage Return" command (CR), the printer starts printing.

6.3.2 Page Mode

In the page mode, the printer prints at each one page.
The printer enters to the page mode by the "Page Mode Select" command (ESC 'L'). When the printer enters to the page mode, the printer maps the received data in the print area of the memory. When the printer receives the "Print and Return to Standard Mode" command (FF) or "Page Mode Data Print" command (ESC FF), the printer prints the data in the print area collectively.
In the page mode, there are two methods, the method that the printer prints only one page and the method that the printer prints the save data for multiple numbers. Refer to the following procedure.

(1) Page mode operational procedures

Table 6-4 and Table 6-5 show the print procedure in the page mode.

Table 6-4 When Only One Page Print Is Desired

Procedure	Command	Description	Remark
1	ESC 'L'	Selects the page mode.	The standard mode and the beginning of the line are required.
2	ESC 'W'	Specifies print area.	When the print area is not specified, all print area is specified.
3	ESC 'T'	Specifies the print start point and print direction.	When the print start point and print direction are not specified: Print start point, upper left; Print direction, left to right.
4	Various	Maps the data in the specified print area.	
5	FF	Prints all data of the page mode collectively and returns to the standard mode.	

Table 6-5 When Multiple Prints Are Desired

Procedure	Command	Description	Remark
1	ESC 'L'	Selects the page mode.	The standard mode and the beginning of the line are required.
2	ESC 'W'	Specifies print area.	When the print area is not specified, all print area is specified.
3	ESC 'T'	Specifies the print start point and print direction.	When the print start point and print direction are not specified: Print start point, upper left; Print direction, left to right.
4	Various	Maps the data in the specified print area.	
5	ESC FF	Prints all data of the page mode collectively.	The data of the page mode is held.
6	⋮	Repeats procedure 5 for [number of reprinting - 1] times.	When changing a part of the print data, execute procedure 2 to 5.
7	ESC 'S'	Returns to the standard mode.	

(2) Data processing of the page mode

1. Preset of the mapping start position

A character, a bit image, and a barcode are mapped with the reference of the mapping start position. Preset the mapping start position by the "Vertical Absolute Position Specify in Page Mode" command (GS '$') before transmitting the print contents. When the printer starts mapping characters and bit images, the mapping start position will be shifted automatically.

2. Mapping of characters and image data

- Characters
  The reference point of characters is lower left. The next mapping start position shifts horizontally for character width (including the right and left space amount).

- Bit image
  The reference point of the bit image is lower left. The next mapping start position shifts horizontally for image width.

- Downloaded bit image, NV graphics
  The reference point of the downloaded bit image and NV graphics is lower left. The next mapping start position shifts horizontally for image width.

- Graphics data stored in print buffer
  The reference point of the graphics data stored in the print buffer is lower left. The next mapping start position does not shift.

- Barcode
  The reference point of the barcode is lower left. The next mapping start position shifts horizontally for the barcode width.

- Raster bit image
  The reference point of the raster bit image is upper left. The next mapping start position shifts horizontally for image width.

The character and the image data are mapped as shown in Figure 6-1.

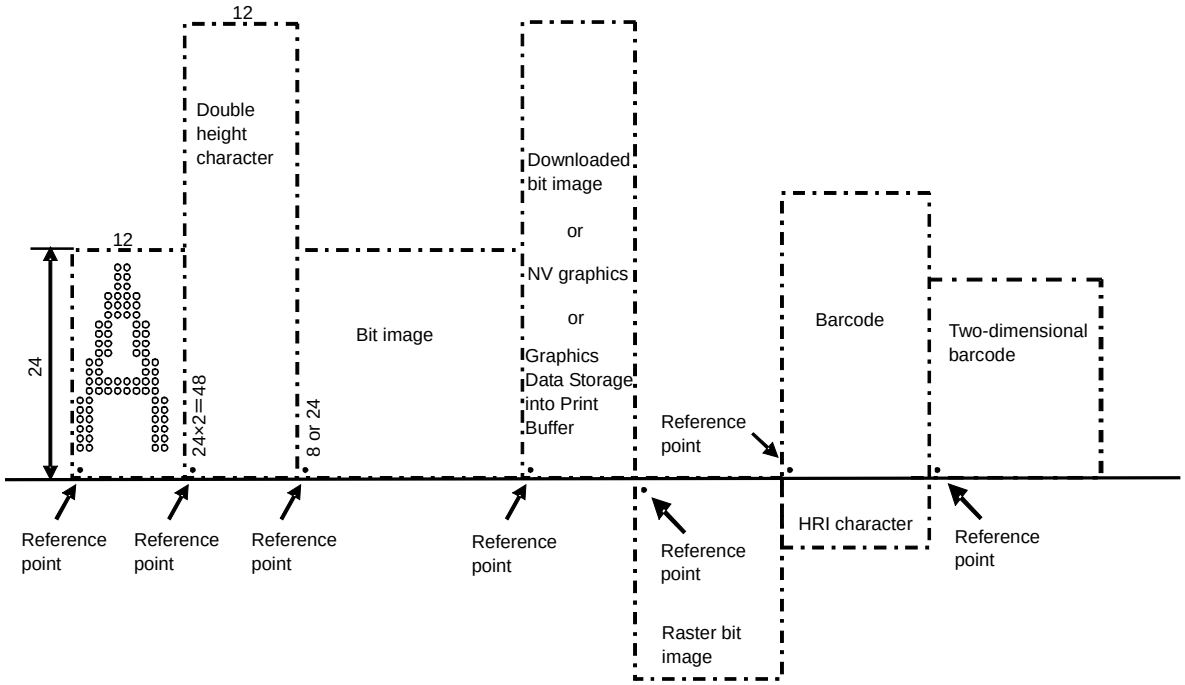


Figure 6-1 Mapping of Characters and Image Data

Transmit print data after executing "Page Mode Select" command (ESC 'L') or "Print Area Set in Page Mode" command (ESC 'W') then specifying mapping start position. When mapping start position is not specified, the position of mapping is undefined.

3. Direction of data mapping

   It is possible to specify the direction of data mapping. See "Character Print Direction Specify in Page Mode" command (ESC 'T').

4. Print command processing

   The commands that involve a print operation in the page mode are "Print and Return to Standard Mode" command (FF) and "Page Mode Data Print" command (ESC FF). Print commands in the standard mode ("Line Feed" command (LF), "Print and Feed Forward" command (ESC 'J'), etc.) do not result in actual printing, but only moving of the mapping start position.

5. Buffer full processing

   When the character data exceeds a line buffer, the subsequent data is mapped from the beginning of the next line.
   When the next line is out of printable area, those data in the next line are discarded.

6. Setting of printing area in page mode

   All printing areas of this printer are listed in Table 6-6.

Table 6-6 Page Mode Maximum Print Range

Paper Width	Maximum Width (X Direction)	Maximum Length (Y Direction)
58 mm	432 dots	2400 dots
80 mm	576 dots	

6.4 RESPONSE DATA

All of upper 4 bits in response data to the host device are identifiers. Table 6-7 shows the meanings to the identifiers.

Table 6-7 Response Identifiers

Identifiers	Function
0xH	Several byte sequence starts or termination
1xH	Xon/Xoff control in the serial communication
2xH to 7xH	ASCII characters
8xH	Execution response
9xH	Progress situation response
AxH	Status response
BxH	Initialized response
CxH	1st byte of automatic status response
DxH	2nd to 8th byte of automatic status response
ExH	Lower 4 bits of HEX code
FxH	Upper 4 bits of HEX code

Each response is responded by the following form.

(1) Character string

Responds the code in the order of the start code (02H), character string and termination code (00H).

For example, when the character string 'SII' is responded:
02H, 53H, 49H, 49H, 00H

(2) HEX code

Responds the code in the order of the start code (0EH), lower byte of HEX code, higher code of HEX code (lower code of HEX code and higher code of HEX code may be responded repeatedly), and termination code (00H).

For example, when the HEX code 12H, 34H, 56H are responded:
0EH, E2H, F1H, E4H, F3H, E6H, F5H, 00H

(3) Execution response

Responds 1 byte code which the logical sum of lower 4 bits of the parameter n specified by "Execution Response Request" command (DC2 'q') and 80H.

For example, when inputting n=4:
84H

(4) Status response

Responds the status byte with 1 byte code specified by "Status Data Send" command (GS 'r').

(5) Progress situation response

Sends various progress situation by lower 4 bits at 16 steps.

(6) Initialized response

Sends 1 byte code after initialization completed.
Lower 4 bits of responded code show its initialized status.

B0H: Initialization by the power on, hardware resetting or serial break.
B1H: Initialization by USB software resetting or download mode resetting.
B2H: Initialization by executing the "Printer Initialize" command (ESC '@').

(7) Automatic status response

When the automatic status response is enabled by executing "Automatic Status Back Enable/Disable" command (GS 'a'), the printer send the status in 8 bytes when specified bit status changed.
When the code CxH is responded from the printer, treat the codes CxH and following 8 bytes (except Xoff) as the response from the automatic status response function.

(8) Peripheral equipment response

Responds the response data from the peripheral equipment in the order of the start code (0FH), lower code of HEX code, higher code of HEX code (lower code of HEX code and higher code of HEX code may be responded repeatedly), and termination code (00H).

For example, when the HEX code 12H, 34H, 56H are responded:
0FH, E2H, F1H, E4H, F3H, E6H, F5H, 00H

6.5 FUNCTION CODE DESCRIPTION

This chapter describes the commands in each function.

Code	Indicates the hexadecimal code (H).
Definition Range	Indicates the parameter and setting data area.
Default	Describes the default for the command with parameter.
Function	Indicates the function of the command.
Notes	Describes notes about the command as needed.
Related Commands	Describes commands related to this command operation.

The meaning of the terms are described below.

- Buffer full
  The line buffer is full status. In the standard mode, the printer prints data in line buffer and feeds paper 1 dot-line after receiving new data. That performance is same as "Line Feed" command (LF). In the page mode, the printer shifts the mapping start position to the beginning of the next line and maps the data after inputting new print data.

- Beginning of line
  The beginning of the line signifies satisfaction of the following conditions.
  No print data (including space and skip portion caused by "Horizontal Tab" command (HT)) exists in the current line buffer.
  No specification of the print position by the "Absolute Position Specify" command (ESC '$'), the "Relative Position Specify" command (ESC '\').

- Printable area
  X direction maximum width that can be printed, as specified by the print width specification. See "6.3.2 Page Mode" for the print width setting. The print width shows the printable area. In the page mode, the print length of Y direction maximum width is defined by "Character Print Direction Specify in Page Mode" command (ESC 'T').

- Print area
  Print area set with the "Print Area Width Set" command (GS 'W') and "Print Area Set in Page Mode" command (ESC 'W'). Must always (Print area ≤ Printable area).

- Ignore
  This is the state of discarding all the code including the parameter and not doing anything.

- Inch
  Unit of length. 1 inch = 25.4mm approx.

- LSB/MSB
  LSB is the least significant bit and MSB is the most significant bit.

- Realtime command
  The command which executes the process when data is received.

6.5.1 Printing Command

LF — Line Feed

Code 0AH

Function [When the standard mode is selected]
Prints the data in the line buffer and performs line feed based on the set line spacing.

[When the page mode is selected]
Moves the mapping start position to the beginning of the next line based on the set line spacing.

Related Commands ESC '2', ESC '3'

FF — (1) Print and Return to Standard Mode (in page mode) (2) Marked Paper Print and Form Feed (in standard mode)

Code 0CH

Function Differs depending on the mode selected.

[When the page mode is selected]
Batch prints data which is mapped to all over the printable area, and returns to the standard mode.

[When the standard mode is selected]
When the Function Setting MS1-3 (Mark Mode Selection) is set to Enable, the printer prints data in the line buffer and executes the thermal paper form feed.

Notes [When the page mode is selected]
All the mapped data is deleted after printing.
The thermal paper cut, marked paper form feed etc. are not executed.
The next print position is the beginning of the line.
The print area set by "Print Area Set in Page Mode" command (ESC 'W') is initialized.

[When the standard mode is selected]
The next print position is the beginning of the line.

Related Commands [When the page mode is selected]
ESC FF, ESC 'L', ESC 'S'

[When the standard mode is selected]
GS FF, GS '<'

CR — Carriage Return

Code 0DH

Function This command is ignored.

ESC FF — Page Mode Data Print

Code 1BH 0CH

Function In the page mode, batch prints all the data mapped to the page buffer.

Notes
Only valid when the page mode is selected. When the standard mode is selected, this command is ignored.
After printing, the mapped data, "Print Area Set in Page Mode" command (ESC 'W') and "Character Print Direction Specify in Page Mode" command (ESC 'T') setting values, and mapping start positions are held.
The thermal paper cut, marked paper form feed etc. are not executed.

Related Commands
FF, ESC 'L', ESC 'S'

ESC 'J' n Print and Feed Forward

Code
1BH 4AH n

Definition Range
0≤n≤255

Function
[When the standard mode is selected]
Feeding the thermal paper for a predefined distance.
When the data exist in the line buffer, the thermal paper is fed after printing one line.
The paper feed distance is [n × basic calculation pitch] inches.
The vertical basic calculation pitch (y) is used.

[When the page mode is selected]
Shifts the mapping start position for predefined distance.
Distance is [n × basic calculation pitch] inches.
The basic calculation pitch differs depending on the start position.

When the starting point is specified as "upper left" or "lower right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the basic calculation pitch (y) in the paper feed direction (characters' vertical direction) is used.

When the starting point is specified as "upper right" or "lower left" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the basic calculation pitch (x) in the direction perpendicular to paper feed (characters' vertical direction) is used.

Notes
The beginning of the line following print completion is the next print position.
This command does not affect the line spacing set by "1/6 Inch Line Spacing Set" command (ESC '2') or "Line Spacing Set" command (ESC '3').
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.

Related Commands
GS 'P'

ESC 'j' n Print and Feed Backward

Code
1BH 6AH n

Definition Range
0≤n≤255

Function
Feeds the thermal paper backward for a predefined distance.
When the data exist in the line buffer, the thermal paper is fed backward after printing one line.
The paper feed distance is [n × basic calculation pitch] inches.
The vertical basic calculation pitch (y) is used.

Notes
Only valid when the standard mode is selected. When the page mode is selected, this command is ignored.
The beginning of the line following print completion is the next print position.
This command does not affect the line spacing set by "1/6 Inch Line Spacing Set" command (ESC '2') or "Line Spacing Set" command (ESC '3').
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.
When the paper feed distance by the compensated value with the basic calculation pitch exceeds 74 dot-lines, this command is ignored.

Related Commands
GS 'P'

ESC 'd' n Print and n Lines Feed Forward

Code
1BH 64H n

Definition Range
0≤n≤255

Function
[When the standard mode is selected]
Feeding the thermal paper for n lines.
The paper feed distance is [n × specified line spacing] inches.
When the data in the line buffer, printing a line and then feeding paper.

[When the page mode is selected]
Moves the mapping start position for n lines.
Moving distance is [n × specified line spacing] inches.

Notes
The next print position is the beginning of the line.

CAN Print Data Cancel in Page Mode

Code
18H

Function
Deletes all the data in the latest print area in the page mode.

Notes
Only valid when the page mode is selected. When the standard mode is selected, this command is ignored.
Data out of print area that is set currently cannot be deleted.

Related Commands
ESC 'L', ESC 'W'
See "6.3.2 Page Mode".

6.5.2 Line Spacing

ESC '2' 1/6 Inch Line Spacing Set

Code	1BH 32H
Function	Specifies the line spacing per line as 1/6 inch (34 dots).
Notes	The line spacing can be independently set in the standard mode and the page mode. This command is not affected by the basic calculate pitch.
Related Commands	ESC '3'

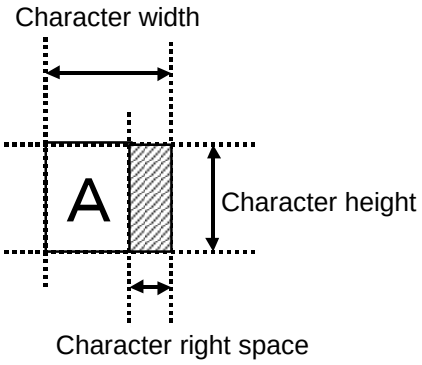
ESC '3' n Line Spacing Set

Code	1BH 33H n
Definition Range	0≤n≤255
Default	The line spacing per line as 1/6 inch (34 dots).
Function	Sets the line spacing per line. The line spacing is [n × basic calculation pitch] inches.
Notes	The line spacing can be independently set in the standard mode and the page mode. The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P'). Moreover, once set, the line spacing is not changed even when the basic calculation pitch is changed by "Basic Calculation Pitch Set" command (GS 'P'). When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded. In the standard mode, the vertical basic calculation pitch (y) is used. When the printer unit is used in the page mode, the operations are as follows depending on the starting point. When the starting point is specified as "upper left" or "lower right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the basic calculation pitch (y) in the paper feed direction (characters' vertical direction) is used. When the starting point is specified as "upper right" or "lower left" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the basic calculation pitch (x) in the direction perpendicular to paper feed (characters' vertical direction) is used.
Related Commands	ESC '2', GS 'P'

6.5.3 Character Set

ESC SP n — Character Right Space Amount Set

Code	1BH 20H n
Definition Range	0≤n≤255
Default	n=0
Function	Sets the amount of space to the right of the character. The right space amount is [n × basic calculation pitch] inches.
Notes	This command does not affect 2-byte character. The amount of right space of double width doubles against the amount of the setting value. It is possible to set the independent right space amount for standard mode and page mode. The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P'). Furthermore, the set right space amount is not changed even when the basic calculation pitch is changed with "Basic Calculation Pitch Set" command (GS 'P') after the right space amount has been set. When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded. In standard mode, the horizontal basic calculation pitch (x) is used. In the page mode, the basic calculation pitch used here is as follows depending on the starting point. When the starting point is specified as "upper left" or "lower right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the horizontal basic calculation pitch (x) is used. When the starting point is specified as "upper left" or "lower right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the vertical basic calculation pitch (y) is used.
Related Commands	GS 'P'



ESC '!' n — Print Mode Select

Code: 1BH 21H n

Definition Range: 0≤n≤255

Default: n=0

Function: Selects the print mode.

Bit	Function	Value	
		0	**1**
0	Character font	Font A selected (24×12)	Font B selected (16×8)
1	Undefined	-	-
2	Undefined	-	-
3	Bold print	Cancel	Specify
4	Double height	Cancel	Specify
5	Double width	Cancel	Specify
6	Undefined	-	-
7	Underline	Cancel	Specify

Notes: When both the double height and double width are specified, double height and double width characters are selected.
When characters with different vertical scale exist on the same line, since the characters are extended using the bottom edge of the characters as reference, the bottom edges of characters are aligned.
When characters are extended horizontally, extension is done in the right direction using the left edge of the characters as reference.

Underlines are applied to the entire character width including the space to the right of the character. However, no underline is applied for the portion skipped by "Horizontal Tab" command (HT), etc., and to 90° right rotated characters.
The underline width is the thickness set with "Underline Settings" command (ESC '-') regardless of the character size. When the underline width is not set with "Underline Settings" command (ESC '-'), the underline width of initial state is 1 dot.
This command does not affect 2-byte character, except bit 3 (bold printing).

Except for this command, the print mode specify/cancel is also possible with other commands. However, the last executed command becomes effective. For example, when bold print is canceled with this command after bold print is specified with "Bold Print Specify/Cancel" command (ESC 'E'), the bold print specified with "Bold Print Specify/Cancel" command (ESC 'E') is canceled.

Related Commands: ESC '-', ESC 'E', ESC 'M', GS '!'

ESC 'M' n — Character Font Select

Code: 1BH 4DH n

Definition Range: n=0, 1, 48, 49

Default: n=0

Function: Selects a character font.

n	Function
0, 48	Select font A (24×12).
1, 49	Select font B (16×8).

Notes: Character fonts can also be selected with "Print Mode Select" command (ESC '!'), but the last executed command becomes effective.

Related Commands: ESC '!'

GS '!' n — Character Size Specify

Code: 1DH 21H n

Definition Range: 0≤n≤255
1≤vertical scale≤8, 1≤horizontal scale≤8

Default: n=0

Function: Specifies a character size (vertical scale/horizontal scale).

Bit	Function	Value	
		Hexadecimal	Decimal
0 to 3	Vertical scale	See table 1 [Vertical Scale]	
4 to 7	Horizontal scale	See table 2 [Horizontal Scale]	

Table 1 Vertical Scale

Hexadecimal	Decimal	Scale
00H	0	×1(default)
01H	1	×2(double height)
02H	2	×3
03H	3	×4
04H	4	×5
05H	5	×6
06H	6	×7
07H	7	×8

Table 2 Horizontal Scale

Hexadecimal	Decimal	Scale
00H	0	×1(default)
10H	16	×2(double width)
20H	32	×3
30H	48	×4
40H	64	×5
50H	80	×6
60H	96	×7
70H	112	×8

Notes

The setting applies to all characters (including kanji) except HRI characters. However, as for the character size of optional font, the scale is specified up to double width or double height. When the command specifies the scale to three or larger, the optional font is modified with double width or double height.
When either vertical scale or horizontal scale is out of definition, this command is ignored.
In the standard mode, the scaling ratio is applied for the paper feed direction as vertical direction and for the vertical direction for the paper feed direction as horizontal direction. Therefore, when specifying character 90° right rotate, the relationship between the length and breadth becomes reverse.
In the page mode, vertical direction shows the vertical direction for the character and horizontal direction shows the horizontal direction for the character.

Related Commands ESC '!', FS '!'

ESC '-' n Underline Settings

Code 1BH 2DH n

Definition Range 0≤n≤2, 48≤n≤50

Default n=0

Function Defines or cancels underline.

n	Function
0, 48	Cancel underline
1, 49	Set 1 dot height underline and specify underline
2, 50	Set 2 dots height underline and specify underline

Notes

Underlines are applied to the entire character width including the space to the right of the character. However, underline is not applied to the portion skipped by "Horizontal Tab" command (HT), etc., and to 90° rotated characters.
When underline is canceled with n=0, no underline is added to the subsequent data, but the underline height setting immediately before underline cancel is retained. Moreover, in the initial state, underline cancel (n=0) is selected.
Regardless of the size of characters, underline height is constant.
This command does not affect 2-byte character.
Except for this command, the underline specify/cancel is also possible with "Print Mode Select" command (ESC '!'). However, the last executed command becomes effective. For example, when underline is canceled with this command after underline is specified with "Print Mode Select" command (ESC '!'), the underline specified with "Print Mode Select" command (ESC '!') is canceled.

Related Commands ESC '!'

ESC 'E' n Bold Print Specify/Cancel

Code 1BH 45H n

Definition Range 0≤n≤255

Default n=0

Function Specifies or cancels bold printing.
When n=<*******0>B, cancels bold printing.
When n=<*******1>B, specifies bold printing.

Notes
Only the LSB is valid for n.
This command affects both 1-byte character and 2-byte character.
However, optional fonts are not affected.

Related Commands
ESC '!'

ESC 'G' n Double Strike Printing Specify/Cancel

Code
1BH 47H n

Definition Range
0≤n≤255

Default
n=0

Function
Specifies or cancels double strike printing.
When n=<*******0>B, cancels double strike printing.
When n=<*******1>B, specifies double strike printing.

Notes
Only the LSB is valid for n.
Print result is exactly the same as bold printing.
This command affects both 1-byte character and 2-byte character.
However, optional fonts are not affected.

Related Commands
ESC 'E'

ESC 'V' n Character 90° Right Rotate Specify/Cancel

Code
1BH 56H n

Definition Range
n=0, 1, 48, 49

Default
n=0

Function
Specifies or cancels 90° character rotation to the right.

n	Function
0, 48	Cancel 90° character rotation to right
1, 49	Specify 90° character rotation to right

Notes
Even when underline is specified, underline is not done for characters that are rotated 90° to the right.
When 90° right rotation is specified, the relation between horizontal scaling and vertical scaling to the character direction is opposite to the case when 90° right rotation is canceled.
This command does not affect the page mode.
When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command affects both 1-byte character and 2-byte character.

Related Commands
ESC '!', ESC '-', FS '!', FS '-'

ESC '{' n — Inversion (Flip) Printing Specify/Cancel

Code	1BH 7BH n
Definition Range	0≤n≤255
Default	n=0
Function	Specifies or cancels inversion (flip) printing. When n=<*******0>B, cancels inversion (flip) printing. When n=<*******1>B, specifies inversion (flip) printing.
Notes	Only the LSB is valid for n. This command is effective only when it is input at the beginning of the line. When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input. This command does not affect the page mode. Inversion (flip) printing rotates the data of the line 180°. This command affects both 1-byte character and 2-byte character.

GS 'B' n — Reverse Print Specify/Cancel

Code	1DH 42H n
Definition Range	0≤n≤255
Default	n=0
Function	Specifies or cancels reverse printing of characters. When n=<*******0>B, cancels reverse printing. When n=<*******1>B, specifies reverse printing.
Notes	Only the LSB is valid for n. Internal characters and downloaded characters are the subject of the reverse print. The right space defined with "Character Right Space Amount Set" command (ESC SP) is also subject to reverse printing. In the following cases, reverse printing is not performed. Bit image (ESC '*') Downloaded bit image (GS '/') Barcode (GS 'k') HRI character (GS 'H') Portion skipped by Horizontal Tab (HT) Portion skipped by Absolute Position Specify (ESC '$') Portion skipped by Relative Position Specify (ESC '\') NV graphics (GS '(' 'L') Graphics Data Storage into Print Buffer (GS '(' 'L') Each two-dimensional barcode print (GS 'p') This command does not affect the space between lines. Bold printing specified and double strike printing are ignored. (Line width of reverse printing character is as same as the normal character.) Reverse print takes precedence over underline. Therefore, even when underline is specified, no underline is applied to reverse print characters. However, the underline setting status does not change. This command affects both 1-byte character and 2-byte character.

ESC 'R' n — International Character Select

Code: 1BH 52H n

Definition Range: 0≤n≤17

Default: n=0

Function: Selects the international character sets listed in the following table.

n	Country	n	Country
0	USA	9	Norway
1	France	10	Denmark II
2	Germany	11	Spain II
3	United Kingdom	12	Latin America
4	Denmark I	13	Prohibition*1
5	Sweden	14	Prohibition*1
6	Italy	15	Prohibition*1
7	Spain I	16	Prohibition*1
8	Japan	17	Arabia

*1: When the Prohibition is selected, the setting is ignored.

Related Commands: See "A.2 INTERNATIONAL CHARACTER SET".

ESC 't' n — Character Code Table Select

Code: 1BH 74H n

Definition Range: n=0 to 5, 16, 18, 19, 37, 45 to 48, 255

Default: Depends on Function Setting.

Function: Selects page n in the character code table as follows.
When selecting the User page, it is required to register the User page beforehand. Set the User page by the "Download Mode Selection" command (DC2 DC2) and then the "1-byte Font Rewrite" command ('S' 'W').

n	Character Set
0	Codepage 437 (USA, Standard Europe)
1	Katakana character set
2	Codepage 850 (Multilingual)
3	Codepage 860 (Portuguese)
4	Codepage 863 (Canadian-French)
5	Codepage 865 (Nordic)
16	Codepage 1252 (Latin)
18	Codepage 852 (Eastern Europe)
19	Codepage 858 (Euro)
37	Codepage 864 (Arabic)
45	Codepage 1250 (Central European)
46	Codepage 1251 (Cyrillic)
47	Codepage 1253 (Greek)
48	Codepage 1254 (Turkish)
255	User page

Notes Codepage 864 is printed in font A (24×12), regardless of the selection of character fonts.

Related Commands DC2 'w', DC2 'l'
See "APPENDIX A CHARACTER SETS (CHARACTER CODE TABLE)".

ESC 'y' a b c 1-byte Font ID Send

Code 1BH 79H a b c

Definition Range a=0, 1
b=255, 0≤c≤7

Function
a: Font size
b: Page No.
c: Information

Sends the information specified by c of the 1-byte font specified by a and b. Page No. is the number registered in the "1-byte Font Rewrite" command ('S' 'W' a [d1]k1 b [d2]k2).

a	Font Size
0	24 dots font
1	16 dots font

c	Function	Response Type
0	Reserved	-
1	Reserved	-
2	Reserved	-
3	Check SUM (2 bytes)	HEX code
4	Reserved	-
5	Reserved	-
6	ID (64 bytes)	Character string
7	Registered international character	Character string

When specifying c as 7, the printer sends registered international abbreviation with the character strings.
When two or more international characters are registered, they are separated by a comma ','.
The character strings sent by the registered content are shown below.

