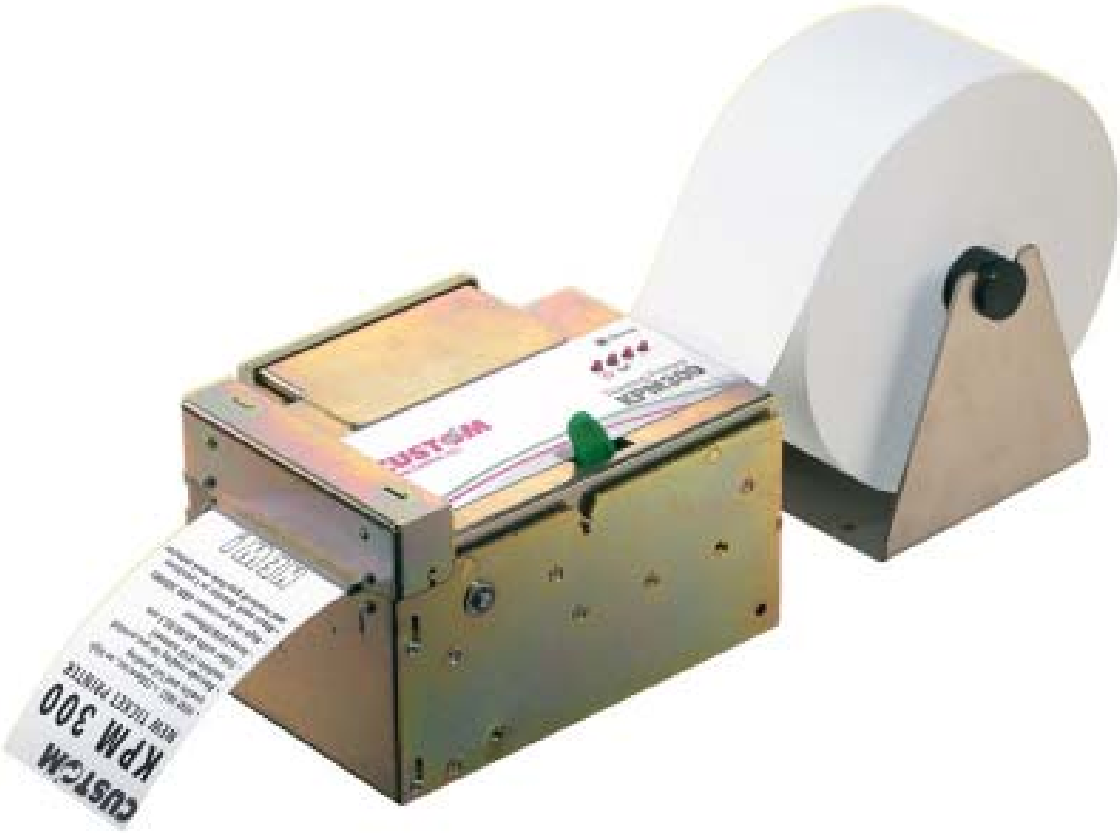
Ticket printer

KPM300

User Manual



PRELIMINARY

COD. DOME-KPM300 REV. 0.00

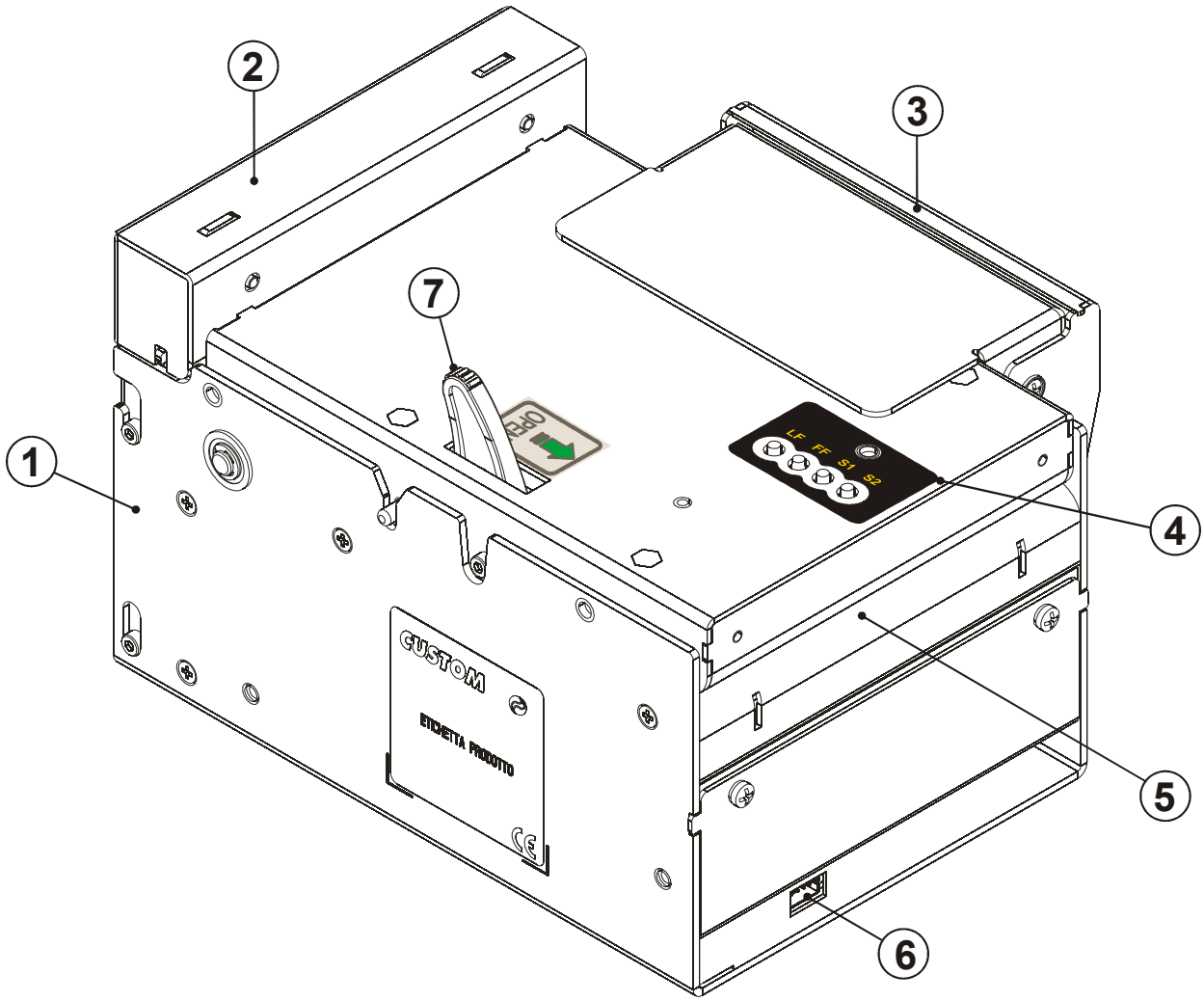
CUSTOM ENGINEERING SPA
Str. Berettine 2 - 43010 Fontevivo (PARMA) - Italy
Tel.: +39 0521-680111 - Fax: +39 0521-610701
http: www.custom.it

Customer Service Department:
OEM AREA : Tel.: +39 059 88 69 587
Email: support@custom.it

