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EPSON

Two-Station Printer

RP-U420 series

Specification

STANDARD	
Rev. No.	B
Notes	

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REVISION SHEET

Sheet 1 of 3

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

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment	Matsumoto	--	Kanai	I	B	19	B	43	B
B	Change				II	B	20	B	44	B
					III	B	21	B	45	B
					IV	B	22	B	46	B
							23	B	47	B
							24	B	48	B
					1	B	25	B	49	B
					2	B	26	B	50	B
					3	B	27	B	51	B
					4	B	28	B	52	B
					5	B	29	B	53	B
					6	B	30	B	54	B
					7	B	31	B	55	B
					8	B	32	B	56	B
					9	B	33	B	57	B
					10	B	34	B	58	B
					11	B	35	B	59	B
					12	B	36	B	60	B
					13	B	37	B	61	B
					14	B	38	B	62	B
					15	B	39	B	63	B
					16	B	40	B	64	B
					17	B	41	B	65	B
					18	B	42	B	66	B
TITLE RP-U420 series Specification (STANDARD)					Front Part					
					Cover	Rev. Sheet	Scope	General Descriptions	Table of Contents	Contents
					1	3	--	2	2	71
										Appendix
										Total
										84

REVISION SHEET

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Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.	
A	Enactment				67	B					
B	Change				68	B					
					69	B					
					70	B					
					71	B					
					App.1	B					
					App.2	B					
					App.3	B					
					App.4	B					
					App.5	B					
TITLE				Front Part							
RP-U420 series Specification (STANDARD)				Cover	Rev. Sheet	Scope	General Descriptions	Table of Contents	Contents	Appendix	Total
				1	3	--	2	2			

REVISION SHEET

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REV.	SHEET	CHANGED CONTENTS
B	All	All pages are renumbered.
	1	1.2 Character Specifications 1) One-byte code font (added) 2) Two-byte code font (added)
	2	1.5.1 Paper feed 1/6 inch → 4.23 mm
	7	1.12 Electrical Specifications 3) Current consumption (added) 1.13 Applicable Standards Europe, Oceania (added)
	17	2.1.2.7 Data Receiving Timing (changed)
	22	3.1 Commands ESC t, GS I, DLE EOT (added)
	25 - 35	3.2.2 through 3.2.12 (added)
	36,37	Table 3.3.1 and Table 3.3.2 Dip Switch 1 Bit 7 of DIP Switch 1 Reserved → Paper cutter
	42	3.7 Hexadecimal Dump 3) <Example Printing> (corrected)
	47	FF [Function] & [Description] (changed)
	59	ESC t (added)
	60	ESC z [Format] Decimal 112 → 122 [Default] $n = 1$ (added)
	61	FS & and FS . [Default] (added) [Description] (changed)
	62	GS I (added)
	63, 64	GS V [Function] (changed)
	66 - 69	DLE EOT (added)
TITLE		
RP-U420 series Specification (STANDARD)		

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Features

This printer is a two-station printer that is light and offers excellent reliability. The design of this printer also emphasizes the needs of the user. The printer has the following features:

- High-speed printing, light weight, one line validation, and low-noise operation
- Excellent universality of control
- Built-in drawer-kick interface provides capability to drive two drawers
- Selectable character fonts (7×9 , 16×9 for Chinese Character)
- Can apply for Taiwan receipt printing with Taiwan mode using DIP switch setting (for RP-U420 with Taiwan black mark sensor model)
- Takeup device installed
- The standard model is equipped with an autocutter. A manual cutter model is also available.


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I. BASIC SPECIFICATIONS

1.1 Printing Specifications

- 1) Printing method: Serial impact dot-matrix
- 2) Head wire configuration: 9-pin serial configuration
- 3) Printing directions: Bi-directional printing
- 4) Printing speed: Approx. 3 lps (lps: lines per second)
(Excludes data transfer and processing time)
- 5) Maximum print positions
Receipt / journal printing : 216
Validation printing: 495
Position spacing: Approx. 0.17 mm (half dot pitch)

Table 1.1.1 Character Dimensions, Characters Per Inch, Characters Per Line

Character configuration		Character dimensions W × H (mm)	Dot spacing between characters	Characters per line (cpl)	Characters per inch (cpi)
Horiz. × Vert.	Character type				
7 × 9	ANK	1.31 × 3.1	2 Half-dots	24	16.6
16 × 9	Chinese	2.84 × 3.1	2 Half-dots	12	8.3

NOTE: Neighboring-position printing is not possible.

Validation printing is for 1 line.

- 6) Characters per line
Using a 7(position) × 9(wire) font with 2-position column spacing.
Receipt / Journal printing : 24 columns
Validation printing : 55 columns

1.2 Character Specifications

1) One-byte code font

- Number of characters:
- | | |
|---------------------------|---|
| Alphanumeric characters: | 95 |
| Extended graphics: | 128 × 12 pages
(including two space pages) |
| International characters: | 37 |

2) Two-byte code font

Traditional Chinese character (Based on Big 5 code table)

- Total 13053 characters (*1)

(*1): When printing Kanji characters which consist of many lines, be sure to consider that some of characters may not be readable.

1.3 Roll Paper Supply Unit

- 1) Supply method: Drop-in method
- 2) Near end detector: Near-end detectors for journal and receipt are standard.
Detection method: By mechanical microswitch
Paper roll near-end detection is adjustable.
Refer to Appendix B for instructions on adjusting the near-end detector location.

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1.4 Takeup Device

The take-up mechanism is integrated into the main unit. Journal paper is taken up automatically when it is fed.

1.5 Paper and Paper Feed Specifications

1.5.1 Paper feed

- | | |
|---------------------------|--|
| 1) Paper feeding method: | Friction feed |
| 2) Paper feed interval: | 4.23 mm |
| 3) Fast paper feed speed: | Continuous paper feeding (*): 30 lps (lps: lines per second)
Other fast feeding: 12 lps (lps: lines per second) |

- (*)
- When the first 30-line paper feeding with the **ESC d n** command is executed.
 - When the paper is fed with the **GS V m n** command in standard mode.

1.5.2 Paper specifications

The following paper must be used to maintain high print quality.

(a) Paper roll

- | | |
|------------------|-------------------------------|
| Width | 44.5 ± 0.5 mm |
| Maximum diameter | 83 mm |
| Thickness | 0.06 to 0.09 mm |
| Weight | 52.3 to 64.0 g/m ² |

(b) Validation paper

1) Single sheet

- | | |
|-------------|--|
| Dimensions: | Width: 135-210 mm × height minimum 70 mm |
| Thickness: | 0.07 - 0.14 mm |

2) Multiple sheet

- | | |
|---------------------------|---|
| Configuration: | Normal paper + carbon paper or pressure-sensitive paper |
| Dimensions: | Width: 135 - 210 mm × height minimum 70 mm |
| Number of layers: | Maximum 2 (1 original + 1 copy) |
| Combined paper thickness: | Maximum 0.14 mm |

3) Other Specifications

- ① Do not use paper that might interfere with operation of the sensors, such as tracing or coated paper.
- ② When using validation printing (factory option), use paper with a light opacity of 70% or more.
- ③ Use paper that is free from wrinkles, creases, and wraps.

1.6 Paper cutter

Autocutter is installed as a standard. (Manual cutter type is available as a factory option)

- 1) One point left uncut or three points uncut can be selected for the autocutter. (refer to Section 6.3 Command Description **GS V**)
- 2) If the Taiwan mode is set with the DIP SW 1-8, paper is cut automatically when **PF** or **FF** command is executed. (refer 3.3.4 *1))

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1.7 Stamp

- The standard model provides a stamp mechanism.
- The stamp material must be provided by the user.
- A stamp frame can be provided as an option.

1) Material: Porous rubber

2) Stamp face dimensions: 30(W) × 20(H)mm

NOTE: Stamp face characters should be equal in the area both above and below the centerline. (When the difference is extreme, part of characters may not print.)

3) Recommended stamp model Shachihata XS-20
Fujicopian CSP-2030D

4) Recommended ink Shachihata Y-34
Fujicopian Super Ink (purple)

- NOTES:
1. Because the stamp is located near the paper exit slot of the paper feed mechanism, the knurled screw of the paper holder may become stained when replacing the stamp or refilling ink.
 2. To refill ink, inject 2-3 drops through each round hole in the rear of the stamp set.
 3. After refilling ink, leave the unit upturned until the ink has fully spread (3 hours is recommended time).
 4. Use only the recommended ink to prevent leaks during and after refilling.
 5. Do not change from using refill ink made by one manufacturer to ink made by another manufacturer.

5) Stamp button: Installed as a standard
Refer to Section 3.3.3 in detail.

1.8 Buzzer

A buzzer is installed.

The buzzer cannot sound if DIP SW2-3 is set to Off. (See Table 3.3.2 for the DIP SW2)

The conditions when the buzzer beeps are as follows if DIP SW2-3 is set to On.

- When an error occurs.
- When the **DLE ENQ** command is executed.
- When the **ESC @** command is executed.
- When the self-test is executed (See Section 3.6, Self-test).
- When the hexadecimal dump is executed (See Section 3.7, Hexadecimal Dump).

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1.9 Ribbon Cassette

The ribbon is fed automatically when the motor runs.

Type: EPSON ERC-32(P)

Use of a ribbon cassette other than the specified type can degrade printer performance and reduce reliability and life expectancy.

Color: Purple(single-color)

Ribbon life: 6,000,000 characters

(24 VDC, 25°C, energizing width, 7 × 9 font, receipt/journal 9 + 9 columns, continuous printing, ASCII code hex 20-5F rolling pattern printing))

1.10 Printing area

1) Receipt/journal printing

Refer to Figure 1.10.1.

Refer to Figure 1.10.3 for the Taiwan receipt.

(Taiwan receipt can be issued easily in Taiwan mode with DIP SW 1-8 setting)

2) Validation Printing (one-line validation)

Single-line validation printing can be performed.

Since there is no validation paper hold mechanism, the validation paper should be inserted using the guide on the journal side to position the paper. During printing, the paper should be held in place, for example, by pushing it against the case.

NOTES: 1. Incorrect printing may result if the above procedure is not followed.

2. If the paper is inserted but is not supported by hand, it may move when the print head moves from the journal side to the receipt side.

The user should define the home position of the print head on the receipt side and have the head return to this position after completing receipt printing.

The printable area is shown in Figure 1.10.2.

3. Refer to Appendix D for inserting the validation paper.

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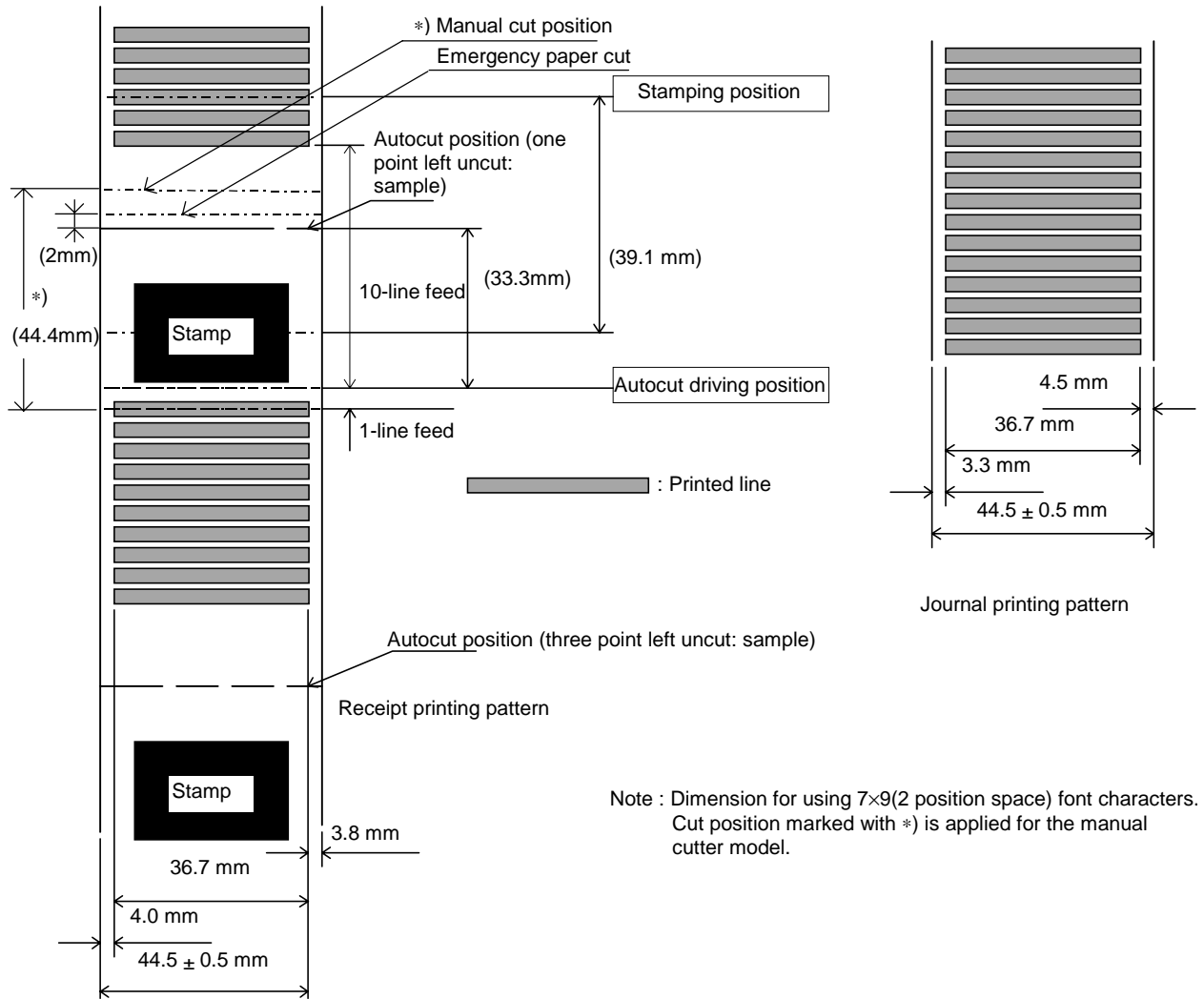