International Character	Responded Strings
USA	US
France	FR
Germany	DE
United Kingdom	UK
Denmark I	DK1
Sweden	SE
Italy	IT
Spain I	ES
Japan	JP
Norway	NO
Denmark II	DK2
Spain II	ES2
Latin America	LA*
Arabia	AR*

Notes

When the font specified by a or b is not registered, only the header and footer by selected response type are sent.

Related Commands

See "6.5.12 Download Mode".
See "6.4 RESPONSE DATA".

ESC '&' y s e [x [d]k]n Downloaded Character Registration

Code 1BH 26H y s e [x [d]k]n

Definition Range
y=3 (when font A (24×12) is selected)
y=2 (when font B (16×8) is selected)
20H≤s≤e≤7EH
0≤x≤12 (when font A (24×12) is selected)
0≤x≤8 (when font B (16×8) is selected)
0≤d≤255

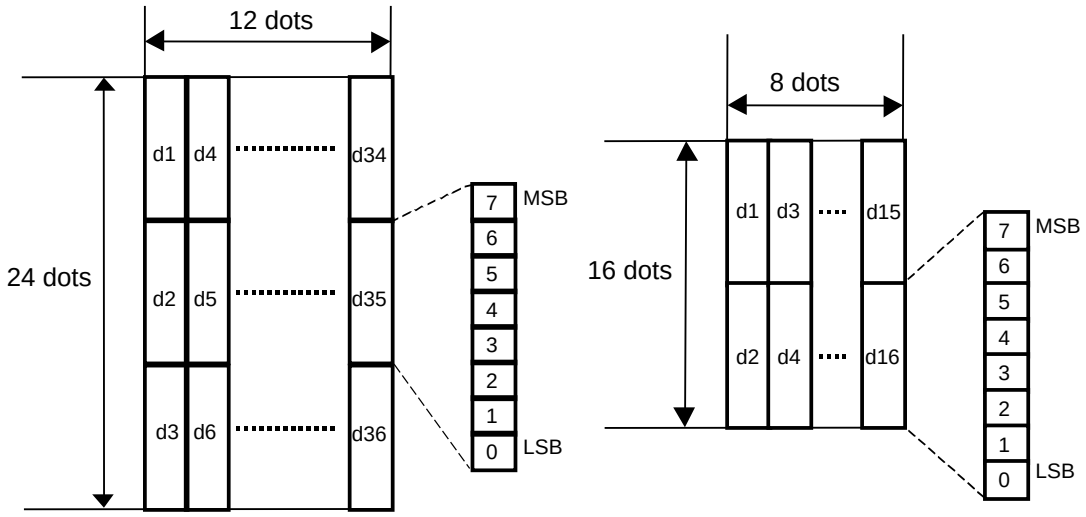
Function Registers the downloaded character pattern to the specified character code.
y defines the number of bytes in the vertical direction.
s defines the registration start character code, and e defines the registration end character code.
x specifies the horizontal dot count to be registered.
d defines the font data.
k specifies the number of data bytes required for downloaded character registration of one character.
n specifies the number of characters required for downloaded character registration.
The downloaded characters are not registered at the shipping.

Notes The character codes that can be registered are ASCII code in the range of 20H to 7EH.
Multiple continuous character codes can be registered per registration. To specify only one character, specify s=e.

d is registration data and indicates the pattern of x dots in horizontal direction from the left end. When at this time x is less than the character configuration dot count, the remaining dots on the right side become spaces.

The number of data bytes required for the downloaded character registration of one character k is k=y × x bytes.
The number of data bytes required for the downloaded character registration n is n=e-s+1.
Registration data bit is 1 in case of corresponding to a dot to be printed, or is 0 in case of corresponding to a dot not to be printed.
The memory usage is m=6184 bytes. (Included number of bytes of memory control information.)

Related Commands ESC '%', ESC '?'



ESC '%' n — Downloaded Character Set Specify/Cancel

Code	1BH 25H n
Definition Range	0≤n≤255
Default	n=0
Function	Specifies or cancels a downloaded character set. When n=<*******0>B, cancels the downloaded character set. When n=<*******1>B, specifies the downloaded character set.
Notes	Only the LSB is valid for n. When the downloaded character set was canceled, the internal character set is automatically specified.
Related Commands	ESC '&', ESC '?'

ESC '?' n — Downloaded Character Release

Code	1BH 3FH n
Definition Range	20H≤n≤7EH
Function	Releases the downloaded character corresponding to the specified code.
Notes	n indicates the character code for releasing the registration pattern. After releasing, the printer prints the internal character. Releases the downloaded character specified by the character code n. The character font selected by "Print Mode Select" command (ESC '!') is subjected to. When the specified character code is undefined, this command is ignored.
Related Commands	ESC '&', ESC '%'

DC2 'D' n — Downloaded Character Area Operation

Code	12H 44H n
Definition Range	0≤n≤255
Function	Releases or allocates the downloaded character area. When n=<*******0>B, releases the downloaded character area. When n=<*******1>B, allocates downloaded character area.
Notes	Only the LSB is valid for n. When the downloaded character area is released, the downloaded characters are deleted, and the downloaded character specification is canceled. Moreover, "Downloaded Character Registration" command (ESC '&') and "Downloaded Character Set Specify/Cancel" command (ESC '%') are ignored. The downloaded character area is 6184 bytes. To allocate again a downloaded character area that has been freed, a remaining memory capacity of 6184 bytes or more is required. When the remaining memory capacity is insufficient, the downloaded character area is not allocated and command is ignored. The remaining memory capacity is not increased. It is possible to use again as the user area by "User Area Defragment" command (DC2 '*' '1').

DC2 'O' n — Optional Font Select

Code 12H 4FH n

Definition Range 0≤n≤255

Default n=0 (Optional font printing cancel)

Function Selects and cancels optional font.
When n=<*******0>B, cancels optional font printing.
When n=<*******1>B, selects optional font printing.

Notes Only the LSB is valid for n.
When an optional font is selected, the subsequent character codes are printed using this optional font when the optional font has been registered previously.
Optional font has priority over downloaded character in printing.

DC2 'P' s e y x [d]k — Optional Font Registration

Code 12H 50H s e y x [d]k

Definition Range 20H≤s≤e≤7EH
1≤y≤127, 1≤x≤127

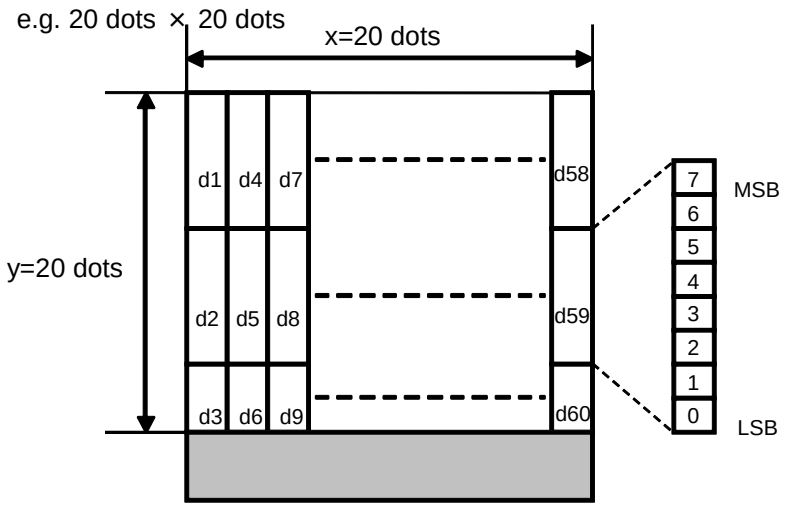
Function Allocates memory area of optional font and registers it.
The registration start character code is specified with s, and the registration end character code is specified with e.
Optional font vertical dot count is specified with y.
Optional font horizontal dot count is specified with x.
d defines the font data.
k specifies the number of total data bytes required for optional font registration.
The optional fonts are not registered at the shipping.

Notes When optional font is already registered, and when it is not as same as the registered content, allocate the area again and register it.
When y falls outside the domain, the subsequent data is processed as character code.
When x falls outside the domain, the subsequent data is processed as character code.

The data count per character is
INT ((y+7)/8) × x bytes.

Therefore, the total data count
k=INT ((y+7)/8) × x × (e-s+1).

Regarding the font data of one character, vertical 8 dots are input as 1 byte data in the order shown in the following figure. The following figure is based on x=y=20.



*The gray area is disregarded.

The calculating method of the memory usage m is different from the calculating method of the total data count k. It is because in the calculating method of the memory usage m, the font image is stored by the low scan method when registering to the memory.
The memory usage
m=INT((x+7)/8) × y × (e-s+1) + (number of bytes of memory control information)

DC2 'Q' Optional Font Area Release

Code	12H 51H
Function	Releases the memory area for the registered optional fonts. The registered optional fonts are not printed after release.
Notes	The remaining memory capacity is not increased. It is possible to use again as the user area by "User Area Defragment" command (DC2 '*' '1').

6.5.4 Print Position

ESC 'L' Page Mode Select

Code 1BH 4CH

Function Switches the mode from the standard mode to the page mode.

Notes This command is effective only when it is input at the beginning of the line.
This command is not effective when input is executed in the page mode.
The printer unit returns to the standard mode after processing the print with "Print and Return to Standard Mode" command (FF) or executing the command of "Standard Mode Select" command (ESC 'S').
In the page mode, the received data is mapped in the print area specified with "Print Area Set in Page Mode" command (ESC 'W'), and the data in all over the area is batch printed with the "Print and Return to Standard Mode" command (FF) or "Page Mode Data Print" command (ESC FF). Print/line feed commands such as "Line Feed" command (LF), "Print and Feed Forward" command (ESC 'J'), and "Print and n Lines Feed Forward" command (ESC 'd') just move the mapping start position of the next data and do not actually execute printing.
The mapping start position is the starting point specified with "Character Print Direction Specify in Page Mode" command (ESC 'T') in the print area specified with "Print Area Set in Page Mode" command (ESC 'W').

The following commands have independent setting values in the page mode and standard mode. The "Page Mode Select" command (ESC 'L') is switched to the setting values of the page mode.

ESC SP	Character Right Space Amount Set
FS 'S'	Kanji Space Amount Set
ESC '3'	Line Spacing Set
ESC '2'	1/6 Inch Line Spacing Set

For the following commands, only setting is available in page mode.

ESC 'V'	Character 90° Right Rotate Specify/Cancel
ESC 'a'	Alignment
ESC '{'	Inversion (Flip) Printing Specify/Cancel
GS 'L'	Left Margin Set
GS 'W'	Print Area Width Set

Related Commands FF, CAN, ESC FF, ESC 'S', ESC 'T', ESC 'W', GS '$', GS '\'
See "6.3.2 Page Mode".

ESC 'S' Standard Mode Select

Code 1BH 53H

Function Switches the printer unit from the page mode to the standard mode.

Notes This command is effective only when it is input in the page mode.
The data mapped in the page mode is deleted.
The print area set through the "Print Area Set in Page Mode" command (ESC 'W') is initialized.

The setting values of the following commands, which have independent values in the page mode and standard mode, are switched to the setting values of the standard mode.

ESC SP	Character Right Space Amount Set
FS 'S'	Kanji Space Amount Set
ESC '3'	Line Spacing Set
ESC '2'	1/6 Inch Line Spacing Set

Related Commands | ESC 'L'

GS 'P' x y — Basic Calculation Pitch Set

Code | 1DH 50H x y

Definition Range | 0≤x≤255
0≤y≤255

Default | x=203, y=203 (Minimum pitches of the printer)

Function | Sets the horizontal basic calculation pitch to 1/x inches, and the vertical basic calculation pitch to 1/y inches.
Returns to the initial value when x=0, y=0.

Notes | The horizontal direction means the direction perpendicular to paper feed, and the vertical direction means the paper feed direction.

In the standard mode, the following parameters are used regardless of the character orientation (inversion (flip), 90° right rotated, etc.).

Commands that use x: ESC SP, ESC '$', ESC '\', FS 'S', GS 'L', GS 'W'
Commands that use y: ESC '3', ESC 'J', ESC 'j', GS 'A', GS 'V'

In the page mode, the following parameters are used depending on the character orientation.

When starting point is "upper left" or "lower right" through "Character Print Direction Specify in Page Mode" command (ESC 'T') (characters mapped in direction perpendicular to paper feed)
Commands that use x: ESC SP, ESC '$', ESC 'W', ESC '\', FS 'S'
Commands that use y: ESC '3', ESC 'J', ESC 'W', GS '$', GS '\'

When starting point is "upper right" or "lower left" through "Character Print Direction Specify in Page Mode" command (ESC 'T') (characters mapped in paper feed direction)
Commands that use x: ESC '3', ESC 'J', ESC 'W', GS '$', GS '\'
Commands that use y: ESC SP, ESC '$', ESC 'W', ESC '\', FS 'S'

This command does not affect existing settings (Line spacing and character spacing, etc.).
When the calculation result combined with other commands is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.

Related Commands | ESC SP, ESC '$', ESC '\', ESC '3', ESC 'J', ESC 'j', ESC 'W', FS 'S', GS '$', GS '\', GS 'A', GS 'L', GS 'W', GS 'V'

HT — Horizontal Tab

Code | 09H

Function | Shifts the print position to the next horizontal tab position.

Notes | This command is ignored when the next horizontal tab position has not been set.
The print position is shifted to [print area + 1] when the next horizontal tab position is beyond the print area.
The horizontal tab position is set with "Horizontal Tab Position Set" command (ESC 'D').
The initial horizontal tab position value is every 8 characters for the characters selected in the initial state.
Upon reception of this command when the print position is at [print area + 1] and the standard mode is selected, the current line buffer full print and horizontal tab processing from the beginning of the next line are executed.

Upon reception of this command when the print position is at [print area + 1] and the page mode is selected, the current line buffer full processing and horizontal tab processing from the beginning of the next line are executed.

Related Commands ESC 'D'

ESC 'D' [n]k NUL Horizontal Tab Position Set

Code 1BH 44H [n]k 00H

Definition Range 1≤n≤255, 0≤k≤32

Default Every eight characters selected in the initial state.

Function Sets the horizontal tab positions
n indicates the number of columns from the left margin or the beginning of the line up to the setting position.
k indicates the number of horizontal tab position data to be set.

Notes The horizontal tab position is set as [n × character width] from the left margin or the beginning of the line. Character width here means the entire character width including the space to the right of the character, and when double width is specified, this width is doubled.
This command cancels already set horizontal tab positions.
When n=8 is set as the horizontal tab position, the next print position shifts to the 9th column as the result of "Horizontal Tab" command (HT) execution.
A maximum of 32 horizontal tabs can be set (k=32). When the number of tabs exceeds this number, the data after the last tab is processed as normal data.
n that specifies the setting position is input in ascending order and then input 00H finally. When n is a value equal to or smaller than the immediately preceding n, tab setting ends the moment this n is input, and the subsequent data is processed as normal data.
Send the "Horizontal Tab Position Set" command (ESC 'D' [n]k NUL) command to cancel all tab settings.
When n exceeds the printable area for one line, a horizontal tab is set in the [number of maximum print column + 1] position.
Even when the character width is changed after setting the horizontal tab positions, the set horizontal tab positions remain unchanged.

Related Commands HT

ESC 'a' n Alignment

Code 1BH 61H n

Definition Range 0≤n≤2, 48≤n≤50

Default n=0

Function Aligns the print data on each line at the specified position.

n	Alignment
0, 48	Align left
1, 49	Centered
2, 50	Align right

Notes

This command is effective only when it is input at the beginning of the line.
When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command does not affect the page mode.
Alignment is performed within the print area's width.
Even portions skipped through the use of "Horizontal Tab" command (HT), "Absolute Position Specify" command (ESC '$'), "Relative Position Specify" command (ESC '\'), etc., are subject to alignment.

GS 'L' nl nh — Left Margin Set

Code

1DH 4CH nl nh

Definition Range

0≤nl≤255
0≤nh≤255

Default

nl=0, nh=0

Function

Sets the left margin set with nl and nh.
The left margin is [(nh × 256+nl) × basic calculation pitch] inches.

Notes

This command is effective only when it is input at the beginning of the line.
When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command does not affect the page mode.

When a value that exceeds the printable area for 1 line is input, the maximum value of the printable area is set as the left margin.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P'). The set left margin does not change even when the basic calculation pitch is changed with "Basic Calculation Pitch Set" command (GS 'P') after the left margin has been set.
"Basic Calculation Pitch Set" command (GS 'P') horizontal basic calculation pitch (x) is used for calculating the left margin. Moreover, when the calculation result is a fractional number, it is compensated using the printer's minimum pitch, and the remainder is discarded.

When the set print area width is less than one character of the currently specified type during character data mapping, the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area corresponding to one character of the specified type is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

When the set print area width is less than the minimum width of one internal character (font size width selected by character font select) during mapping of non-character data (bit image, etc.), the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area up to one character of the minimum width among the internal characters is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

Ruled line data specified with "Ruled Line" command (DC3) is not shifted or masked by Left Margin Set. (Ruled line data is always valid in printable area.)

Related Commands

GS 'P', GS 'W'

GS 'W' nl nh Print Area Width Set

Code 1DH 57H nl nh

Definition Range 0≤nl≤255
0≤nh≤255

Default Printable area

Function Sets the print area width specified with nl and nh.
The print area width is [(nh × 256+nl) × basic calculation pitch] inches.

Notes This command is effective only when it is input at the beginning of the line.
When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command does not affect the page mode.

When a value that exceeds the printable area for 1 line is input, the entire area except the left margin is set as the print area width.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
Moreover, the set print area width does not change even when the basic calculation pitch is changed with "Basic Calculation Pitch Set" command (GS 'P') after the print area width has been set.

"Basic Calculation Pitch Set" command (GS 'P') horizontal basic calculation pitch (x) is used for calculating the print area width. Moreover, when the calculation result is a fractional number, it is compensated using the printer's minimum pitch, and the remainder is discarded.

When the set print area width is less than one character of the currently specified type during character data mapping, the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area corresponding to one character of the specified type is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

When the set print area width is less than the minimum width of one internal character (font size width selected by character font select) during mapping of non-character data (bit image, etc.), the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area up to one character of the minimum width among the internal characters is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

Ruled line data specified with "Ruled Line" command (DC3) is not shifted or masked by Left Margin Set. (Ruled line data is always valid in maximum printable area.)

Related Commands GS 'L', GS 'P'

ESC 'T' n Character Print Direction Specify in Page Mode

Code 1BH 54H n

Definition Range 0≤n≤3, 48≤n≤51

Default When the MS13-2 (180° Reverse Function Selection) is Disabled: n=0
When the MS13-2 (180° Reverse Function Selection) is Enabled: n=2

Function Specifies the character print direction and starting point in the page mode.

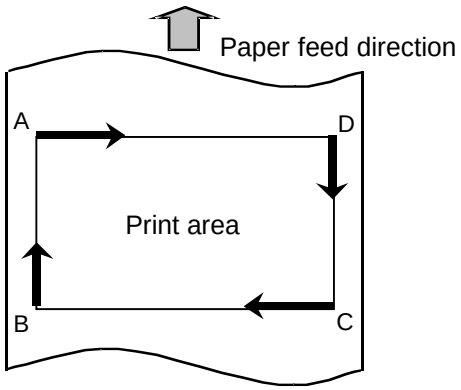
n	Print Direction	Starting Point
0, 48	Left -> Right	Upper left (A in figure at below)
1, 49	Bottom -> Top	Lower left (B in figure at below)
2, 50	Right -> Left	Lower right (C in figure at below)
3, 51	Top -> Bottom	Upper right (D in figure at below)

Notes When the standard mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command does not affect the standard mode.
The mapping start position of the character is the starting point specified with "Print Area Set in Page Mode" command (ESC 'W') in the print area.
The basic calculation pitch parameters (x or y) used for the following commands differ depending on the starting point.

When the starting point is "upper left" or "lower right" (character mapped in direction perpendicular to paper feed direction)
Commands that use x: ESC SP, ESC '$', ESC '\', FS 'S'
Commands that use y: ESC '3', ESC 'J', GS '$', GS '\'

When the starting point is "upper right" or "lower left" (character mapped in paper feed direction)
Command that use x: ESC '3', ESC 'J', GS '$', GS '\'
Commands that use y: ESC SP, ESC '$', ESC '\', FS 'S'

Related Commands ESC '$', ESC 'L', ESC 'W', ESC '\', GS '$', GS 'P', GS '\'
See "6.3.2 Page Mode".



ESC 'W' xL xH yL yH dxL dxH dyL dyH — Print Area Set in Page Mode

Code 1BH 57H xL xH yL yH dxL dxH dyL dyH

Definition Range 0≤xL, xH, yL, yH, dxL, dxH, dyL, dyH≤255

Default Printable area of the thermal paper.

Function Sets the print area position and size.
The settings are as follows.
Horizontal starting point = [(xH × 256+xL) × basic calculation pitch] inches
Vertical starting point = [(yH × 256+yL) × basic calculation pitch] inches
Horizontal length = [(dxH × 256+dxL) × basic calculation pitch] inches
Vertical length = [(dyH × 256+dyL) × basic calculation pitch] inches

Notes When the standard mode is selected, only the printer unit's internal flag operation is performed when this command is input.
This command does not affect the standard mode.
This command is ignored when the horizontal or vertical starting point falls outside the printable area. Refer to "6.3.2 Page Mode" for page mode printable area.

The mapping start position of the character is the starting point specified with "Character Print Direction Specify in Page Mode" command (ESC 'T') in the print area.

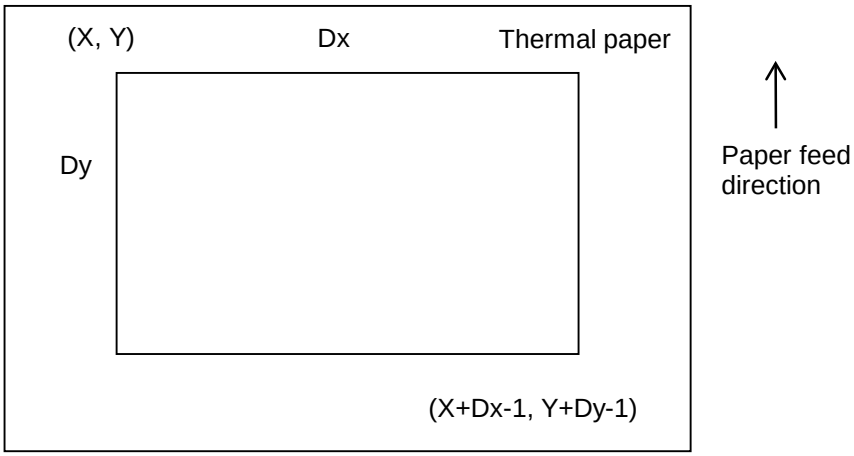
When either the (horizontal starting point + horizontal length) or (vertical starting point + vertical length) falls outside the printable area, the maximum value of the print area becomes the printable area.

The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P'). Moreover, the set print area does not change even when the basic calculation pitch is changed with "Basic Calculation Pitch Set" command (GS 'P') after the print area has been set.

When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.

Basic calculation pitch (x) is used to calculate the horizontal starting point and horizontal length, and basic calculation pitch (y) is used to calculate the vertical starting point and vertical length.

Using X as the horizontal starting point, Y as the vertical starting point, Dx as the horizontal length, and Dy as the vertical length, the print area appears as follows.



When the page mode is selected, the ruled line data specified by the ruled line command (DC3) is affected by the print area specified by this command. The ruled line is not printed outside the print area.

Related Commands: CAN, ESC 'L', ESC 'T', GS 'P'
See "6.3.2 Page Mode".

ESC '$' nl nh Absolute Position Specify

Code: 1BH 24H nl nh

Definition Range: 0≤nl≤255
0≤nh≤255

Function: Specifies the print position using the left margin position as reference.
The next print position is [(nh × 256+nl) × basic calculation pitch] inches from the left margin position.

Notes: Specified values that fall outside the print area are ignored.
The absolute position of the print position is specified using the beginning of the line as reference.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.

In standard mode, the horizontal basic calculation pitch (x) is used.

In the page mode, the following operations are executed, depending on the starting point.

(1) When the starting point is specified as "upper left" or "lower right" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the absolute position in the perpendicular direction (horizontal direction of character) is specified for paper feed. At this time, the horizontal basic calculation pitch (x) is used for calculation.

(2) When the starting point is specified as "upper right" or "lower left" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the absolute position in the paper feed direction (horizontal direction of character) is specified. At this time, the vertical basic calculation pitch (y) is used for calculation.

Related Commands: ESC '\', GS 'P'

ESC '\' nl nh Relative Position Specify

Code: 1BH 5CH nl nh

Definition Range: 0≤nl≤255, 0≤nh≤255

Function: Specifies the print position using the current position as reference.
The next print position is [(nh × 256+nl) × basic calculation pitch] inches from the current position.

Notes: Specified values that fall outside the print area are ignored.
In relation to the character direction, to specify a right position of the current position, specify a positive number, and to specify a left position of the current position, specify a negative number. The negative number is in 2's complement.

The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.
In standard mode, the horizontal basic calculation pitch (x) is used.

In the page mode, the following operations are executed, depending on the starting point.

(1) When the starting point is specified as "upper left" or "lower right" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the relative position of the perpendicular direction to the paper feed direction (character's horizontal direction) specified. At this time, the horizontal basic calculation pitch (x) is used.

(2) When the starting point is specified as "upper right" or "lower left" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the relative position in the paper feed direction (horizontal direction of character) is specified. At this time, the vertical basic calculation pitch (y) is used.

Related Commands ESC '$', GS 'P'

GS '$' nl nh Vertical Absolute Position Specify in Page Mode

Code 1DH 24H nl nh

Definition Range 0≤nl≤255, 0≤nh≤255

Function The vertical absolute position of data mapping start position of the character is specified on the basis of the starting point, when the page mode is specified.
The absolute position is [(nh × 256+nl) × basic calculation pitch] inches.

Notes This command is effective only when the page mode is selected.
The reference starting point refers to the position specified with "Character Print Direction Specify in Page Mode" command (ESC 'T').
Absolute position specification that exceeds the specified print area is ignored.

The following operations are performed depending on the starting point of "Character Print Direction Specify in Page Mode" command (ESC 'T').

(1) When the starting point is specified as "upper left" or "lower right", the absolute position in the paper feed direction (vertical direction of the character) is specified. At this time, the vertical basic calculation pitch (y) is used.

(2) When the starting point is specified as "lower left" or "upper right", the absolute position in the perpendicular direction to paper feed (vertical direction of the character) is used. At this time, the horizontal basic calculation pitch (x) is used.

The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.
When characters with different vertical scale exist on the same line, the characters are extended using the base line or the bottom edge of the character.

The base line is set at 0 dots.

The references for the mapping of data to the specified print position are as shown in the table below.

Data	Mapping Reference
Character	Bottom edge of character
Bit image	Bottom edge of bit image
Downloaded bit image	Bottom edge of downloaded bit image
Raster bit image	Top edge of raster bit image
NV graphics	Bottom edge of NV graphics
Graphics data storage into print buffer	Bottom edge of graphics
Barcode	Bottom edge of barcode (except HRI characters)

Related Commands ESC 'T', GS '\', GS 'P'
See "6.3.2 Page Mode".

GS '\' nl nh Vertical Relative Position Specify in Page Mode

Code 1DH 5CH nl nh

Definition Range 0≤nl≤255, 0≤nh≤255

Function The vertical relative position of data mapping start position of the character is specified on the basis of the current position, when the page mode is specified.
The relative position is [(nh × 256+nl) × basic calculation pitch] inches.

Notes This command is effective only when the page mode is selected.
The current position used as reference means the mapping reference position for the next data.

In relation to the character, to specify a lower position from the current position, specify a positive number, and to specify a higher position from the current position, specify a negative number. The negative number is in 2's complement.

Relative position specifications that exceed the specified print area are ignored.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.

The following operations are performed depending on the starting point of "Character Print Direction Specify in Page Mode" command (ESC 'T').

(1) When the starting point is specified as "upper left" or "lower right", the relative position of paper feed (vertical character direction) is specified. At this time, the vertical basic calculation pitch (y) is used for calculation.