PRINTER COMPONENTS

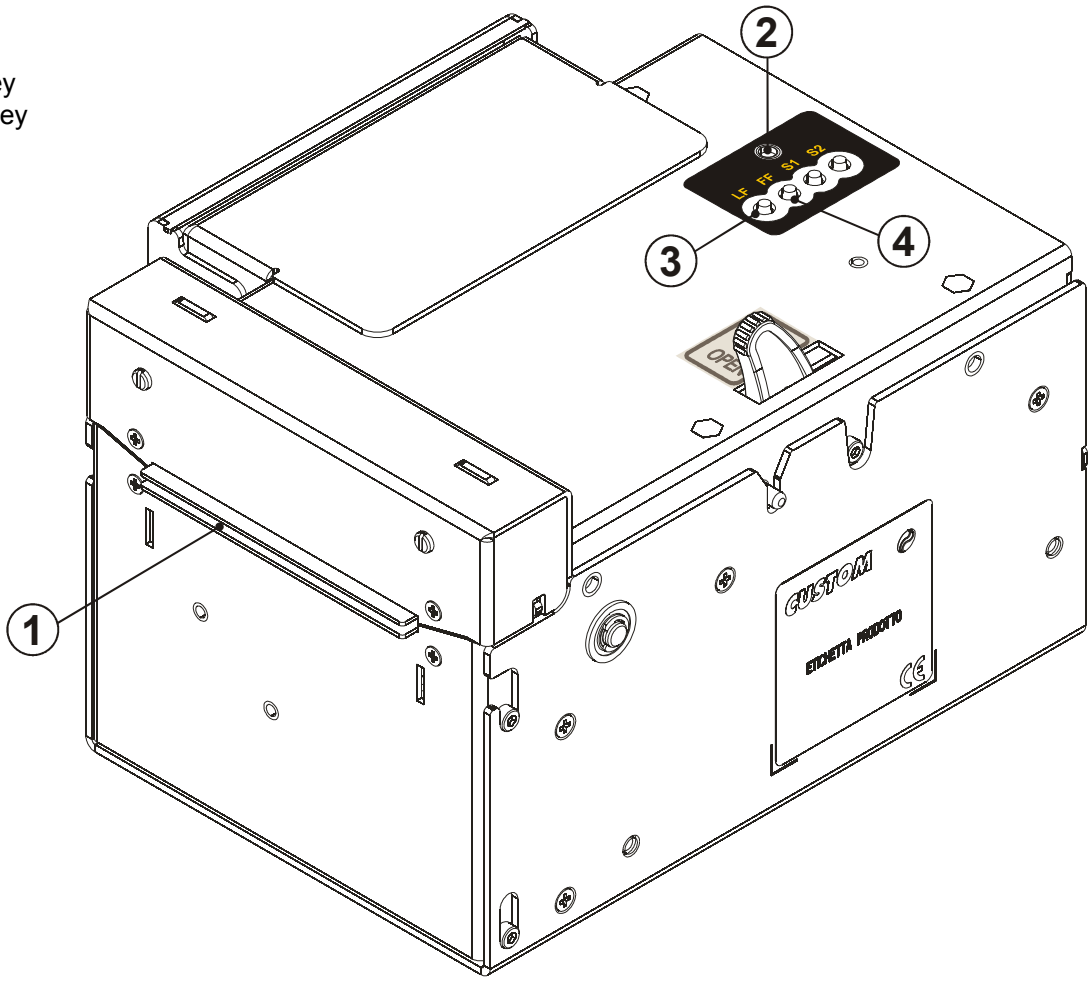
A. Front external view

1- Printer frame
2- Printing head set
3- Closing Carter
4- Panel key
5- Paper input
6- External near paper end sensor connector
7- Release lever