Figure 1.10.1 Printing Area

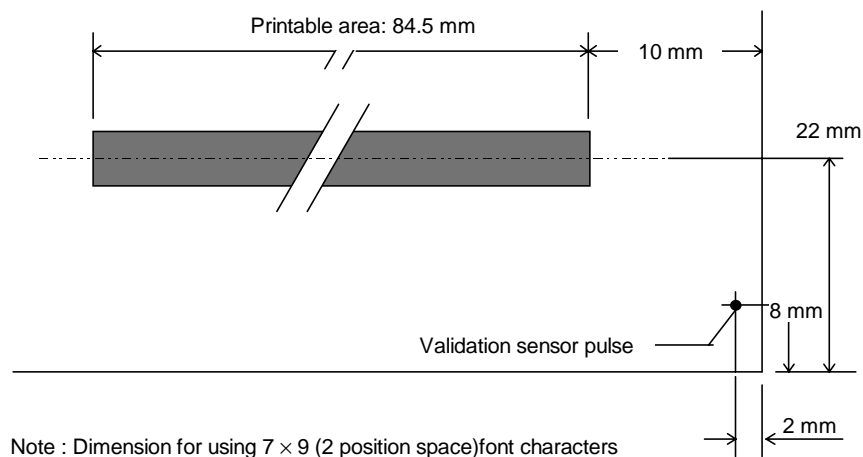
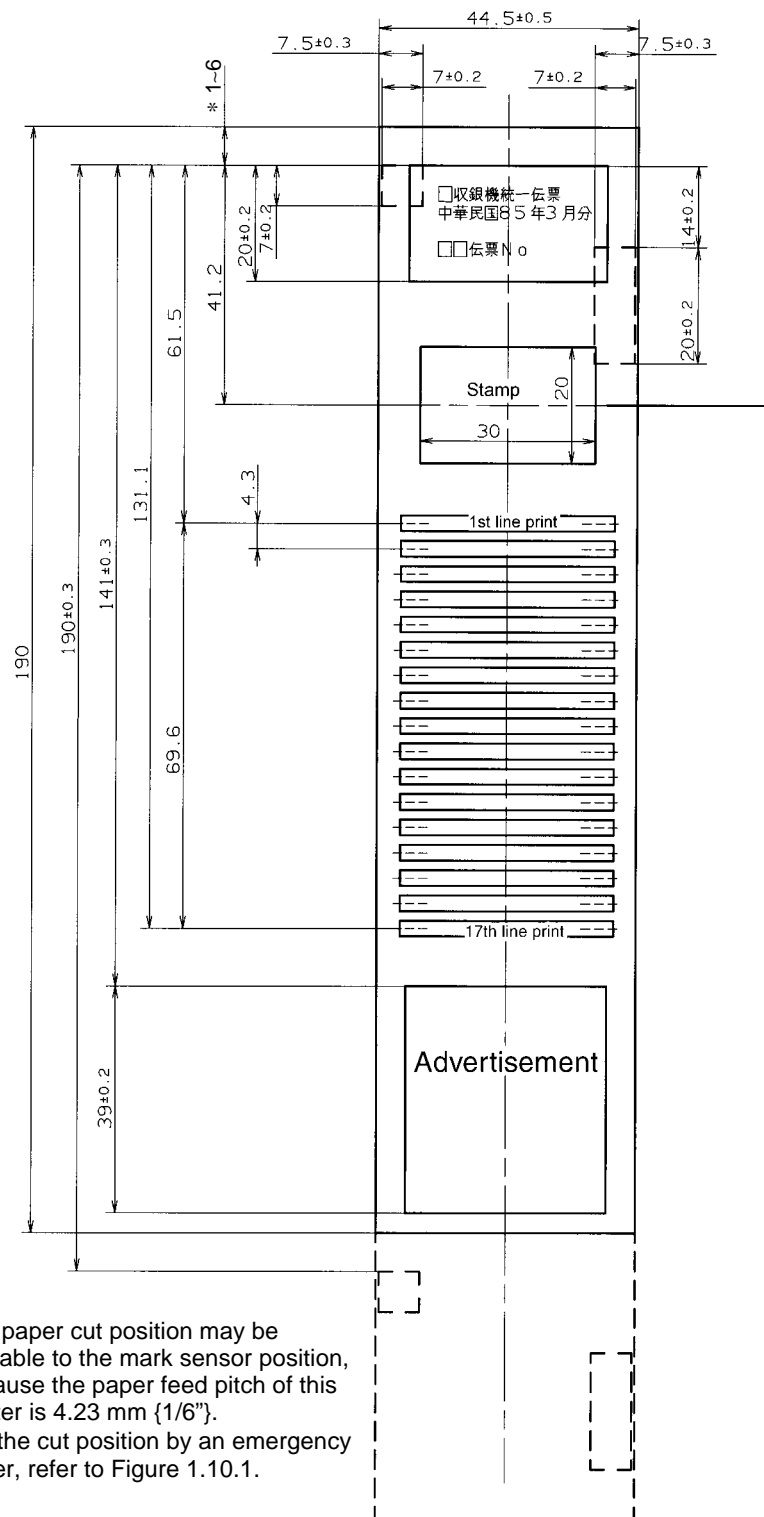


Figure 1.10.2

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[Units: mm]

Figure 1.10.3

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1.11 Receive Buffer

4 KB

1.12 Electrical Specifications

1) Use EPSON PS-170

2) Voltage: 24 V \pm 5%

3) Current consumption (at 25°C):

During operation:

Mean: Approximately 0.75A (α -N 24 columns printing)

Standby:

Mean: Approximately 0.12A

1.13 Applicable Standards

Taiwan: EMI Class B

Europe: EMC: CE marking

EN55022 Class B

EN55024

Safety standard: EN60950 (TUV)

Oceania: EMC: AS/NZS 3548 Class B

1.14 Reliability

1) Life: 8,000,000 lines

2) MCBF: 20,000,000 lines

3) Print head life: 300,000,000 dots/wire

4) Auto cutter life: 800,000 times

1.15 Environmental Specifications

1) Temperature

During operation: 5 to 45°C {41° to 113°F}. (At 34°C {93°F} or higher, there are humidity restrictions; refer to Figure 1.15.1.)

During storage: -10 to 50°C {14° to 122°F} (excludes paper and ribbon)

2) Humidity

During operation: 10 to 90% (no condensation)

During storage: 10 to 90% (no condensation; excludes paper and ribbon)

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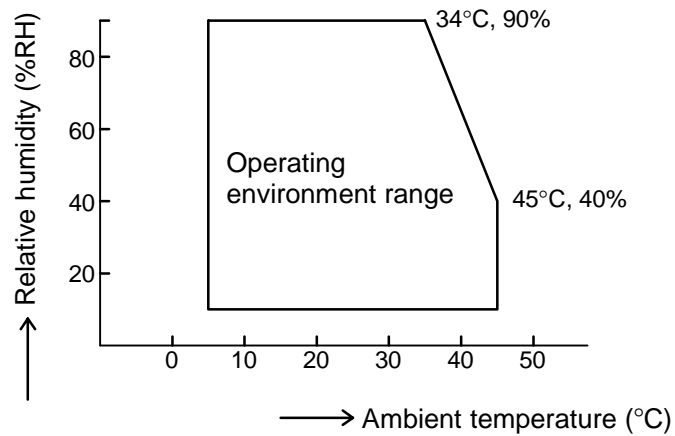


Figure 1.15.1 Operating Temperature and Humidity Range

3) Vibration resistance

While packed:

Frequency	5 to 55 Hz
Acceleration	Approximately 19.6 m/s ² {2 G}
Sweep	10 minutes (half cycle)
Time	One hour
Directions	X, Y and Z

4) Impact resistance

While not packed:

Height:	5 cm
Directions	4 sides, supported on one side

While packed:

Height:	80 cm
Directions	1 corner, 3 edges, 6 sides

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2. CONFIGURATION

2.1 Interface Specifications

2.1.1 RS-232 Serial Interface

2.1.1.1 Specifications

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15 V ... logic '1' / OFF SPACE = +3 to +15 V ... logic '0' / ON
Baud rate:	9600 , 19200 bps (bps: bits per second)
Data word length:	7 or 8 bits
Parity:	None, even, odd
Stop bits:	1 or more
Connector:	D-SUB 25 (female) or equivalent

2.1.1.2 Online/Offline switching

The printer does not have an online/offline button. The printer goes online or offline under the following conditions:

<Conditions to go offline>

- 1) When the printer cover is open
- 2) Between the time when the power is turned on and when the printer is ready to receive data.
- 3) During the self-test.
- 4) During paper feeding using the receipt/journal paper feed button.
- 5) During the printer stops printing due to a paper-end.
- 6) When an error has occurred.

<Conditions to go online>

- 1) Automatically after the time when the power is turned on (including reset using the interface) when the printer is ready to receive data.
- 2) Automatically after the self-test.
- 3) Automatically after the paper feeding is stopped by releasing the receipt/journal paper feed button.
- 4) After the time when the paper loading is completed, using **DLE ENQ 1** or **DLE ENQ 2** command.
The receipt/journal paper out (PAPER OUT) LEDs are off after the paper loading is completed.

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2.1.1.3 Interface connector terminal assignments and signal functions

Table 2.1.1 Interface Pin Assignments and Functions

Pin No.	Signal Name	Signal Direction	Function
1	FG	-	Frame ground
2	TXD	Output	Transmit data
3	RXD	Input	Receive data
4	RTS	Output	Same as DTR signal (same as pin 20)
6	DSR	Input	Indicates whether the host can receive data. SPACE indicates that the host can receive data, and MARK indicates that the host cannot receive data. When DTR/DSR control is selected, the printer transmits data after checking this signal. When XON/XOFF control is selected, the printer does not check this signal. Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains MARK for 1 ms or more.
7	SG	-	Signal ground
20	DTR	Output	1) When DTR/DSR control is selected, this signal indicates whether the printer is BUSY. SPACE indicates that the printer is READY to receive data, and MARK indicates that the printer is BUSY. DIP switch 1-6 switches conditions for BUSY. The BUSY (MARK) condition is changed using DIP switch 1-6 as follows:
			Printer Status
			Dip Switch 1-6 Status
			ON OFF
			Offline 1) The period from power-on (or initialization of the mechanism due to resetting through the interface) until the printer is ready to receive data.
			2) During the self-test.
			3) During paper feeding using the FEED button.
			4) When the printer stops due to a paper-end (ESC c 4).
			5) During an error condition.
			6) When the receive buffer is full (*1).
25	INIT	Output	2) When XON/XOFF control is selected, this signal indicates whether the printer is properly connected and is ready to receive data. SPACE indicates that the printer is properly connected and is ready to receive data. This signal is always SPACE except during the following periods:
			<ul style="list-style-type: none"> • From power-on until the printer is ready to receive data. • During the self-test.
25	INIT	Output	Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains SPACE for 1 ms or more.

- *1
- The period from when the remaining space in the receive buffer drops to 256 bytes until it increases to 1000 bytes is called the "buffer full state."
 - Data received when the remaining space in the receive buffer is zero bytes is ignored.

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2.1.1.4 XON/OFF transmission timing

When XON/OFF control is selected, the printer transmits XON or XOFF signals as follows. Transmit timing depends on the setting of DIP switch 1-5.

Table 2.1.2 XON/XOFF Transmission Timing

Printer Status		Dip Switch 1-5 Status	
		ON	OFF
[XON transmission]	1) When the printer first goes online after power on or after resetting through the interface.	Transmission	Transmission
	2) When the receive buffer is released from the buffer-full state.	Transmission	Transmission
	3) When the printer status changes from offline to online.	--	Transmission
	4) When the printer recovers from an error through a command.	--	Transmission
[XOFF transmission]	5) When the receive buffer is full.	Transmission	Transmission
	6) When the printer status changes from online to offline.	--	Transmission

- NOTES:
- The XON code is <11>H and the XOFF code is <13>H.
 - In case 3), XON is not transmitted when the receive buffer is full.
 - In case 6), XOFF is not transmitted when the receive buffer is full.
 - When the DIP SW1-5 is set to Off, XON is not transmitted if the printer is offline state in case 2).

2.1.1.5 Example serial interface connection

Host	Printer
TXD-----	RXD
DSR -----	DTR
CTS-----	RTS
RXD -----	TXD
DTR -----	DSR
FG -----	FG
SG -----	SG

- When connecting the printer to a DCE (DCE: Data Circuit Terminating Equipment), set the handshaking so that the transmitted data can be received.
- Transmit data to the printer after turning on the power and initializing the printer.

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2.1.1.6 Notes on setting DIP switch 1-6 to on

- 1) The printer mechanism stops but does not become BUSY in the following cases:
 - When an error occurs.
 - When the printer stops printing due to a paper-end.
 - When paper is fed using the feed button.
- 2) When using the **DLE ENQ** command, make sure that the receive buffer does not become full.
 - Notes on using a host that cannot transmit data when the printer is BUSY:
If an error occurs when the receive buffer is full and the printer is BUSY, the **DLE ENQ** commands cannot be used.
 - Notes on using a host that can transmit data when the printer is BUSY:
If a **DLE ENQ** command is used while sending bit-image data, and the receive buffer-full state is encountered during transmission of the data, the **DLE ENQ** is processed as bit-image data. In addition, the data transmitted during the receive buffer-full state may be lost.

Example:

Check the status with **GS r** for each line of printing transmitted. Make sure the data for printing each line does not cause the printer to enter the receive buffer-full state.

2.1.1.7 Notes on resetting the printer using the interface

The printer can be reset through the interface (pins 6 or 25) by changing the DIP switch settings accordingly (Refer to Table 2.1.3).

Table 2.1.3 Switching of the Reset Condition

Pin No.	DIP Switch	Reset Condition
Pin 6 (DSR)	DSW 2-2: ON	MARK input
Pin 25 (INIT)	DSW 2-1: ON	SPACE or TTL-HIGH level voltage signal input

To reset the printer, the conditions given below must be satisfied:

<DC characteristics>

Table 2.1.4 DC Characteristics of the Reset Condition

Item	Symbol	Pin 6 (DSR)	Pin 25 (INIT)
Input HIGH level voltage	V IH	+3 to +15 V	+2 to + 15 V
Input LOW level voltage	V IL	-15 to -3 V	-15 to + 0.8 V
Input HIGH level current	I IH	5 mA (maximum)	1 mA (maximum)
Input LOW level current	I IL	-5.3 mA (maximum)	-2 mA (maximum)
Input impedance	RIN	3 kΩ (minimum)	

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<AC characteristics>

Reset minimum pulse width: TRS 1 ms (minimum)

- When pin 6 (DSR) is used:

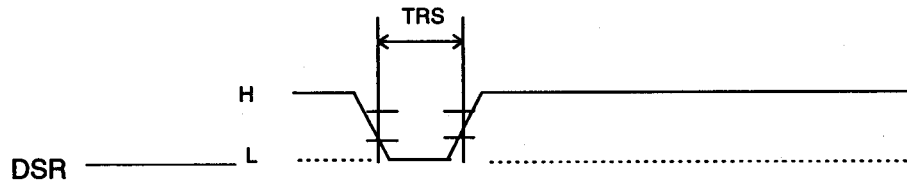


Figure 2.1.1 Interface Reset Signal (Pin 6)

- When pin 25 (INIT) is used:

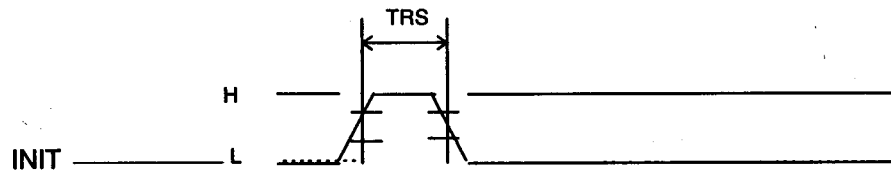


Figure 2.1.2 Interface Reset Signal (Pin 25)

- NOTES:
1. Correct printer operation is not guaranteed unless the signals meet the above stated conditions. The above conditions must also be met when TTL signals are used to drive the DSR and INIT reset pins. Although a signal is input to pin 6 (DSR) at the TTL level, according to the DC characteristics described above, the operation is not guaranteed and pin 6 cannot be controlled.
 2. When pin 6 (DSR) and Pin 25 (INIT) are open, the printer is operating.

2.1.2 IEEE 1284 Bidirectional Parallel Interface (Parallel Interface Specifications)

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2.1.2.1 Specifications

Data transmission: 8-bit Parallel
 Synchronization: Externally supplied nStrobe signals
 Handshaking: nAck and Busy signals
 Signal levels: TTL compatible
 Connector: 57RE-40360-830B (DDK) or equivalent (IEEE 1284 Type B)

Reverse communication (Printer Host): Nibble or Byte Mode

NOTE: The letter "n" in front of a signal name indicates active LOW.