(2) When the starting point is specified as "lower left" or "upper right", the relative position in the perpendicular position to paper feed (vertical character direction) is specified. At this time, the horizontal basic calculation pitch (x) is used for calculation.

The references for the mapping of data to the specified print position are as shown in the table below.

Data	Mapping Reference
Character	Bottom edge of character
Bit image	Bottom edge of bit image
Downloaded bit image	Bottom edge of downloaded bit image
Raster bit image	Top edge of raster bit image
NV graphics	Bottom edge of NV graphics
Graphics data storage into print buffer	Bottom edge of graphics
Barcode	Bottom edge of barcode (except HRI characters)

Related Commands ESC 'T', GS '$', GS 'P'
See "6.3.2 Page Mode".

6.5.5 Image

ESC '*' m nl nh [d]k — Bit Image Mode Print

Code 1BH 2AH m nl nh [d]k

Definition Range m=0, 1, 32, 33
0≤nl≤255, 0≤nh≤3, 0≤d≤255

Function Prints the number of dots defined by nl and nh as the bit image in the mode specified by m.

m	Mode	Vertical Dot Density	Horizontal Dot Density	Data Count (k)
0	8 dots single density	8	Single density	nh × 256+nl
1	8 dots double density	8	Double density	nh × 256+nl
32	24 dots single density	24	Single density	(nh × 256+nl)×3
33	24 dots double density	24	Double density	(nh × 256+nl)×3

Notes When m falls outside the parameter range, the data after nl is processed as normal data.
nl and nh indicate the horizontal dots of the bit image to be printed, and are [nh × 256+nl].
When bit image data exceeds the printable dot count for one line, the exceeding portion is discarded.
d indicates the bit image data. Bits that correspond to dots to be printed are 1, and bits that correspond to dots that are not printed are 0.

When the print area width specified by "Left Margin Set" command (GS 'L') and "Print Area Width Set" command (GS 'W') is less than the minimum width of one internal character, the following processing is performed only for that line.

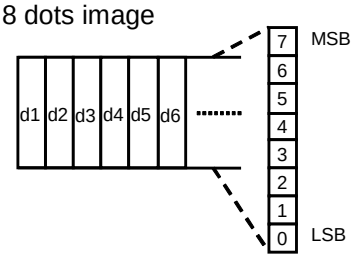
(1) In the range that does not exceed the printable area, the print area up to one character of the minimum width among the internal characters is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

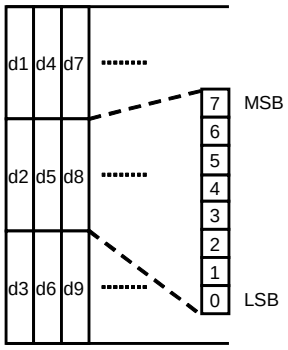
The printer returns to usual data processing after executing image data.
The commands for Bold Print Specify, Double Strike Printing Specify, Underline Specify and Character Font Select other than inversion printing do not affect this command.

<Data input order>

8 dots image



24 dots image



GS '*' x y [d]k — Downloaded Bit Image Registration

Code 1DH 2AH x y [d]k

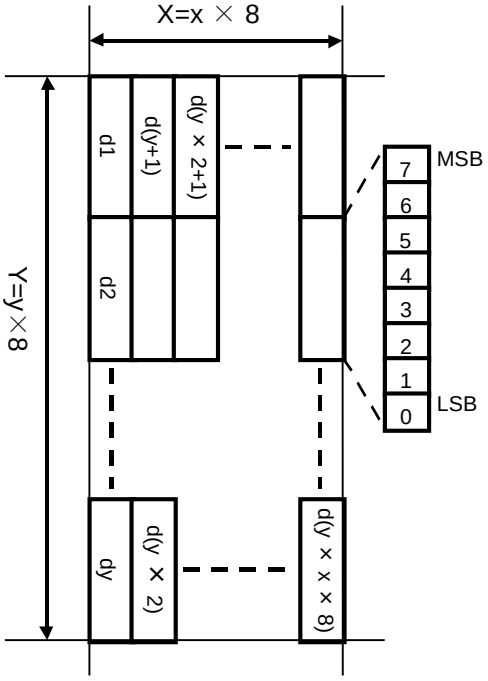
Definition Range 1≤x≤255, 1≤y≤255, 0≤d≤255, 8≤k≤65524
(However, delete in case of x=0 or y=0)

Function Registers the downloaded bit image with bit count defined with x and y.
x × 8 specifies the horizontal bit count.
y × 8 specifies the vertical bit count.
Downloaded bit images are not registered at the shipping.

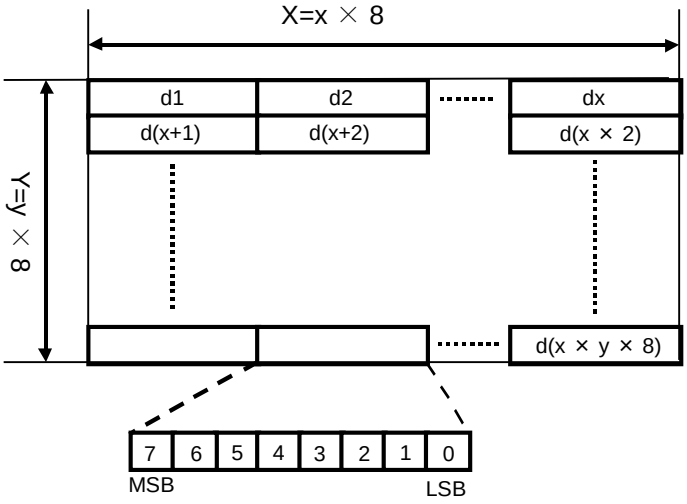
Notes Downloaded bit image is registered in user area with this command. And it is possible to print by the "Downloaded Bit Image Print" command (GS '/').
A horizontal dot count of (x × 8) dots, and a vertical dot count of (y × 8) dots is used.
d indicates the bit image data. 1 is used for bits corresponding to dots to be printed, and 0 for bits corresponding to dots that are not printed.
65524-byte or more image data cannot be registered.
Whether to use the column scan mode or the row scan mode for transfer data can be selected with the "Bit Image Scan Method Selection" command (DC2 'I').
k indicates the number of data bytes. k=y × x × 8 bytes
The relation between the downloaded bit image and image data is shown as follows.
The memory usage amount m=k+(number of bytes of memory control information) bytes.
When there is the data in the line buffer at the standard mode, this command is ignored.

Related Commands GS '/'

<Column scan mode>



<Row scan mode>



(1) GS '/' m — Downloaded Bit Image Print
(2) GS '/' m n — Downloaded Bit Image Selection

Code

(1) 1DH 2FH m
(2) 1DH 2FH m n

Definition Range

(1) 0≤m≤3, 48≤m≤51
(2) 4≤m≤7, 52≤m≤55, 0≤n≤255

Function

Prints the specified downloaded bit image data in mode m.
When m is in the range 4≤m≤7 or 52≤m≤55, print start position in horizontal direction of downloaded bit image can be specified with n.
(The print start position is specified with n × 8 dots from the left edge of the thermal paper).

m	Function
0, 48	Normal mode printing
1, 49	Double width mode printing
2, 50	Double height mode printing
3, 51	Double height and width mode printing
4, 52	Normal mode selection
5, 53	Double width mode selection
6, 54	Double height mode selection
7, 55	Double height and width mode selection

Notes

This command is not effective when the downloaded bit image data is not defined.
When the standard mode is selected, this command is effective only when there is no data in the line buffer.
Except for inversion (flip) printing, this command does not affect the print mode (bold print, double strike printing, underline, character size, etc.). The inversion (flip) printing is disabled in "Downloaded Bit Image Selection" command (GS '/').
When the registered downloaded bit image data count exceeds the print area, the data that exceeds the print area is not printed.

When downloaded bit image, character data, bit image mode print, and barcodes are mixed in the same line in page mode, the bottom of downloaded bit image and the others are aligned as follows:

Character data:	Bottom edge of the character are aligned.
Bit image:	Bottom edges of bit images are aligned.
Barcode:	Bottom edges of barcodes are aligned. At this time, HRI characters are not included.

When the print area width specified by "Left Margin Set" command (GS 'L') and "Print Area Width Set" command (GS 'W') is less than the minimum width of one internal character, the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area up to one character of the minimum width among the internal characters is extended toward the right side.
(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

When this command is received with m in the range 0≤m≤3 or 48≤m≤51, printing starts immediately.
When m is in the range 4≤m≤7 or 52≤m≤55, the selected downloaded bit image is printed in the character print area and the space between lines. Printing is also done in the paper feed area with "Print and Feed Forward" command (ESC 'J') and "Print and n Lines Feed Forward" command (ESC 'd').
When the downloaded bit image is selected, specifying outside the range 4≤m≤7 or 52≤m≤55 cancels the downloaded bit image selection.
In the page mode, downloaded bit image selection is invalid.

Related Commands GS '*'

GS 'v' '0' m xL xH yL yH [d]k Raster Bit Image Print

Code 1DH 76H 30H m xL xH yL yH [d]k

Definition Range 0≤m≤3, 48≤m≤51, 128≤m≤131
0≤xL≤255, 0≤xH≤255
0≤yL≤255, 0≤yH≤15, 0≤d≤255
k=(xH × 256+xL)×(yH × 256+yL), however, k≠0

Function Prints raster format bit images in mode m.

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48, 128	Normal mode	203 dpi	203 dpi
1, 49, 129	Double width mode	203 dpi	101 dpi
2, 50, 130	Double height mode	101 dpi	203 dpi
3, 51, 131	Double height and width mode	101 dpi	101 dpi

xL and xH specify the horizontal data count of bit images as (xH × 256+xL) bytes.
yL and yH specify the vertical data count of bit images as (yH × 256+yL) bits.

When 128≤m≤131 is specified, the received bit image data is mapped in the memory at first and then the image print is collectively executed.
This setting is valid from Firmware version 1.11 or later.

Notes When the standard mode is selected, this command is effective only when there is no print data in the line buffer.
None of the printing modes (character size, bold print, double strike printing, inversion (flip) printing, underline, reverse print, etc.) affect raster bit images.

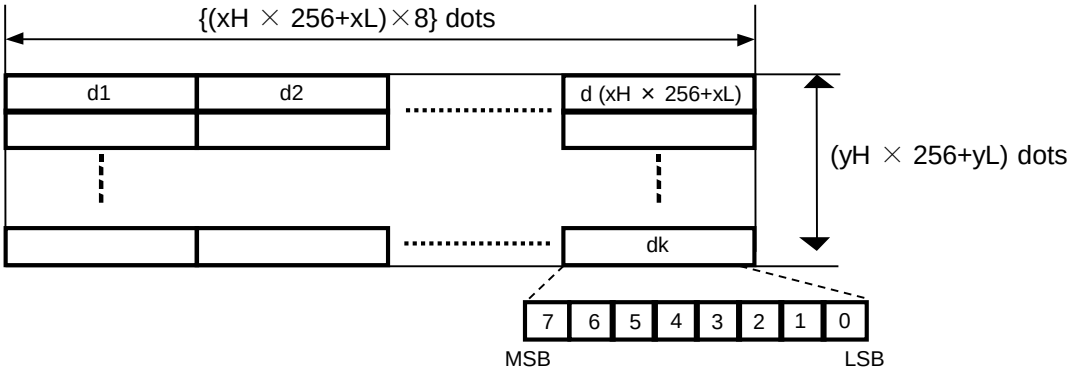
When the print area set with "Left Margin Set" command (GS 'L') or "Print Area Width Set" command (GS 'W') is less than the minimum width, the print area width is extended to the minimum width for that line only. The minimum width is 1 dot irrespective of the mode.
The data out of printable area is discarded by dots.

The raster bit image print start position can be freely set with "Horizontal Tab" command (HT), "Absolute Position Specify" command (ESC '$'), "Relative Position Specify" command (ESC '\'), or "Left Margin Set" command (GS 'L').
The "Alignment" command (ESC 'a') setting is also effective for raster bit images.

When this command is executed during macro definition, macro definition is stopped and processing of this command starts. At this time, the macro becomes undefined.

d indicates the bit image data. Bits that correspond to dots to be printed are 1, and bits that correspond to dots that are not printed are 0.

When executing this command, reduced printing speed due to communication speed may cause poor print quality or abnormal noise. Therefore, this command should be used under the environment which can maintain with a constant speed, for example the Page mode and so on.



DC2 'I' n — Bit Image Scan Method Selection

Code 12H 49H n

Definition Range 0≤n≤255

Default n=0 (Column scan)

Function Specifies whether to perform bit image registration transfer data with column scan or row scan.
When n=<*******0>B, column scan is performed.
When n=<*******1>B, row scan is performed.

Notes Only the LSB is valid for n.

The commands that are affected by this command are as follows.
Downloaded Bit Image Registration (GS '*')

DC2 '=' n — Image LSB/MSB Selection

Code 12H 3DH n

Definition Range 0≤n≤255

Default n=1

Function When the row scan method is selected as the bit image scan method, selects whether the left edge of the print image is the LSB or MSB.
When n=<*******0>B, the LSB is the left edge or top.
When n=<*******1>B, the MSB is the left edge or top.

Notes Only the LSB is valid for n.

The commands that are affected by this setting are as follows.
NV Graphics Data Define
((1) GS '(' 'L' pL pH '0' fn '0' kc1 kc2 b xL xH yL yH '1' [d]k
(2) GS '8' 'L' p1 p2 p3 p4 '0' fn '0' kc1 kc2 b xL xH yL yH '1' [d]k)
Graphics Data Storage into Print Buffer
((1) GS '(' 'L' pL pH '0' fn '0' bx by '1' xL xH yL yH [d]k
(2) GS '8' 'L' p1 p2 p3 p4 '0' fn '0' bx by '1' xL xH yL yH [d]k)

Downloaded Bit Image Registration (GS '*')
Raster Bit Image Print (GS 'v' '0')
Ruled Line Image Write (DC3 'v')
Ruled Line Pattern Fill (DC3 'F')

When the column scan method is selected, only the internal flag operation is performed when this command is input.

Related Commands DC2 'I'

GS '(' 'L' pL pH '0' fn NV Graphics Memory Capacity Response

Code 1DH 28H 4CH pL pH 30H fn

Definition Range pL=2, pH=0
fn=0, 48

Function Responds the total number of byte for NV graphics area by 4 bytes in HEX code.
The number of transmitted data is 2 bytes of header and footer + 4×2=10 bytes.
pL, pH: number of following data bytes
fn: function selection number

Notes NV graphics memory capacity is the maximum capacity to use for NV graphics in the user area. The response depends on the user area usage by other commands.

Related Commands GS '(' 'L', GS '8' 'L'
See "6.4 RESPONSE DATA".

GS '(' 'L' pL pH '0' fn Graphics Data Print in Print Buffer

Code 1DH 28H 4CH pL pH 30H fn

Definition Range pL=2, pH=0
fn=2, 50

Function Prints the graphics data stored in the print buffer by "Graphics Data Storage into Print Buffer" command (GS '(' 'L', GS '8' 'L').
pL, pH: number of following data bytes
fn: function selection number

Notes When the standard mode is selected, this command is effective only when there is no print data in the line buffer. None of the printing modes (character size, bold print, double strike printing, inversion (flip) printing, underline, reverse print, etc.) affect this command.

Related Commands GS '(' 'L', GS '8' 'L'

GS '(' 'L' pL pH '0' fn NV Graphics Memory Remaining Capacity Response

Code 1DH 28H 4CH pL pH 30H fn

Definition Range pL=2, pH=0
fn=3, 51

Function Responds the number of remaining memory byte for NV graphics area by 4 bytes in HEX code.
The number of transmitted data is 2 bytes of header and footer + 4×2=10 bytes.
pL, pH: number of following data bytes
fn: function selection number

Notes
Responds the memory capacity of unused state without the used state by the HEX code.
Responded value is same as "Remaining User Area Response" command (DC2 '*' '2').

Related Commands
GS '(' 'L', GS '8' 'L', DC2 '*' '1', DC2 '*' '2'
See "6.4 RESPONSE DATA".

GS '(' 'L' pL pH '0' fn 'K' 'C' Defined NV Graphics Key Code List Send

Code
1DH 28H 4CH pL pH 30H fn 4BH 43H

Definition Range
pL=4, pH=0
fn=64

Function
Sends the key code list defined NV graphics by character string.
pL, pH: number of following data bytes
fn: function selection number

Notes
When defined key code is 40 or more, divided data up to 40 are sent. The responded 1st character as response code shows the following data status.

Response Code	Status
40H	No following data
41H	Some following data

The printer performs the following operation depending on the transmission data from the host device after sending the character string one time.

Transmission Data	Operations
06H	Previous status is 40H: processing termination Previous status is 41H: following data constellation send
15H	Previous data constellation resend
18H	Even when there are some data, processing is aborted and terminated.

The printer does not return to normal processing until receiving the termination/suspension data listed above-mentioned.

Related Commands
GS '(' 'L', GS '8' 'L'
See "6.4 RESPONSE DATA".

GS '(' 'L' pL pH '0' fn 'C' 'L' 'R' NV Graphics Data Batch Deletion

Code
1DH 28H 4CH pL pH 30H fn 43H 4CH 52H

Definition Range
pL=5, pH=0
fn=65

Function
Performs batch deletion to all of NV graphics data.
pL, pH: number of following data bytes
fn: function selection number

Notes: When the standard mode is selected, this command is effective only when there is no print data in the line buffer.
The memory area is not increased even when executing the command to delete the graphics data. It is possible to use again as the user area by "User Area Defragment" command (DC2 '*' '1').

Related Commands: GS '(' 'L', GS '8' 'L'

GS '(' 'L' pL pH '0' fn kc1 kc2 Specified NV Graphics Data Deletion

Code: 1DH 28H 4CH pL pH 30H fn kc1 kc2

Definition Range:
pL=4, pH=0
fn=66
32≤kc1≤126, 32≤kc2≤126

Function: Performs deletion the NV graphics data specified by key code.
pL, pH: number of following data bytes
fn: function selection number
kc1, kc2 : key code

Notes: When the NV graphics data specified by key code is not registered, this command is ignored.
When the standard mode is selected, this command is effective only when there is no print data in the line buffer.
The memory area is not increased even when executing the command to delete the graphics data. It is possible to use again as the user area by "User Area Defragment" command (DC2 '*' '1').

Related Commands: GS '(' 'L', GS '8' 'L'

GS '(' 'L' pL pH '0' fn kc1 kc2 x y Specified NV Graphics Data Print

Code: 1DH 28H 4CH pL pH 30H fn kc1 kc2 x y

Definition Range:
pL=6, pH=0
fn=69
32≤kc1≤126, 32≤kc2≤126
x=1, 2
y=1, 2

Function: Prints the NV graphics data specified by key code with x width and y height.
pL, pH: number of following data bytes
fn: function selection number
kc1, kc2: key code
x: horizontal scale
y: vertical scale

Notes: When the NV graphics data specified by key code is not registered, this command is ignored.
When the standard mode is selected, this command is effective only when there is no print data in the line buffer. Except for inversion (flip) printing, this command does not affect the print mode (bold print, double strike printing, underline, character size, etc.).

When the print area width specified by "Left Margin Set" command (GS 'L') and "Print Area Width Set" command (GS 'W') is less than the minimum width of one internal character (font size width selected by character font select), the following processing is performed only for that line.

(1) In the range that does not exceed the printable area, the print area up to one character of the minimum width among the internal characters is extended toward the right side.

(2) When an area corresponding to one character cannot be secured even when processing (1) is performed, the print area is extended to the left side. (The left margin is reduced.)

When the page mode is selected, the printer maps the image memory in the printer. Actual printing is performed by page mode printing with FF or ESC FF.

Related Commands GS '(' 'L', GS '8' 'L'

GS '(' 'L' pL pH '0' fn kc1 kc2 x y z Specified NV Graphics Data Select

Code 1DH 28H 4CH pL pH 30H fn kc1 kc2 x y z

Definition Range
pL=7, pH=0
fn=70
32≤kc1≤126, 32≤kc2≤126
x=1, 2
y=1, 2
0≤z≤255

Function Selects the NV graphics data specified by key code with x width and y height. z specifies the horizontal print start position of the graphics data. (The print start position is the position of z × 8 dots from the left end of paper.)

pL, pH:	number of following data bytes
fn:	function selection number
kc1, kc2:	key code
x:	horizontal scale
y:	vertical scale
z:	horizontal print start position

Notes When the NV graphics data specified by key code is not registered, this command is ignored.
Multiple NV graphics data cannot be selected so last selected graphics data is valid.
When the standard mode is selected, this command is effective only when there is no print data in the line buffer.
When the page mode is selected, NV graphics selection is invalid.

Related Commands GS '(' 'L', GS '8' 'L'

(1) GS '(' 'L' pL pH '0' fn '0' kc1 kc2 b xL xH yL yH '1' [d]k
(2) GS '8' 'L' p1 p2 p3 p4 '0' fn '0' kc1 kc2 b xL xH yL yH '1' [d]k NV Graphics Data Define

Code
(1) 1DH 28H 4CH pL pH 30H fn 30H kc1 kc2 b xL xH yL yH 31H [d]k
(2) 1DH 38H p1 p2 p3 p4 30H fn 30H kc1 kc2 b xL xH yL yH 31H [d]k

Definition Range
In the case of (1)
12≤(pL+pH × 256)≤65535 (0≤pL≤255, 0≤pH≤255)

In the case of (2)
12≤(p1+p2×256+p3×65536+p4×16777216)≤917501
(0≤p1≤255, 0≤p2≤255, 0≤p3≤255, 0≤p4≤255)
fn=67
32≤kc1≤126, 32≤kc2≤126, b=1
1≤(xL+xH × 256)≤8192 (0≤xL≤255, 0≤xH≤32)
1≤(yL+yH × 256)≤2304 (0≤yL≤255, 0≤yH≤9)
0≤d≤255, k=(int((xL+xH×256)+7)/8)×(yL+yH×256)

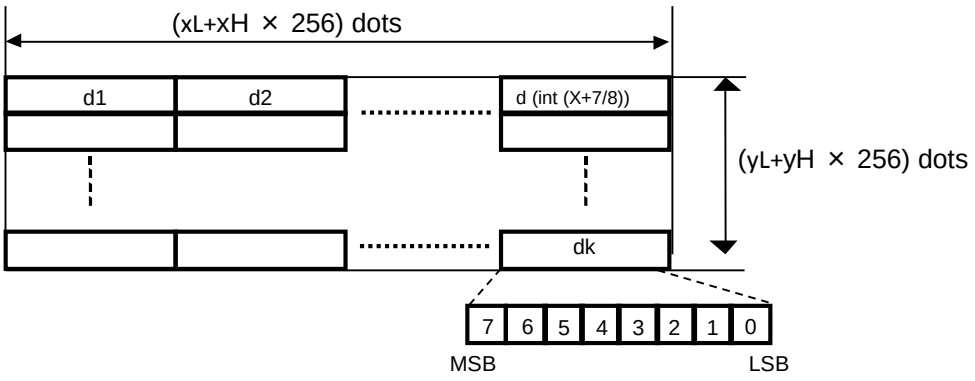
Function

Defines the NV graphics data in accordance with key code kc1 and kc2.
Defining several NV graphics data which have different key code is available within usable user memory area.
pL, pH, or p1, p2, p3 and p4 specify the number of byte of following parameter.
fn specifies the function selection number.
b specifies specific value.
xL and xH specify defined data by (xL+xH × 256) dots as width size.
yL and yH specify defined data by (yL+yH × 256) dots as height size.
d specifies defined data.
k indicates the number of image data.
NV Graphics are not registered at the shipping.

Notes

This command requires the number of (data + memory control information) bytes in the user area of FLASH memory.
When the unused state of user area is less than the number of (data + memory control information) bytes, this command is ignored.
When the standard mode is selected, this command is effective only when there is no print data in the line buffer.

Memory usage m bytes is as below.
m=(number of the data)+(number of bytes of memory control information)



Related Commands

GS '(' 'L'

(1) GS '(' 'L' pL pH '0' fn '0' bx by '1' xL xH yL yH [d]k
(2) GS '8' 'L' p1 p2 p3 p4 '0' fn '0' bx by '1' xL xH yL yH [d]k
Graphics Data Storage into Print Buffer

Code

(1) 1DH 28H 4CH pL pH 30H fn 30H bx by 31H xL xH yL yH [d]k
(2) 1DH 38H 4CH p1 p2 p3 p4 30H fn 30H bx by 31H xL xH yL yH [d]k

Definition Range

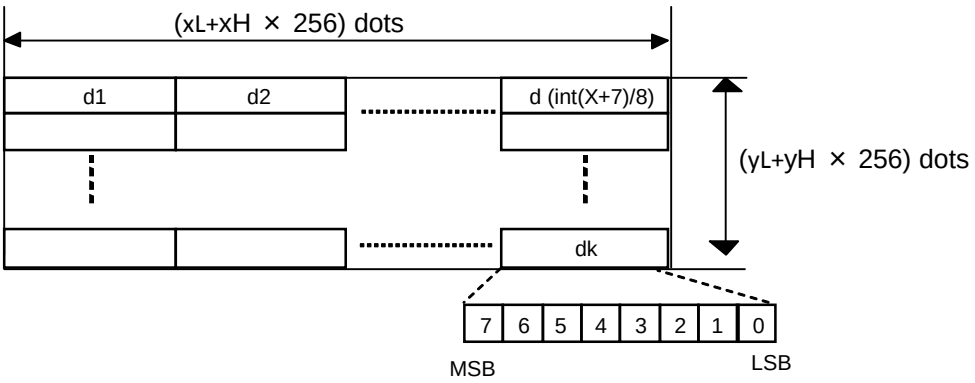
In the case of (1)
11≤(pL+pH × 256)≤65535 (0≤pL≤255, 0≤pH≤255)

In the case of (2)
11≤(p1+p2×256+p3×65536+p4×16777216)≤425482
(0≤p1≤255, 0≤p2≤255, 0≤p3≤255, 0≤p4≤255)
fn=112
bx=1, 2
by=1, 2
1≤(xL+xH × 256)≤2047 (0≤xL≤255, 0≤xH≤7)
1≤(yL+yH × 256)≤1662 (0≤yL≤255, 0≤yH≤6) (when by=1)

1≤(yL+yH × 256)≤831 (0≤yL≤255, 0≤yH≤3) (when by=2)
0≤d≤255
k=(int((xL+xH × 256)+7)/8)×(yL+yH × 256)

Function Prints graphics data by width magnification of "bx" times and height magnification of "by" times with raster format.
pL, pH, or p1, p2, p3 and p4 specify the number of byte of following parameter.
xL and xH specify defined data by (xL+xH × 256) dots as width size.
yL and yH specify defined data by (yL+yH × 256) dots as height size.
fn specifies the function selection number.
d specifies defined data.
k indicates the number of image data.

Notes When the standard mode is selected, this command is effective only when there is no print data in the line buffer.
Moreover, this command only stores graphics data to the print buffer.
Actual printing is performed after executing "Graphics Data Print in Print Buffer" command (GS '(' 'L') or line feed, or sending character data.
When the print area set with "Left Margin Set" command (GS 'L') or "Print Area Width Set" command (GS 'W') is less than the minimum width, the print area width is extended to the minimum width for that line only. The minimum width is that 1 dot at bx=1 and 2 dots at bx=2.
The data out of printable area is discarded by dots.
The graphics data print start position can be freely set with "Horizontal Tab" command (HT), "Absolute Position Specify" command (ESC '$'), "Relative Position Specify" command (ESC '\'), or "Left Margin Set" command (GS 'L').
The "Alignment" command (ESC 'a') setting is also effective for graphics data.