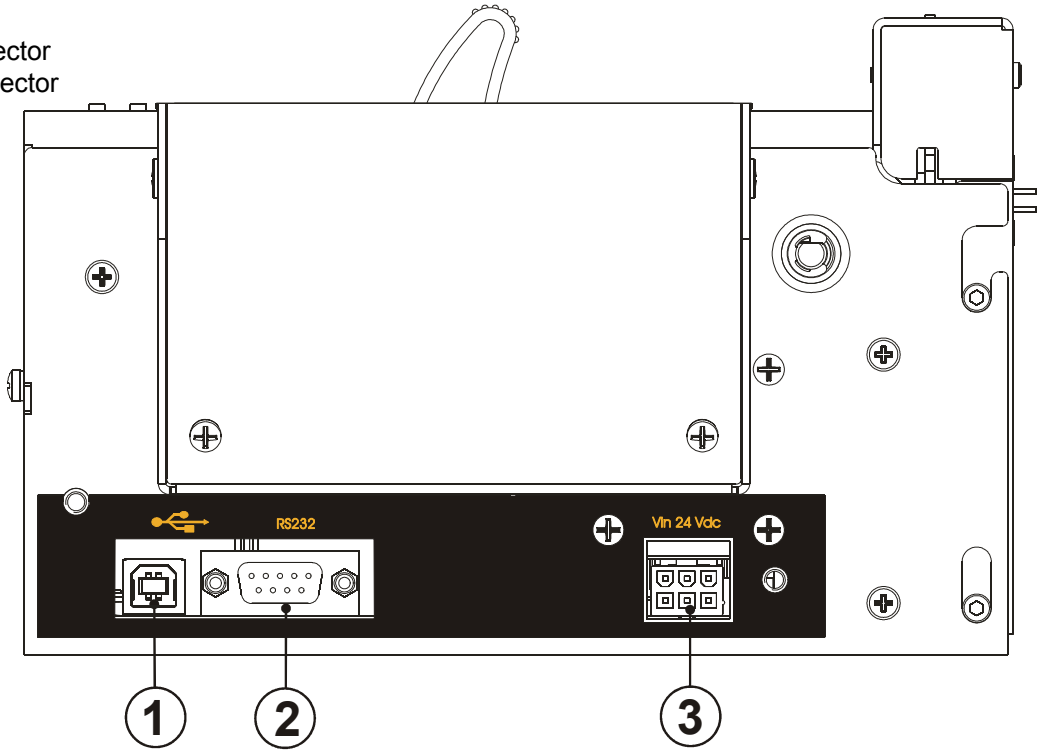
B. Side external view

1- Paper outfeed
2- “Status” led
3- “Line Feed” Key
4- “Form Feed” Key



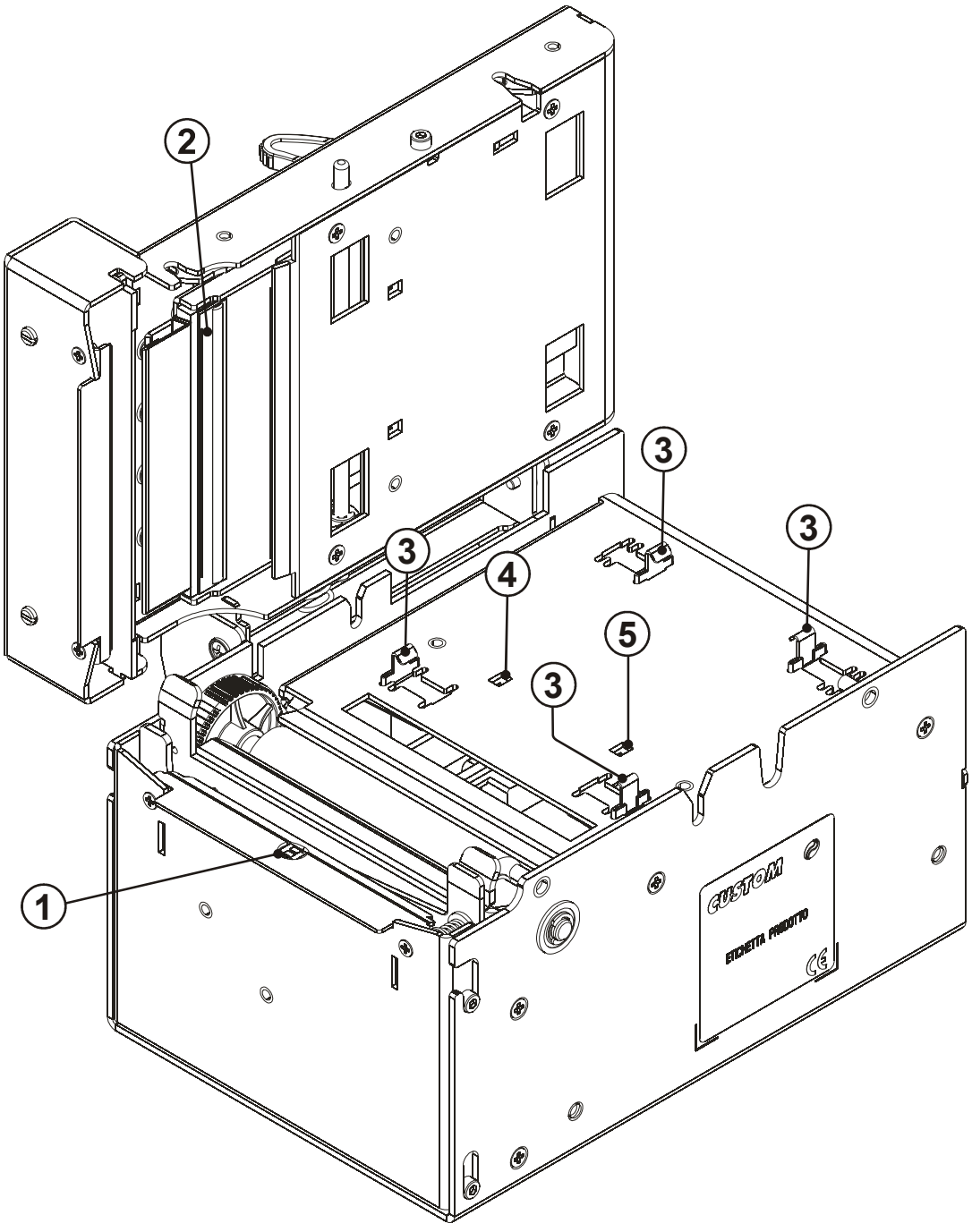
C. External connectors view

1- USB connector
2- RS232 serial connector
3- Power supply connector



D. Inside view of sensors position

1- Sensor of ticket presence on output
2- Printing head
3- Paper width guides (adjustable)
4- Ticket presence sensor
5- Black mark sensor



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MANUAL CONTENTS

In addition to the Introduction which includes a description of the explanatory notes used in the manual, general safety information, how to unpack the printer and a brief description of the printer including its basic features, this manual is organized as follows:

Chapter 1: Contains the information required for correct printer installation and its proper use

Chapter 2: Contains information on interface specifications

Chapter 3: Contains a description of the printer command set

Chapter 4: Contains Technical Specifications of the printer

Chapter 5: Contains the character sets (fonts) used by the printer

EXPLANATORY NOTES USED IN THIS MANUAL

N.B.
Gives important information or suggestions relative to the use of the printer.

WARNING
Information marked with this symbol must be carefully followed to guard against damaging the printer.

DANGER
Information marked with this symbol must be carefully followed to guard against operator injury or damage.

GENERAL SAFETY INFORMATION

- Read and keep the instructions which follow.
- Follow all warnings and instructions indicated on the printer.
- Before cleaning the printer, disconnect the power supply.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near water.
- Do not use the printer on unstable surfaces that might cause it to fall and be seriously damaged.
- Only use the printer on hard surfaces and in environments that guarantee proper ventilation.
- Make sure the printer is placed in such a way as to avoid damage to its wiring.
- Use the type of electrical power supply indicated on the printer label. If in doubt, contact your retailer.
- Do not block the ventilation openings.
- Do not introduce foreign objects of any kind into the printer as this could cause a short circuit or damage parts that could jeopardize printer functioning.
- Do not spill liquids onto the printer.
- Do not carry out technical operations on the printer, with the exception of the scheduled maintenance procedures specifically indicated in the user manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician when:

    A. The feed connector has been damaged.
    B. Liquid has seeped inside the printer.
    C. The printer has been exposed to rain or water.
    D. The printer is not functioning normally despite the fact that all instructions in the users manual have been followed.
    E. The printer has been dropped and its outer casing damaged.
    F. Printer performance is poor.
    G. The printer is not functioning.