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2.1.2.2 Switching between online and offline

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

- When the power is turned on or until the printer becomes ready for data transmission after it is initialized by the reset signal (nInit) from the interface.
- In the process of self-test.
- In the process of paper feeding using the paper feed switch
- Between the time when the printer stops printing due to a paper-end and when the online recovery wait time finishes after loading paper (in cases when an empty paper supply is detected by either the paper roll end detector or the paper roll near-end detector with a printing halt feature set enabled due for low paper by **ESC c 4**).
- When an error has occurred.

2.1.2.3 Compatibility Mode (Data Transmission from Host to Printer)

Centronics compatible

2.1.2.4 Reverse Mode (Data Transmission from Printer to Host)

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

- Description

This mode allows data transmission from the asynchronous printer under the control of the host. Data transmissions in the Nibble Mode are made via the existing control lines in units of four bits (a Nibble). In the Byte Mode, data transmissions proceed by making the eight-bits data lines bidirectional.

Both modes fail to proceed concurrently in the Compatibility Mode, thereby causing half duplex transmission.

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2.1.2.5 Interface Pin Assignments for Each Mode

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

- NOTES:
1. A prefix "n" to signal names refers to "L" active signals. To the host not provided with all the signal lines listed above, both-way communication fails.
 2. For interfacing, signal lines shall use twisted pair cables with the return sides connected to signal ground level.
 3. Interfacing conditions shall be all based on the TTL level to meet the characteristics described below. In addition, both rise time and fall time of each signal shall be 0.5μs or less.

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4. Data transmission shall not ignore the signals nAck or Busy. An attempt to transmit data with either signal, nAck or Busy, ignored can cause lost data. (Data transmissions to the printer shall be made after verifying the nAck signal or while the Busy signal is at the "L" level.)

5. Interface cables shall be the minimum length required and as short in length as possible.

*NC: Not Connected

ND: Not Defined

2.1.2.6 Electrical Characteristics

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

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	VOH	*2.4 V	5.5 V	*IOH=0.32 mA
Output LOW voltage	VOL	-0.5 V	*0.4 V	*IOL=-12 mA
Output HIGH current	IOH	0.32 mA	-	VOH=0.32 V
Output LOW current	IOL	-12 mA	-	VOL=0.4 V
Input HIGH voltage	VIH	2.0 V	-	VIH=2.0 V VIL=0.8 V
Input LOW voltage	VIL	-	0.8 V	
Input HIGH current	VIH	-	-0.32 mA	
Input LOW current	VIL	-	12 mA	

Logic-H Signal Sender Characteristics

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

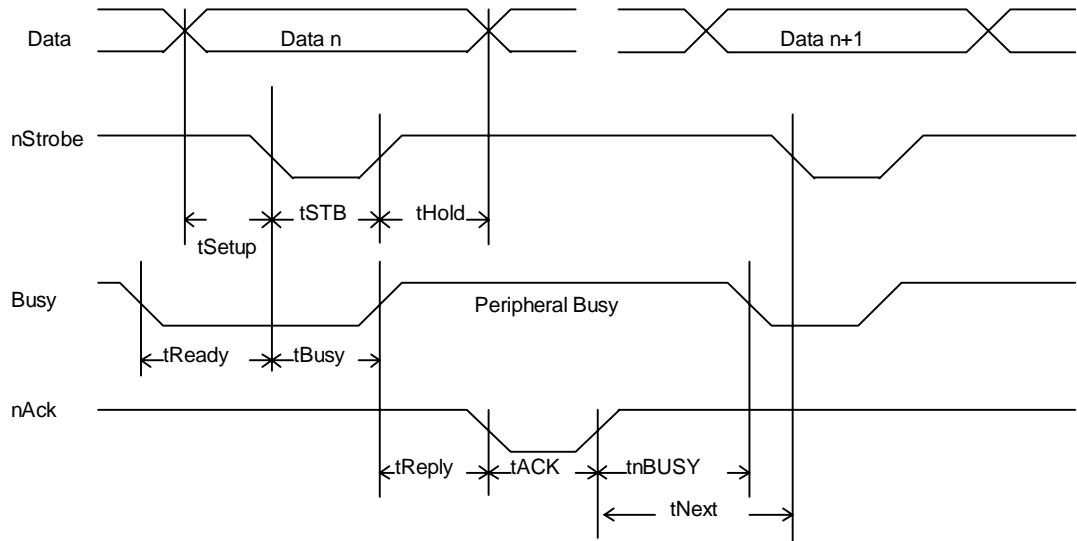
+5 V Signal Sender Characteristics

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

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

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2.1.2.7 Data Receiving Timing (Compatibility Mode)



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

*The printer latches data at the nStrobe \downarrow timing

NOTE: The letter "n" before a signal name indicates active LOW.

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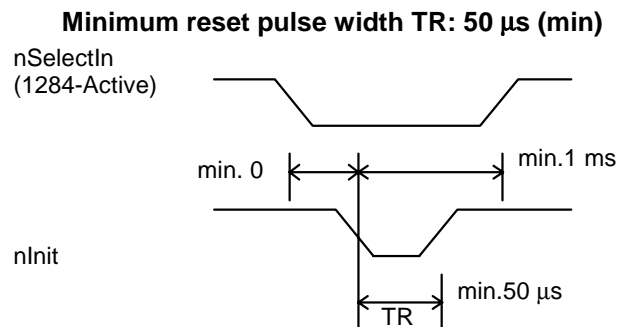
2.1.2.8 Notes on resetting the printer through the interface

The printer reset is available through the interface nInit signal (pin 31) by changing the DIP switch setting. (Refer to Table 2.1.5. DIP Switch settings for Printer Reset.)

Table 2.1.5 DIP Switch Setting for Printer Reset

Signal Line	DIP Switch	Reset Condition
Pin 31 (nInit)	DSW 2-1: ON	TTL-LOW level input

The printer reset through the nInit signal is only available with the SelectIn (1284-Active) signal at LOW. To enable the printer reset, the following signal timing shall be satisfied.



2.1.2.9 Notes on setting DIP switch 1-6 to ON

- 1) The printer mechanism stops but does not become busy when: an error has occurred, printing stops due to a paper-end, or paper is fed using the paper feed button.
- 2) When using **DLE ENQ** be sure that the receive buffer does not become full.
 - When using a host that cannot transmit data when the printer is busy:

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

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

Example: Check the printer status using **GS r 1** or **GS r 49** after transmitting each line of data. Transmit one line of data so that the receive buffer does not become full.

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

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

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

- 1) Allowable capacity of the printer internal buffer is 99 bytes. The status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data acceptance (Reverse Mode).

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2.2 Connectors

2.2.1 Interface connectors

Refer to Section 2.1, Interface Specifications.

1) RS-232 serial interface specification

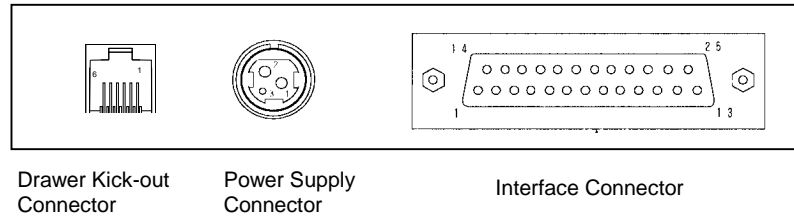


Figure 2.2.1 Serial Connector Panel Diagram

2) IEEE 1284 Parallel interface specification

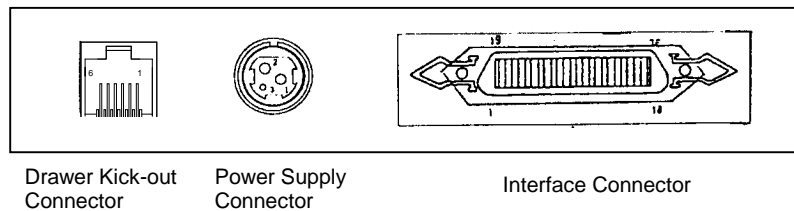


Figure 2.2.2 Parallel Connector Panel Diagram

2.2.2 Power supply connector

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

1) Pin assignments:

Pin Number	Signal Name
1	+ Power source
2	GND
3	NC
Shell	FG

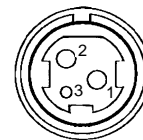


Figure 2.2.3 Power Supply Connector

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2.2.3 Drawer kick-out connector (modular connector)

1) Pin assignments

Pin No.	Signal Name	Direction
1	Frame GND	--
2	Drawer kick-out drive signal 1	Output
3	Drawer open/close signal	Input
4	+24 V	--
5	Drawer kick-out drive signal 2	Output
6	Frame GND	--

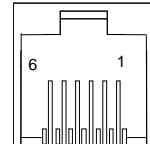


Figure 2.2.4 Drawer Kick-out Connector

2) Drawer kick-out drive signal

Output signal: Voltage: Approximately 24 V
Current: 1 A or less

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

Output waveform: Outputs the waveforms in Figure 2.2.5 to points A and B in Figure 2.2.6. (The **ESC p** command specifies ON time $t1$ and OFF time $t2$.)

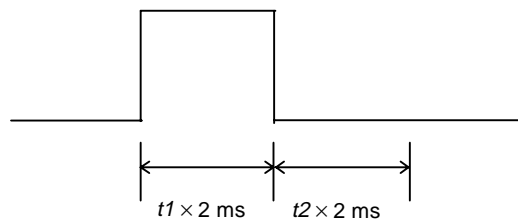
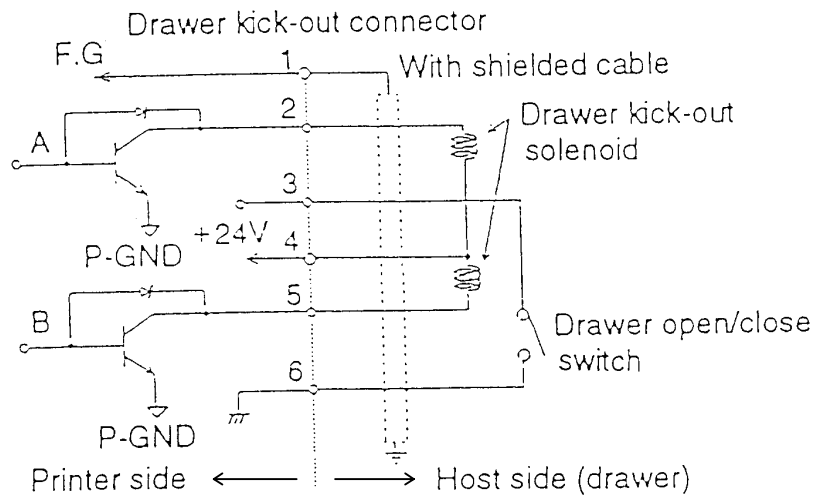


Figure 2.2.5 Drawer Kick-out Drive Signal

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3) Drawer open/close signal



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

Figure 2.2.6 Drawer Circuitry

- NOTES:
1. Two driver transistors cannot be driven simultaneously.
 2. The drawer drive duty must be as shown below:

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

3. Be sure to use the printer power supply (connector pin 4) for the drawer power source.
4. The resistance of the drawer kick-out solenoid must not be less than that specified (24 Ω). Otherwise, an overcurrent could damage the solenoid.
5. Refer to Appendix E for notes on using the drawer kick-out connector.

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3. FUNCTIONS

3.1 Commands

1) Command list for RP-U420

Command	Name	Command classification	
		Executing	Setting
LF	Print and line feed	○	
FF	Print and feed paper to print starting position (on label)	○	
CR	Print and carriage return	○	
RS	Journal tab	○	
ESC !	Select print mode(s)		○
ESC %	Select/cancel user-defined character set		○
ESC &	Define user-defined characters		○
ESC *	Select bit-image mode	○	
ESC <	Return home	○	
ESC =	Select peripheral device		○
ESC ?	Cancel user-defined characters		○
ESC @	Initialize printer	○	○
ESC R	Select an international character set		○
ESC c 0	Select paper type(s) for printing	○	○
ESC c 3	Select paper sensor(s) to output paper-end signals		○
ESC c 4	Select paper sensor(s) to stop printing		○
ESC c 5	Enable/disable receipt/journal feed buttons		○
ESC d	Print and feed n lines	○	
ESC f	Set validation paper waiting time		○
ESC o	Stamp	○	
ESC p	General pulse	○	
ESC t	Select character code table		○
ESC z	Turn parallel printing mode on/off for receipt and journal		○
FS &	Select Kanji character mode		○
FS .	Cancel Kanji character mode		○
GS I	Transmit printer ID	○	
GS V	Cut paper	○	
GS r	Transmit status	○	
DLE EOT	Real-time status transmission	○	
DLE ENQ	Real-time request to printer	○	
DLE DC4	Generate pulse at real-time	○	

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*1: There are two major classifications for command, as follows:

Execution command: Executes printer functions. Does not affect the following data.

Setting command: Sets the printer's operational conditions. The printer status is retained by flag, and the command affects the following data.

○ marks in the table above show whether the command is an execution or setting command.

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3.2 Character Code Tables

3.2.1 Page 0 (PC437: U.S.A. Standard Europe) (International character set: U.S.A.)

HEX	O	I	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	NUL	DL	SP	0	@	P	1	P	Ç	£	á	☐	L	1	110	111
0001		XON	!	1	A	Q	a	q	ü	æ	í	☐	1	192	224	240
0010			"	2	B	R	b	r	é	Æ	ó	☐	1	193	225	241
0011		XOFF	#	3	C	S	c	s	â	ø	ú	1	194	210	226	242
0100	EOT		\$	4	D	T	d	t	ä	ö	ñ	1	195	211	227	243
0101	ENQ		%	5	E	U	e	u	å	õ	ñ	1	196	212	228	244
0110			&	6	F	V	f	v	ä	û	ä	1	197	213	229	245
0111			'	7	G	W	g	w	å	ü	ö	1	198	214	230	246
1000	BS		(	8	H	X	h	x	é	ý	ó	1	199	215	231	247
1001			)	9	I	Y	i	y	è	ö	í	1	200	216	232	248
1010	LF		*	:	J	Z	j	z	ù	ü	í	1	201	217	233	249
1011		ESC	+	;	K	[	k	{	ï	ç	í	1	202	218	234	250
1100	FF	FS	,	<	L	\	l	!	î	æ	í	1	203	219	235	251
1101	CR	GS	-	=	M	]	m	}	ï	æ	í	1	204	220	236	252
1110			.	>	N	^	n	~	Ä	pt	«	1	205	221	237	253
1111			/	?	O	_	o	SP	Å	f	»	1	206	222	238	254
												1	207	223	239	255

NOTE: The actual print patterns differ from those in the above character code

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3.2.2 Page 1 (Katakana)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	ー	上	SP	ー	タ	ミ	ニ	×
		128	144	160	176	192	208	224	240
1	0001	ー	下	。	ア	チ	ム	ト	円
		129	145	161	177	193	209	225	241
2	0010	ー	ナ	「	イ	ツ	メ	キ	年
		130	146	162	178	194	210	226	242
3	0011	■	ト	」	ウ	テ	モ	コ	月
		131	147	163	179	195	211	227	243
4	0100	■	ー	、	エ	ト	ヤ	▲	日
		132	148	164	180	196	212	228	244
5	0101	■	ー	・	オ	ナ	ユ	▲	時
		133	149	165	181	197	213	229	245
6	0110	■	丨	ヲ	カ	ニ	ヨ	▲	分
		134	150	166	182	198	214	230	246
7	0111	■	丨	ア	キ	ヌ	ラ	▲	秒
		135	151	167	183	199	215	231	247
8	1000	丨	「	イ	ク	ネ	リ	♠	〒
		136	152	168	184	200	216	232	248
9	1001	丨	「	ウ	ケ	ノ	ル	♥	市
		137	153	169	185	201	217	233	249
A	1010	丨	「	エ	コ	ハ	レ	♦	区
		138	154	170	186	202	218	234	250
B	1011	丨	「	オ	サ	ヒ	ロ	♣	町
		139	155	171	187	203	219	235	251
C	1100	■	「	ヤ	シ	フ	ワ	●	村
		140	156	172	188	204	220	236	252
D	1101	■	「	ユ	ス	ヘ	ン	○	人
		141	157	173	189	205	221	237	253
E	1110	■	「	ヨ	セ	ホ	・	/	罫
		142	158	174	190	206	222	238	254
F	1111	+	「	ッ	ソ	マ	・	＼	SP
		143	159	175	191	207	223	239	255