Related Commands GS '(' 'L'

GS '(' 'L' pL pH '0' fn kc1 kc2 n w yL yH — Watermark Print Position Specify

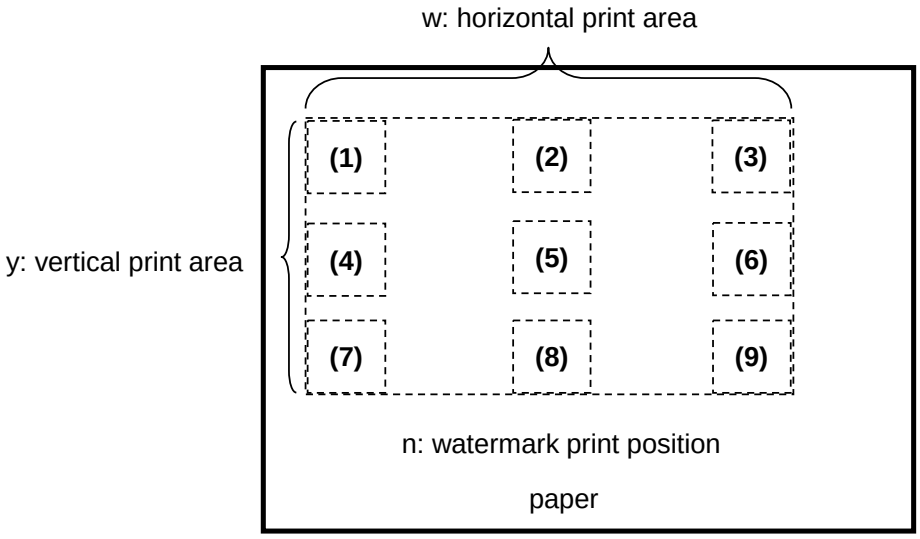
Code 1DH 28H 4CH pL pH 30H fn kc1 kc2 n w yL yH

Definition Range pL=8, pH=0
fn=71
32≤kc1≤126, 32≤kc2≤126
1≤n≤9
1≤w≤72 (When MS4-4 (Paper Width Selection) is set to 80mm and when MS4-5 (Number of Effective Dots Selection) is set to 576 dots)
1≤w≤54 (When MS4-4 is set to 58mm and MS4-5 is set to 432 dots)
1≤w≤64 (When MS4-4 is set to 80mm and MS4-5 is set to 512 dots)
1≤w≤45 (When MS4-4 is set to 58mm and MS4-5 is set to 360 dots)
1≤(yL+yH × 256)≤32768

Function

Overlaps and prints NV graphics data which corresponds to the key code at the specified print position.
Specify horizontal print area with w×8 dots and vertical print area with (yL+yH × 256) dots where the NV graphics data is mapped.
The following figure shows the print position of the printed NV graphics data.

pL, pH: number of following data bytes
fn: function selection number
kc1, kc2: key code
w: horizontal print area
yL, yH: vertical print area



Notes

Only valid during standard mode.
Only valid when this command is input at the beginning of the line. Otherwise, this command is ignored.
Printing does not executed when horizontal or vertical size is smaller than the size of NV graphics data which corresponds to the key code. When horizontal size is specified to a value outside the definition range, it is adjusted automatically to the maximum value.
n has the meaning as listed below.

n	Print Position
1	Upper left
2	Upper center
3	Upper right
4	Center left
5	Center
6	Center right
7	Lower left
8	Lower center
9	Lower right

When the position is outside the range, it is ignored.

Related Commands

GS '(' 'L'

6.5.6 Macro

GS ':' Macro Definition Start/Stop

Code 1DH 3AH

Function Starts and stops macro definition.
Macro is not registered at the shipping.

Notes Macro definition defines the macro to the user area by this command.
It is possible to perform the registered macro by the "Macro Execution" command (GS '^').
When this command is input during normal operation, macro definition start is specified.
Moreover, when this command is input during macro definition, macro definition stop is specified.

When specifying 00H just after sending this command, the printer defines the macro without execution of processing command.

When the following items are input during macro definition, macro definition is stopped and the definition contents are cleared.

Macro Execution (GS '^')
Downloaded Character Registration (ESC '&')
Downloaded Character Area Operation (DC2 'D')
User-Defined Character Registration (FS '2')
User Defined Character Area Operation (DC2 'G')
Optional Font Registration (DC2 'P')
Optional Font Area Release (DC2 'Q')
User Area Initialization (DC2 'R')
NV Graphics Data Define (GS ' (' 'L', GS '8' 'L')
NV Graphics Data Batch Deletion (GS '(' 'L')
Specified NV Graphics Data Deletion (GS '(' 'L')
Graphics Data Storage into Print Buffer (GS '(' 'L', GS '8' 'L')
Downloaded Bit Image Registration (GS '*')
Raster Bit Image Print (GS 'v')
User Area Defragment (DC2 '*' '1')
Tag Processing Start (GS '{' '0')
Style Sheet Registration (GS '{' '1')
Style Sheet Deletion (GS '{' '2')

The definition contents are not cleared by "Printer Initialize" command (ESC '@').
When "Macro Definition Start/Stop" command (GS ':') is input immediately after input of "Macro Definition Start/Stop" command (GS ':'), the macro status changes to the undefined status.
A maximum of 2048 bytes of data can be defined for macro.

Memory usage m bytes is as below.
m=(number of the data)+(number of bytes of memory control information)

Related Commands GS '^'

GS '^' r t m — Macro Execution

Code 1DH 5EH r t m

Definition Range 0≤r≤255, 0≤t≤255
m=0, 1

Function Executes macro definition contents.
r specifies the macro execution count.
t specifies the wait time during macro execution.
m specifies the macro execution mode.
When m=0, the printer performs continuous execution r times with a period of time specified by t.
When m=1, the printer blinks LED after the time specified by t, and waits for the FEED Switch to be pressed. After pressing the FEED Switch, the printer processes macro processing one time and repeats that r times.

Notes Wait time is approx. (t × 100ms) for each execution mode.
When this command is input during macro definition, macro definition is stopped and the definition contents are cleared.
When no macro is defined, and r=0, this command is ignored.
Even when the "Panel Switch Specify" command (ESC 'c' '5') is invalid, FEED Switch operation during this command processing is effective.

Related Commands GS ':', ESC 'c' '5'

6.5.7 Barcode

GS 'H' n — HRI Character Print Position Selection

Code 1DH 48H n

Definition Range 0≤n≤3, 48≤n≤51

Default n=0

Function Selects the HRI character print position during barcode printing.

n	Print Position
0, 48	Do not print
1, 49	Over barcode
2, 50	Under barcode
3, 51	Over and under barcode (both)

Notes HRI is an acronym that stands for Human Readable Interpretation.
HRI characters are printed in the typeface selected with "HRI Character Typeface Selection" command (GS 'f').

Related Commands GS 'f', GS 'k', ESC 'M'

GS 'f' n — HRI Character Typeface Selection

Code 1DH 66H n

Definition Range n=0, 1, 48, 49

Default n=0

Function Selects the HRI character typeface to be used to print barcodes.

n	Typeface
0, 48	Font A (24×12)
1, 49	Font B (16×8)

Notes HRI is an acronym that stands for Human Readable Interpretation.
HRI characters are printed to the position specified by "HRI Character Print Position Selection" command (GS 'H').
HRI characters are printed as the base position that is downed for the specified characters height from the base line of the barcode print.

Related Commands GS 'H'

GS 'h' n — Barcode Height Set

Code: 1DH 68H n

Definition Range: 1≤n≤255

Default: n=162

Function: Sets the barcode height to n dots.

Related Commands: GS 'k'

GS 'w' n — Barcode Horizontal Size Set

Code: 1DH 77H n

Definition Range: 2≤n≤6

Default: n=3

Function: Sets the barcode's horizontal size.

n	Multilevel Barcode Module Width (mm)	Binary Level Barcode Fine Element (mm)
2	0.250	0.250 (2 dots)
3	0.375	0.375 (3 dots)
4	0.500	0.500 (4 dots)
5	0.625	0.625 (5 dots)
6	0.750	0.750 (6 dots)

Notes: Multilevel barcode refers to the following barcode systems.

UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128, JAN13 add-on

Binary level barcode refers to the following barcode systems.

CODE39, ITF, CODABAR

Wide element width for the binary level barcode depends on the setting ratio N to W by "Barcode N:W Ratio Set" command.

Set a value of 3 or greater to n to print a ladder barcode. (Barcode printed horizontally when viewed in the paper feed direction.) When 2 is set to n, accuracy of reading may degrade.

Related Commands: GS 'k', DC2 ':'

GS 'j' n — Barcode Print Direction Specify

Code: 1DH 6AH n

Definition Range: 0≤n≤3

Default: n=0

Function | Specifies the barcode print direction.

n	Rotation Direction
0	No rotation
1	Rotation of 90° to right
2	Rotation of 180°to right
3	Rotation of 270° to right

Notes | When n is outside the range, it is ignored. This command is valid for the barcode in the standard mode and two-dimensional barcode. This command does not affect the page mode. This command setting is valid only for the barcode and two-dimensional barcode that are input immediately after this command. When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input. When the rotation is selected to 90° or 270° to right, the barcode can be printed at the maximum width of 300mm. When it exceeds 300mm when the rotation is selected to 90° or 270° to right, the barcode cannot be printed.

Related Commands | GS 'k', GS 'p'

DC2 ':' n — Barcode N:W Ratio Set

Code | 12H 3AH n

Definition Range | 0≤n≤2

Default | n=1

Function | Changes the barcode N:W ratio (Narrow width : Wide width).

n	N:W
0	1:2
1	1:2.5
2	1:3

The width of the element is determined by setting a barcode horizontal size as follows:

Fine Element (mm)	Thick Element (mm)		
	N:W = 1:2	N:W = 1:2.5	N:W = 1:3
0.250 (2 dots)	0.500 (4 dots)	0.625 (5 dots)	0.750 (6 dots)
0.375 (3 dots)	0.750 (6 dots)	1.000 (8 dots)	1.125 (9 dots)
0.500 (4 dots)	1.000 (8 dots)	1.250 (10 dots)	1.500 (12 dots)
0.625 (5 dots)	1.250 (10 dots)	1.625 (13 dots)	1.875 (15 dots)
0.750 (6 dots)	1.500 (12 dots)	1.875 (15 dots)	2.250 (18 dots)

Notes | Some barcode readers may not read the barcode depending on the setting of the narrow width and the setting value of this command. Use this command after confirming that there is no problem.

Related Commands | GS 'w'

(1) GS 'k' m [d]k NUL
(2) GS 'k' m n [d]n Barcode Print

Code

1DH 6BH m [d]k 00H (0≤m≤6)
1DH 6BH m n [d]n (65≤m≤73)
1DH 6BH m [d]k 00H [d2]s 00H (JAN13 add-on) (m=22)
1DH 6BH m n [d]n s [d2]s (JAN13 add-on) (m=87)

Definition Range

0≤m≤6, m=22, 32≤d≤126, 1≤k≤150
65≤m≤73, m=87, 1≤n≤150, 0≤d≤127
s=2, 5, 48≤d2≤57 (JAN13 add-on)

Function

Selects the barcode typeface and prints the barcode.

m	Barcode System	Barcode Data Count	Remark
0	UPC-A	11≤k≤12	Same barcode system as m = 65
1	UPC-E	11≤k≤12	Same barcode system as m = 66
2	JAN13(EAN)	12≤k≤13	Same barcode system as m = 67
3	JAN8(EAN)	7≤k≤8	Same barcode system as m = 68
4	CODE39	Variable	Same barcode system as m = 69
5	ITF	Variable (always even number)	Same barcode system as m = 70
6	CODABAR	Variable	Same barcode system as m = 71
22	JAN13 add-on	Add-on 2: 12≤k≤13, s=2	Same barcode system as m = 87
		Add-on 5: 12≤k≤13, s=5	
65	UPC-A	11≤n≤12	Same barcode system as m = 0
66	UPC-E	11≤n≤12	Same barcode system as m = 1
67	JAN13(EAN)	12≤n≤13	Same barcode system as m = 2
68	JAN8(EAN)	7≤n≤8	Same barcode system as m = 3
69	CODE39	Variable	Same barcode system as m = 4
70	ITF	Variable (always even number)	Same barcode system as m = 5
71	CODABAR	Variable	Same barcode system as m = 6
72	CODE93	Variable	
73	CODE128	Variable	
87	JAN13 add-on	Add-on 2: 12≤n≤13, s=2	Same barcode system as m = 22
		Add-on 5: 12≤n≤13, s=5	

Notes

The command configuration, code, domain, and some notes differ depending on the value of m.
When m=0 to 6 and m=65 to 71, or m=22 and m=87, the same barcode system is selected and the print result is also the same.

d and d2 indicate the characters to be printed. In all the barcode systems, when d and d2 are the characters that cannot be printed, the barcode is printed until then and normal data processing is resumed from the next data. s indicates the number of added symbol data.

When specifying a UPC-A barcode data and a UPC-E barcode data by 12 bytes including the check digit, the printer ignores the 12th byte and automatically calculates the check digit.

When specifying a JAN13 (EAN) barcode data by 13 bytes including the check digit, the printer ignores the 13th byte and automatically calculates the check digit.

When specifying a JAN8 (EAN) barcode data by 8 bytes including the check digit, the printer ignores the 8th byte and automatically calculates the check digit.

The printer unit performs paper feed a distance equivalent to the barcode height (including HRI characters when HRI character printing is specified), regardless of the line spacing set with "1/6 Inch Line Spacing Set" command (ESC '2') or "Line Spacing Set" command (ESC '3').

When the standard mode is selected and the horizontal direction exceeds the print area for one line, the printer unit does not print the barcode and performs only paper feed.

When the standard mode is selected, this command is effective only when there is no data in the line buffer. When data exists in the line buffer, data after m is processed as normal data. Moreover, the beginning of the line following barcode operation completion becomes the next print position.

Selecting the standard mode does not affect the print modes other than the inversion (flip) printing (bold printing, double strike printing, underline, character size, etc.).

For the concept of the barcode printing in the standard mode, refer to the figure [Barcode print in the standard mode].

When the page mode is selected, the printer performs only barcode data mapping and does not print. After completion of barcode mapping, the next dot of the last barcode data (the right side of the quiet zone) becomes the next mapping start position.

In page mode, when barcodes, character data, bit images, and downloaded bit images exist together on the same line, the bottom edge of the barcode and the following positions of the character data, bit image and downloaded bit image are aligned. At this time, HRI characters are not included. (See the figure [Barcode print in the page mode].)

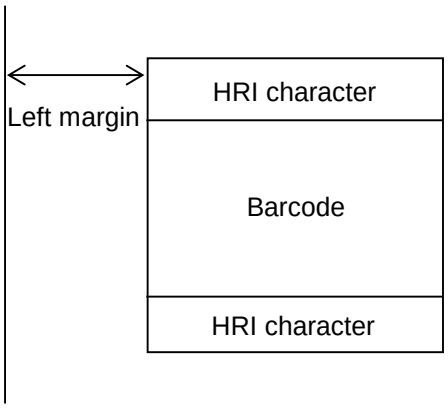
Data	Mapping Reference
Character	Bottom edge of character
Bit image	Bottom edge of bit image
Downloaded bit image	Bottom edge of downloaded bit image

When the barcode width exceeds the print area in page mode, barcode printing is not performed, and the mapping start position of the data shifts to the left edge of the print area.
In page mode, barcode layout includes horizontal tab.
In page mode, inversion (flip) printing, bold line, under line, and character size do not affect barcode printing.
In page mode, when the mapping start position is specified to "lower left" or "upper right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), the direction of bars is perpendicular to the paper feed direction (ladder barcodes). When printing ladder barcodes, height of the barcode should be 10mm or higher and ambient temperature should be 0°C to 40°C. When not, print may be unstable and accuracy of reading may degrade.
In page mode, when the mapping start position is specified to "lower left" or "upper right" by "Character Print Direction Specify in Page Mode" command (ESC 'T'), width of the barcode should be 300mm or shorter. The printer cannot print correctly when width of the barcode is more than 300mm.

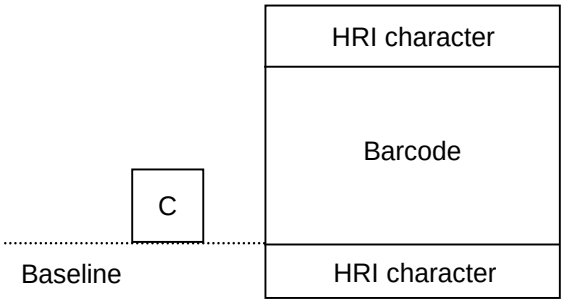
[Notes regarding (1) GS 'k' m[d]k NUL]
This command ends with NUL code.
k indicates the barcode data count. When a barcode system with fixed data count is selected, be sure to make k match this character count. When the data count is insufficient, data processing is performed up to the NUL code. Moreover, when the data count is excessive, a fixed length of data is processed and any excess data is processed as normal data.
Always make the data count for ITF barcodes with m=5 an even number. When the data count is an odd number, the last data is ignored.

[Notes regarding (2) GS 'k' m n [d]n]
n indicates the data count, and n bytes are processed as barcode data from the next data. When n falls outside the domain or the data count when the ITF barcode with m=70 is selected is an odd number, command processing is stopped and data from the next data is processed as normal data.

[Barcode print in the standard mode]



[Barcode print in the page mode]



UPC A :Input 11 characters using numbers between '0' and '9'. Alternatively, input additional one check digit.
The check digit is automatically calculated inside the printer.

UPC E :Input 11 characters using numbers between '0' and '9'. Alternatively, input additional one check digit.
The check digit is automatically calculated inside the printer.
The following data can be input:
When the original code is the following: 0 - ABCDE - VWXYZ
1. 0 - ABCDE - 0000Z (Z is 5 to 9)
2. 0 - ABCD0 - 0000Z
3. 0 - ABC00 - 000YZ (C is 3 to 9)
4. 0 - ABC00 - 00XYZ (C is 0 to 2)

JAN 13 :Input 12 characters using numbers between '0' and '9'. Alternatively, input additional one check digit.
The check digit is automatically calculated inside the printer.

JAN 8 :Input 7 characters using numbers between '0' and '9'. Alternatively, input additional one check digit.
The check digit is automatically calculated inside the printer.

CODE39 :Input any number of characters using the following:
' ', '$', '%', '+', '-', '.', '/', '0' to '9', and 'A' to 'Z'.

ITF :Input any even number of characters using numbers between '0' and '9'.

CODABAR :Input one start character in the range of 'A' to 'D', any number of characters using '0' to '9', '+', '.', '/', ':', '$', '-',
and one stop character in the range of 'A' to 'D'.

CODE93 :Input any number of data between 00H and 2EH. Multiple data can be input. Finally, input 2FH or more data.

CODE93 Code Set

Input	Data	Input	Data	Input	Data
00H	0	10H	G	20H	W
01H	1	11H	H	21H	X
02H	2	12H	I	22H	Y
03H	3	13H	J	23H	Z
04H	4	14H	K	24H	-
05H	5	15H	L	25H	.
06H	6	16H	M	26H	SP
07H	7	17H	N	27H	$
08H	8	18H	O	28H	/
09H	9	19H	P	29H	+
0AH	A	1AH	Q	2AH	%
0BH	B	1BH	R	2BH	[S1]
0CH	C	1CH	S	2CH	[S2]
0DH	D	1DH	T	2DH	[S3]
0EH	E	1EH	U	2EH	[S4]
0FH	F	1FH	V		

CODE128 :There are the following two types of data input format.
It is distinguished by the start code which type of data input format was selected.

(1) Input start code with 67H, 68H, or 69H according to the figure of CODE 128 Code Set. Then, input any number of data between 00H and 66H. Multiple data can be input. Finally, input 1 byte of 67H or more data.

(2) Input start code of selected code set "START A, START B, or START C" according to the figure of CODE 128 Special Code. Then input data in each format.

Code Set A	Data between 00H and 5FH can be input in ASCII format.
Code Set B	Data between 20H and 7FH can be input in ASCII format.
Code Set C	Data between 00H (00) and 63H (99) can be input.

As for the data corresponding to special code, input it as 2 characters according to the figure of CODE 128 Special Code. Available since Firmware version 1.08.

CODE128 Code Set

Input	Data			Input	Data			Input	Data		
	CodeSet A	CodeSet B	CodeSet C		CodeSet A	CodeSet B	CodeSet C		CodeSet A	CodeSet B	CodeSet C
00H	SP	SP	00	24H	D	D	36	48H	BS	h	72
01H	!	!	01	25H	E	E	37	49H	HT	i	73
02H	"	"	02	26H	F	F	38	4AH	LF	j	74
03H	#	#	03	27H	G	G	39	4BH	VT	k	75
04H	$	$	04	28H	H	H	40	4CH	FF	l	76
05H	%	%	05	29H	I	I	41	4DH	CR	m	77
06H	&	&	06	2AH	J	J	42	4EH	SO	n	78
07H	'	'	07	2BH	K	K	43	4FH	SI	o	79
08H	(	(	08	2CH	L	L	44	50H	DLE	p	80
09H	)	)	09	2DH	M	M	45	51H	DC1	q	81
0AH	*	*	10	2EH	N	N	46	52H	DC2	r	82
0BH	+	+	11	2FH	O	O	47	53H	DC3	s	83
0CH	,	,	12	30H	P	P	48	54H	DC4	t	84
0DH	-	-	13	31H	Q	Q	49	55H	NAK	u	85
0EH	.	.	14	32H	R	R	50	56H	SYN	v	86
0FH	/	/	15	33H	S	S	51	57H	ETB	w	87
10H	0	0	16	34H	T	T	52	58H	CAN	x	88
11H	1	1	17	35H	U	U	53	59H	EM	y	89
12H	2	2	18	36H	V	V	54	5AH	SUB	z	90
13H	3	3	19	37H	W	W	55	5BH	ESC	{	91
14H	4	4	20	38H	X	X	56	5CH	FS	|	92
15H	5	5	21	39H	Y	Y	57	5DH	GS	}	93
16H	6	6	22	3AH	Z	Z	58	5EH	RS	~	94
17H	7	7	23	3BH	[	[	59	5FH	US	DEL	95
18H	8	8	24	3CH	\	\	60	60H	FNC3	FNC3	96
19H	9	9	25	3DH	]	]	61	61H	FNC2	FNC2	97
1AH	:	:	26	3EH	^	^	62	62H	SHIFT	SHIFT	98
1BH	;	;	27	3FH	_	_	63	63H	CODE C	CODE C	99
1CH	<	<	28	40H	NUL	`	64	64H	CODE B	FNC4	CODE B
1DH	=	=	29	41H	SOH	a	65	65H	FNC4	CODE A	CODE A
1EH	>	>	30	42H	STX	b	66	66H	FNC1	FNC1	FNC 1
1FH	?	?	31	43H	ETX	c	67				
20H	@	@	32	44H	EOT	d	68	67H	START A		
21H	A	A	33	45H	ENQ	e	69	68H	START B		
22H	B	B	34	46H	ACK	f	70	69H	START C		
23H	C	C	35	47H	BEL	g	71				

CODE128 Special Code

Input		Data		
Code	ASCII	CodeSet A	CodeSet B	CodeSet C
7B41H	{A	START A	CODE A	CODE A
7B42H	{B	CODE B	START B	CODE B
7B43H	{C	CODE C	CODE C	START C
7B31H	{1	FNC1	FNC1	FNC1
7B32H	{2	FNC2	FNC2	-
7B33H	{3	FNC3	FNC3	-
7B34H	{4	FNC4	FNC4	-
7B53H	{S	SHIFT	SHIFT	-
7B7BH	{{	{	{	{

Related Commands GS 'H', GS 'f', GS 'h', GS 'W'

6.5.8 Two-dimensional Barcode

GS 'n' n — Nominal Fine Element Width

Code	1DH 6EH n
Definition Range	2≤n≤4 (dot count)
Function	Sets the nominal fine element width.
Default	n=3
Related Commands	GS 'p'

GS 'o' n — PDF Module Height Set

Code	1DH 6FH n
Definition Range	2≤n≤127
Default	n=10
Function	Sets the PDF module height by dot.
Notes	When the module height is set too low, the barcode reader may not be able to read barcodes. Min. height should be specified more than 3 dots in case of the normal use.

GS 'p' 0 m2 e r c nl nh [d]k — PDF417 Print

Code	IDH 70H 00H m2 e r c nl nh [d]k
Definition Range	0≤m2≤255 0≤e≤8 r=0, 3≤r≤90 c=0, 1≤c≤30 0≤d≤255 0≤nl≤255, 0≤nh≤255 1≤k(=nh × 256+nl)≤499
Function	PDF417 is printed from the specified contents. m2=<*******0>B: Normal mode m2=<*******1>B: Simple mode (Micro PDF is not supported) e: Error correction level r: Module (0 is automatically set) c: Number of columns in data area (0 is automatically set) nl, nh : Specifies the number of data bytes. d: Data k: nh × 256+nl
Notes	Only the LSB is valid for m2.
Related Commands	GS 'n', GS 'o'

DC2 ';' n — QR Code, Data Matrix Module Size Set

Code 12h 3BH n

Definition Range 2≤n≤11

Default n=6

Function Specifies a module size of QR Code and Data Matrix.
n: The number of dots for one side of the module size.

Related Commands GS 'p' 1, GS 'p' 2

GS 'p' 1 model e v mode nl nh [d]k — QR Code Print

Code 1DH 70H 01H model e v mode nl nh [d]k

Definition Range model = 01H, 02H
e=4CH, 4DH, 51H, 48H
v=0, 1≤v≤40
mode = 4EH, 41H, 42H, 4BH, 4DH
1≤k(=nh × 256+nl)≤7089

Function Prints QR Code data based on the specified contents.

Model: Specifies a model

e: Selects an error correction level.
'L'(4CH), 'M'(4DH), 'Q'(51H), 'H'(48H)

v: Specifies a version
When v=0, selects automatically. (A version is automatically selected depending on the number of input data.)
When 1≤v≤40, selects a fixed version. (up to 14 when selecting model-1)

mode: Specifies a mode of data.

Mode	Hexadecimal	Mode
N	4E	Numerical mode
A	41	Alphanumeric mode
B	42	8-bit byte mode
K	4B	Kanji mode
M	4D	Mixed mode

nl, nh: Specifies the number of data.

d: Specifies the QRCode input data. When using 2-byte code (such as kanji or hiragana), it should be input by Shift JIS.

k: The number of data specified by nl and nh.

Notes When specifying any value out of the defined range, this command is ignored, and the subsequent data is processed as the normal data.
When specifying any value of 7090 or more bytes, the subsequent data is processed as the normal data. The maximum value should be 7089 or less bytes depending on the model, the mode, and the error revision level.
When specifying any value exceeding the maximum value, the value is read out. When the horizontal width (includes a quiet zone) of the QR Code exceeds the print area, this command is ignored.

In the standard mode, when the data exists in the line buffer, this command is ignored.
In the standard mode, Alignment and Inversion (Flip) Printing are enabled.
The width of the quiet zone is fixed 4 modules.

Related Commands ESC 'a', ESC '{'

GS 'p' 2 ecc row col nl nh [d]k Data Matrix Print

Code 1DH 70H 02H ecc row col nl nh [d]k

Definition Range
ecc=00H
row=0, 8≤row≤144
col=0, 10≤col≤144
1≤k(=nh × 256+nl)≤3116

Function Prints the Data Matrix code base on the specified contents.

ecc: 00H (ECC 200) (for future extensional function)
row: Specifies the number of the modules for the vertical direction. When '0' is specified, this is defined automatically.
col: Specifies the number of the modules for the horizontal direction. When '0 is specified, this is defined automatically.
nl, nh: Specifies the number of the data.
The maximum number of the data is 3116 bytes.
When specifying any value of more than 3117 bytes, the subsequent data is processed as the normal data.
d: Specifies barcode data.
k: The number of data specified by nl and nh.

Notes When specifying any value other than the number of the modules for the vertical direction and the horizontal direction in ECC 200, this command is ignored.
When specifying any value exceeding 3116 bytes, the subsequent data is processed as the normal print data.
The maximum value varies depending on the number of the modules for the vertical direction and the horizontal direction and storage data. When specifying any data exceeding the maximum value, it is discarded.
When the barcode size (includes a quiet zone) exceeds the print area, this command is ignored.
In the standard mode, when the data exists in the line buffer, this command is ignored.
In the standard mode, Alignment and Inversion (Flip) Printing are enabled.
The width of the quiet zone is fixed to 1 value.
The Structured Append is not supported.