UNPACKING THE PRINTER

Remove the printer from its carton being careful not to damage the packing material so that it may be re-used if the printer is to be transported in the future.
Make sure that all the components listed below are present and that there are no signs of damage. If there are, contact Customer Service.

1. Paper roll
2. Manual (or CD-Rom)
3. Printer
4. Box

- Open the printer packaging
- Remove the paper roll, the manual (or CD-Rom).
- Take out the printer.
- Keep the box, trays and packing materials in the event the printer must be transported/shipped in the future.

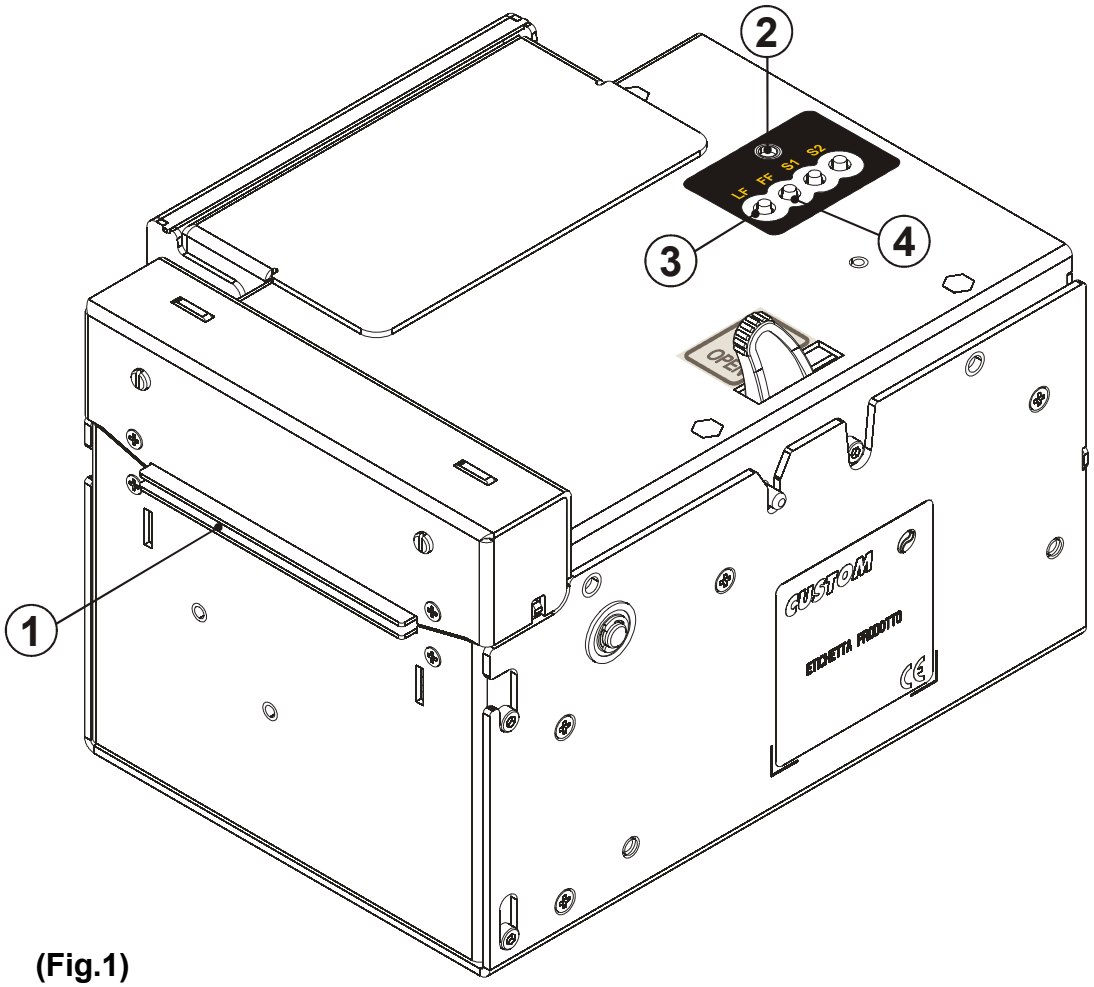
PRINTER FEATURES

The printer is a very fast ticket printer, on high quality and full printing. The printer offers a wide range of options in addition to normal print features:

- Ticket width : 54, 76, 80, 82.5 mm.
- equipped with barcode laser reader (CCD scanner) for reading pre-printed modules.
- High printing speed: 220 mm/sec.
- Interfaces : Serial RS232, USB.
- ESC/POS™ emulation.
- Bar code UPC-A. UPC-E, EAN13, EAN8, CODE39, ITF, CODABAR, CODE93, CODE128 and CODE32.
- 6 standard and international character set fonts.
- Completely- or partially-programmable fonts.
- Double width/height, quadruple width/height, expanded, italic, rotated 90°, 180° and 270°.
- Receive buffer: from 16 bytes to 8 Kbytes.
- Definition of function macros for automatic operation repetition.
- Internal programmable counter.
- Graphic print mode.
- Print density.
- 2 programmable logos: 608 x 862 each dots
- Sensors : ticket presence, black mark detector, ticket presence on output, cover open, external near paper end .
- Paper cutter.
- Options : Fan-Fold holder and external paper holder support.

PRINTER DESCRIPTION

The printer (fig.1) is comprised of a metal frame (1), printing mechanism and cutter .
The following keys are located on the control panel: LINE FEED (3), FORM FEED (4) and “Status” LED (2).



(Fig.1)

- When the LINE FEED (3) key is pressed, the printer advances the paper so that it may be inserted manually in the printing mechanism. During power-up, if the LINE FEED key is held down, the printer enters the print setup routine. Following the print-out of the setup report, the printer remains in standby until a key is pressed or signals arrive from the serial port; each 10 characters it prints out hexadecimal and ASCII codes (if the characters are underlined, the receive buffer is full); see Receive buffer hexidecimal print-out.