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3.2.3 Page 2 (PC850: Multilingual)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	Ü 129	Æ 145	Í 161	177	± 193	Đ 209	ß 225	± 241
2	0010	É 130	Æ 146	Ó 162	178	Ƨ 194	Ê 210	Ô 226	= 242
3	0011	Â 131	Ô 147	Ú 163	179	Ƨ 195	Ë 211	Ö 227	¾ 243
4	0100	Ä 132	Ö 148	Ñ 164	180	— 196	È 212	Õ 228	¶ 244
5	0101	À 133	Ò 149	Ñ 165	Á 181	† 197	ı 213	Ö 229	§ 245
6	0110	Å 134	Û 150	ä 166	Â 182	ã 198	í 214	μ 230	÷ 246
7	0111	Ç 135	Ù 151	Ó 167	À 183	Ä 199	î 215	þ 231	ˆ 247
8	1000	Ê 136	Ÿ 152	Ć 168	© 184	Ł 200	İ 216	þ 232	° 248
9	1001	Ë 137	Ö 153	® 169	¶ 185	Ʀ 201	Ɔ 217	Û 233	ˆ 249
A	1010	È 138	Û 154	Ƨ 170	ı 186	± 202	Ƨ 218	Û 234	ˆ 250
B	1011	İ 139	ø 155	½ 171	¶ 187	Ƨ 203	■ 219	Û 235	¹ 251
C	1100	Î 140	£ 156	¼ 172	¶ 188	Ƨ 204	■ 220	Ÿ 236	³ 252
D	1101	Ì 141	ø 157	ı 173	¢ 189	= 205	ı 221	Ÿ 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	† 206	İ 222	— 238	■ 254
F	1111	Å 143	ƒ 159	» 175	Ƨ 191	Ƨ 207	■ 223	’ 239	SP 255

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3.2.4 Page 3 (PC860: Portuguese)

	HEX	8	9	A -	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	ˆ 192	⌘ 208	α 224	≡ 240
1	0001	ü 129	À 145	í 161	⌘ 177	ˆ 193	⌘ 209	β 225	± 241
2	0010	é 130	È 146	ó 162	⌘ 178	ˆ 194	⌘ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	⌘ 179	ˆ 195	⌘ 211	π 227	≤ 243
4	0100	ã 132	õ 148	ñ 164	⌘ 180	ˆ 196	⌘ 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	⌘ 181	ˆ 197	ˆ 213	σ 229	Ƶ 245
6	0110	Á 134	Ú 150	ä 166	⌘ 182	ˆ 198	ˆ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	⌘ 183	ˆ 199	ˆ 215	τ 231	≈ 247
8	1000	ê 136	î 152	¿ 168	⌘ 184	ˆ 200	ˆ 216	Φ 232	° 248
9	1001	Ê 137	Ï 153	Ò 169	⌘ 185	ˆ 201	ˆ 217	Θ 233	• 249
A	1010	è 138	Û 154	¬ 170	⌘ 186	ˆ 202	ˆ 218	Ω 234	· 250
B	1011	Í 139	Φ 155	½ 171	⌘ 187	ˆ 203	■ 219	δ 235	√ 251
C	1100	Ô 140	£ 156	¼ 172	⌘ 188	ˆ 204	■ 220	∞ 236	n 252
D	1101	ì 141	Ü 157	ı 173	⌘ 189	ˆ 205	■ 221	∅ 237	² 253
E	1110	Ã 142	Π 158	« 174	⌘ 190	ˆ 206	■ 222	∈ 238	■ 254
F	1111	Â 143	Ó 159	» 175	⌘ 191	ˆ 207	■ 223	∩ 239	SP 255

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3.2.5 Page 4 (PC863: Canadian-French)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Ì 160	Í 176	Ì 192	Í 208	α 224	≡ 240
1	0001	Û 129	È 145	Í 161	Î 177	Í 193	Ï 209	β 225	± 241
2	0010	É 130	Ê 146	Ó 162	Ô 178	Ï 194	Ï 210	Γ 226	≥ 242
3	0011	Â 131	Ô 147	Ú 163	Û 179	Ï 195	Ï 211	π 227	≤ 243
4	0100	À 132	Ë 148	Ê 164	Ï 180	Ï 196	Ï 212	Σ 228	ƒ 244
5	0101	À 133	Ï 149	Û 165	Ï 181	Ï 197	Ï 213	σ 229	ƒ 245
6	0110	ŋ 134	Û 150	Û 166	Ï 182	Ï 198	Ï 214	μ 230	÷ 246
7	0111	Ç 135	Û 151	Û 167	Ï 183	Ï 199	Ï 215	τ 231	≈ 247
8	1000	Ê 136	Û 152	Û 168	Ï 184	Ï 200	Ï 216	Φ 232	° 248
9	1001	Ë 137	Û 153	Û 169	Ï 185	Ï 201	Ï 217	Θ 233	• 249
A	1010	È 138	Û 154	Û 170	Ï 186	Ï 202	Ï 218	Ω 234	• 250
B	1011	Ï 139	Φ 155	½ 171	Ï 187	Ï 203	Ï 219	δ 235	√ 251
C	1100	Î 140	£ 156	¼ 172	Ï 188	Ï 204	Ï 220	∞ 236	n 252
D	1101	= 141	Û 157	¾ 173	Ï 189	Ï 205	Ï 221	∅ 237	² 253
E	1110	À 142	Û 158	« 174	Ï 190	Ï 206	Ï 222	∈ 238	■ 254
F	1111	§ 143	ƒ 159	» 175	Ï 191	Ï 207	Ï 223	∩ 239	SP 255

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3.2.6 Page 5 (PC865: Nordic)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Á 160	176	Ł 192	Ł 208	α 224	≡ 240
1	0001	ü 129	æ 145	í 161	177	Ł 193	Ŧ 209	β 225	± 241
2	0010	é 130	Æ 146	ó 162	178	Ŧ 194	Ŧ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	179	Ł 195	Ł 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	180	Ł 196	Ł 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	181	Ł 197	Ŧ 213	σ 229	Ƶ 245
6	0110	å 134	û 150	ä 166	182	Ł 198	Ŧ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	183	Ł 199	Ŧ 215	τ 231	≈ 247
8	1000	ê 136	ÿ 152	¿ 168	184	Ł 200	Ł 216	Φ 232	° 248
9	1001	ë 137	Ö 153	ƒ 169	185	Ŧ 201	Ŧ 217	Θ 233	• 249
A	1010	è 138	Û 154	ƒ 170	186	Ł 202	Ŧ 218	Ω 234	· 250
B	1011	ï 139	ø 155	½ 171	187	Ŧ 203	219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	188	Ŧ 204	220	∞ 236	ⁿ 252
D	1101	ì 141	Ø 157	í 173	189	205	221	ø 237	² 253
E	1110	Ä 142	Pt 158	« 174	190	206	222	€ 238	■ 254
F	1111	Å 143	f 159	œ 175	191	207	223	∩ 239	SP 255

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3.2.7 Page 16 (WPC1252)

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

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3.2.8 Page 17 (PC866: Cyrillic #2)

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

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3.2.9 Page 18 (PC852: Latin 2)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	Ł 192	đ 208	Ó 224	- 240
1	0001	ū 129	Ĺ 145	í 161	⌘ 177	Ł 193	Đ 209	β 225	" 241
2	0010	é 130	í 146	ó 162	⌘ 178	Ł 194	Ǿ 210	Ô 226	˘ 242
3	0011	â 131	ô 147	ú 163	⌘ 179	Ł 195	Ě 211	Ň 227	ˇ 243
4	0100	ä 132	ö 148	À 164	⌘ 180	Ł 196	ǿ 212	á 228	˘ 244
5	0101	û 133	Ľ 149	ą 165	Á 181	⌘ 197	Ñ 213	ň 229	§ 245
6	0110	ć 134	Ī 150	Ž 166	Â 182	Ă 198	Í 214	Š 230	÷ 246
7	0111	ç 135	š 151	ž 167	Ě 183	ǿ 199	Î 215	š 231	˘ 247
8	1000	ı 136	ś 152	Ɛ 168	Ş 184	Ł 200	č 216	Ř 232	° 248
9	1001	ē 137	Ö 153	ƒ 169	⌘ 185	Ł 201	Ĵ 217	Ú 233	˘ 249
A	1010	Ö 138	Ü 154	170	⌘ 186	Ł 202	Ŧ 218	í 234	˘ 250
B	1011	õ 139	Ť 155	ž 171	⌘ 187	Ł 203	219	Ů 235	ũ 251
C	1100	î 140	ť 156	Č 172	⌘ 188	Ł 204	220	ý 236	Ř 252
D	1101	Ž 141	Ł 157	š 173	Ž 189	205	Ŧ 221	Ý 237	ř 253
E	1110	Ä 142	× 158	« 174	ž 190	⌘ 206	Ů 222	ı 238	254
F	1111	Ć 143	č 159	» 175	⌘ 191	Ł 207	223	’ 239	SP 255

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3.2.10 Page 19 (PC858: Euro)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	Ü 129	Æ 145	Í 161	177	± 193	Đ 209	ß 225	± 241
2	0010	É 130	Æ 146	Ó 162	178	Ƨ 194	Ê 210	Ô 226	= 242
3	0011	Â 131	Ô 147	Ú 163	179	Ƨ 195	Ë 211	Õ 227	¾ 243
4	0100	Ä 132	Ö 148	Ñ 164	180	— 196	È 212	Ö 228	¶ 244
5	0101	À 133	Ò 149	Ñ 165	Á 181	† 197	€ 213	Ö 229	§ 245
6	0110	Å 134	Û 150	ä 166	Â 182	ã 198	í 214	µ 230	÷ 246
7	0111	Ç 135	Ù 151	Ó 167	À 183	Ä 199	î 215	þ 231	ˆ 247
8	1000	È 136	Ý 152	Ú 168	© 184	Ł 200	ï 216	þ 232	° 248
9	1001	Ë 137	Ö 153	® 169	Ƨ 185	Ƨ 201	Ƨ 217	Û 233	˙ 249
A	1010	È 138	Û 154	Ƨ 170	186	202	Ƨ 218	Û 234	˙ 250
B	1011	Ï 139	Ø 155	½ 171	Ƨ 187	Ƨ 203	219	Û 235	¹ 251
C	1100	Î 140	£ 156	¼ 172	Ƨ 188	Ƨ 204	220	Ý 236	³ 252
D	1101	Ì 141	Ø 157	í 173	¢ 189	= 205	221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	† 206	Ï 222	238	254
F	1111	Å 143	ƒ 159	» 175	Ƨ 191	207	223	239	SP 255

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3.2.11 Page 254 (PC857: Latin 5)

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

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3.2.12 Page 255 (Space Page)

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

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3.3 Switches and Buttons

3.3.1 Power switch

The power switch is on the lower right front of the printer and turns the power on or off.

3.3.2 Paper feed buttons

Receipt/journal paper feed buttons. Non-locking push button.

The **ESC c 5** command enables or disables the receipt/journal paper feed buttons.

When disabled, the receipt/journal feed paper buttons will not function.

- While printing, the paper cannot be fed with the receipt/journal paper feed buttons.

3.3.3 Stamp button

While reloading paper, use stamp button after cover open.

- If the stamp button is pressed one time when the case cover is open, the printer executes stamping once.

3.3.4 DIP switches

1) RS-232 serial interface model

Table 3.3.1 DIP Switch 1

Switch No.	Function	ON	OFF
1	Data word length	7 bit	8 bit
2	Parity	Yes	No
3	Parity selection	Even	Odd
4	Baud rate selection	19200 bps	9600 bps
5	Hand shaking	XON/XOFF	DTR/DSR
6	Busy condition	Refer to Table 2.1.1	Refer to Table 2.1.1
7	Paper cutter	Manual cutter	Auto cutter
8	Printer mode selection	Taiwan mode *1)	Standard mode *2) *3)

Table 3.3.2 DIP Switch 2

Switch No.	Function	ON	OFF
1	Pin 25 reset signal	Used	Not used
2	Pin 6 reset signal	Used	Not used
3	Buzzer	Enabled	Disabled
4	Reserved	Fixed to Off.	
5	Download mode	Enabled	Disabled
6	Reserved	Fixed to Off.	

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2) Parallel interface model

Table 3.3.3 DIP Switch 1

Switch No.	Function	ON	OFF
1	Reserved	Fixed to Off.	
2	Reserved	Fixed to Off.	
3	Reserved	Fixed to Off.	
4	Reserved	Fixed to Off.	
5	Reserved	Fixed to Off.	
6	Busy condition	Refer to Table 2.1.1	Refer to Table 2.1.1
7	Paper cutter	Manual cutter	Auto cutter
8	Printer mode selection	Taiwan mode *1)	Standard mode *2) *3)

Table 3.3.4 DIP Switch 2

Switch No.	Function	ON	OFF
1	Pin 31 reset signal	Used	Not used
2	Reserved	Fixed to Off.	
3	Buzzer	Enabled	Disabled
4	Reserved	Fixed to Off.	
5	Download mode	Enabled	Disabled
6	Reserved	Fixed to Off.	

- *1) Taiwan mode: Printer mode which is used for Taiwan market
This mode can be set to the printer which is equipped with the Taiwan black mark sensor.
- Receipt paper feed button: Feeds paper with one short pressing the button
Continuous pressing the button which exceeds for 2 seconds feeds paper to the next mark sensor setting position then cuts the paper with one point left uncut.
- Journal paper feed button: Feeds paper with one short pressing the button
Continuous pressing the button which exceeds for 2 seconds feeds paper to the next mark sensor setting position.
- FF** command: Prints the data in the print buffer and feeds to the next print starting position on the receipt and cut (one point left uncut).
- GS V** command: Feed paper to the preprint black mark position then cuts the paper.
- *2) Standard mode: Printer mode which is used except for Taiwan market
FF command: Ignored in this mode.
- *3) Printing for paper without the preprint black mark must be set to the DIP SW1-8 to Off (standard mode).

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3.4 Panel LED Indicators

3.4.1 Panel LED indicators

1) Power supply (POWER) LED: Green

ON: Power supply is stable.

OFF: Power supply is not stable.

2) Receipt/Journal paper roll near-end (PAPER OUT) LED: Red

ON: Near-end or end of paper roll is detected. (*1)

OFF: Adequate paper remains on the paper roll (normal condition).

Blinking: See Table 3.4.1 for the meanings. (Both a receipt and a journal LED blink)

*1: A near-end detector is installed.

Table 3.4.1 Printer Status In Blinking

Printer Status	Receipt/Journal LEDs blinking pattern
A self-test printing is in a wait state.	
The printer waits for a validation paper to be inserted.	
The printer waits for a validation paper to be removed.	

3) Error (ERROR) LED: Red

ON: Offline (except during paper feeding using the paper feed button and during the self-test).

Blinking: Error state. (See Section 3.5, Error Processing)

OFF: Normal operation.