Only the following combinations of the number of the modules for the vertical direction ('row') and the horizontal direction ('col') are enabled.
Squares ('row' × 'col')
10×10, 12×12, 14×14, 16×16, 18×18, 20×20, 22×22, 24×24, 26×26,
32×32, 36×36, 40×40, 44×44, 48×48, 52×52, 64×64, 72×72, 80×80,
88×88, 96×96, 104×104, 120×120, 132×132, 144×144
Rectangles ('row' × 'col')
8×18, 8×32, 12×26, 12×36, 16×36, 16×48

Related Commands ESC 'a', ESC '{'

GS 'p' 3 mode ・・・ n [d]k — Maxi Code Print

Code

1DH 70H 03H 02H sc cc pc n [d]k (mode2)
1DH 70H 03H 03H sc cc pc n [d]k (mode3)
1DH 70H 03H 04H n [d]k (mode4)
1DH 70H 03H 05H n [d]k (mode5)

Definition Range

1≤n≤138

Function

Prints the Maxi Code data based on the specified contents.

sc: Specifies a service class.
In mode 2, and mode 3, sc should be 3-digit numerals.
cc: Specifies a country code.
In mode 2, and mode 3, cc should be 3-digit numerals.
pc: Specifies a postal code.
In mode 2, the postal code should be specified in 9-digit numerals.
When less than 9-digit numerals is desired, specify data except numerals for the remainder.
In mode 3, the postal code should be specified in 6 alpha numerals.
n: Specifies the number of data.
d: Specifies barcode data.
k: The number of data specified by n.

Notes

When specifying any value of 139 or more bytes, the subsequent data is processed as the normal print data.
The maximum data value will be 138 or less bytes depending on the mode. When specifying any data exceeding the maximum value, it is discarded.

When the barcode size (includes a quiet zone) exceeds the print area, this command is ignored.
In the standard mode, when the data exists in the line buffer, this command is ignored.
In the standard mode, Alignment and Inversion (Flip) Printing are enabled.
The print size of the barcode is fixed to vertical 213 dots × horizontal 225 dots.
The right and left width of the quiet zone is 8 dots.
The bottom and top width of the quiet zone is 7 dots.
The Structured Append is not supported.

Related Commands

ESC 'a', ESC '{'

6.5.9 Kanji

FS '&' Kanji Mode Specify

Code: 1CH 26H

Function: Specifies the kanji mode.

Notes: When the kanji code system is the Shift JIS code system, the printer unit's internal flag operation is only performed when this command is input. In this case, printing is not affected. The kanji code is processed 1st byte first, then 2nd byte.

Related Commands: FS '.', FS 'C

FS '.' Kanji Mode Cancel

Code: 1CH 2EH

Function: Cancels the kanji mode.

Notes: When the kanji code system is the Shift JIS code system, only the printer unit's internal flag operation is performed when this command is input. In this case, printing is not affected.

Related Commands: FS '&', FS 'C'

FS '!' n Kanji Print Mode Specify

Code: 1CH 21H n

Definition Range: 0≤n≤255

Default: n=0

Function: Specifies the kanji print mode.

Bit	Function	Value	
		0	1
0	Kanji font	Font A (24×24)	Font B (16×16)
1	Undefined	-	-
2	Double width	Cancel	Specify
3	Double height	Cancel	Specify
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Underline	Cancel	Specify

Notes

When both double width and double height are specified, double height and double width characters are selected.
When characters with different vertical scale exist on the same line, since the characters are extended using the bottom edge of the characters as reference, the bottom edges of characters are aligned.
When characters are extended horizontally, extension is done in the right direction using the left edge of the characters as reference.

Underline is applied to the entire character width including the spaces to the left and right of the character. However, underline is not applied to the portion skipped by "Horizontal Tab" command (HT), etc., and to 90° rotated characters.
The underline width is the thickness set with "Kanji Underline Specify" command (FS '-'), regardless of the character size.
When the underline width is not set with "Kanji Underline Specify" command (FS '-'), it is set to 1 dot.

Except for this command, the print mode specify/cancel is also possible with other commands. However, the last executed command becomes effective. For example, when double height and double width are canceled with this command after double height and double width characters are specified with "Kanji Double Height and Double Width Specify/Cancel" command (FS 'W'), the double height and double width characters specified with "Kanji Double Height and Double Width Specify/Cancel" command (FS 'W') are canceled.

Related Commands FS '-', FS 'W', DC2 '.', GS '!'

FS '-' n Kanji Underline Specify

Code 1CH 2DH n

Definition Range 0≤n≤2, 48≤n≤50

Default n=0

Function Specifies and cancels kanji underline.

n	Function
0, 48	Cancel kanji underline
1, 49	Set 1 dot height kanji underline and specify kanji underline
2, 50	Set 2 dots height kanji underline and specify kanji underline

Notes

Underline is applied to the entire character width including the spaces to the left and right of the character. However, underline is not applied to the portion skipped by "Horizontal Tab" command (HT), etc., and to 90° rotated characters.
When kanji underline is canceled with n=0, underline is not applied to the subsequent kanji data, but the underline width setting in effect until immediately before is retained.
The kanji underline width is the specified thickness (and thus is constant), regardless of the character size.
Except for this command, the kanji underline specify/cancel is also possible with "Kanji Print Mode Specify" command (FS '!'). However, the last executed command becomes effective. For example, when kanji underline is canceled with this command after kanji underline is specified with "Kanji Print Mode Specify" command (FS '!'), the kanji underline specified with "Kanji Print Mode Specify" command (FS '!') is canceled.

Related Commands FS '!'

FS 'C' n — Kanji Code System Selection

Code 1CH 43H n

Definition Range n=0, 1, 48, 49

Default When MS13-1 (Kanji Code System Selection) is JIS code, n=0
When MS13-1 (Kanji Code System Selection) is Shift-JIS code, n=1

Function Selects the kanji code system.

n	Function
0, 48	JIS code system
1, 49	Shift JIS code system

Notes The kanji code valid in the JIS code system is as follows.
1st byte: 21H to 7EH and 93H to 97H
2nd byte: 21H to 7EH

The kanji code valid in the Shift JIS code system is as follows.
1st byte: 81H to 9FH, E0H to EFH, and FAH to FCH
2nd byte: 40H to 7EH and 80H to FCH

FS 'S' n1 n2 — Kanji Space Amount Set

Code 1CH 53H n1 n2

Definition Range 0≤n1≤255, 0≤n2≤255

Default n1=0, n2=0

Function Sets the kanji's left space (n1) and the kanji's right space (n2).
The left space is [n1 × basic calculation pitch] inches, and the right space is [n2 × basic calculation pitch] inches.

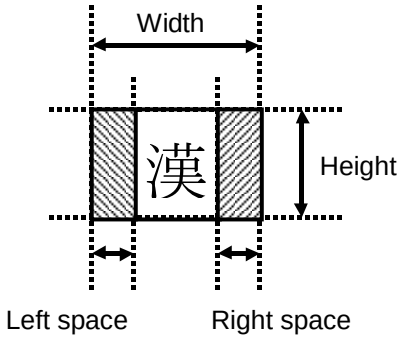
Notes When specifing the expand width as double, the space of the left and the right is double as the setting amount.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
Moreover, the set space does not change even when the basic calculation pitch is changed with "Basic Calculation Pitch Set" command (GS 'P') after the Kanji space amount set have been performed.
When the result calculated with "Basic Calculation Pitch Set" command (GS 'P') is a fractional figure, it is compensated using the printer's minimum pitch and the remainder discarded.
It is possible to set the independent space amount for standard mode and page mode.
In standard mode, the horizontal basic calculation pitch (x) is used.

In the page mode, the basic calculation pitch is as follows, depending on the starting point.

(1) When the starting point is specified as "upper left" or "lower right" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the horizontal basic calculation pitch (x) is used.

(2) When the starting point is specified as "upper right" or "lower left" with "Character Print Direction Specify in Page Mode" command (ESC 'T'), the vertical basic calculation pitch (y) is used.

Related Commands | GS 'P'



FS 'W' n — Kanji Double Height and Double Width Specify/Cancel

Code | 1CH 57H n

Definition Range | 0≤n≤255

Default | n=0

Function | Specifies or cancels double height and double width characters for kanji.
When n=<*******0>B, double height and double width characters are canceled.
When n=<*******1>B, double height and double width characters are specified.

Notes | Only the LSB is valid for n.
Double height and double width characters are the characters for which double height and double width are specified simultaneously.
When double height and double width characters are canceled using this command, the printer unit prints the subsequent data starting from the next character in the normal size.
When characters with different vertical scale exist on the same line, the characters are extended using the bottom edge of the characters as reference. (Bottom edges of characters are aligned.)
When characters are extended horizontally, extension is done in the right direction using the left edge of the characters as reference.
Except for this command, it is possible to specify/cancel double height and double width characters by simultaneously specifying double width extension and double height extension with "Kanji Print Mode Specify" command (FS '!'). However, the last executed command becomes effective. For example, when double height and double width characters are canceled with this command after double height and double width are specified with "Kanji Print Mode Specify" command (FS '!'), the double height and double width specified with "Kanji Print Mode Specify" command (FS '!') are canceled.

Related Commands | FS '!'

DC2 '.' n — Kanji Font Selection

Code | 12H 2EH n

Definition Range | n=0, 1, 48, 49

Default | n=0

Function Selects the kanji font.

n	Function
0, 48	Select kanji font A (24×24)
1, 49	Select kanji font B (16×16)

Notes It is possible to select the kanji font with "Kanji Print Mode Specify" command (FS '!'), but the command that is processed last is valid.

Related Commands FS '!'

FS 'I' a b c 2-byte Font ID Send

Code 1CH 49H a b c

Definition Range a=0
b=0
0≤c≤5

Function Send specified c information according to a and b.

a: Font size
b: Font type number
c: Information

c	Function	Response Type
0	Language	Character string
1	Standard	Character string
2	Company name	Character string
3	Check SUM (4 bytes)	HEX code
4	Data size	HEX code
5	ROM ID	HEX code

Notes When a or b is out of the Definition Range, only the header and footer are sent in the response type of the selected function.

Related Commands See "6.4 RESPONSE DATA".

FS '2' c1 c2 [d]k User-Defined Character Registration

Code 1CH 32H c1 c2 [d]k

Definition Range The domain differs depending on the kanji code system.

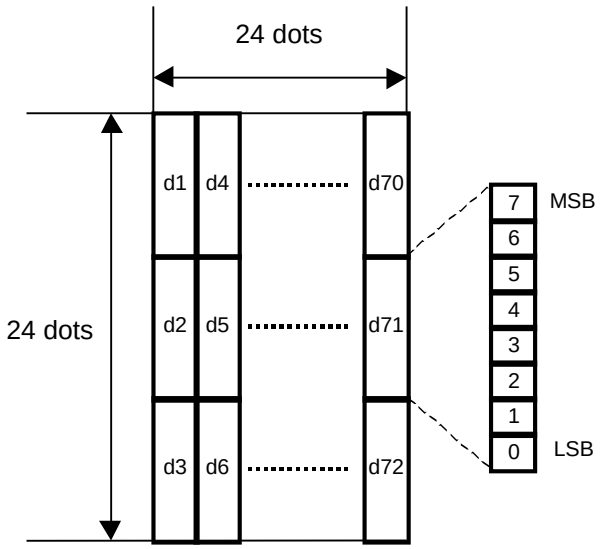
When JIS code system is specified
c1=77H
21H≤c2≤7EH
0≤d≤255

When Shift JIS code system is specified
c1=ECH
40H≤c2≤7EH and 80H≤c2≤9EH
0≤d≤255

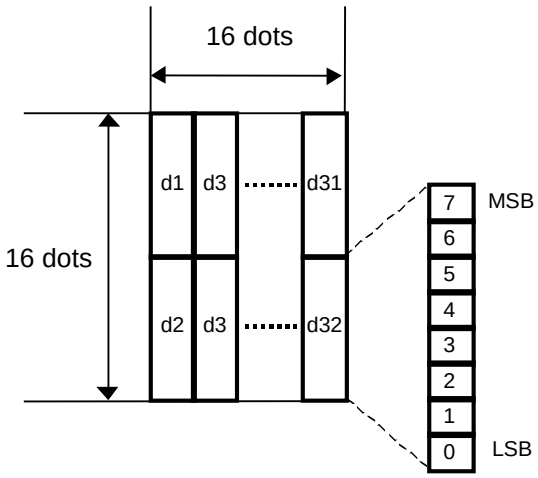
k=72 (when font A 24×24 is selected)
k=32 (when font B 16×16 is selected)

Function Registers the kanji user-defined character pattern as the character code specified with c1, c2.
Rewriting to already registered external character is over written.
User-defined characters are not registered at the shipping.

<Font A 24 × 24 selected>



<Font B 16 × 16 selected>



Notes c1, c2 indicate the kanji code for defining user-defined characters, c1 indicating the 1st byte, and c2 the 2nd byte.
d indicates the definition data. Bits that correspond to dots to be printed are 1, and bits that correspond to dots that are not printed are 0.
k indicates the definition data count. This count differs depending on the selected font size.
The memory usage m=9784 bytes. (Included number of bytes of memory control information.)

Related Commands FS 'C'

DC2 'G' n — User-Defined Character Area Operation

Code 12H 47H n

Definition Range 0≤n≤255

Function Releases and allocates user-defined character area.
When n=<*******0>B, releases user-defined character area.
When n=<*******1>B, allocates user-defined character area.

Notes

Only the LSB is valid for n.
User-defined characters are not printed when the user-defined character area is released. The user-defined character area is 9784 bytes. Even when this area is released, the remaining memory capacity is not increased. The user area is allocated again by "User Area Defragment" command (DC2 '*' '1').
To allocate again a user-defined character area that has been freed, a remaining memory capacity of 9784 bytes or more is required. When the remaining memory capacity is insufficient, the user-defined character area is not allocated and this command is ignored.

6.5.10 Auxiliary Functions

ESC '=' n — Peripheral Equipment Selection

Code: 1BH 3DH n

Definition Range: 0≤n≤255

Default: n=1

Function: Selects peripheral equipment for which data from the host computer is valid.

Bit	Function	Value	
		0	1
0	Printer unit	Disable	Enable
1	Undefined	-	-
2	Undefined	-	-
3	Undefined	-	-
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

Notes: When the printer disable setting is selected, the printer behaves as follows depending on the communication interface.

Powered Serial model:

Data sent to the printer is sent from the serial interface to peripheral equipment until the printer enable setting is selected by this command. Response data from the peripheral equipment responds to the host device in the peripheral equipment response format. When the printer enable setting is selected, data sent to the printer is handled as data for the printer, instead of sent to the peripheral equipment. Response data from the peripheral equipment responds to the host device in the peripheral equipment response format.

Other models:

The printer discards all the data except the realtime command, until the printer enable setting is selected again by this command.

ESC '@' — Printer Initialize

Code: 1BH 40H

Function: Clears the data in the line buffer and initializes the settings.

Notes: The Function Setting reread is not performed.
The data in the input buffer is held.

Related Commands: See "CHAPTER 7 INITIALIZATION".

DC2 '@' Hardware Reset

Code	12H 40H
Function	Performs hardware reset.
Notes	The command performs the same operation as when you turn the power on. When this command is executed during printing, printing is stopped and reset is executed.

GS FF Marked Paper Form Feed

Code	1DH 0CH
Function	Executes the marked paper form feed (form feed to the cut position).
Notes	This command is effective only when it is input at the beginning of the line. Otherwise it is ignored. Executing this command at the print start position does not perform the paper form feed to the next print start position.

GS '<' Marked Paper Form Feed

Code	1DH 3CH
Function	Performs the marked paper form feed.
Notes	This command is effective only when marked paper is selected. Executes the paper form feed to the print start position after initialization.

GS 'A' m n Marked Paper Form Feed Position Correct

Code	1DH 41H m n
Definition Range	0≤m≤3, 48≤m≤51 0≤n≤255
Function	Sets the amount of correction for the marked paper form feed position in relation to the initial position. m specifies the correction direction.

m	Print Position
0, 48	Forward
1, 49	Reverse
2, 50	Forward, FLASH memory
3, 51	Reverse, FLASH memory

n specifies the amount of correction.
The absolute position is [n × basic calculation pitch] inches.
The vertical basic calculation pitch (y) is used to calculate the correction amount.

Notes

This command is effective only when marked paper is selected.
This command is executed when is input immediately after the marked paper form feed (FF, GS FF, GS '<', paper FEED Switch operation, etc.). This command is ignored when it is not input immediately after the marked paper form feed.
The edge of next mark cannot go beyond the mark sensor. When a correction amount that exceeds the marked paper edge is set, the paper form feed position is set at the end of mark.

The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
"Basic Calculation Pitch Set" command (GS 'P') vertical basic calculation pitch (y) is used for calculating the correction amount.
When the calculation result is a fractional figure, it is compensated using the printer's minimum pitch, and the remainder is discarded.
Paper feed is performed to compensate during command execution. The paper feed distance depends on the set correction amount.
When rewriting to the FLASH memory is selected, the printer rewrites the number of correction dots with the code positive(+) or negative(-) ahead in the MS 8 to 9 (Mark Position Correction). The code + indicates the paper feed forward and the code - indicates the paper feed backward. When the number of correction dots exceeds 2400 dots for the paper feed forward and it exceeds 74 dots for the paper feed backward, it becomes the maximum dot-line respectively.
When rewriting to the FLASH memory is selected, the printer initializes the printer after rewriting to FLASH memory.

When adjusting the paper form feed position, set the distance from the paper edge to the print start position with an enough margin. The print start position for the thermal paper may change depending on the temperature and humidity. When setting with no margin, unprinted area or paper jam may occur. Set a margin of 3mm or more from the paper edge.
When the paper form feed position is corrected forward, note that the next mark does not overlap with the sensor.
A scratch mark may occur on the print side of thermal paper when the paper form feed performs backward.

Related Commands: FF, GS FF, GS '<', GS 'P'

GS 'C' '0' n m — Counter Print Mode Set

Code: 1DH 43H 30H n m

Definition Range: 0≤n≤5
0≤m≤2, 48≤m≤50

Default: n=0, m=0

Function: Sets the continuous counter print mode.

n specifies the number of print columns.
When n=0, only the number of columns corresponding to the counter value is printed. In this case, the value m does not affect the printer performance.
When n≠0, the number of print columns is set.

m specifies the print position of the continuous counter within the set number of columns.

m	Print Position	Processing When Counter Value Is Lower Than the Set Number of Columns
0, 48	Align right	Add space(s) to left side
1, 49	Align right	Add '0' to left side
2, 50	Align left	Add space(s) to right side

Notes: When the counter value is higher than the n set number of columns, the printer unit prints n columns below the counter value.
When n or m falls outside the domain, the setting value does not change.

Related Commands: GS 'C' '1', GS 'C' '2', GS 'c'

GS 'C' '1' aL aH bL bH n r — Count Mode Set

Code: 1DH 43H 31H aL aH bL bH n r

Definition Range: 0≤aL≤255, 0≤aH≤255
0≤bL≤255, 0≤bH≤255
0≤n≤255
0≤r≤255

Default: aL=1, aH=0, bL=255, bH=255, n=1, r=1

Function: Sets the count mode of the continuous counter.
n specifies the step magnitude during count-up or count-down.
r specifies the number of repetitions with the counter value fixed.

Notes: When [aH × 256+aL<bH × 256+bL and n≠0 and r≠0], the count-up mode is set.
When [aH × 256+aL>bH × 256+bL and n≠0 and r≠0], the count-down mode is set.
When [aH × 256+aL=bH × 256+bL or n=0 or r=0], count stop is set.

When the count-up mode is set, [aH × 256+aL] becomes the minimum counter value, and [bH × 256+bL] becomes the maximum counter value. Moreover, when the counter exceeds the maximum value, count-up from the minimum value starts again.

When the count-down mode is set, [aH × 256+aL] becomes the maximum counter value, and [bH × 256+bL] becomes the minimum counter value. Moreover, when the counter is smaller than the minimum value, count-down from the maximum value starts again.

Related Commands: GS 'C' '0', GS 'C' '2', GS 'c'

GS 'C' '2' nl nh — Counter Value Set

Code: 1DH 43H 32H nl nh

Definition Range: 0≤nl≤255
0≤nh≤255

Default: nl=1, nh=0

Function: Sets the continuous counter value.

Notes: nl and nh indicate the continuous counter value, and the counter value is [nh × 256+nl].
When the count-up mode is specified, and when the counter value set with this counter falls outside the counter range set with "Count Mode Set" command (GS 'C' '1'), the counter value is forcibly changed to the minimum value upon execution of the next "Counter Print " command (GS 'c').
When the count-down mode is specified, and when the counter value set with this command falls outside the counter range set with "Count Mode Set" command (GS 'C' '1'), the counter value is forcibly changed to the maximum value upon execution of the "Counter Print " command (GS 'c').

Related Commands: GS 'C' '0', GS 'C' '1', GS 'c'

GS 'c' Counter Print

Code 1DH 63H

Function Sets the continuous counter value to the line buffer and updates the counter.

Notes After setting the current continuous counter value as print data (character string) to the line buffer, counter is updated according to the set count mode. The counter value set to the line buffer is printed through a print command or buffer full.
When the counter value exceeds the range of the line buffer , the printer resets the counter value as minimum value at the count-up mode and then stores the counter to the line buffer. Likewise, the printer resets the counter value as maximum value at the count-down mode and then stores the counter to the line buffer.
When updated counter value exceeds the counter maximum/minimum range, the printer resets the counter value as minimum value at the count-up mode, and otherwise the counter is reset as maximum value at the count-down mode.

Related Commands GS 'C' '0', GS 'C' '1', GS 'C '2'

GS 'I' n Printer ID Send

Code 1DH 49H n

Definition Range 1≤n≤3, 49≤n≤51, 65≤n≤67, 97≤n≤100

Function Sends the specified printer ID.

n	Printer ID Type	Specifications	Response Form
1, 49	Printer model ID	1AH	HEX code
2, 50	Type ID	See Table [Type ID]	HEX code
3, 51	ROM version ID	Depends on ROM version	HEX code
65	Firmware version (main)	x.xx.xx	Character string
66	Manufacturer	Seiko Instruments Inc.	Character string
67	Model name	SII RP-E10 Series	Character string
97	Firmware version (boot)	x.xx.xx	Character string
98	Firmware check SUM (boot)	2 bytes check SUM	HEX code
99	Firmware check SUM (main)	2 bytes check SUM	HEX code
100	Firmware check SUM (main + boot)	2 bytes check SUM	HEX code

Table [Type ID]

Bit	Information	Value	
		0	1
0	Reserved	Fixed to 1	
1	Reserved	Fixed to 1	
2	Undefined	Fixed to 0	
3	Undefined	Fixed to 0	
4	Reserved	Fixed to 1	
5	Reserved	Fixed to 1	
6	Undefined	Fixed to 0	
7	Undefined	Fixed to 0	

Notes

Printer ID is responded in accordance with the response form.
Since this command is executed when it is retrieved from the input buffer, a delay may occur between command reception and printer ID transmission, depending on the input buffer status.
ROM version ID is needed when this printer's Firmware is uploaded.

Related Commands

See "6.4 RESPONSE DATA".

(1) GS 'V' m
(2) GS 'V' m n Paper Cut

Code

(1) 1DH 56H m
(2) 1DH 56H m n

Definition Range

(1) m=0, 1, 48, 49
(2) m=65, 66, 0≤n≤255

Function

Feeds the thermal paper to the specified paper cut position.

m	Function
0, 48	Full cut
1, 49	Partial cut
65	Cut position + [n × basic calculation pitch] feed forward and full cut
66	Cut position + [n × basic calculation pitch] feed forward and partial cut

Notes

The command configuration, code, domain, and some notes differ depending on the value of m.
In the standard mode, this command is effective only when input is executed at the beginning of the line.

[Notes regarding (1) GS 'V' m]
Cuts the thermal paper with specified cutting method.

[Notes regarding (2) GS 'V' m n]
When n=0, the printer unit feeds the thermal paper to the cut position.
When n≠0, the printer feeds [n × basic calculation pitch] inches beyond the cut position.
The basic calculation pitch is set with "Basic Calculation Pitch Set" command (GS 'P').
The vertical basic calculation pitch (y) is used as the paper feed distance. Moreover, when the calculation result is a fractional number, it is compensated using the printer's minimum pitch, and the remainder is discarded.

Related Commands DC2 'w', DC2 'l'

ESC i Full Cut

Code 1BH 69H

Function Cuts the thermal paper by full cutting.

Notes In the standard mode, this command is effective only when input is executed at the beginning of the line.

ESC m Partial Cut

Code 1BH 6DH

Function Cuts the thermal paper by partial cutting.

Notes In the standard mode, this command is effective only when input is executed at the beginning of the line.

GS 'Y' n Stamp&cut

Code 1DH 59H n

Definition Range 0≤n≤255

Function Prints the NV graphics registered key code as '0' '0' at the center within the printable area, and then cuts the thermal paper.
When n=<*******0>B, cuts the thermal paper by full cutting.
When n=<*******1>B, cuts the thermal paper by partial cutting.

Notes Only the LSB is valid for n.
This command is not effective when the page mode is selected.
This command is executed during the line.
The following operation is executed according to vertical length of the NV graphics who's key code is registered with '0' '0'.

NV Graphics Height	Operation
12.5 mm or less	NV graphics printing Paper cutting Remaining NV graphics printing
12.625 mm or more	NV graphic printing by 12.5 mm Paper cutting Remaining NV graphics printing

When NV graphics which registered key code as '0' '0' is not registered, the printer operates paper cutting by initial cut.
At performance of Stamp&cut, the print result may degrade due to a printer pause and paper cutting operation during graphics printing.

GS '(' 'D' pL pH m [a b] Realtime Command Enable/Disable

Code 1DH 28H 44H pL pH m [a b]

Definition Range pL=3, pH=0
m=20
a=1
b=0, 1, 48, 49

Default a=1, b=1 (Enable)

Function Specifies the realtime command as enable/disable.

a	b	Function
1	0, 48	The realtime command is not processed (disable)
	1, 49	The realtime command is processed (enable)

When enable is specified, the following commands are available:
"Specification Pulse Realtime Output" command (DLE DC4 fn m t)
"Buffer Clear at Error" command (DC3 '(' 'c' 'l' 'r' ')')

Notes When image data contains the code line matching the code that comprises the realtime command, use this command to disable the realtime command.

Related Commands DLE DC4, DC3 '(' 'c' 'l' 'r' ')'

ESC 'p' m n1 n2 Specification Pulse

Code 1BH 70H m n1 n2

Definition Range 0≤m≤255
0≤n1≤255, 0≤n2≤255

Function Drive the drawer.
When m=<*******0>B, drive the drawer 1.
When m=<*******1>B, drive the drawer 2.

Specifies the time of the pulse ON/OFF, by n1 and n2.
ON time: n1 × 2 ms
OFF time: n2 × 2 ms

Notes Only the LSB is valid for m.
When n1=0, drawer is not driven.

Related Commands DC2 'w', DC2 'l'

DLE DC4 fn m t — Specification Pulse Realtime Output

Code 10H 14H fn m t

Definition Range fn=l
0≤m≤255, 1≤t≤8

Function Drives the drawer.
When m=<*******0>B, drive the drawer 1.
When m=<*******1>B, drive the drawer 2.

Specifies the time of the pulse ON/OFF, by t.
ON/OFF time: t × 100ms

Notes This is a realtime command.
Notes when using the realtime command
The user should note that the same behavior as this command occurs when the code line matching the code that comprises this command is received. For example, graphics data contains that code line.

ESC RS n1 n2 — Buzzer Setting

Code 1BH 1EH n1 n2

Definition Range 0≤n1≤255, 0≤n2≤255

Function Specifies the time of the buzzer ON/OFF, by n1 and n2.
ON time: n1 x 2 ms
OFF time: n2 x 2 ms

Notes Other operations are not performed while the buzzer is running.

GS 'g' '0' m nl nh — Maintenance Counter Initialization

Code 1DH 67H 30H m nl nh

Definition Range m=0
nh × 256+nl=20, 21, 50, 70

Function Sets the values of the specified maintenance counter and the maintenance counter saved in the FLASH memory to 0.
nl and nh specify the maintenance number as [nh × 256+nl].

nh × 256+nl		**Counter Type**
Hexadecimal	**Decimal**	
14H	20	Paper feed line count (in 100 dot-lines)
15H	21	Number of thermal head activation times (in 100 dot-lines)
32H	50	Number of autocutter drive times
46H	70	Drive time of printer unit (in minutes)

Notes
The FLASH memory life is shortened if this command is used many times.
The FLASH memory life is approx. 100000 times.
The printer turns BUSY status during writing data to the FLASH memory for this command. Do not transmit data from the host computer while the printer is in BUSY status. The printer stops data receiving.
Do not turn the printer off while executing the command.

Related Commands GS 'g' '1', GS 'g' '2'

GS 'g' '1' m Maintenance Counter Preservation

Code 1DH 67H 31H m

Definition Range m=0

Function Saves all maintenance counter values in the FLASH memory.

Notes
The number of paper feed line and thermal head activation count are returned in 1/100 unit.
The maintenance counter is automatically saved at two-minute intervals without using this command.
The FLASH memory life is shortened if this command is used many times.
The FLASH memory life is approx. 100000 times.
Do not turn the printer off while executing the command.

Related Commands GS 'g' '0', GS 'g' '2'

GS 'g' '2' m nl nh Maintenance Counter Transmission

Code 1DH 67H 32H m nl nh

Definition Range m=0
nh × 256+nl=20, 21, 50, 70, 148, 149, 178, 198

Function Transmits the maintenance counter value. The initial value of the maintenance counter becomes the value saved in the FLASH memory.
nl and nh specify the maintenance number as [nh × 256+nl].

nh × 256+nl		**Counter Type**
Hexadecimal	**Decimal**	
14H	20	Number of paper feed line (in 100 dot-lines)
15H	21	Number of thermal head activation times (in 100 dot-lines)
32H	50	Number of autocutter drive times
46H	70	Product drive time (in minutes)
94H	148	Number of paper feed line (in 100 dot-lines) (integrated value)
95H	149	Thermal head activation time (in 100 dot-lines) (integrated value)
B2H	178	Number of autocutter drive times (integrated value)
C6H	198	Product drive time (in minutes) (integrated value)

Notes: Sends the value of maintenance counter by 4 bytes HEX code.
The number of transmitted data is 2 bytes of header and footer + 4 × 2=10 bytes.
The thermal head activation time is not counted up for paper feed with the FEED Switch and paper feed by the command. The thermal head activation time is counted up for the paper feed or line feed with print action and paper feed for the page print with the command.

Related Commands: GS 'g' '0', GS 'g' '1', GS 'a'

DC2 '*' '1' n — User Area Defragment

Code: 12H 2AH 31H n

Definition Range: 0≤n≤255

Function: Defragments the user area (FLASH memory), and remaining memory capacity is allocated.
When n=<*******0>B, the printer executes User Area Defragment without progress situation response.
When n=<*******1>B, the printer executes User Area Defragment with progress situation response.

Notes: The available memory does not increase even when the user area is released.
Released memory becomes reusable after executing this command.
The printer sends its progress situation when n=1 is specified. Progress situation is sent by the remaining quantity after organizing the user area accordingly. Note that the value of progress situation is as a reference. The processing time depends on the amount of registered data in the user area.
FLASH memory can be rewritten approximately 100000 times. Execute this command at low remaining capacity for restraining the memory rewriting.

Related Commands: See "6.4 RESPONSE DATA".

DC2 '*' '2' — Remaining User Area Response

Code: 12H 2AH 32H

Function: Sends the remaining memory capacity in the user area (FLASH memory) by 4 bytes HEX code.
The number of transmitted data is 2 bytes of header and footer + 4×2=10 bytes.

Notes: Unused state memory except used state in the user area is responded by HEX code.

Related Commands: See "6.4 RESPONSE DATA".

DC2 '*' '6' — Remaining User Area after Defragment Response

Code: 12H 2AH 36H

Function: Sends the remaining memory capacity in the user area after executing "User Area Defragment" command by 4 bytes HEX code.
The number of transmitted data is 2 bytes of header and footer + 4×2=10 bytes.

Notes: This command does not defrag the user area.
Unused state memory including released area is responded by HEX code.

Related Commands: See "6.4 RESPONSE DATA".

DC2 'R' n — User Area Initialization

Code 12H 52H n

Definition Range n=1

Function Initializes user area (FLASH memory).

Notes All user-defined characters, downloaded characters, optional fonts, downloaded bit images, macro, NV graphics, User page 1-byte font, and User page international characters are cleared and returned to the initial state.
(The area for user-defined characters and downloaded characters are allocated.)
Function Setting and maintenance counter are not initialized. When the status is other than n=1, this command is ignored.

DC2 'k' f [d]k NUL — Function Setting Change

Code 12H 6BH f [d]k 00H

Definition Range 0≤f≤254
0≤d≤255
k=40

Function Sets all the MS.
Sets the functions below. The setting value is valid when the command is executed.
f=00H : Does not write at the system area in the FLASH memory at the same time as the setting.
MS40 (Serial communication settings) is not changed.
f=80H : Writing at the system area in the FLASH memory at the same time as the setting.

Specifies the total 40 bytes of MS1 to 40 continuously.

Notes Do not set f=FFH. The printer may not work properly.
The printer performs printer initialization after execution of the command.
However, the printer does not perform initial process in the cutter.
Do not turn the printer off while executing the command.
See "CHAPTER 4 FUNCTION SETTING" for the meaning of MS.
When MS40 is changed, execute software reset or hardware reset to enable the setting.

Related Commands DC2 'w'

DC2 'w' f [d]k NUL — Function Setting Change

Code 12H 77H f [d] k 00H

Definition Range 0≤d≤255
0≤f≤255 (See the following each function)
k=40 (f=00H, f=80H), k=1 (except left value)

Function Sets the MS.

The MSB of f has the meaning below.
f=00H: Does not write at the system area in the FLASH memory at the same time as the setting.
MS40 (Serial communication settings) is not changed.
f=80H: Writes at the system area in the FLASH memory at the same time as the setting.

MS	f		Function
All MS	00H	80H	40 Bytes All Writing
1	01H	81H	General Setting 1
2	02H	82H	General Setting 2
3	03H	83H	General Setting 3
4	04H	84H	General Setting 4
5	05H	85H	General Setting 5
6	06H	86H	Print Density Specify
7	07H	87H	Thermal Paper Selection
8, 9	08H, 09H	88H, 89H	Mark Position Correction
10,11	0AH, 0BH	8AH, 8BH	Mark Detection Maximum Feeding Length Setting
12	0CH	8CH	Mark Threshold Value Setting
13	0DH	8DH	Command Setting
14	0EH	8EH	(Reserved)
15	0FH	8FH	International Character Selection
16	10H	90H	Character Code Table Setting
17 to 39	11H to 27H	91H to A7H	(Reserved)
40	28H	A8H	Serial Communication Setting
-	7FH	FFH	(Prohibition)

Notes

The printer performs printer initialization after execution of the command.
However, the printer does not perform initial process in the cutter.
Do not turn the printer off while executing the command.
When 40 Bytes All Writing is executed, MS40 (Serial communication settings) is written in the system area of FLASH memory; however, the setting is not changed.
Execute software reset or hardware reset to enable the setting.
When changing MS40 only, it is written in the system area of FLASH memory, and additionally the software is automatically reset.

See "CHAPTER 4 FUNCTION SETTING" for details of each function.

DC2 'l' n Function Setting Response

Code

12H 6CH n

Definition Range

n=0

Function

Reads the MS setting.

Notes

Responds the present value of all MS.
See "CHAPTER 4 FUNCTION SETTING" for the meaning of MS.

Responses are sent by 40 bytes HEX code.
The number of transmitted data is 2 bytes of header and footer + 40×2=82 bytes.

Related Commands

DC2 'w'
See "6.4 RESPONSE DATA".

DC2 'q' n — Execution Response Request

Code 12H 71H n

Definition Range 0≤n≤255

Function When this command is processed, the specified response code is returned.

Notes Specify the response code with n. The low order 4 bits are valid for n. The transmitted code, which is the logical sum of the low order 4 bits of specified n and 80H, consists of the code from 80H to 8FH.

This printer unit has 16384 bytes input buffer, and input and execution of command and data are not synchronized. Therefore, it is not possible to confirm command execution completion from external. Use this command to confirm command execution completion from external. Input this command following a command. The response to this command is returned after the previously entered command is completed.

Related Commands See "6.4 RESPONSE DATA".

DC2 't' — Test Print

Code 12H 74H

Function Performs test print.

Notes All setting values using commands are initialized.
The line buffer is cleared when executing the test print.

ESC 'c' '4' n — Print Stop Capable Paper Sensor Selection

Code 1BH 63H 34H n

Definition Range 0≤n≤255

Default Depends on Function Setting.

Function Selects a paper sensor that stops printing when paper is out.

Bit	Sensor	Value	
		0	1
0	Paper-near-end sensor	Disable	Enable
1			
2	Undefined	-	-
3	Undefined	-	-
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

Notes
The printer stops printing after printing the current printing line and feeding the thermal paper.
When MS1-6 (Near-end Sensor Function Selection) is set to Disable, this command is ignored.
When MS5-5 (Paper-Near-End Sensor Selection) is set to Disable, the initial value becomes 0, and when MS5-5 (Paper-Near-End Sensor Selection) is set to Enable, the initial value becomes 3.

Related Commands DC2 'w', DC2 'l'

ESC 'c' '5' n Panel Switch Specify

Code 1BH 63H 35H n

Definition Range 0≤n≤255

Default n=0

Function Shifts the panel switch (FEED Swith) state to valid or invalid.
When n=<*******0>B, the panel switch is valid.
when n=<*******1>B, the panel switch is invalid.

Notes Only the LSB is valid for n.
This command affects the FEED Switch. In the switch waiting state during "Macro Execution" command processing, the printer operates regardless of this command setting.

Related Commands GS '^'

GS 'r' n Status Data Send

Code 1DH 72H n

Definition Range 0≤n≤11

Function Sends the specified status data.

(NOTE) Reserved values in the following tables may be changed.

Printer Status 1 (n=0)

Bit	Function	Value	
		0	**1**
0	Voltage error	No	Yes
1	Reserved	Fixed to 0	
2	Head temperature error	No	Yes
3	Autocutter error	No	Yes
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Printer Status 2 (n=1)

Bit	Function	Value	
		0	1
0	Out-of-paper error	No	Yes
1	Paper-near-end sensor error	No	Yes
2	Paper jam error while detecting mark	No	Yes
3	Cover open error	No	Yes
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Printer Status 3 (n=2)

Bit	Function	Value	
		0	1
0	FEED Switch status	Off	On
1	Reserved	Fixed to 0	
2	Printing	Stop	Printing
3	Return-waiting status	No	Yes
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Option Sensor Status (n=3)

Bit	Function	Value	
		0	1
0	Reserved	Fixed to 0	
1	Reserved	Fixed to 1	
2	Reserved	Fixed to 1	
3	Drawer switch input status	Low	High
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Printer Status 4 (n=4)

Bit	Function	Value	
		0	1
0	FLASH memory rewriting	No	Yes
1	Reserved	Fixed to 0	
2	Reserved	Fixed to 1	
3	Reserved	Fixed to 1	
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Bit 0: The value is 1(YES) during writing and deleting FLASH memory.

Reserved (n=5 to 7)

Bit	Function	Value	
		0	1
0	Reserved	Fixed to 1	
1	Reserved	Fixed to 1	
2	Reserved	Fixed to 1	
3	Reserved	Fixed to 1	
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Paper Sensor Status (n=8)

Bit	Function	Value	
		0	1
0	Cover open sensor	Closed	Opened
1	Out-of-paper sensor	Paper	No paper
2	Paper-near-end sensor	Paper	No paper
3	Mark sensor	Paper	Mark
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Autocutter Status (n=9)

Bit	Function	Value	
		0	1
0	Cutter blade does not return to home position	Return	Not return
1	Cutter blade is locked in home position	Unlocked	Locked
2	Autocutter error history	No	Yes
3	Autocutter drive	Stop	Work
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Reserved (n=10 to 11)

Bit	Function	Value	
		0	1
0	Reserved	Fixed to 0	
1	Reserved	Fixed to 0	
2	Reserved	Fixed to 0	
3	Reserved	Fixed to 0	
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 1	
6	Identifier	Fixed to 0	
7	Identifier	Fixed to 1	

Notes — Since this command is executed when it is retrieved from the input buffer, a delay may occur between command reception and status data transmission, depending on the input buffer status.

Related Commands — GS 'a'
See "6.4 RESPONSE DATA".

GS 'a' n — Automatic Status Back Enable/Disable

Code — 1DH 61H n

Definition Range — 0≤n≤255

Default — When the MS5-1 (Automatic Status Response Selection) is set to Disable: n=00H
When the MS5-1 (Automatic Status Response Selection) is set to Enable: n=FFH

Function Selects a status for ASB (Automatic Status Back).

Bit	Function	Value	
		0	1
0	Printer status 1	Disabled	Enabled
1	Printer status 2	Disabled	Enabled
2	Printer status 3	Disabled	Enabled
3	Option sensor status	Disabled	Enabled
4	Printer status 4	Disabled	Enabled
5	Reserved	-	-
6	Reserved	-	-
7	Reserved	-	-

Notes When either status becomes enable, the status at the time of executing this command is sent. Hereafter, whenever the enable status condition changes, the status data is sent. At this time, in even the status where the ASB is not enabled, any change may occur because each status data indicates the current state.
When all status become disable, the ASB function becomes disable.
When the ASB function is enable in the default, the status at the 1st communicable time after powering on the printer is sent.
8-byte status except Xoff code always continues.
Since this command is executed when it is retrieved from the input buffer, a delay may occur between command reception and status data transmission, depending on the input buffer status.
The printer responds only to the interface being selected.
When the cable is connected, the status data is sent right after connecting.
The high order 4 bits of all byte are identifiers to distinguish from other responses. Identifier(s) for 1st byte shows CxH (1100xxxx) and 2nd to 8th byte show DxH (1101xxxx). Therefore, when the code CxH is responded from the printer, treat the codes CxH and following 7 bytes (except Xoff) as the response from ASB function.
Paper-near-end sensor is responded when the MS1-6(Near-end Sensor Function Selection) is set to Enable.
Mark sensor is responded only when the MS1-3 (Mark Mode Selection) is set to Enable.

(NOTE) Reserved values in the following tables may be changed.

(1) The 1st Byte (Printer Status 1)

Bit	Function	Value	
		0	1
0	Voltage error	No	Yes
1	Head error Voltage initialization error	No	Yes
2	Head temperature error	No	Yes
3	Autocutter error	No	Yes
4	Identifier	Fixed to 0	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

(2) The 2nd Byte (Printer Status 2)

Bit	Function	Value	
		0	1
0	Out-of-paper error	No	Yes
1	Paper-near-end sensor error	No	Yes
2	Paper jam error while detecting mark	No	Yes
3	Cover open error	No	Yes
4	Identifier	Fixed to 1	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

(3) The 3rd Byte (Printer Status 3)

Bit	Function	Value	
		0	1
0	FEED Switch status	Off	On
1	Reserved	Fixed to 0	
2	Printing	Stop	Printing
3	Return-waiting status	No	Yes
4	Identifier	Fixed to 1	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

(4) The 4th Byte (Option Sensor Status)

Bit	Function	Value	
		0	1
0	Reserved	Fixed to 0	
1	Reserved	Fixed to 1	
2	Reserved	Fixed to 1	
3	Drawer switch input status	Low	High
4	Identifier	Fixed to 1	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

(5) The 5th byte (printer status 4)

Bit	Function	Value	
		0	1
0	FLASH memory rewriting	No	Yes
1	Peripheral Equipment selection	Printer unit	Others
2	Reserved	Fixed to 1	
3	Reserved	Fixed to 1	
4	Identifier	Fixed to 1	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

Bit 0: The value is 1(YES) during writing and deleting FLASH memory.

(6) The 6th Byte To 8th Byte (Reserved)

Bit	Function	Value	
		0	1
0	Reserved	Fixed to 1	
1	Reserved	Fixed to 1	
2	Reserved	Fixed to 1	
3	Reserved	Fixed to 1	
4	Identifier	Fixed to 1	
5	Identifier	Fixed to 0	
6	Identifier	Fixed to 1	
7	Identifier	Fixed to 1	

Related Commands GS 'r', DC2 'w', DC2 'l'
See "6.4 RESPONSE DATA".

DC2 '0' 'c' n — Error History Response

Code 12H 30H 63H n

Definition Range 0≤n≤255

Function This printer records an error as a history when it occurs.
This command can call the error history in the HEX code.

Specify the target history number as n.
When the specified history number does not contain data, 00H data is returned.

Execute this command to stop collecting the error history.
To resume the collection, read the previously read history number data again or read n=255 data.

Data responded from the error history is as follows:
1st to 4th byte: Elapse time (sec.) after turning the power on
5th to 12th byte: Responded value of auto status response

Notes The number of transmitted data is 2 bytes of header and footer + 12×2=26 bytes.

Related Commands See "6.4 RESPONSE DATA".

DC3 '(' 'c' 'l' 'r' ')' — Buffer Clear at Error

Code 13H 28H 63H 6CH 72H 29H

Function When this command is received, clears the contents of the input buffer and the line buffer, and returns its state from parameter waiting.

Notes This is a realtime comand.
This command is executed only when the errors occur.
This command is executed only when the Data Discard Selection When an Error Occurs is set to Enable.

Notes when using the realtime command
The user should note that the same behavior as this command occurs when the code line matching the code that comprises this command is received. For example, graphics data contains that code line.

DC2 '>' n — Fixed Division Selection

Code 12H 3EH n

Definition Range 0≤n≤1

Function Sets the thermal head driving method to fixed division mode.
n specifis the number of the division.

n	Number of the Division
0	Fixed 2-division
1	Fixed 4-division

Notes
The printer performs the fixed division drive mode with this command.
The default status can be determined using MS4-1 to 2 (Number of Dots Selection for Fixed Division and Dynamic Division).

DC2 '%' n — Dynamic Division, Number of Dots Specify

Code
12H 25H n

Definition Range
8≤n≤36

Function
Sets the thermal head driving method to dynamic division mode and specifies the maximum number of simultaneously activated dots.
n: Specifies maximum number of simultaneously activated dots to n × 8.

Notes
By setting this command, the thermal head is dynamic division driving method.
The range of n is between 8 and 36. Specify the maximum number of simultaneously activated dots as n × 8 dots.
It is processed as n=8 when n<8 and as n=36 when n>36.
When the printer prints the data that is high density by the dynamic division mode using low-capacity power supply, the printing defect or voltage errors may occur. Make sure not to exceed its voltage capacity when the number of dots is specified by this command.
The default status can be determined using MS4-1 to 2 (Number of Dots Selection for Fixed Division and Dynamic Division) or MS4-3 (Division Driving Method Selection).

DC2 '~' n — Print Density Specify

Code
12H 7EH n

Definition Range
70≤n≤130

Function
Sets print density.

Notes
A Print density can be adjusted by setting the energy applied to the thermal head to a value from 70% to 130% of the rated energy. However, when the print density that exceeds the rating (100%) is set, a life span of the thermal head may be shorter than that specification.

When n is specified less than 70 or more than 130, this command is ignored.
The default status can be determined from 70% to 130% using Function Setting MS6-1 to 8 (Print Density Selection).

Excessive energy may cause shortening the life of thermal head, or may cause the paper feed problem, so specify the accurate thermal paper selection and print density selection. When the using thermal paper is different from the one specified or the print density selection is other than 100%, the reliability of the product specification may not be satisfied.

GS 's' n — Print Speed Specify

Code
1DH 73H n

Definition Range
0≤n≤3

Function
Sets the print speed.

n	Speed Setting
0	High
1	Middle(Quality)
2	Low
3	Middle(Silent)

High: Drives at the maximum speed of 350mm/sec.
Middle(Quality): Decreases the maximum print speed to 150mm/sec for printing of image to improve the print quality of image. Printing of image includes the following: Raster bit image, graphics data stored in print buffer, NV graphics, downloaded bit image, bit image mode, barcode, two-dimensional barcode
Also, for print in the page mode, the whole page is regarded as image.
Low: Decreases the maximum print speed to 150mm/sec to improve the print quality.
Middle(Silent): Decreases the maximum print speed to 280mm/sec to print silently.

Notes: The speed may be lower than the selected maximum speed due to the thermal head driving method, environmental temperature, and communication methods.
It is possible to change the initial state by the Function Setting MS4-7 to 8 (Maximum Print Speed Selection).

GS 'O' Power Off Execution

Code: 1DH 4FH

Function: Turns the printer off.
No data is processed after this command is executed.
The maintenance counter value is saved.
The interface is in the offline state.
The printer is in the standby state at power off. The LED is turned off. The microcomputer is in the standby state of the low power consumption mode.

Notes: To return to the printable state, the POWER Switch should be turned on again.

DC2 'u' 0 iSerialNumber Setting

Code: 12H 75H 00H

Function: Sets the printer's serial number to iSerialNumber.

Notes: It may cause a breakage in the FLASH memory when this command is frequently used.
Use this command only when the printer is introduced, and do not use it during normal operation.

DC2 'u' 1 [d]k NUL iSerialNumber Setting

Code: 12H 75H 01H [d]k 00H

Definition Range: d: 30H to 39H, 41H to 5AH, 61H to 7AH (1-byte alphanumeric character)
$1 \leq k \leq 8$

Function: Sets the string to iSerialNumber.
One to eight characters can be set.

Notes	Set the string that does not duplicate other RP-E10. Do not set characters other than 1-byte characters. It may cause a breakage in the FLASH memory when this command is frequently used. Use this command only when the printer is introduced, and do not use it during normal operation.

6.5.11 Ruled Line

DC3 '#' n — Overlapping Mode Selection

Code	13H 23H n
Definition Range	0≤n≤255
Default	Ruled line OR overlapping mode
Function	Specifies OR or XOR for the overlapping mode of ruled line, character and image data. n=<*******0>B: OR overlapping mode n=<*******1>B: XOR overlapping mode
Notes	Only the LSB is valid for n. When the page mode is selected, only the printer unit's internal flag operation is performed when this command is input. This command setting does not affect the page mode. When the OR overlapping mode is specified, either the part where dots exist in the ruled line, image or character is print out in black. XOR shows exclusive OR. When the XOR overlapping mode is specified, the part where image is overlapped with character is printed out in white and the non-overlapped part is print out in black.

DC3 '(' — Ruled Line Continuous Command

Code	13H 28H
Function	Following input of this command, the printer unit receives ruled line commands without DC3 code until it receives 29H.
Notes	All commands other than ruled line commands are ignored.

DC3 '+' — Ruled Line ON

Code	13H 2BH
Default	Ruled line OFF
Function	Sets the ruled line ON.
Notes	Following input of this command, ruled line is printed in the following cases. (1) Printing of character and space between lines (2) Execution of "Line Feed" command (LF), "Print and Feed Forward" command (ESC 'J'), "Print and n Lines Feed Forward" command (ESC 'd'), "Ruled Line 1 dot-line Print" command (DC3 'P'), and "Ruled Line n dot-lines Print" command (DC3 'p') This command is effective until the "Ruled Line OFF" command (DC3 '-') is executed. The dots whose bits on the selected ruled line buffer is 1, are printed out. However, ruled line beyond the printing area specified with "Print Area Set in Page Mode" command (ESC 'W') is not printed. (In the standard mode, the ruled line data is always printed in the printable area width.)
Related Commands	DC3 '-', ESC '#'

DC3 '-' Ruled Line OFF

Code	13H 2DH
Default	Ruled line OFF
Function	Sets the ruled line to OFF.
Notes	After this command is executed, ruled line is not applied.
Related Commands	DC3 '+'

DC3 'A' Ruled Line A Selection

Code	13H 41H
Default	Ruled line buffer A is selected
Function	Selects ruled line buffer A.
Notes	Following this, ruled line data set is performed for ruled line buffer A, and the image of ruled line buffer A is printed out.
Related Commands	DC3 'B'

DC3 'B' Ruled Line B Selection

Code	13H 42H
Default	Ruled line buffer A is selected
Function	Selects ruled line buffer B.
Notes	Following this, ruled line data set is performed for ruled line buffer B, and the image of ruled line buffer B is printed out.
Related Commands	DC3 'A'

DC3 'C' Ruled Line Buffer Clear

Code	13H 43H
Default	All the data of ruled line buffers A and B cleared.
Function	Clears all the bits of the selected ruled line buffer to 0.

DC3 'D' nl nh Ruled Line Dot Set

Code	13H 44H nl nh
Definition Range	0≤nl≤255, 0≤nh≤255
Function	Sets 1 to the bit of the [nh × 256+nl] dot of the selected ruled line buffer.

Notes
The position of the dot is counted by regarding the dots on the left edge of the screen as position 0.
When dots have been specified outside the printable area, the dots are ignored. At this time, the maximum printable area is not maximum width (X direction), but maximum length (Y direction) in consideration of rotate 90° in the page mode.

DC3 'F' n1 n2 — Ruled Line Pattern Fill

Code
13H 46H n1 n2

Definition Range
0≤n1≤255, 0≤n2≤255

Default
Ruled lines all cleared

Function
Fills the selected ruled line buffer with 2 bytes data specified with n1, n2.

Notes
Fills the ruled line buffer with a 16 dots repetitive image pattern consisting of n1 (8 dots on left side) and n2 (8 dots on right side).
The correspondence of n1 and n2 bits and dots can be changed through "Image LSB/MSB Selection" command (DC2 '='). (The initial state is MSB on the left side.)
When dots have been specified outside the printable area, they are ignored. At this time, the maximum printable area is not maximum width (X direction), but maximum length (Y direction) in consideration of rotate 90° in the page mode.

Related Commands
DC2 '='

DC3 'L' ml mh nl nh — Ruled Line Line Set

Code
13H 4CH ml mh nL nh

Definition Range
0≤ml≤255, 0≤mh≤255
0≤nl≤255, 0≤nh≤255

Default
Ruled lines all cleared

Function
Sets 1 to the bits in the range from the [mh × 256+ml] dot to the [nh × 256+nl] dot of the selected ruled line buffer.

Notes
The position of the dot is counted by regarding the dots on the left edge of the screen as position 0.
When dots have been specified outside the printable area, they are ignored. At this time, the maximum printable area is not maximum width (X direction), but maximum length (Y direction) in consideration of rotate 90° in the page mode.

DC3 'P' — Ruled Line 1 dot-line Print

Code
13H 50H

Function
Prints a 1 dot-line of the selected ruled line buffer image when ruler line is ON.

Notes
When there is data in the line buffer, after this data is printed and paper feed equivalent to the space between lines is performed, the ruled line is printed as a 1 dot-line. (A ruled line is also printed on the printed characters and space between lines.)
When the ruled line is OFF, no ruled line is printed and 1 dot-line paper feed is performed.
Configure the ruled line by 2 dots or more. The 1 dot ruled line may be invisible.

DC3 'p' nl nh — Ruled Line n dot-lines Print

Code	13H 70H nl nh
Definition Range	0≤nl≤255, 0≤nh≤255
Function	Prints n dot-lines defined the selected ruler line buffer image when ruled line is ON.
Notes	When there is data in the line buffer, after this data is printed and paper feed equivalent to the space between lines is performed, the ruled line is printed as [nh × 256+nl] dot-lines. (A ruled line is also printed on the printed characters and space between lines.) When the ruled line is OFF, no ruled line is printed and [nh × 256+nl] dot-lines paper feed is performed.

DC3 'v' nl nh [d]k — Ruled Line Image Write

Code	13H 76H nl nh [d]k
Definition Range	0≤d≤255 1≤nh × 256+nl≤ (Maximum page length)
Default	Ruled lines all cleared (d is all 0)
Function	Writes image data of [nh × 256+nl] bytes from 0th byte of buffer which selected ruler line buffer. d indicates image data. The number of [k=nh × 256+nl]
Notes	As for image data, input data corresponding to 1 dot-line amount. The correspondence between image data bits and dots can be changed with "Image LSB/MSB Selection" command (DC2 '='). (The initial state is MSB on the left side.) When dots are specified outside the printable area, the data within print area is retrieved and subsequent data is processed as normal data. At this time, the maximum printable area is not maximum width (X direction), but maximum length (Y direction) in consideration of rotate 90° in the page mode.
Related Commands	DC2 '='

6.5.12 Download Mode

DC2 DC2 — Download Mode Selection

Code	12H 12H
Function	Switches to the download mode. In order to return from the download mode to the printing mode, turn the power on again or execute "Download Mode Reset" command ('@'). In the download mode, only the commands listed below become valid. Download Mode Reset ('@') 1-byte Font Rewrite ('S' 'W') 1-byte Font International Character Registration('S' 'R') 1-byte Font Deletion ('S' 'C')
Notes	The POWER Switch and FEED Switch operations are not permitted during the download mode.

'@' — Download Mode Reset

Code	40H
Function	Performs hardware reset.
Notes	This command is only valid for download mode. When this command is executed during printing, printing is stopped and reset is executed.