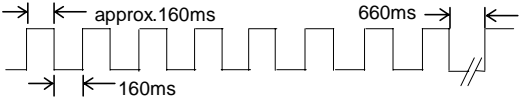
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3.5 Error Processing

3.5.1 Error types

- 1) Error that is automatically recovered

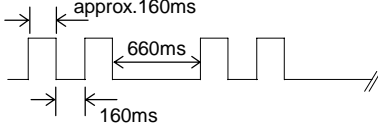
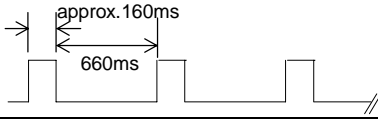
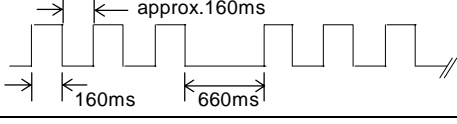
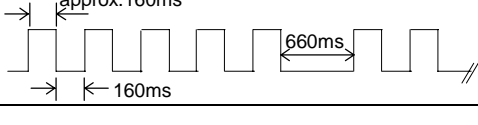
Table 3.5.1 Automatically Recoverable Error

Error	Description	ERROR LED blinking pattern (buzzer beeps)	Recovery
Print head temperature error (*1)	Print head temperature is extremely high.	(8 short beeps) 	Automatically recovers when the print head temperature falls.

*1: A print head temperature error is not abnormal.

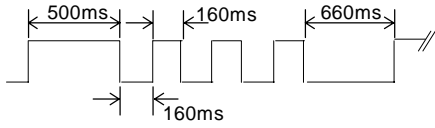
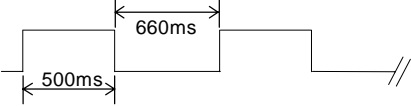
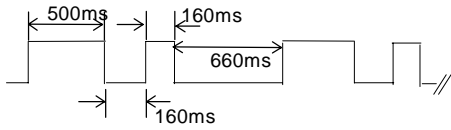
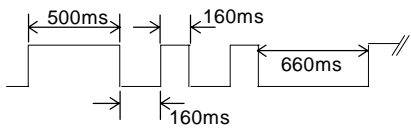
- 2) Errors that may be recovered via commands

Table 3.5.2 Command-recoverable Errors

Error	Description	ERROR LED blinking pattern (buzzer beeps)	Recovery
Home position detection error (mechanical error)	Home position cannot be detected.	(2 short beeps) 	Recovers using DLE ENQ 1 or DLE ENQ 2 .
Autocutter error	Abnormality in the autocutter	(1 short beep) 	Recovers using DLE ENQ 1 or DLE ENQ 2 .
Main motor lock-up error	Head carriage is not being driven normally.	(3 short beeps) 	Recovers using DLE ENQ 1 or DLE ENQ 2 .
Mark sensor error	Mark sensor signal or mark sensor circuit error, in DIP SW1-8 ON condition	(5 short beeps) 	Recovers using DLE ENQ 1 or DLE ENQ 2 .

3) Errors that cannot be recovered

Table 3.5.3 Unrecoverable Errors

Error	Description	ERROR LED blinking pattern (buzzer beeps)	Recovery
CPU execution error	CPU executes incorrect address.	(1 long 3 short beeps) 	Impossible to recover.
High or low voltage error	Power voltage is extremely high or low.	(1 long beep) 	Impossible to recover.
ROM check sum	ROM check sum error	(1 long 1 short beeps) 	Impossible to recover.
SRAM	SRAM access error	(1 long 2 short beeps) 	Impossible to recover.

NOTE: 1) If an error that cannot be recovered occurs, turn off the power as soon as possible.

2) A buzzer sound can be kept in silence with DIP SW 2-3 as shown in Table 3.3.4.

3.5.2 Operation when an error is detected

The printer executes the following operations when detecting an error:

<Serial interface model>

- Stops all mechanical operations.
- Sets the DTR signal to MARK.
- Blinks the ERROR LED
- Transmits XOFF if XON/XOFF control is selected.

<Parallel interface model>

- Stops all mechanical operations.
- Sets the Busy signal to HIGH.
- Blinks the ERROR LED.
- Sets the nFault signal to LOW.

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3.6 Self-test

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

- Control ROM version
- DIP switch settings (DIP SW2-1, 2-2 and 2-4 are not printed.)

2) Self-test on paper roll

[Starting the self-test]

To start the self-test on a paper roll, turn the power on while pressing the receipt paper feed button with the cover closed.

When the receipt paper feed button is released after approximately 1 second (if the DIP SW2-3 is On, the printer beeps once shortly), the printer starts printing the printer status.

[Self-test standby state]

After printing the current printer status, the printer prints the message "Self-test printing. PRESS R-FEED button." The receipt and journal PAPER OUT LED blink, and the printer enters the test printing standby status. (Refer to Table 3.4.1)

Press the receipt paper feed button in this state to start test printing.

3) Ending the self-test

After a number of lines are printed, the printer indicates the end of self-test by printing "****completed***," performs initialization, and then goes to normal mode.

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3.7 Hexadecimal Dump

1) Hexadecimal dump function

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

2) Starting hexadecimal dumping

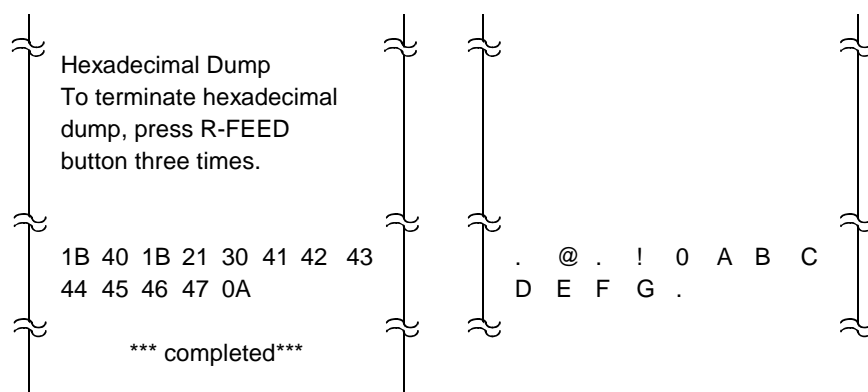
Open the cover and turn the power on while pressing the receipt paper feed button. When the receipt paper feed button is released after approximately 1 second (if the DIP SW2-3 is On, the printer beeps twice shortly) and close the cover, the printer first prints "Hexadecimal Dump" on roll paper and prints the received print data in hexadecimal numbers and in its corresponding characters.

- NOTES:
1. Be sure to execute the hexadecimal dump in setting with the paper.
 2. Set the printer in the hexadecimal dump first; then transmit the data from the host.
 3. "." is printed if no printable character corresponds to the data received.
 4. During the hexadecimal dump, all commands except **DLE ENQ** is disabled.

3) Ending hexadecimal dump

End the hexadecimal dump by turning off the power, by pressing the receipt paper feed button three times, or by resetting the printer after printing completes.

< Example printing >



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3.8 Paper Detectors

The printer has the following paper detectors:

- Paper roll near-end detector
- Validation detector

3.8.1 Detectors and LED indicators

1) Paper roll near-end detector (Receipt and Journal)

This sensor is installed on the paper roll supply device. It detects a paper near-end by monitoring the paper roll diameter. The PAPER OUT LED lights when the paper roll diameter becomes sufficiently small.

2) Validation detector

This sensor detects a validation paper inserting.

When a validation is selected as a paper source and the printer waits for the validation to be inserted or removed, the PAPER OUT LED blinks. (Refer to Table 3.4.1)

3.8.2 Detectors and printing

When the printer detects a paper near-end, it stops or continues printing, depending on the **ESC c 4** command setting.

3.9 Buffer-full Printing

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

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4. CASE SPECIFICATIONS

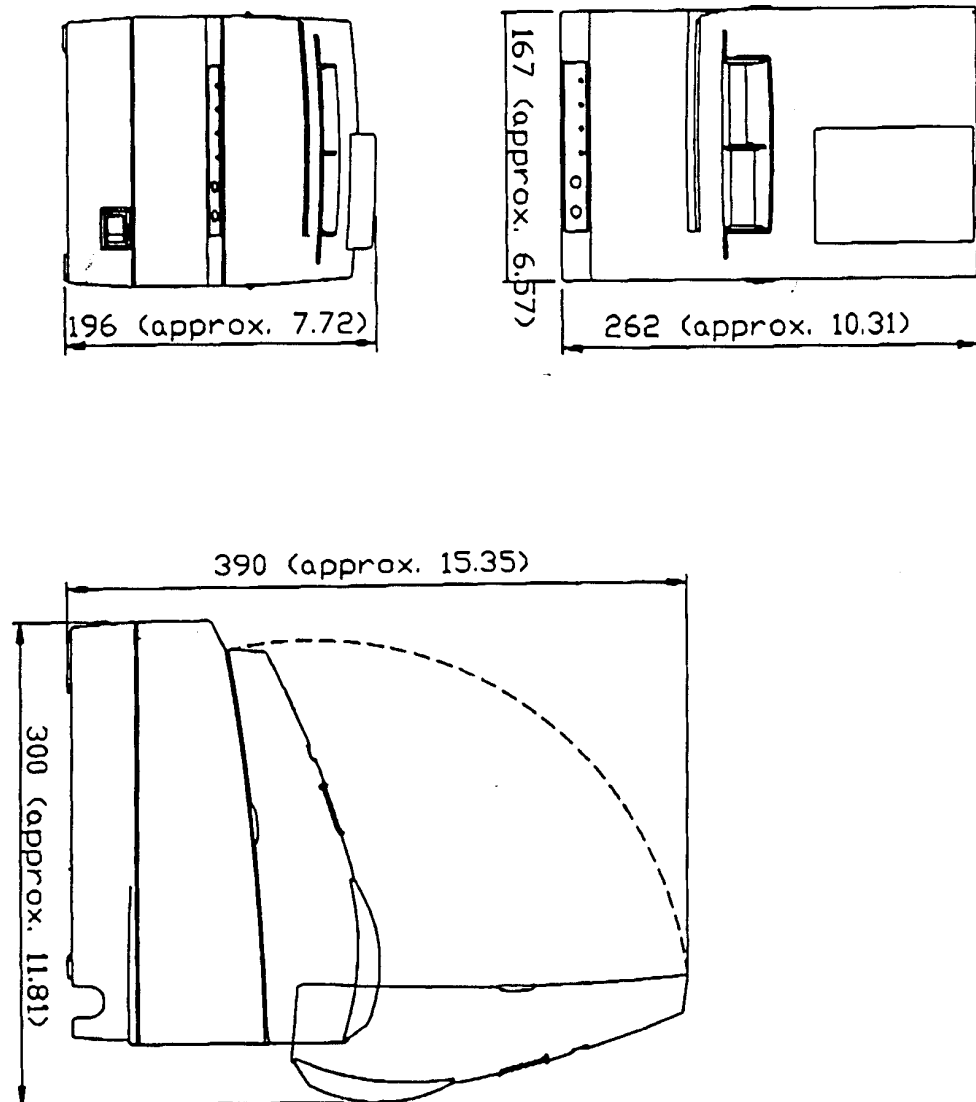
4.1 External Dimensions and Mass

- 1) Dimension: 167(W) × 262(D) × 196(H) (mm)
- 2) Mass: Approximately 2.8 kg

4.2 Color

Epson cool white

4.3 External Appearance



[Units: mm (inch)]

Figure 4.3.1 External Appearance

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5. ACCESSORIES AND OPTIONS

5.1 Standard Accessories

- Ribbon cassette ERC-32(P)
- Paper roll × 2
- Operator's manual
- Stamp mount
- Power switch cover

5.2 Options

- AC adapter PS-170 (sold separately)
- Stamp frame

5.3 Interface Board

- IEEE 1284 compatible interface board (Bidirectional parallel)Option
- RS-232 compatible interface boardOption

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6. COMMANDS

6.1 Command Notation

XXXX

[Name]	The name of the command.
[Format]	The code sequence.
[Range]	Gives the allowable ranges for the arguments.
[Description]	Describes the command's function.
[Notes]	Provides important information on setting and using the printer command, if necessary. Items marked with * indicate "important notice."
[Default]	Gives the default values,(if any) for the command arguments.
[Reference]	Lists related commands.
[Example]	Gives examples of how to use the command.

ASCII indicates the ASCII equivalents.

Hex indicates the hexadecimal equivalents.

Decimal indicates the decimal equivalents.

[]k indicates the contents of the [] should be repeated k times.

6.2 Explanation of Terms

1) Receive buffer

The receive buffer is a buffer that stores, as is, the data received from the host. The data is stored in the receive buffer temporarily, and is then processed sequentially.

2) Print buffer

The print buffer is a buffer that stores the image data to be printed.

3) Print buffer full

This is the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the **LF** operation.

4) Start of line

The start of line state satisfies the following conditions:

- There is no print data (including spaces) currently in the print buffer.

5) Printable area

The maximum range within which printing is possible under the printer specifications. The printable area for this printer is 84.5 mm.

6) Ignore

The state in which all codes, including parameters, are read in and discarded, and nothing happens.

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7) Invalid

The state in which the command portion of codes is read in and discarded, while the parameter portion of codes is treated as normal data.

8) Inch

A unit of length. One inch is 25.4 mm.

9) MSB

Most Significant Bit

10) LSB

Least Significant Bit

6.3 Command Descriptions**LF**

[Name]	Print and line feed	
[Format]	ASCII	LF
	Hex	0A
	Decimal	10
[Function]	Prints the data in the print buffer and feeds one line, using the current line spacing (1/6").	
[Description]	This command sets the print position to the beginning of the line.	

FF

[Name]	Print and feed paper to print starting position	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
[Function]	<ul style="list-style-type: none">• When DIP switch 1-7 OFF (auto cutter installed): Prints the data in the print buffer and feeds to the next print starting position on the receipt and cut (one point left uncut).• When DIP switch 1-7 ON (manual cutter installed): Prints the data in the print buffer and feeds to the next print starting position on the receipt.	
[Description]	<ul style="list-style-type: none">• This command is effective only in the Taiwan mode. (Refer to Table 3.3.1)• This command is effective only when receipt or journal is selected as the print sheet.• After the operation, the printer sets the print starting position to the beginning of a line.• The paper is not fed when the paper presents on the print starting position or when the mark sensor detects the marked portion. The paper is fed when the paper is not presented on the print starting position, or when the mark sensor does not detect the marked portion.	

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Confidential

CR

[Name]	Print and carriage return	
[Format]	ASCII	CR
	Hex	0D
	Decimal	13
[Function]	Prints the data in the print buffer and does not feed the paper.	
[Description]	Sets the print starting position to the beginning of the line.	

RS

[Name]	Journal tab	
[Format]	ASCII	RS
	Hex	1E
	Decimal	30
[Function]	Moves the print starting position to the beginning of the print area for the journal.	
[Description]	This command is effective when all the following conditions are satisfied simultaneously: <ul style="list-style-type: none">• Both receipt and journal are selected for the print sheet.• The parallel printing mode for receipt and journal is turned off.• The print area is set within a printable area on the receipt.	

ESC ! *n*

[Name]	Select print mode(s)			
[Format]	ASCII	ESC	!	<i>n</i>
	Hex	1B	21	<i>n</i>
	Decimal	27	33	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Description]	Selects print mode(s) using <i>n</i> as follows:			

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Reserved.
1	Off	00	0	Reserved.
2	Off	00	0	Reserved.
3	Off	00	0	Reserved.
4	Off	00	0	Reserved.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	Off	00	0	Reserved.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Note]	• If the underline is added to the characters to be printed, the lowest bit of the characters overlaps the underline. Therefore, this may cause a difficulty in reading. Give this in consideration when the underline is added.
[Default]	$n = 0$

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ESC % *n*

[Name]	Select/cancel user-defined character set			
[Format]	ASCII	ESC	%	<i>n</i>
	Hex	1B	25	<i>n</i>
	Decimal	27	37	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Function]	Selects or cancels the user-defined character set.			
	When the Least Significant Bit (LSB) is 0, the user-defined character set is canceled and the internal character set is enabled.			
	When the LSB is 1, the user-defined character set is selected.			
[Description]	<ul style="list-style-type: none"> Only the least significant bit of <i>n</i> is valid. 			
	<ul style="list-style-type: none"> When the user-defined character set has been released, the internal character set is specified automatically. 			