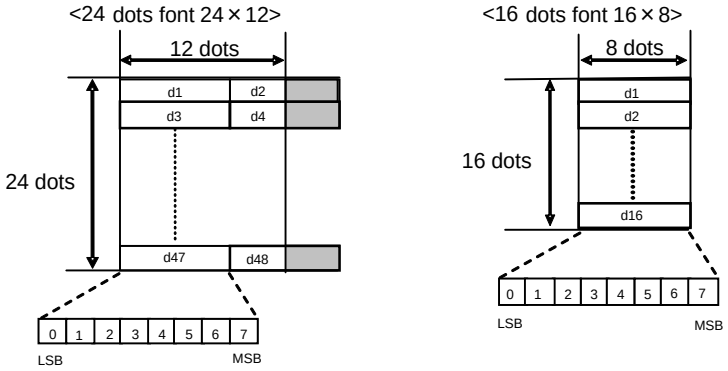
'S' 'W' a [d1]k1 b [d2]k2 — 1-byte Font Rewrite

Code	53H 57H a [d1]k1 b [d2]k2
Definition Range	a=255 32≤d1≤126 k1=64 b=0, 1 0≤d2≤255 k2=10752 (when b=0) k2=3584 (when b=1)
Function	Registers 1-byte font data to the User page of character code table specified by an information a and b. Registers d1 as 64 bytes ID data. This command requires the number of (data + memory control information) bytes in the user area of FLASH memory. Registered font data can be used by specifying 255 for n through the "Character Code Table Select" command (ESC 't'). Data is assigned in the order of 20H to FFH as 224 characters. However, the character codes of 7FH cannot be assigned. 1-byte Font of this command is not registered at the shipping. d1: ID data k1: Number of ID data b: Font size d2: Font data k2: Number of font data

b	Font Size	Number of Requiring Data (k2)
0	24 dots font	10752 bytes
1	16 dots font	3584 bytes

Font data format

<1-byte character>



Notes This command is valid for the download mode only.

Memory usage m bytes is as below.
m=(number of the data)+(number of bytes of memory control information)

Related Commands ESC 't'

'S' 'R' a b c [d]k 1-byte Font International Character Registration

Code 53H 52H a b c [d]k

Definition Range
a=255
b=0, 1
0≤c≤17
0≤d≤255
k=576 (when b=0)
k=192 (when b=1)

Function Registers 1-byte font data as the international character rewritten by "1-byte Font Rewrite" command ('S' 'W').

b: Font size
c: Country number
d: Font data
k: Number of font data

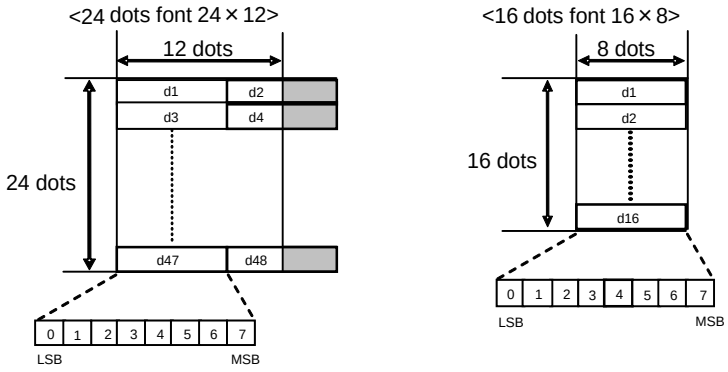
This command requires the number of (data + memory control information) bytes in the user area of FLASH memory.
Registered font data can be used by specifying 255 for n through the "Character Code Table Select" command (ESC 't') and by specifying the country through the "International Character Select" command (ESC 'R'). Required command data is twelve characters and those are assigned in the order of 23H, 24H, 40H, 5BH, 5CH, 5DH, 5EH, 60H, 7BH, 7CH, 7DH and 7EH.
1-byte Font International Character of this command is not registered at the shipping.

b	Font Size	Number of Requiring Data (k)
0	24 dots font	576 bytes
1	16 dots font	192 bytes

c	Country	c	Country
0	USA	9	Norway
1	France	10	Denmark II
2	Germany	11	Spain II
3	United Kingdom	12	Latin America
4	Denmark I	13	Prohibition
5	Sweden	14	Prohibition
6	Italy	15	Prohibition
7	Spain I	16	Prohibition
8	Japan	17	Arabia

Font data format

<1-byte character>



Notes This command is valid for the download mode only.
When 1-byte font is not registered on specified page, this command is ignored.

Memory usage m bytes is as below.
m=(number of the data)+(number of bytes of memory control information)

Related Commands ESC 't', ESC 'R'

'S' 'C' n 1-byte Font Deletion

Code 53H 43H n

Definition Range n=255

Function Deletes 1-byte font data in page specified by n.

Notes Deletes all of 1-byte font data as 24 dots font, 16 dots font, 24 dots font international character, and 16 dots font international character in page specified by n.
This command is valid for the download mode only.

6.5.13 Tag Processing Mode

In this mode, input the HTML format tag to create print data. This is not case-sensitive.

Since the page mode is used to map data, the maximum print area is limited by the page mode.

Start and end tags cannot be omitted. Be sure to input them.

When a tag contains another one, the maximum number of nested tags is 16. When they exceed the maximum value, the formatting is overwritten and not retained.

The control code in the HTML document is ignored. In case of barcode data, binary data can be accepted.

A space (20H) in HTML documents is ignored when it is located at the beginning of printing lines. Otherwise it is processed as a character code. Be careful especially when indents are used to write HTML documents.

For attributes that have their initial values in the attribute tables, a selected value is underlined and variables are enclosed in parentheses.

The following units can be used to specify a numerical value. When the unit is omitted, it becomes px (by dots).
px: by dots, mm: in millimeters (1mm = 8px), cm: in centimeters (1cm = 80px),
in: by inches (1in=203px)
When the result converted to px exceeds the maximum value, it is rounded to the maximum value.

When the style sheet language is selected using the LINK tag, the style attribute registered with FLASH memory using the "Style Sheet Registration" command (GS '{' '1') can be applied to the corresponding tag.

It is possible to apply the style attribute registered with FLASH memory to the corresponding tag using "Style Sheet Registration" command (GS '{' '1').

"&" and "<," which control tags, cannot be used as character sets. In order to print these characters as letters, submit following corresponding character strings.
&: &
<: <

Character decoration, which is set by using style, applies to all character strings enclosed in tags. It cannot be applied to one particular part.

(1) Tag processing command

GS '{' '0' Tag Processing Start

Code	1DH 7BH 30H
Function	Starts the tag processing mode. Subsequent data is processed as tag processing data. This command reads the HTML end tag to print mapped data and ends the tag processing mode.
Notes	Various settings are initialized when this command is executed.
Related Commands	ESC '@'

GS '{' '1' Style Sheet Registration

Code	1DH 7BH 31H m n data 00H
Definition Range	1≤m≤4 1≤n≤64
Function	Registers the style sheet applied to the tag to FLASH memory. m indicates the style sheet number to be registered. Four sheets can be registered individually. n indicates the number of styles to be registered. Its maximum value is 64. The style sheet can have the class attribute. Use period "." to connect the tag with the class. Use "class=" to specify the class attribute in the tag when calling.
Notes	The style attribute of the corresponding tag can be only registered. Strings up to 20 digits of alphabets or numbers can be used as a class attribute. When two or more styles are registered in the same tag, specify the class attribute to each style.
Description Example	1DH 7BH 31H 01H 03H div{font-weight:bold;} p{text-align:center; font-family:fontB;} hr.class{width:320px; height:4px;} 00H

GS '{' '2' Style Sheet Deletion

Code	1DH 7BH 32H n
Definition Range	1≤n≤4
Function	Deletes the style sheet registered with FLASH memory. n indicates the style sheet number to be deleted.

(2) Tag processing

HTML

Start Tag <HTML>

End Tag </HTML>

Function Describes the HTML style tag language.
This command reads the end tag to print mapped data and ends the tag processing mode.

Containing Tag <HEAD> <BODY>

HEAD

Start Tag <HEAD>

End Tag </HEAD>

Function Describes various types of header information.

Containing Tag <META> <LINK>

LINK

Start Tag <LINK>

End Tag None

Function Specifies external reference information.
When the style sheet specified in the href attribute is not registered, the HTML language is selected.

Attribute "type", "href"

Attribute	Value	Function
type	text/html text/css	HTML language select Style sheet language select
href	1/2/3/4	Style sheet number select

META

Start Tag <META>

End Tag None

Function Specifies language information.

Attribute "charset", "codeset", "international"

Attribute	Value	Function
charset	iso-2022-jp shift_jis	JIS code select Shift JIS code select
codeset	codepage437 katakana codepage850 codepage860 codepage863 codepage865 codepage1252 codepage852 codepage858 codepage864 codepage1250 codepage1251 codepage1253 codepage1254 userpage	Codepage 437 (USA, Standard Europe) Katakana character set Codepage 850 (Multilingual) Codepage 860 (Portuguese) Codepage 863 (Canadian-French) Codepage 865 (Nordic) Codepage 1252 (Latin) Codepage 852 (Eastern Europe) Codepage 858 (Euro) Codepage 864 (Arabic) Codepage 1250 (Central European) Codepage 1251 (Cyrillic) Codepage 1253 (Greek) Codepage 1254 (Turkish) User page
international	usa france germany united-kingdom denmark1 sweden italy spain1 japan norway denmark2 spain2 latin-america arabic	USA France Germany UK Denmark I Sweden Italy Spain Japan Norway Denmark II Spain II Latin America Arabia

Related Commands FS 'C', ESC 't', ESC 'R'

BODY

Start Tag <BODY>

End Tag </BODY>

Function Describes the document's body.

Attribute "style"

Attribute		Value	Function
style	font-weight	normal/bold	Bold print set/cancel
	text-decoration	none/underline	Underline set/cancel
	font-size	medium/2x/3x/4x 5x/6x/7x/8x	Font size set (length and width one to eight times)
	font-stretch	normal semi-expanded expanded extra-expanded ultra-expanded	Horizontal scale select (one to five times)
	font-family	fontA/fontB	Character font select
	line-height	0 to 255 px (34px)	Line spacing set (numerical value with unit)
	letter-spacing	0 to 255 px (0)	Character spacing set (numerical value with unit)
	text-align	left/right/center	Alignment
	margin	0 to 255 px (0)	Margin set (right margin set is disabled) (numerical value with unit)*1

*1: For <BODY> tag, bottom margin set is ignored.

Containing Tag <Hn> <P> <DIV> <SPAN> <UL> <OL> <HR> <TABLE> <IMG> <BARCODE> <PDF417> <QR>

Related Commands ESC 'E', ESC '-', GS '!', ESC 'M', ESC '3', ESC SP, ESC 'a'

Hn

Start Tag <Hn>

End Tag </Hn>

Function Describes the heading. n indicates the level. It is specified in the range of one to four. H1 indicates the highlighted four times extension, H2 indicates the four times extension, H3 indicates the highlighted state, and H4 indicates the normal state.

Attribute "style" (See the "BODY" tag for details.)

Containing Tag <P> <DIV> <SPAN> <UL> <OL> <HR> <TABLE> <IMG> <BARCODE> <PDF417> <QR>

P

Start Tag <P>

End Tag </P>

Function Specifies the paragraph. Line feeds are inserted before and after the paragraph.

Attribute "style" (See the "BODY" tag for details.)

Containing Tag <P> <DIV> <SPAN> <UL> <OL> <HR> <TABLE> <IMG> <BARCODE> <PDF417> <QR>

DIV

Start Tag <DIV>

End Tag </DIV>

Function Used to apply the style to the element enclosed in tags.

Attribute "style" (See the "BODY" tag for details.)

Containing Tag <P> <DIV> <SPAN> <UL> <OL> <HR> <TABLE> <IMG> <BARCODE> <PDF417> <QR>

SPAN

Start Tag <SPAN>

End Tag </SPAN>

Function Used to apply the style to the element enclosed in tags. The element is processed as an inline element.

Attribute "style" (See the "BODY" tag for details. The right margin set is enabled. The top and bottom margin set are disabled.)

Containing Tag <P> <DIV> <SPAN> <UL> <OL> <HR> <TABLE> <IMG> <BARCODE> <PDF417> <QR>

UL

Start Tag <UL>

End Tag </UL>

Function Specifies the list without numbers.

Attribute "style" (See the "BODY" tag for other details.)

Attribute		Value	Function
style	list-style-type	<u>disc</u> circle square decimal lower-alpha upper-alpha	Mark type

Containing Tag <UL> <OL> <LI>

OL

Start Tag <OL>

End Tag </OL>

Function Specifies the list with numbers.

Attribute "style" (See the "UL" tag for details.)

Containing Tag <UL> <OL> <LI>

LI

Start Tag <LI>

End Tag </LI>

Function Defines the list item.

Attribute "style" (See the "UL" tag for details.)

Containing Tag None

HR

Start Tag <HR>

End Tag None

Function Prints the horizontal ruled line.

Attribute "style"

Attribute		Value	Function
style	text-align	left/right/center	Alignment
	width	1 to 32767 px	Ruled line width (numerical value with unit)
	height	1 to 32767 px (1 px)	Ruled line height (numerical value with unit)

TABLE

Start Tag <TABLE>

End Tag </TABLE>

Function Creates the table.

Attribute "rules", "cellspacing", "style"

Attribute		Value	Function
rules		none/rows cols/all	Internal ruled line display format
cellspacing		0 to 255 px (1 px)	Ruled line width (numerical value with unit)
style	font-weight	normal/bold	Bold print set/cancel
	text-decoration	none/underline	Underline set/cancel
	font-size	medium/2x/3x/4x 5x/6x/7x/8x	Font size set (length and width one to eight times)
	font-stretch	normal semi-expanded expanded extra-expanded ultra-expanded	Horizontal scale select (one to five times)
	font-family	fontA/fontB	Character font select
	line-height	0 to 255 px (34 px)	Line spacing set (numerical value with unit)
	letter-spacing	0 to 255 px (0)	Character spacing set (numerical value with unit)
	text-align	left/right/center	Alignment
	margin	0 to 255 px (0)	Margin set (numerical value with unit) The right margin is disabled.
	padding	0 to 255 px (0)	Margin set in the cell (numerical value with unit)
	width	1 to 32767 px (96 px)	Cell width set (numerical value with unit)
	height	1 to 32767 px	Cell height set (numerical value with unit)

Containing Tag <CAPTION> <COL> <TR>

CAPTION

Start Tag <CAPTION>

End Tag </CAPTION>

Function Prints the table's title.
It is left aligned in the table.

Attribute "style"

Attribute		Value	Function
style	font-weight	normal/bold	Bold print set/cancel
	text-decoration	none/underline	Underline set/cancel
	font-size	medium/2x/3x/4x 5x/6x/7x/8x	Font size set (length and width one to eight times)
	font-stretch	normal semi-expanded expanded extra-expanded ultra-expanded	Horizontal scale select (one to five times)
	font-family	fontA/fontB	Character font select
	line-height	0 to 255 px (34 px)	Line spacing set (numerical value with unit)
	letter-spacing	0 to 255 px (0)	Character spacing set (numerical value with unit)

Containing Tag None

COL

Start Tag <COL>

End Tag None

Function Specifies all column attributes in the table.

Attribute "span", "style"

Attribute		Value	Function
span		1 to 8 (1)	Number of target columns
style	width	1 to 32767 px (96 px)	Cell width set (numerical value with unit)
	text-align	left/right/center	Alignment

TR

Start Tag <TR>

End Tag </TR>

Function Defines the table's row.

Attribute "style"

Attribute		Value	Function
style	font-weight	normal/bold	Bold print set/cancel
	text-decoration	none/underline	Underline set/cancel
	font-size	medium/2x/3x/4x 5x/6x/7x/8x	Font size set (length and width one to eight times)
	font-stretch	normal semi-expanded expanded extra-expanded ultra-expanded	Horizontal scale select (one to five times)
	font-family	fontA/fontB	Character font select
	line-height	0 to 255 px (34 px)	Line spacing set (numerical value with unit)
	letter-spacing	0 to 255 px (0)	Character spacing set (numerical value with unit)
	text-align	left/right/center	Alignment
	width	1 to 32767 px (96 px)	Cell width set (numerical value with unit)
	height	1 to 32767 px	Cell height set (numerical value with unit)

Containing Tag <TH> <TD>

TH

Start Tag <TH>

End Tag </TH>

Function Defines the table's item as a heading.
By default, the element defined as a heading is center aligned and indicated by boldface.

Attribute "rowspan", "colspan", "style" (See the "TR" tag for details of "style".)

Attribute	Value	Function
rowspan	1 to 127 (1)	Number of vertically connected rows
colspan	1 to 8 (1)	Number of horizontally connected columns

Containing Tag None

TD

Start Tag <TD>

End Tag </TD>

Function Defines the table's item.

Attribute "rowspan", "colspan", "style" (See the "TH" tag for details.)

Containing Tag None

IMG

Start Tag <IMG>

End Tag None

Function Prints the image registered with the selected key code.

Attribute "key-code", "style"

Attribute		Value	Function
key-code		kc1, kc2	Specify the key code of the registered image
style	float	none/right/left	Image position when characters are wrapped
	border-width	0 to 255 px (0)	Border width (numerical value with unit)
	margin	0 to 255 px (0)	Margin set (numerical value with unit)
	image-size	normal/2x	Image mapped size
	text-align	left/right/center	Alignment

Notes Characters are wrapped in the right and left empty areas of a image. Characters are not wrapped when there are no empty areas. When specifying character wrap, adjust the image print position by using attributes like text-align to allocate areas.

Related Commands GS '(' 'L'

Description Example <IMG key-code="33 32" style="border-width:3; margin:20">

BARCODE

Start Tag <BARCODE>

End Tag </BARCODE>

Function Prints the barcode. This command inputs barcode data between the start and end tags. Barcode data starts with "data=", and subsequent data-number binary data is handled as barcode data.
Be sure to set the barcode type. When the valid setting is not specified, data before the end tag is ignored.

Attribute "type", "data-number", "style"

Attribute		Value	Function
type		UPCA/UPCE/ EAN8/EAN13/ ITF/CODABAR/ CODE39/CODE93/ CODE128	Barcode type select
data-number		-	Barcode data count
style	width	2 to 6 (3)	Barcode horizontal size set
	height	1 to 255 (162)	Barcode height set
	ratio	0 to 2 (1)	Barcode N:W ratio set
	font-family	fontA/fontB	HRI character typeface selection
	hri-text	none/top/ bottom/two-sides	HRI character print position set
	text-align	left/right/center	Alignment

Containing Tag: None

Related Commands: GS 'k', GS 'w', GS 'h', DC2 ':', GS 'f', GS 'H', ESC 'a'

Description Example:
```
<BARCODE type="UPCA" style="text-align:center; hri-text:top" data-number=11>
data=12345678901
</BARCODE>
```

PDF417

Start Tag: <PDF417>

End Tag: </PDF417>

Function: Prints PDF417. This command inputs barcode data between the start and end tags.
Barcode data starts with "data=", and subsequent data-number binary data is handled as barcode data.
Be sure to set the number of columns, number of rows, error correction level, and mode. When the valid setting is not specified, data before the end tag is ignored.

Attribute: "data-number", "style"

Attribute		Value	Function
data-number		-	Barcode data count
style	width	2 to 4 (3)	Nominal fine element width
	height	2 to 127 (10)	PDF module height set
	column	0 to 30	Number of columns in the data area
	row	0, 3 to 90	Number of rows
	error-correct	0 to 8	Error correction level
	mode	0 to 1	Mode select
	text-align	left/right/center	Alignment

Containing Tag: None

Related Commands: GS 'p' 0, GS 'n', GS 'o', ESC 'a'

Description Example
<PDF417 style="row:0; column:0; error-correct:0; mode:0" data-number=10>
data=1234567890
</PDF417>

QR

Start Tag <QR>

End Tag </QR>

Function Prints QR. This command inputs barcode data between the start and end tags.
Barcode data starts with "data=", and subsequent data-number binary data is handled as barcode data.
Be sure to set the model, version, error correction level, and mode. When the valid setting is not specified, data before the end tag is ignored.

Attribute "data-number", "style"

Attribute		Value	Function
data-number		-	Barcode data count
style	module-size	2 to 11 (6)	Module size set
	model	model1/model2	Model select
	version	0 to 40	Version select
	error-correct	L/M/Q/H	Error correction level
	mode	number/ alpha-numeric/ 8bit-byte/ Kanji/mix	Mode select
	text-align	left/right/center	Alignment

Containing Tag None

Related Commands GS 'p' 1, DC2 ';', ESC 'a'

Description Example
<QR style="model:model2; version:0 error-correct:M; mode:mix" data-number=10>
data=1234567890
</QR>

BR

Start Tag

End Tag None

Function Inserts line feeds. When the "clear" attribute is specified, the image wrapped printing is canceled after the line feed.

Attribute "style"

Attribute		Value	Function
style	clear	left/right	Wrapped printing cancel

6.6 COMMAND LIST

CHAPTER 7
INITIALIZATION

7.1 INITIALIZATION

Initializations are as follows:

(1) Initialization of settings

- "Printer Initialize" command (ESC '@')

(2) Initialization by software resetting

- Resetting of USB class request
- "Download Mode Reset" command ('@')

(3) Initialization by hardware resetting

- "Hardware Reset" command (DC2 '@')
- Power on by the POWER Switch
- Communication break in the serial communication

Following items are initialized by initialization of settings.

Table 7-1 Setting Value After Initialization

Item	Setting Value	Command
Character right space amount set	0	ESC SP
Bold printing	Cancel	ESC '!', ESC 'E'
Double strike printing	Cancel	ESC 'G'
Underline	Cancel/1 dot width	ESC '!', ESC '-'
90° right rotated character printing	Cancel	ESC 'V'
Inversion (flip) printing	Cancel	ESC '{'
Character font	Font A (24×12)	ESC '!'
Double height	Cancel	ESC '!', FS '!', FS 'W'
Double width	Cancel	ESC '!', FS '!', FS 'W'
Reverse printing	Cancel	GS 'B'
International character set	Depends on Function Setting	ESC 'R'
Character code table	Depends on Function Setting	ESC 't'
Kanji mode	Cancel	FS '&', FS '.'
Kanji font	24×24	FS '!'
Kanji underline	Cancel/1 dot width	FS '!', FS '-'
Kanji code system	Depends on Function Setting	FS 'C'
Kanji space amount set	Right = 0, Left = 0	FS 'S'
Line spacing	1/6 inch	ESC '2', ESC '3'
Horizontal tab position	Every 8 characters	ESC 'D'
Page mode	Not selected	ESC 'L', ESC 'S'
Print direction in page mode	Left -> Right	ESC 'T'
Starting point in page mode	Depends on Function Setting	ESC 'T'
Print area in page mode	Entire printable area	ESC 'W'
Alignment	Left	ESC 'a'
Counter print mode	Digit number = 0/Align right	GS 'C' '0'
Counter mode	Count-up	GS 'C' '1'
Counter range	1 to 65535	GS 'C' '1'
Counter value	1	GS 'C' '2'
Counter step	1	GS 'C' '1'
Number of repetitions	1	GS 'C' '1'
HRI character print position	Do not print	GS 'H'
HRI character typeface	Font A	GS 'f'
Barcode print direction	No rotation	GS 'j'
Barcode height	162 dots	GS 'h'
Barcode width	0.375 mm, 0.375/1.000 mm	GS 'w'
Barcode N:W ratio	1:2.5	DC2 ':'
Nominal fine element width	3 dots	GS 'n'
PDF module height	10 dots	GS 'o'

Item	Setting Value	Command
QR Code, DataMatrix module size set	6 dots	DC2 ';'
Left margin	0 (beginning of line)	GS 'L'
Print area	Printable area	GS 'W'
Basic calculation pitch	x direction: 1/203 inch y direction: 1/203 inch	GS 'P'
Downloaded bit image selection	Cancel	GS '/'
NV graphics select	Cancel	GS '(' 'L'
Watermark	Cancel	GS '(' 'L'
Sending of automatic status	Depends on Function Setting	GS 'a'
Image LSB/MSB	MSB	DC2 '='
Bit image scan method	Column scan method	DC2 'I'
Ruled line	OFF	DC3 '+', DC3 '-'
Ruled line buffer	Clear	DC3 'C'
Ruled line overlapping	OR	DC3 '#'
Downloaded character set specify	Cancel	ESC '%'
Optional font select	Cancel	DC2 'O'

In addition to the above items, the following items are initialized by software resetting and hardware resetting.

Table 7-2 Setting Value After Software Resetting and Hardware Resetting

Items	Setting Value	Command
Input buffer	Clear	-
Output buffer	Clear	-
Function Setting	Depends on Function Setting	DC2 'k', DC2 'w'
Macro	Cancel	GS '.'
Peripheral equipment selection	Printer enabled	DC2 '='
Print Stop Capable Paper Sensor	Depends on Function Setting	ESC 'c' '4'
Panel Switch Specify	Valid	ESC 'c' '5'
Automatic Status Back	Depends on Function Setting	GS 'a'
Thermal head driving method	Depends on Function Setting	DC2 '>', DC2 '%'
Print density	Depends on Function Setting	DC2 '~'
Print speed	Depends on Function Setting	GS 's'

Each communication is initialized at the timing shown in the following table. The communication is disconnected by the initialization.

Table 7-3 Initialization Timing for Each Communication

Communication	Timing
Serial	Software reset, hardware reset
USB, LAN	Hardware reset

APPENDIX A
CHARACTER SETS (CHARACTER CODE TABLE)

A.1 CHARACTER CODE TABLE (CODEPAGE)

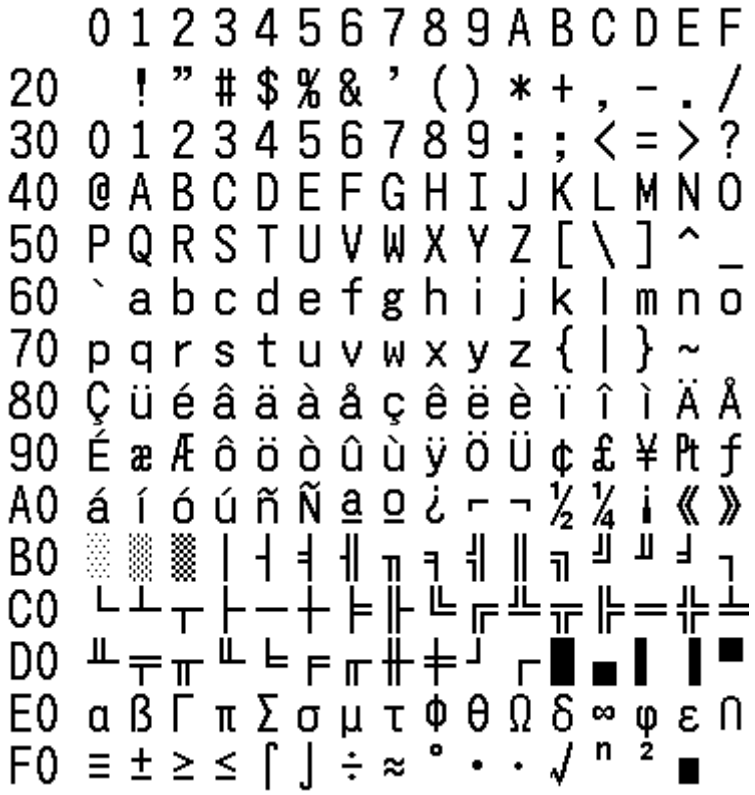


Figure A-1 Codepage 437 (USA, Standard Europe)

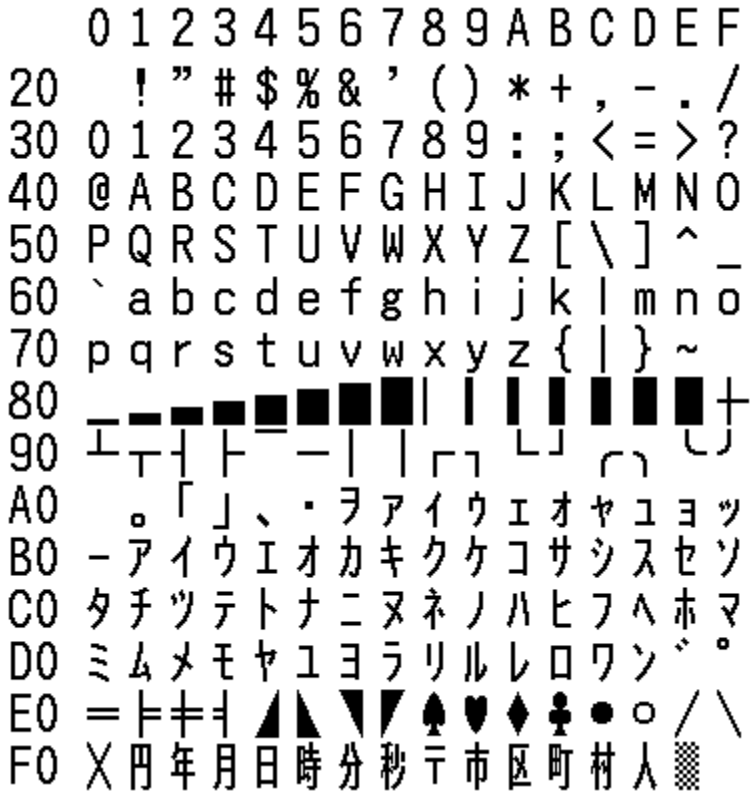


Figure A-2 Katakana Character Set

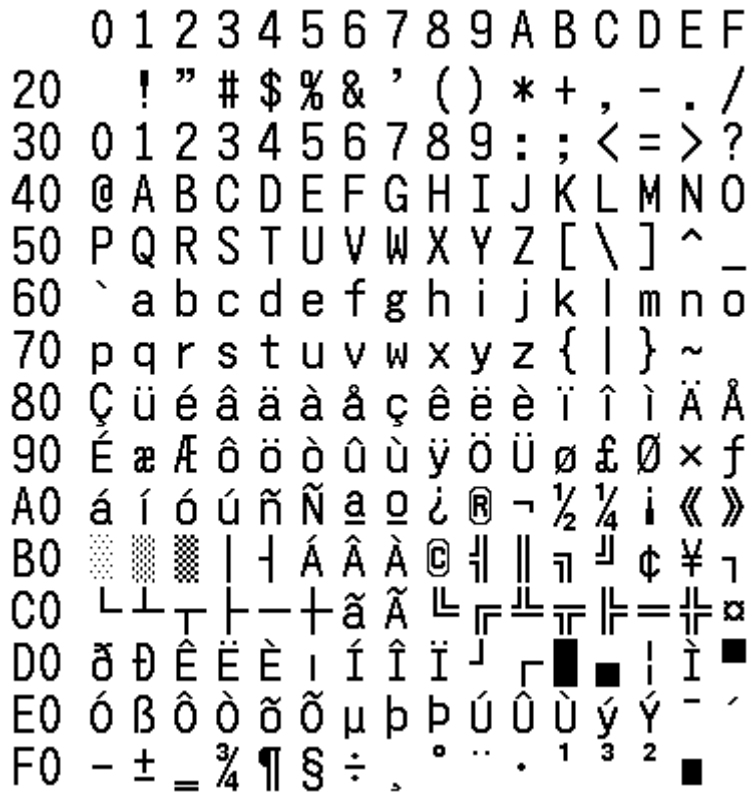


Figure A-3 Codepage 850 (Multilingual)

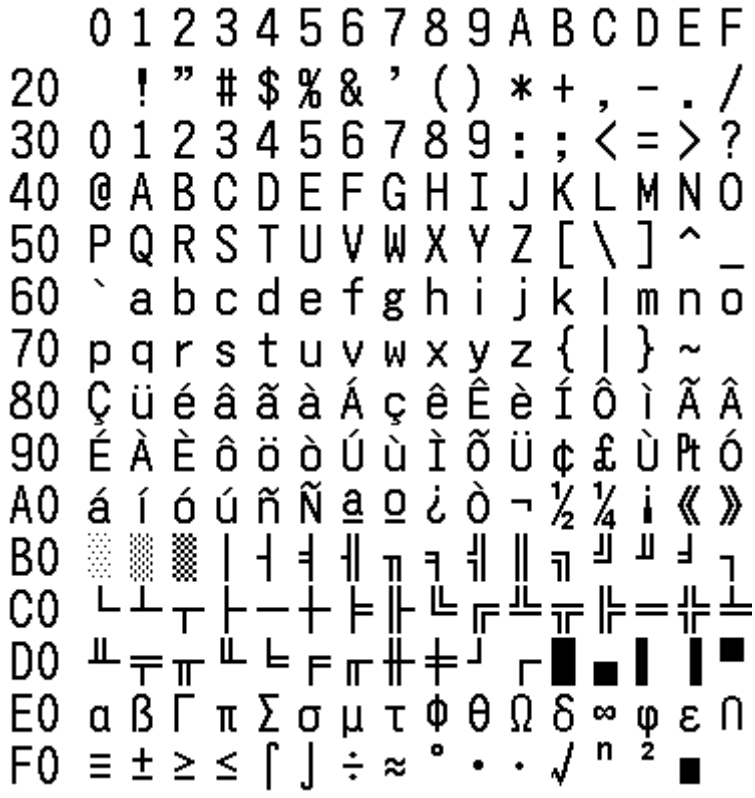


Figure A-4 Codepage 860 (Portuguese)

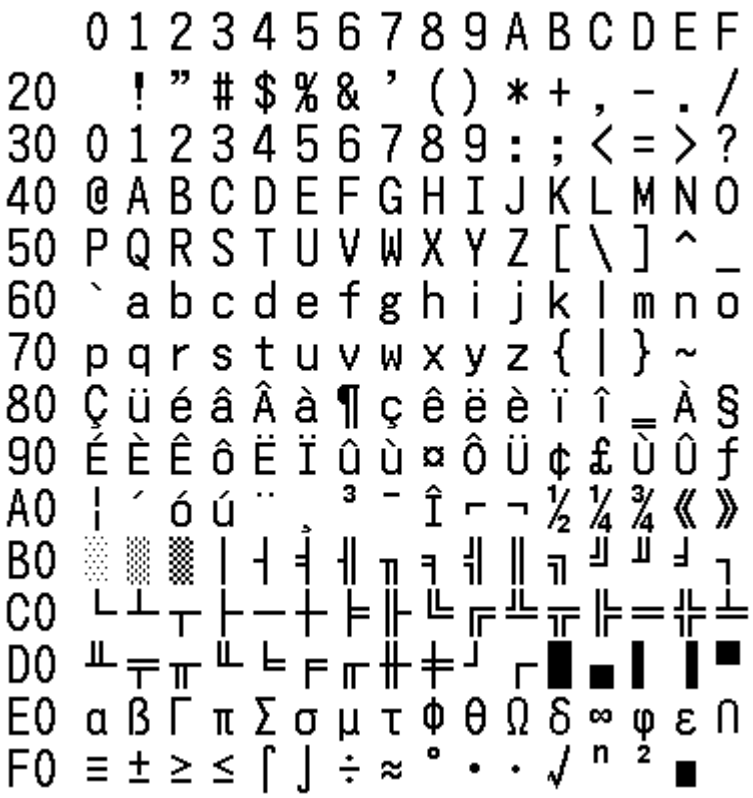


Figure A-5 Codepage 863 (Canadian-French)

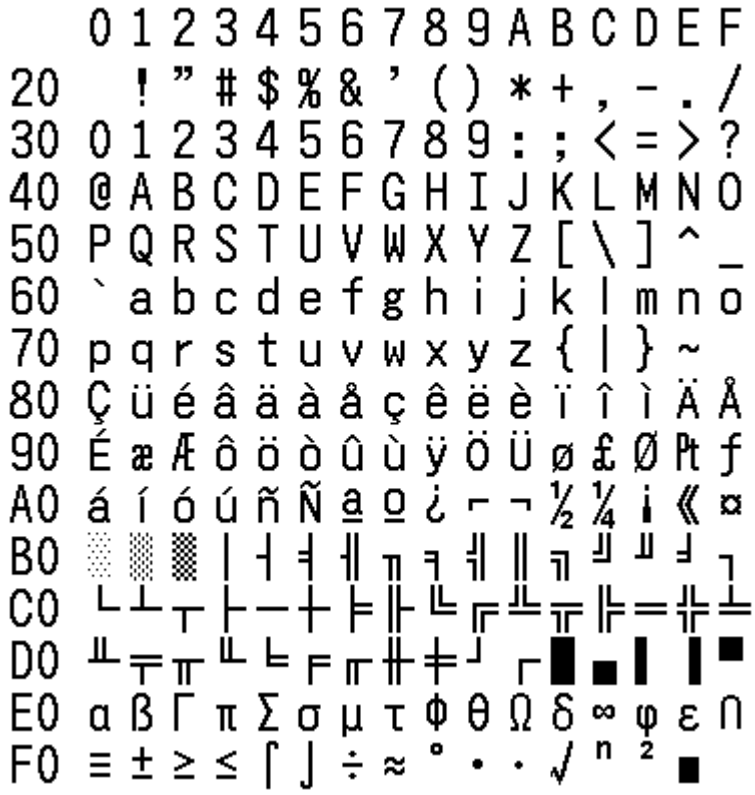


Figure A-6 Codepage 865 (Nordic)

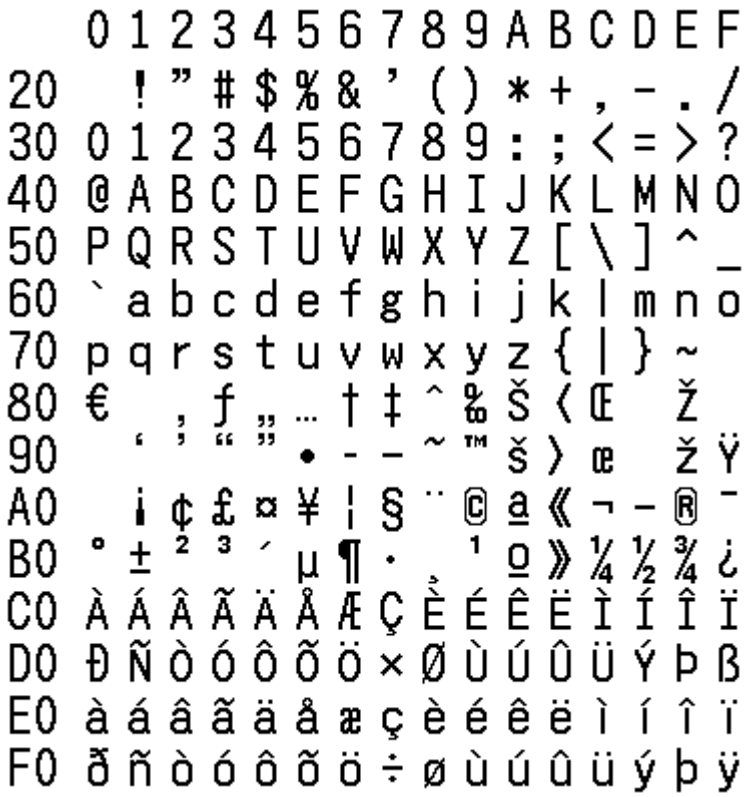


Figure A-7 Codepage 1252 (Latin)

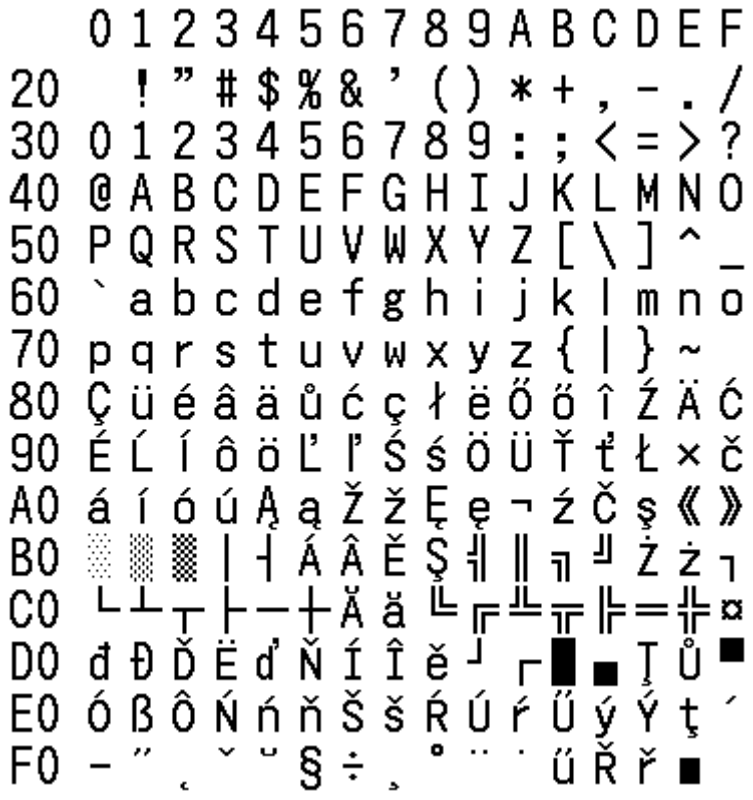


Figure A-8 Codepage 852 (Eastern Europe)

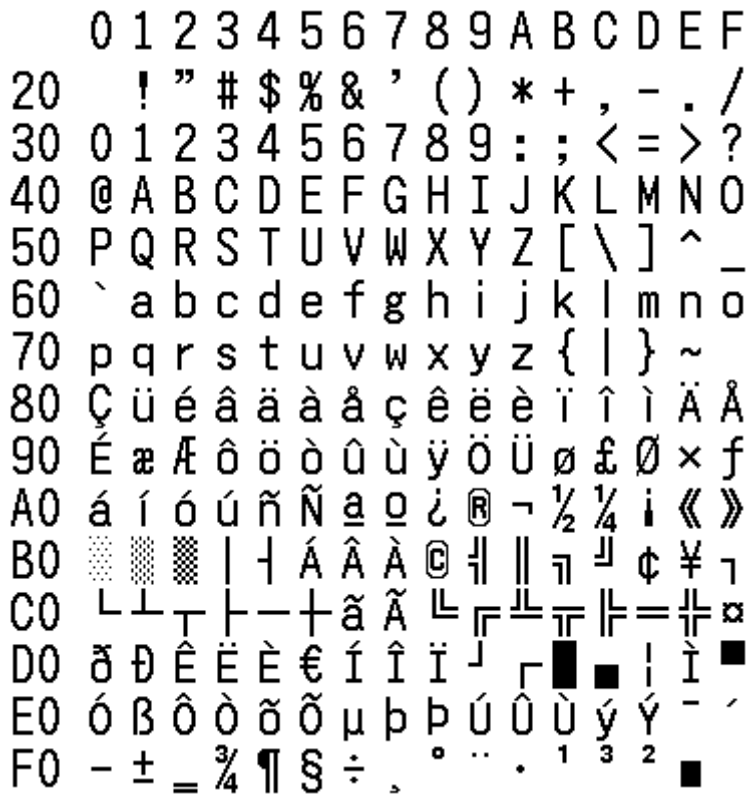


Figure A-9 Codepage 858 (Euro)

Figure A-10 Codepage 864 (Arabic)

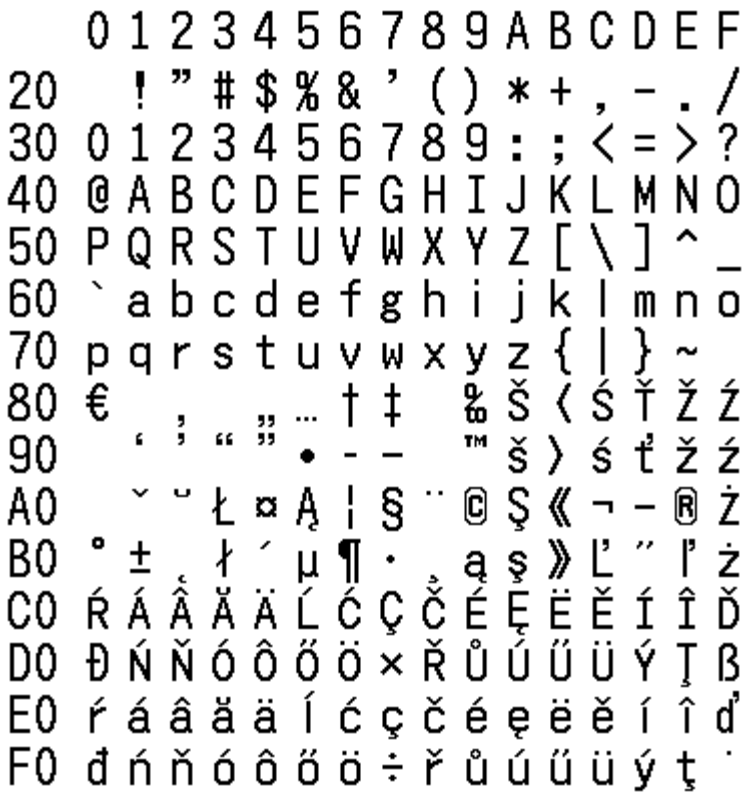


Figure A-11 Codepage 1250 (Central European)

Figure A-12 Codepage 1251 (Cyrillic)

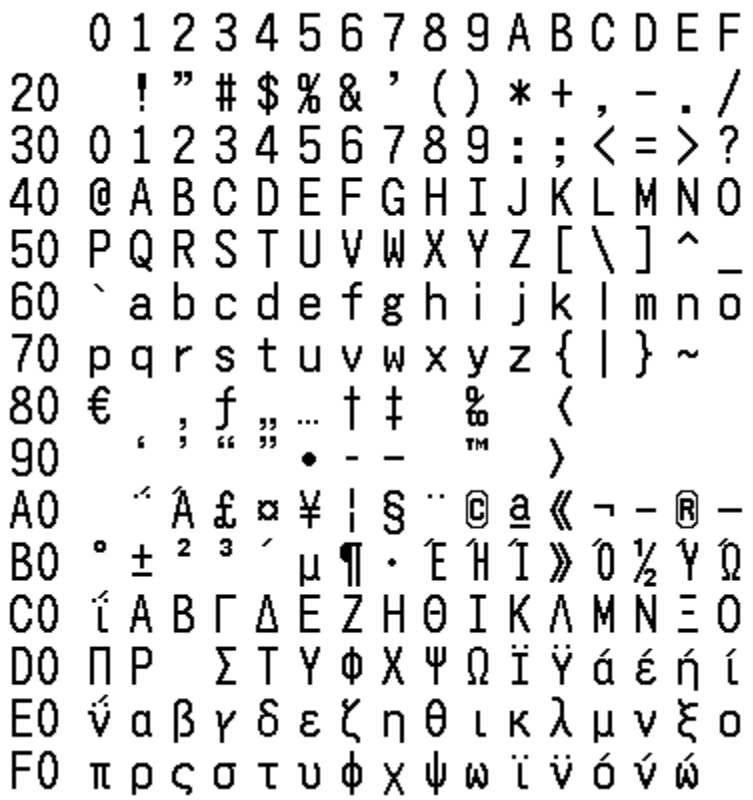


Figure A-13 Codepage 1253 (Greek)

Figure A-14 Codepage 1254 (Turkish)

A.2 INTERNATIONAL CHARACTER SET

The following codes differ depending on the specified international character set.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	₧	$	@	¡	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
Arabia	#	$	@	[	\	]	^	`	{	|	}	~

Figure A-15 International Character Set

A.3 2-BYTE CHARACTER

Kanji defined in the JIS 1st and 2nd levels in 1990, NEC selection of IBM extensions, and IBM extensions can be printed. Also, special characters and NEC special characters are allocated to the kanji code of the non-kanji area.

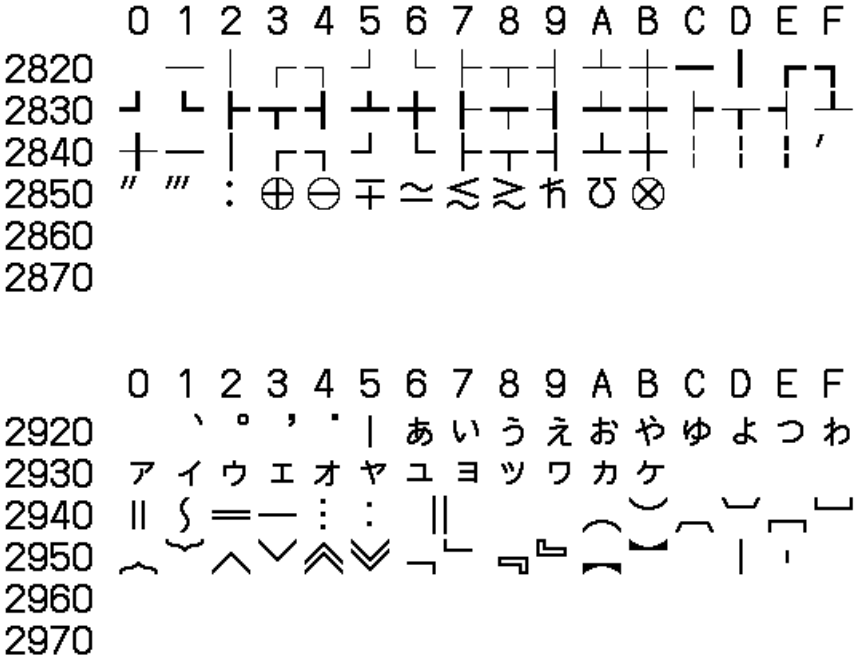


Figure A-16 Special Character Set

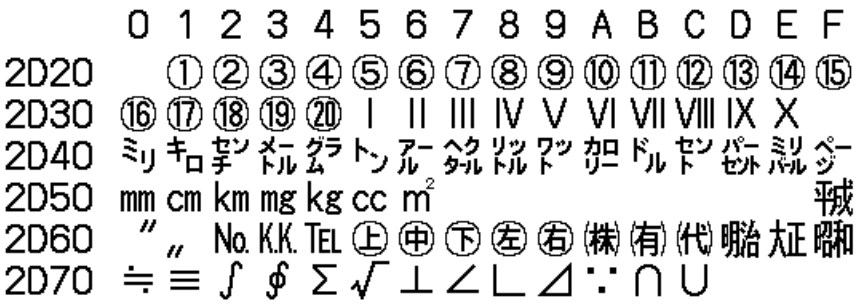


Figure A-17 NEC Special Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7920		纊	褜	鍈	銈	蓜	俉	炻	昱	棈	鋹	曻	彅	丨	仡	仼
7930	伀	伃	伹	佖	侒	侊	侚	侔	俍	偀	倢	俿	倞	偆	偰	偂
7940	傔	僴	僘	兊	兤	冝	冾	凬	刕	劜	劦	勀	勛	匀	匇	匤
7950	卲	厓	厲	叝	﨎	咜	咊	咩	哿	喆	坙	坥	垬	埈	埇	﨏
7960	塚	增	墲	夋	奓	奛	奝	奣	妤	妺	孖	寀	甯	寘	寬	尞
7970	岦	岺	峵	崧	嵓	﨑	嵂	嵭	嶸	嶹	巐	弡	弴	彧	德	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7A20		忞	恝	悅	悊	惞	惕	愠	惲	愑	愷	愰	憘	戓	抦	揵
7A30	摠	撝	擎	敎	昀	昕	昻	昉	昮	昞	昤	晥	晗	晙	晴	晳
7A40	暙	暠	暲	暿	曺	朎	朗	杦	枻	桒	柀	栁	桄	棏	﨓	楨
7A50	﨔	榘	槢	樰	橫	橆	橳	橾	櫢	櫤	毖	氿	汜	沆	汯	泚
7A60	洄	涇	浯	涖	涬	淏	淸	淲	淼	渹	湜	渧	渼	溿	澈	澵
7A70	濵	瀅	瀇	瀨	炅	炫	焏	焄	煜	煆	煇	凞	燁	燾	犱	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7B20		犾	猤	猪	獷	玽	珉	珖	珣	珒	琇	珵	琦	琪	琩	琮
7B30	瑢	璉	璟	甁	畯	皂	皜	皞	皛	皦	益	睆	劯	砡	硎	硤
7B40	硺	礰	礼	神	祥	禔	福	禛	竑	竧	靖	竫	箞	精	絈	絜
7B50	綷	綠	緖	繒	罇	羡	羽	茁	荢	荿	菇	菶	葈	蒴	蕓	蕙
7B60	蕫	﨟	薰	蘒	﨡	蠇	裵	訒	訷	詹	誧	誾	諟	諸	諶	譓
7B70	譿	賰	賴	贒	赶	﨣	軏	﨤	逸	遧	郞	都	鄕	鄧	釚	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7C20		釗	釞	釭	釮	釤	釥	鈆	鈐	鈊	鈺	鉀	鈼	鉎	鉙	鉑
7C30	鈹	鉧	銧	鉷	鉸	鋧	鋗	鋙	鋐	﨧	鋕	鋠	鋓	錥	錡	鋻
7C40	﨨	錞	鋿	錝	錂	鍰	鍗	鎤	鏆	鏞	鏸	鐱	鑅	鑈	閒	隆
7C50	﨩	隝	隯	霳	霻	靃	靍	靏	靑	靕	顗	顥	飯	飼	餧	館
7C60	馞	驎	髙	髜	魵	魲	鮏	鮱	鮻	鰀	鵰	鵫	鶴	鸙	黑	
7C70		ⅰ	ⅱ	ⅲ	ⅳ	ⅴ	ⅵ	ⅶ	ⅷ	ⅸ	ⅹ	￢	￤	＇	＂	

Figure A-18 NEC Selection of IBM Extension Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9320		ⅰ	ⅱ	ⅲ	ⅳ	ⅴ	ⅵ	ⅶ	ⅷ	ⅸ	ⅹ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ
9330	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	￢	￤	＇	＂	㈱	№	℡	∵	纊	褜	鍈
9340	銈	蓜	俉	炻	昱	棈	鋹	曻	彅	丨	仡	仼	伀	伃	伹	佖
9350	侒	侊	侚	侔	俍	偀	倢	俿	倞	偆	偰	偂	傔	僴	僘	兊
9360	兤	冝	冾	凬	刕	劜	劦	勀	勛	匀	匇	匤	卲	厓	厲	叝
9370	﨎	咜	咊	咩	哿	喆	坙	坥	垬	埈	埇	﨏	塚	增	墲	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9420		夋	奓	奛	奝	奣	妤	妺	孖	寀	甯	寘	寬	尞	岦	岺
9430	峵	崧	嵓	﨑	嵂	嵭	嶸	嶹	巐	弡	弴	彧	德	忞	恝	悅
9440	悊	惞	惕	愠	惲	愑	愷	愰	憘	戓	抦	揵	摠	撝	擎	敎
9450	昀	昕	昻	昉	昮	昞	昤	晥	晗	晙	晴	晳	暙	暠	暲	暿
9460	曺	朎	朗	杦	枻	桒	柀	栁	桄	棏	﨓	楨	﨔	榘	槢	樰
9470	橫	橆	橳	橾	櫢	櫤	毖	氿	汜	沆	汯	泚	洄	涇	浯	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9520		涖	涬	淏	淸	淲	淼	渹	湜	渧	渼	溿	澈	澵	濵	瀅
9530	瀇	瀨	炅	炫	焏	焄	煜	煆	煇	凞	燁	燾	犱	犾	猤	猪
9540	獷	玽	珉	珖	珣	珒	琇	珵	琦	琪	琩	琮	瑢	璉	璟	甁
9550	畯	皂	皜	皞	皛	皦	益	睆	劯	砡	硎	硤	硺	礰	礼	神
9560	祥	禔	福	禛	竑	竧	靖	竫	箞	精	絈	絜	綷	綠	緖	繒
9570	罇	羡	羽	茁	荢	荿	菇	菶	葈	蒴	蕓	蕙	蕫	﨟	薰	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9620		蘒	﨡	蠇	裵	訒	訷	詹	誧	誾	諟	諸	諶	譓	譿	賰
9630	賴	贒	赶	﨣	軏	﨤	逸	遧	郞	都	鄕	鄧	釚	釗	釞	釭
9640	釮	釤	釥	鈆	鈐	鈊	鈺	鉀	鈼	鉎	鉙	鉑	鈹	鉧	銧	鉷
9650	鉸	鋧	鋗	鋙	鋐	﨧	鋕	鋠	鋓	錥	錡	鋻	﨨	錞	鋿	錝
9660	錂	鍰	鍗	鎤	鏆	鏞	鏸	鐱	鑅	鑈	閒	隆	﨩	隝	隯	霳
9670	霻	靃	靍	靏	靑	靕	顗	顥	飯	飼	餧	館	馞	驎	髙	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9720		髜	魵	魲	鮏	鮱	鮻	鰀	鵰	鵫	鶴	鸙	黑			
9730																
9740																
9750																
9760																
9770																

Figure A-19 IBM Extension Character Set

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