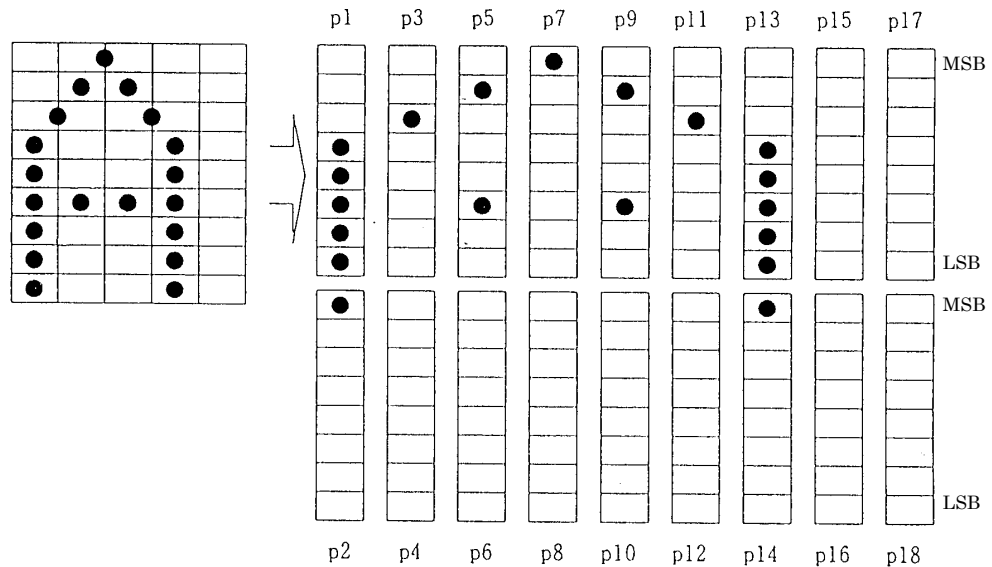
ESC & *y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]*

[Name]	Define user-defined characters					
[Format]	ASCII	ESC	&	<i>y</i>	<i>c1</i>	<i>c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]</i>
	Hex	1B	26	<i>y</i>	<i>c1</i>	<i>c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]</i>
	Decimal	27	38	<i>y</i>	<i>c1</i>	<i>c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]</i>
[Range]	$y = 2$					
	$32 \leq c1 \leq c2 \leq 126$					
	$0 \leq x \leq 9$					
	$0 \leq d \leq 255$					
	$k = c2 - c1 + 1$					
[Function]	Defines user-defined characters.					
	<ul style="list-style-type: none"> <i>y</i> specifies the number of bytes in the vertical direction. 					
	<ul style="list-style-type: none"> <i>c1</i> specifies the beginning character code for the definition, and <i>c2</i> specifies the final code. 					
	<ul style="list-style-type: none"> <i>x</i> specifies the number of dots in the horizontal direction. 					
	<ul style="list-style-type: none"> <i>d</i> specifies the defined character data pattern. 					
[Description]	<ul style="list-style-type: none"> Consecutive character codes for multiple characters can be defined in one definition. 					
	<ul style="list-style-type: none"> "<i>d</i>" is definition data that indicates the pattern for "<i>x</i>" dots in the horizontal direction, starting from the left edge. If "<i>x</i>" does not satisfy dots in the character configuration pattern (9 dots), the remaining dots on the right are spaces. 					
	<ul style="list-style-type: none"> In the definition data, a "1" represents a dot that is to be printed, and a "0" represents a dot that is not to be printed. 					
	<ul style="list-style-type: none"> Only the most significant bit of the second data byte in the vertical direction can be printed. 					
	<ul style="list-style-type: none"> Independent user-defined character definitions are possible for the fonts if the character pattern is different in the international character sets. 					

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- The defined downloaded characters are cleared in the following circumstances:
 - 1) When deleted by **ESC ?**.
 - 2) When **ESC @** is executed.
 - 3) When the printer is reset or turned off.
 - 4) When a hardware reset is executed or the power is turned off.
- No user-defined characters are defined in the initial state.
- If any user-defined characters are not defined, the internal character set (built-in) is selected.

[Example] 7 × 9 font with 2-dot character space



When the dot pattern for code 20H is defined as shown above.

	ESC	&	y	c1	c2	X	p1	p2	p3	d4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14
Code	1B	26	02	20	20	07	1F	80	20	00	44	00	80	00	44	00	20	00	1F	80

The corresponding bit is 1 when printing and 0 when not printing.

- [Note]
- If the **ESC R n** is executed, the user-defined characters which have been already defined are canceled.

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

[Name] Select bit image mode

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

[Range] $m = 16, 17$
 $0 \leq nL \leq 255$
 $0 \leq nH \leq 3$
 $0 \leq d \leq 255$
 $k = (nL + nH \times 256) \times 2$

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

<i>m</i>	Mode	Vertical Direction	Max. Number of Dots			Min. number of dots in horizontal
		Number of Dots	receipt	journal	validation	
16	9-dot single-density	9	108	108	248	2 half dots
17	9-dot double-density	9	216	216	495	1 half dot

- *m* specifies the print mode of the bit-image.
- *nL* and *nH* specify the number of dots of the bit-image in the horizontal direction as $(nL + nH \times 256)$ dots.
- *d* indicates the bit-image data.
- *k* specifies the number of the bit-image data.

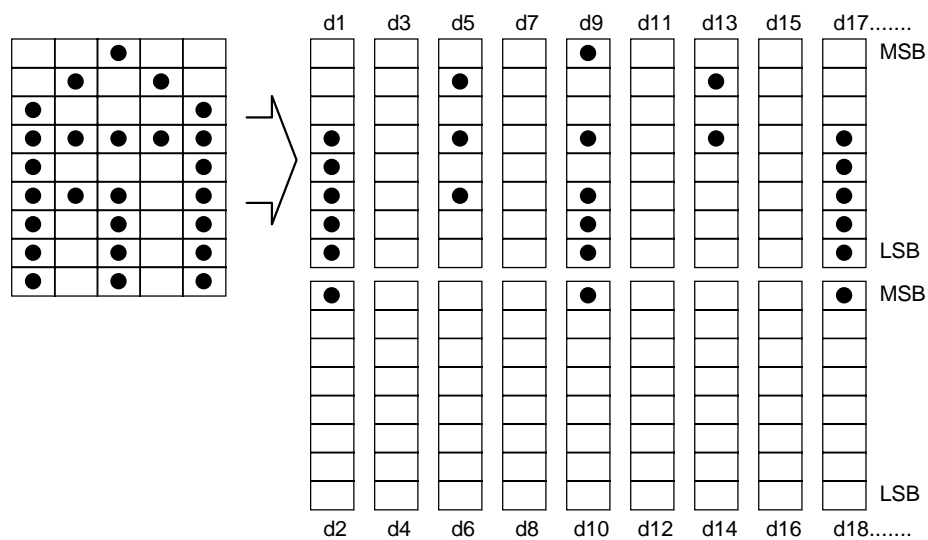
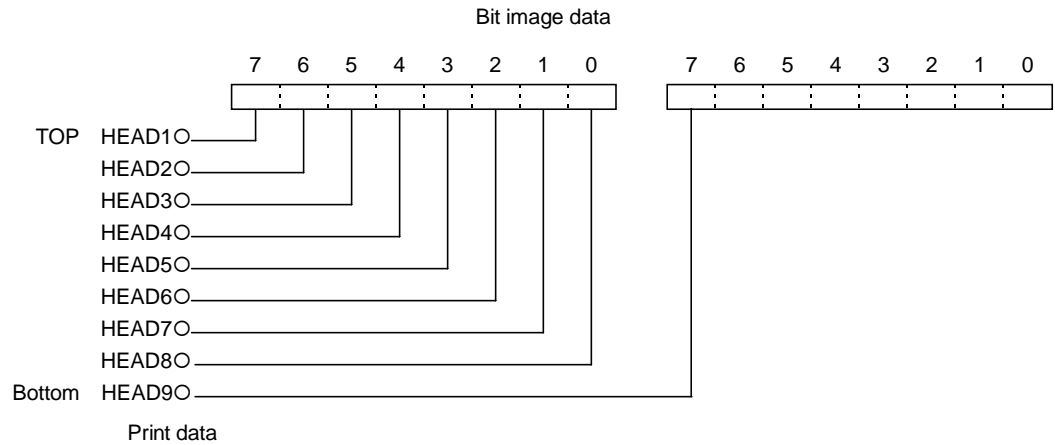
- [Description]
- *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 not to print a dot.
 - If bit-image data and character data are printed on a line, the bottom of the bit-image is aligned to the baseline (the second dot from the bottom) of the built-in internal character.
 - If bit-image data input exceeds the number of dots to be printed on a line, the excess data and the number of dots of the bit-image in the horizontal direction which is specified by *nL* and *nH* are discarded. Then the printer performs the buffer full process when the next data is input.
 - If an adjacent dot is specified for the bit-image in double-density mode ($m = 17$), the right side of the adjacent dot is not printed.
 - This command is not affected by print modes (double width or underline).
 - After finishing processing the bit-image, the printer returns to normal data processing mode. The next print starting position is located at the next dot of the last bit-image data.
 - "Dot density in the vertical direction" indicates the dot density in the paper feeding direction, and "Dot density in the horizontal direction" indicates the direction perpendicular to the paper feeding direction.
 - The bit-image data is developed, based on the current print position.

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- If the width set for the printing area is less than the minimum width of the bit-image data to be printed, the printer performs buffer full printing for the current print line; then the remaining data is printed from the beginning of the next line.

[Example]

- The relationship between the image data and the dots to be printed is as follows:



ESC <

[Name]	Return home		
[Format]	ASCII	ESC	<
	Hex	1B	3C
	Decimal	27	60
[Function]	Detects the home position again; then moves the print head to the standby position.		

ESC = *n*

[Name]	Select device			
[Format]	ASCII	ESC	=	<i>n</i>
	Hex	1B	3D	<i>n</i>
	Decimal	27	61	<i>n</i>
[Range]	$1 \leq n \leq 3$			
[Default]	$n = 1$			
[Function]	Selects device to which the host computer sends data, using <i>n</i> as follows:			

<i>n</i>	Function
1	Enables printer.
2	Enables customer display.
3	Enables printer and customer display.

- [Description] • When the printer is disabled, it ignores all data except for real-time commands until it is enabled by this command.

ESC ? *n*

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

- *n* specifies the character code corresponding to the user-defined character to be canceled.
- [Description] • If a user-defined character has not been defined for the specified character code, the printer ignores this command.
- After the user-defined character is canceled, the corresponding pattern for the internal character is printed.

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ESC @

[Name]	Initialize printer		
[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64
[Function]	Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.		
[Description]	• The data in the receive buffer is not cleared.		
	• After this command is executed; the printer goes to the following state:		
	• Both receipt and journal are selected for the print sheet.		
	• The parallel printing mode is canceled if this command is executed.		
	• The print starting position is set to the beginning of a line.		

ESC R *n*

[Name]	Select an international character set			
[Format]	ASCII	ESC	R	<i>n</i>
	Hex	1B	52	<i>n</i>
	Decimal	27	82	<i>n</i>
[Range]	$0 \leq n \leq 13$			
[Default]	<i>n</i> = 0			
[Function]	Selects an international character set <i>n</i> from the following table:			

<i>n</i>	Country	ASCII code (Hex)											
		23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U.S.A	#	\$	@	[	\	\]	^	`	{	|	}	~
1	France	#	\$	à	°	ç	\$	^	`	é	ù	è	ˆ
2	Germany	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	U.K.	£	\$	@	[	\	\]	^	`	{	|	}	~
4	Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain I	Pt	\$	@	ı	Ñ	ı	^	`	ı	ñ	}	~
8	Japan	#	\$	@	[	¥	]	^	`	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain II	#	\$	á	ı	Ñ	ı	é	`	ı	ñ	ó	ú
12	Latin America	#	\$	á	ı	Ñ	ı	é	ü	ı	ñ	ó	ú
13	Korea	#	\$	@	[	₩	]	^	`	{	|	}	~

[Note]	• If the ESC R <i>n</i> is executed, the user-defined characters which are defined with the ESC & are canceled.
--------	---

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ESC c 0 n

[Name] Select paper type(s) for printing

[Format] ASCII ESC c 0 n
 Hex 1B 63 30 n
 Decimal 27 99 48 n

[Range] $1 \leq n \leq 3, n = 8$

[Default] $n = 3$

[Description] Selects the type of paper for printing, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Journal paper roll disabled.
	On	01	1	Journal paper roll enabled.
1	Off	00	0	Receipt paper roll disabled.
	On	02	2	Receipt paper roll enabled.
2	Off	00	0	Reserved.
3	Off	00	0	Validation disabled.
	On	08	8	Validation enabled.
4-7	Off	00	0	Reserved.

- [Description]
- This command is effective only when processed at the beginning of a line.
 - When validation is selected, the printer waits for insertion of a validation sheet.
 - For the validation wait time, use **ESC f**.
 - The validation waiting state does not cause offline or busy.
 - The printer waits for validation insertion until the following event occurs:
 - A validation sheet is inserted.
 - The wait time set by **ESC f** has passed.
 - Hardware reset or power off.
 - When the **DLE ENQ 3** is executed.
 - When validation is set from enabled to disabled, the printer waits for removal of the validation sheet.
 - When the printer receives **DLE ENQ3** during validation waiting state, printing sheet will return to default ($n=3$).

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ESC c 3 n

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

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

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

[Default] $n = 0$

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

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Journal near-end sensor disabled.
	On	01	1	Journal near-end sensor enabled.
1	Off	00	0	Receipt near-end sensor disabled.
	On	02	2	Receipt near-end sensor enabled.
2-7	Off	00	0	Reserved.

- [Description]
- The command is available only with a parallel interface and is ignored with a serial interface.
 - When all the sensors are disabled, the paper end signal always outputs a paper present status.

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ESC c 4 n

[Name]	Select paper sensor(s) to stop printing				
[Format]	ASCII	ESC	c	4	<i>n</i>
	Hex	1B	63	34	<i>n</i>
	Decimal	27	99	52	<i>n</i>
[Range]	$0 \leq n \leq 255$				
[Default]	$n = 0$				
[Function]	Selects the paper sensor(s) to use to stop printing when a paper-end is detected, using <i>n</i> as follows :				

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Journal near end sensor disabled.
	On	01	1	Journal near end sensor enabled.
1	Off	00	0	Receipt near end sensor disabled.
	On	02	2	Receipt near end sensor enabled.
2-7	Off	00	0	Reserved.

- When all of the following conditions are satisfied, the printer stops printing:
 - Paper near-end sensor(s) is enabled.
 - The applicable sensor(s) detects a paper end.
 - The print sheet(s) for the applicable sensor(s) is selected.
- If the paper near-end sensor for the print sheet to be disabled detects a paper end, the printer executes paper LED light processing only.

ESC c 5 n

[Name]	Enable/disable panel buttons				
[Format]	ASCII	ESC	c	5	<i>n</i>
	Hex	1B	63	35	<i>n</i>
	Decimal	27	99	53	<i>n</i>
[Range]	$0 \leq n \leq 255$				
[Default]	$n = 0$				
[Function]	Enables or disables the receipt/journal feed buttons. <ul style="list-style-type: none"> • When the LSB of <i>n</i> is 0, the receipt/journal feed buttons are enabled. • When the LSB of <i>n</i> is 1, the receipt/journal feed buttons are disabled. 				
[Description]	<ul style="list-style-type: none"> • Only the least significant bit of <i>n</i> is valid. • When the receipt/journal feed buttons are disabled, no buttons on the receipt/journal feed are usable, except in the following case: <ul style="list-style-type: none"> • Paper feed button is enabled when the cover is opened. 				

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ESC d n

[Name]	Print and feed n lines			
[Format]	ASCII	ESC	d	n
	Hex	1B	64	n
	Decimal	27	100	n
[Range]	$0 \leq n \leq 255$			
[Function]	Prints the data in the print buffer and feeds n /6 inches.			
[Description]	<ul style="list-style-type: none"> This command sets the print starting position to the beginning of the line. After printing, the paper is fed with the continuous paper feeding mode for the first 30 lines. It is prohibited to adjoin this command such as "ESC d 30", "ESC d 20", for example. In this case, use "ESC d 50". 			

ESC f t1 t2

[Name]	Set validation paper waiting time				
[Format]	ASCII	ESC	f	t1	t2
	Hex	1B	66	t1	t2
	Decimal	27	102	t1	t2
[Range]	$0 \leq t1 \leq 15$ $0 \leq t2 \leq 64$				
[Default]	t1 = 0, t2 = 10				
[Function]	Sets the time that the printer waits for validation paper to be inserted and the time from insertion of the validation paper to the start of printing. <ul style="list-style-type: none"> t1 specifies the wait time for validation paper to be inserted as [t1 × 1] minutes. When t1 is set to 0, the printer waits until validation paper is inserted forever. t2 specifies time from insertion of the validation paper to the start of printing as [t2 × 0.1] seconds. 				
[Description]	<ul style="list-style-type: none"> The setting values for this command are used for validation paper insertion. When the waiting time t1 set by this command has passed even though the validation paper is not detected, the printer ends the validation paper waiting state. Then the printer selects both paper sources - journal and receipt for printing. If data is in the print buffer, the print data is printed on both journal and receipt. Waits for a validation paper to be inserted when the printer recovers from an error. 				

ESC o

[Name]	Stamp		
[Format]	ASCII	ESC	o
	Hex	1B	6F
	Decimal	27	111
[Function]	Executes a stamp operation on the receipt.		
[Description]	<ul style="list-style-type: none"> This command is enabled only when processed at the beginning of a line. If a receipt is not selected as the paper source, this command is ignored. 		

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			NEXT 59	SHEET 58

ESC p m t1 t2

[Name]	Generate pulse					
[Format]	ASCII	ESC	p	m	t1	t2
	Hex	1B	70	m	t1	t2
	Decimal	27	112	m	t1	t2
[Range]	m = 0, 1, 48, 49					
	$0 \leq t1 \leq 255$					
	$0 \leq t2 \leq 255$					
[Function]	Outputs the pulse specified by t1 and t2 to connector pin m as follows:					
	m	Function				
	0, 48	Drawer kick-out connector pin 2.				
	1, 49	Drawer kick-out connector pin 5.				
[Description]	• The pulse ON time is $[t1 \times 2]$ ms and the OFF time is $[t2 \times 2]$ ms.					
	• When $t2 < t1$, the printer processes $t1 \times 2$ ms as the OFF time.					

ESC t n

[Name]	Select character code table			
[Format]	ASCII	ESC	t	n
	Hex	1B	74	n
	Decimal	27	116	n
[Range]	$0 \leq n \leq 5$, $16 \leq n \leq 19$, $254 \leq n \leq 255$			
[Default]	n = 0			
[Function]	Selects a page n from the character code table.			
	n	Selected Character Code		
	0	PC437 (U.S.A., Standard Europe)		
	1	Katakana		
	2	PC850 (Multilingual)		
	3	PC860 (Portuguese)		
	4	PC863 (Canadian-French)		
	5	PC865 (Nordic)		
	16	WPC1252		
	17	PC866 (Cyrillic2)		
	18	PC852 (Latin 2)		
	19	PC858 (Euro)		
	254	PC857 (Latin 5)		
	255	Space page		

[Reference] 3.2 Character code tables

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ESC z n

[Name]	Turn parallel printing mode on/off for receipt and journal			
[Format]	ASCII	ESC	z	n
	Hex	1B	7A	n
	Decimal	27	122	n
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 1$ (when DIP switch 1-8 ON: Taiwan mode)			
	$n = 0$ (when DIP switch 1-8 OFF: standard mode)			
[Function]	Turns parallel printing mode for receipt and journal on or off. When parallel printing mode is turned on, the printer prints the same data on both receipt and journal paper <ul style="list-style-type: none"> When the LSB of n is 0, turns off parallel printing mode. When the LSB of n is 1, turns on parallel printing mode. 			
[Description]	<ul style="list-style-type: none"> Only the lowest bit of n is enabled. This command is enabled only when input at the beginning of a line. This command affects printing only when both print sources - journal and receipt are selected for printing. When the parallel printing mode is turned off, the printing area can be developed for receipt + journal. The first column in the print buffer is printed on the receipt. The print starting position moves to the first column of the journal in the following case. <ul style="list-style-type: none"> When RS is executed. When buffer full is processed at the end of the printing area on the receipt. (The data that causes the buffer full is printed on the first column of the journal.) 			

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FS &

[Name]	Select Kanji character mode		
[Format]	ASCII	FS	&
	Hex	1C	26
	Decimal	28	38
[Default]	Kanji character mode is selected when DIP switch 1-8 is ON (Taiwan mode). Kanji character mode is canceled when DIP switch 1-8 is OFF (standard mode).		
[Function]	Selects Kanji character mode.		
[Description]	<ul style="list-style-type: none">When the kanji character mode is selected, the printer checks whether the code is for Kanji or not, then processes the first byte and the second byte if the code is for Kanji.Kanji character mode is initialized to default when the power is turned on, when ESC @ is executed.		
[Note]	<ul style="list-style-type: none">The printer supports the subset of the Big5 code system (Chinese font:13053 characters) for Kanji character printing. If the printer processes a Kanji code which is not supported, the printer prints a space character.		
[Reference]	FS .		

FS .

[Name]	Cancel Kanji character mode		
[Format]	ASCII	FS	.
	Hex	1C	2E
	Decimal	28	46
[Default]	Kanji character mode is selected when DIP switch 1-8 is ON (Taiwan mode). Kanji character mode is canceled when DIP switch 1-8 is OFF (standard mode).		
[Function]	Cancels Kanji character mode.		
[Description]	<ul style="list-style-type: none">When the Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.Kanji character mode is initialized to default when the power is turned on, when ESC @ is executed.		
[Reference]	FS &		

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GS I *n*

[Name]	Transmit printer ID			
[Format]	ASCII	GS	I	<i>n</i>
	Hex	1D	49	<i>n</i>
	Decimal	29	73	<i>n</i>
[Range]	$1 \leq n \leq 3$, $49 \leq n \leq 51$, $65 \leq n \leq 67$, $n = 69$			
[Function]	Transmits the printer ID specified by <i>n</i> as follows:			

<i>n</i>	Printer ID	Contents
1, 49	Model ID	<2C>H
2, 50	Type ID	See table below.
3, 51	Firmware version ID	Depends on firmware version. Example) <02>H
65	Firmware version	Depends on firmware version. Example) <5F>H, "1.28", <00>H
66	Manufacturer	<5F>H, "EPSON", <00>H
67	Model name	<5F>H, "RP-U420", <00>H
69	Supporting Kanji type	<5F>H, "TAIWAN BIG5", <00>H

n = 2 : Type ID

Bit	Off / On	Hex	Decimal	Function
0	On	01	1	Two-byte character code supported.
1	Off	00	0	Auto cutter installed.
	On	02	2	Manual cutter installed.
2	Off	00	0	Reserved
3	Off	00	0	Reserved
4	Off	00	0	Not used. Fixed to Off
5	Off	00	0	Reserved
6	Off	00	0	Reserved
7	Off	00	0	Not used. Fixed to Off

- [Description]
- The printer transmits the status after confirming the host is ready to receive data. If the host computer is not ready to receive data, the printer waits until the host becomes ready.
 - When the parameter ($1 \leq n \leq 3$) or ($49 \leq n \leq 51$) is specified, the printer transmits one byte code.
 - When the parameter ($65 \leq n \leq 67$) or ($n = 69$) is specified, the printer transmits following data string.
 - Header (<5F>H)
 - Printer information (multiple bytes)
 - Terminator (<00>H)

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① GS V *m*

② GS V *m n*

[Name] Feed paper to the cutting position and cut it.

[Format] ① ASCII GS V *m*
 Hex 1D 56 *m*
 Decimal 29 86 *m*
 ② ASCII GS V *m n*
 Hex 1D 56 *m n*
 Decimal 29 86 *m n*

[Range] ① $0 \leq m \leq 2, 48 \leq m \leq 50$
 ② $65 \leq m \leq 67$
 $0 \leq n \leq 255$

[Function] Cuts a receipt.

- When DIP switch 1-7 OFF (auto cutter installed), *m* specifies the paper cutting operation as follows.

<i>m</i>	Paper cutting operation	
	when standard mode	when Taiwan mode
0, 48, 1, 49	Cut (one point left uncut)	Cut (one point left uncut).
2, 50	Cut (three points left uncut)	Cut (three points left uncut).
65, 66	Feed paper to the cutting position, then cut (one point left uncut).	Feed paper to the preprint black mark position, then cut (one point left uncut).
67	Feed paper to the cutting position, then cut (three points left uncut).	Feed paper to the preprint black mark position, then cut (three points left uncut).

- When DIP switch 1-7 ON (manual cutter installed), *m* specifies the paper cutting operation as follows.

<i>m</i>	Paper cutting operation	
	when standard mode	when Taiwan mode
0, 48, 1, 49	No operation	No operation
2, 50	No operation	No operation
65, 66	Only feed paper to the cutting position.	Only feed paper to the preprint black mark position.
67	Only feed paper to the cutting position.	Only feed paper to the preprint black mark position.

- n* specifies the paper feeding amount before cutting a paper.

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- [Description]
- This command is effective only when processed at the beginning of a line.
 - This command is ignored when receipt is not selected as the paper source.

[Description for ②]

- In Taiwan mode, parameter n has no meaning.
- When $n = 0$, the printer feeds the paper to the cutting position and cuts it.
- When $n \neq 0$, the printer feeds the paper to (cutting position + $(n \times 4.23\text{mm})$), and cuts it.
- In standard mode, the paper is fed with the continuous paper feeding mode for the first 30 lines.

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			NEXT 65	SHEET 64

GS r n

[Name]	Transmit status			
[Format]	ASCII	GS	r	n
	Hex	1D	72	n
	Decimal	29	114	n
[Range]	n = 1, 2, 49, 50			
[Function]	Transmits the status specified by n, as follows:			

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

- [Description]
- The printer transmits the status after confirming the host is ready to receive data. If the host computer is not ready to receive data, the printer waits until the host becomes ready.

- The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Journal paper near-end sensor: paper present
	On	01	1	Journal paper near-end sensor: paper near end
1	Off	00	0	Receipt paper near-end sensor: paper present
	On	02	2	Receipt paper near-end sensor: paper near-end
2, 3	Off	00	0	Reserved.
4	Off	00	0	Fixed.
5	Off	00	0	Validation sensor: paper present
	On	20	32	Validation sensor: paper not present
6	Off	00	0	Reserved.
7	Off	00	0	Fixed.

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1,2,3	Off	00	0	Reserved.
4	Off	00	0	Fixed.
5,6	Off	00	0	Reserved.
7	Off	00	0	Fixed.

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			NEXT 66	SHEET 65

DLE EOT n

[Name]	Real-time status transmission			
[Format]	ASCII	DLE	EOT	n
	Hex	10	04	n
	Decimal	16	4	n
[Range]	$1 \leq n \leq 4, 6$			
[Function]	Transmits the selected printer status specified by n in real-time, according to the following parameters:			
	$n = 1$: Transmit printer status			
	$n = 2$: Transmit off-line status			
	$n = 3$: Transmit error status			
	$n = 4$: Transmit paper roll sensor status			
	$n = 6$: Transmit validation status			

[Description]

$n = 1$: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer open/close signal is LOW (connector pin 3).
	On	04	4	Drawer open/close signal is HIGH (connector pin 3).
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Reserved. Fixed to Off.
6	Off	00	0	No panel switch is pressed.
	On	40	64	One of panel switch is pressed.
7	Off	00	0	Not used. Fixed to Off.

Bit 6: Even if panel switch is disabled by ESC c 5, bit6 becomes "On" during one of panel switch is pressed.

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			NEXT 67	SHEET 66

$n = 2$: Off-line status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open.
3	Off	00	0	Paper is not being fed by using the FEED button.
	On	08	8	Paper is being fed by the FEED button.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No paper-end stop.
	On	20	32	Printing is being stopped due to paper-end.
6	Off	00	0	No error.
	On	40	64	Error occurs.
7	Off	00	0	Not used. Fixed to Off.

$n = 3$: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	No mechanical error.
	On	04	4	Mechanical error occurs.
3	Off	00	0	No auto-cutter error.
	On	08	8	Auto-cutter error occurs.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurs.
6	Off	00	0	No print head temperature error.
	On	40	64	Print head temperature error occurs.
7	Off	00	0	No mark sensor error.
	On	80	128	Mark sensor error occurs.

Bit 2: This bit becomes "On" when home position detecting error or main motor lock-up error is occurs.

Bit 7: When serial interface model and 7 bit data word length selected, this bit can not be transferred to the host.

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			NEXT 68	SHEET 67

$n = 4$: Paper roll sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Journal paper roll is not near-end.
	On	04	4	Journal paper roll near-end is detected.
3	Off	00	0	Receipt paper roll is not near-end.
	On	08	8	Receipt paper roll near-end is detected.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Journal mark sensor does not detect black mark.
	On	20	32	Journal mark sensor is detecting black mark.
6	Off	00	0	Receipt mark sensor does not detect black mark.
	On	40	64	Receipt mark sensor is detecting black mark.
7	Off	00	0	Not used. Fixed to Off.

$n = 6$: Validation status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Validation is not selected.
	On	04	4	Validation is selected.
3	Off	00	0	Not validation insertion waiting state.
	On	08	8	Within validation insertion waiting state.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Validation sensor does not detect paper.
	On	20	32	Validation sensor is detecting paper.
6	Off	00	0	Reserved. Fixed to Off.
7	Off	00	0	Not used. Fixed to Off.

[Notes] • The status is transmitted whenever the data sequence of <10>H <04>H < n > ($1 \leq n \leq 4$ or 6) is received.

Example:

In **ESC * m nL nH d1...dk**, $d1 = \text{<10>H}$, $d2 = \text{<04>H}$, $d3 = \text{<01>H}$

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- This command should not be used within the data sequence of another command that consists of 2 or more bytes.

Example:

If you attempt to transmit **ESC 3 *n*** to the printer, but DTR (DSR for the host computer) goes to MARK before *n* is transmitted and then **DLE EOT 3** interrupts before *n* is received, the code <10>H for **DLE EOT 3** is processed as the code for **ESC 3 <10>H**.

- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.
- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 1-6 is on with a parallel interface model.

[Reference] **DLE ENQ, GS r**

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			NEXT 70	SHEET 69

DLE ENQ n

[Name]	Real-time request to printer			
[Format]	ASCII	DLE	ENQ	n
	Hex	10	05	n
	Decimal	16	5	n
[Range]	$1 \leq n \leq 3$			
[Description]	<p>Responds to a request from the host specified by n. The operations performed depends on the value of n, as follows:</p> <p>$n = 1$: Recover from an error and restart printing from the line where the error occurred.</p> <p>$n = 2$: Clear the receive and print buffers and recover from an error.</p> <p>$n = 3$: Cancel waiting for validation.</p>			
[Notes]	<ul style="list-style-type: none"> The printer executes this command upon receiving this command. With a serial interface model, this command is executed even in the off-line, receive buffer-full, or error states. This command is transmitted anytime the data sequence $\langle 10 \rangle \text{H} \langle 05 \rangle \text{H} \langle n \rangle$ ($1 \leq n \leq 3$) is received, even if it appears as part of another command, <Example> In ESC * m n L n H $d1$... dk, $d1 = \langle 10 \rangle \text{H}$, $d2 = \langle 05 \rangle \text{H}$, $d3 = \langle 1 \rangle$ This command should not be used within the data sequence of another command that consists of two or more bytes. <Example> If you attempt to transmit ESC R n to the printer, but DLE ENQ 3 interrupts before n is received, the code $\langle 10 \rangle \text{H}$ for DLE ENQ 3 is processed as the code for ESC R $\langle 10 \rangle \text{H}$. DLE ENQ 1 restarts printing from the line where the error occurred. This command is available only for recoverable errors other than a print head temperature error. DLE ENQ 2 enables the printer to recover from an error after clearing the data in the receive and print buffers. The printer retains the settings (form ESC!, ESC R, etc.) that were in effect when the error occurred. Using DLE ENQ 2 and ESC @, the printer can be completely initialized. DLE ENQ 2 is available only for recoverable errors other than a print head temperature error. The printer enters paper roll mode after recovering from an error by using DLE ENQ 2. DLE ENQ 3 is available only when the printer is waiting for the insertion of validation paper, and is ignored in other states. After the printer is released from the cut sheet waiting state, the paper roll is selected. When the cut sheet waiting state canceled by DEL ENQ 3, the data in the receive and print buffers is cleared. DLE ENQ 1 and DLE ENQ 2 are enabled, even if the printer is canceled by ESC =. 			

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DLE DC4 n m t

[Name] Generate pulse at real-time

[Format]

ASCII	DLE	DC4	n	m	t
Hex	10	14	n	m	t
Decimal	16	20	n	m	t

[Range]

$n = 1$
 $0 \leq m \leq 1$
 $1 \leq t \leq 8$

[Function] Outputs the pulse specified by t to connector pin m as follows:

m	Function
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

- The pulse ON time is $[t \times 100]$ ms and the OFF time is $[t \times 100]$ ms.

[Description]

- This command will be executed when printer receives this command. Therefore this command can be used even when the printer is in offline state as well as receive buffer full state.
- This command is enable even when the error occurs.
- This command is enable even when printer is not selected by **ESC =**.
- If printer receives this command during outputting pulse required by **ESC p** or **DLE DC4** to the same connector pin, this command will be ignored.
- If printer receives this command during outputting pulse required by **ESC p** or **DLE DC4** to another connector pin, this command will be queued and executed afterwards.

[Refer] **ESC p**

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			NEXT App.1	SHEET 71

APPENDIX A. MISCELLANEOUS NOTES

1) Print duty

- When printing exceeds the allowable print duty cycle, the printer automatically detects the print head temperature rise. If the print head temperature continues to rise, the printer stops the print head until the temperature goes down to the threshold level.
- When printing is stopped due to high print head temperature, the ERROR LED blinks as shown in Table 3.5.1.
- When the head temperature error occurs, the printer goes offline. The printer automatically goes back online when the print head temperature falls.

2) Data transmission

Data should be transmitted after the printer power is turned on and initialize operation completes.

3) Manual cutter (only for the manual cutter installed model)

The roll paper should be cut off after finishing paper feed.

4) For faster receipt printing

This printer supports two kinds of the paper feeding speed (See Section 1.5.1, Paper feed).
If the **ESC d n** or the **GS V m n** is used effectively, the printer can print the receipt faster.

5) Other

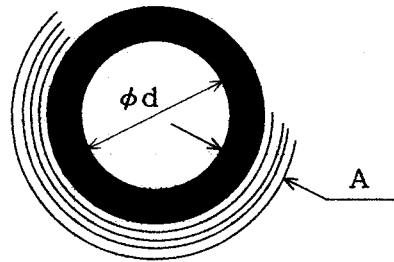
Because plated steel plate is used in this unit, the cut edges may get rusty.

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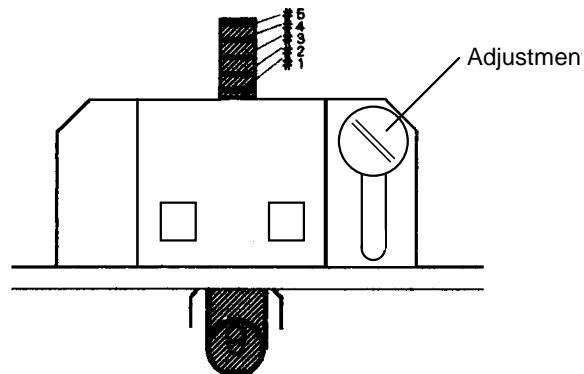
APPENDIX B. ADJUSTING THE PAPER ROLL NEAR-END SENSOR LOCATION

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

- 1) The inside diameter (ϕd) of the paper spool should be 10mm {.394"} or more.
- 2) Loosen the adjustment screw with a coin-like tool.
- 3) Set the paper roll diameter A to obtain the corresponding adjustment position from the table below.
- 4) Tighten the screw to secure the paper holder with a coin-like tool.



A	Adjustment position
Approx. 10mm {.39"}	#1
Approx. 8mm {.32"}	#2
Approx. 6mm {.24"}	#3
Approx. 4mm {.16"}	#4
Approx. 2mm {.08"}	#5



- NOTES:
1. Since diameter A corresponding to the adjustment position in the table is a calculated value, there may be some variations depending on the printer.
 2. If a paper roll with a red end mark at the paper end is used, the mark may cause the paper to pull up. If this occurs, diameter A differs from the values in the table.
 3. Be sure that the adjustable slider operates smoothly after finishing the adjustment.
 4. If the paper on the paper roll becomes loose due to the paper quality, the paper roll near-end sensor may operate incorrectly.

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APPENDIX C. USING THE RELEASE LEVERS

1) Using the Release Levers

The release levers on both sides of the printer unit can be used for the following two purposes.

2) Releasing the paper

The release levers on the left and right sides can be used to loosen the paper on the receipt and journal sides independently. Firmly pressing down on a lever in direction A (see Figure C-1) releases the paper. When pressure on the lever ceases, the paper holder spring returns the lever to its normal position.

3) Opening and closing the paper guide

To open the paper guide, first remove the take-up shaft and then pull both release levers simultaneously in direction B (see Figure C-1). This raises the paper guide and opens it, giving access to the printing section.

To close the paper guide, carefully push the cover near the levers down with both hands until the cover clicks shut on both sides. Remember to reinsert the take-up shaft in the take-up frame.

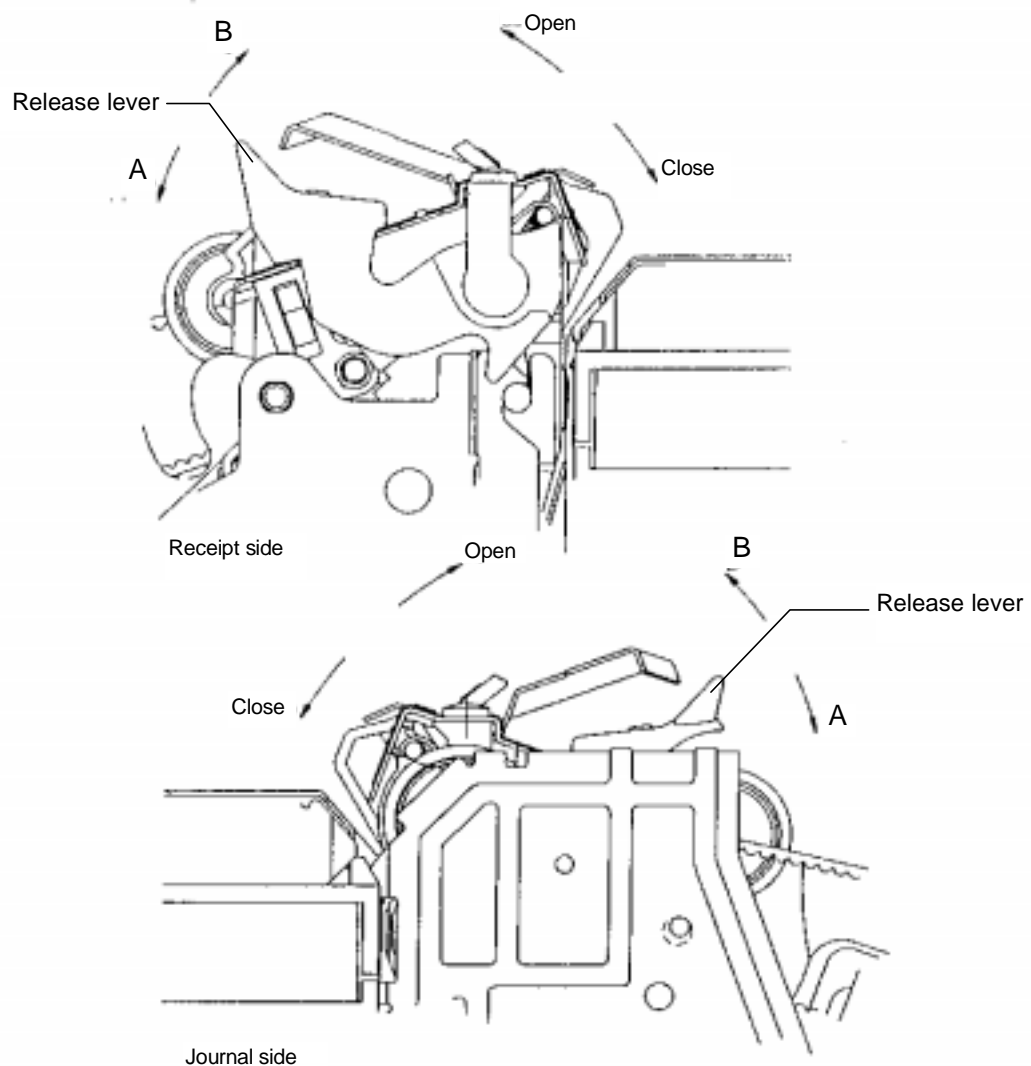
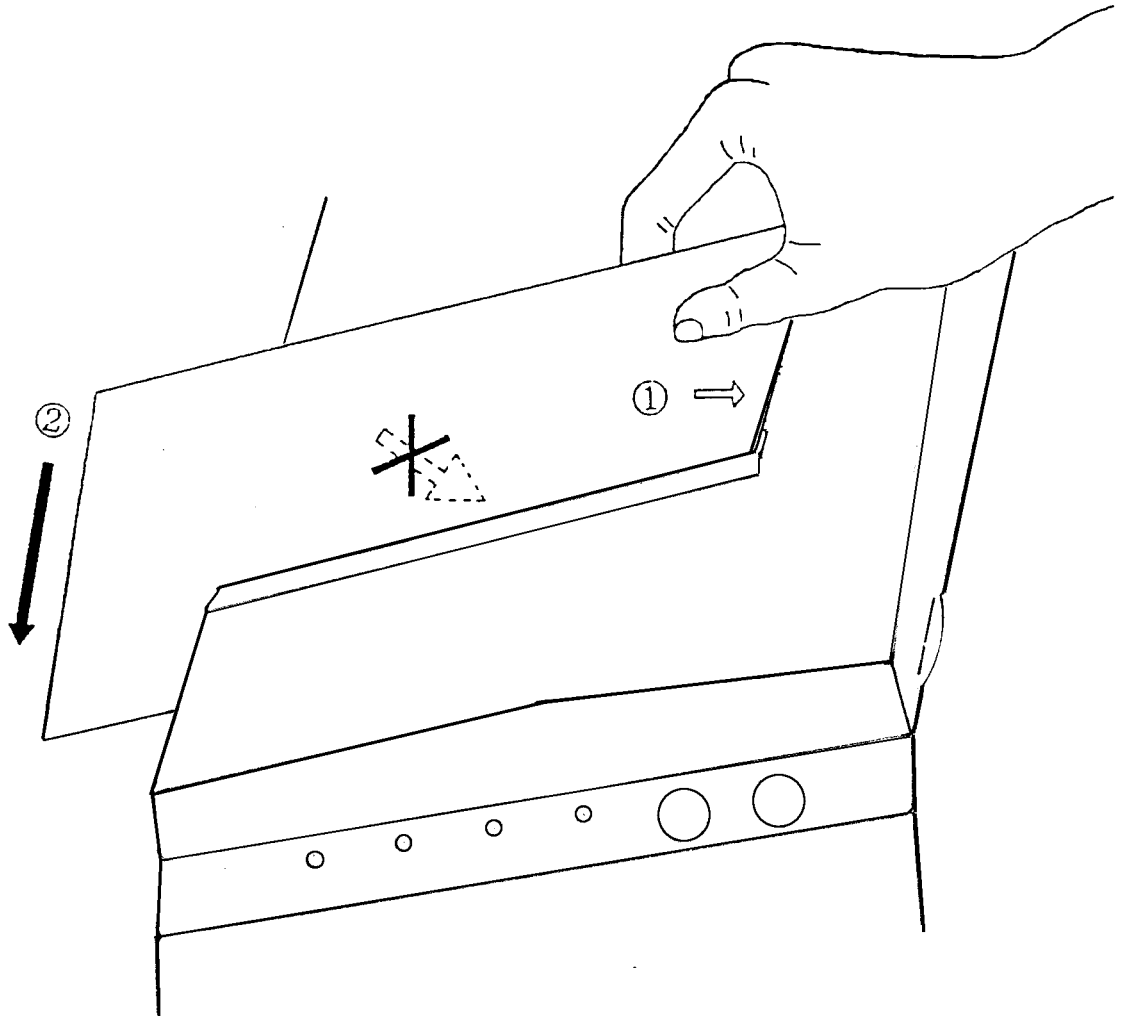


Figure C-1. Release Levers

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APPENDIX D. INSERTING THE VALIDATION PAPER**Inserting the Validation Paper**

- 1) Hold the top of the paper, with the printed side facing toward you.
- 2) Insert the card straight into the paper slot, with the right side aligned with the paper stopper on the paper guide.
- 3) To prevent the paper from being pushed down or bent, hold it during printing.

**Figure D-1. Validation Paper Insertion**

NOTE: A Validation detector is standard equipment. The detected portion of the validation paper as shown in Figure 1.10.2 must not include any holes or torn portions.

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APPENDIX E. NOTES ON USING THE DRAWER KICK-OUT CONNECTOR

1) Drawer specifications

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

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

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

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

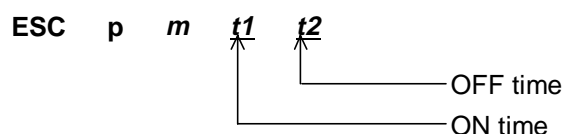
(*2): Proper operation is not guaranteed with different connections or connection to a component other than a switch.

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

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

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

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



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

$$\text{or, OFF time} \geq \text{ON time} \times 4$$

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