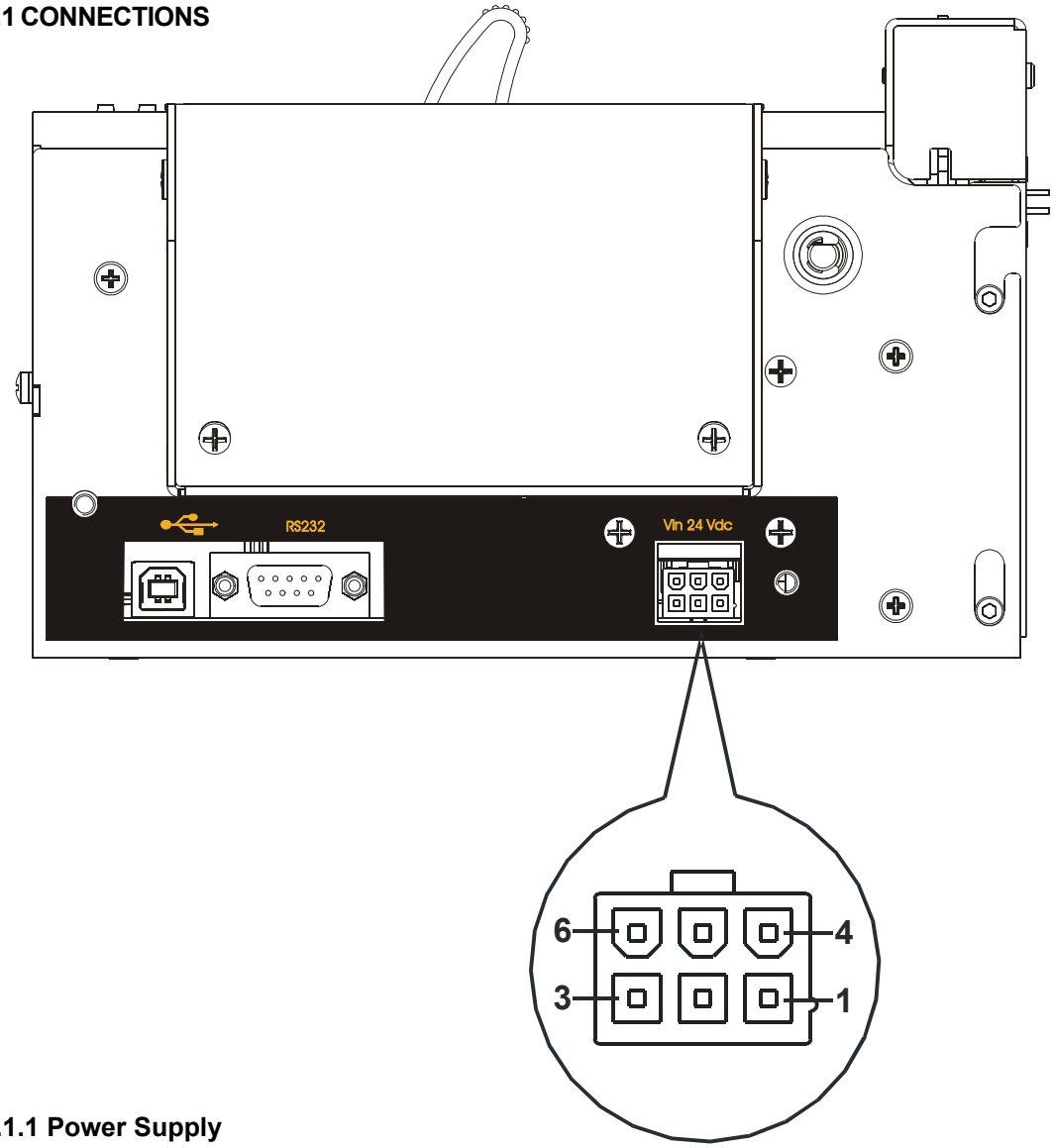
- When the FORM FEED (4) key is pressed, the printer execute the form feed. If the FORM / FEED key is hold down at the moment of the turning on, the printer executes the FONT TEST.

- The “Status” LED indicates printer status; the check is made on-line. Given in the table below are the various LED signals and the corresponding printer status.

(Tab.1)

STATUS LED	COLOR	DESCRIPTION	
○	None	Printer OFF	
●	Green	Printer ON : no error	
	Green	**Communication status**	
		nr. flashings	description
		1	Receive data
		2	Reception errors (parity, frame error, overrun error)
		3	Misinterpret command
		4	Command reception time out
	Yellow	**Recovering error**	
		nr. flashings	description
		2	Heading over temperature
		3	Paper end
		5	Power supply voltage incorrect
		6	Cover opened
	Red	**Unrecovering error**	
		nr. flashings	description
		3	RAM error
		4	EEPROM error
		5	Cutter error

1.1 CONNECTIONS



(Fig.1.1)

1.1.1 Power Supply

The printer is equipped with an external power supply outlet (see Fig. 1.1). The connector pin configuration is as follows:

Model no. type : Header : Molex 39-30-0060 (Vertical)
Housing: Molex 39-01-2065

(Tab.1.1)

Pin No.	Signal
1	+ 24 V
2	+ 24 V
3	+ 24 V
4	GND
5	GND
6	GND

WARNING:
Respect power supply polarity.

1.2 SELF-TEST

Printer operating status is indicated in the configuration print-out in which, next to the name of the components displayed (see fig. 1.2 and fig. 1.3), the following information is given:
• under *INTERFACE* is given the interface present (RS232).
• under *PROGRAM MEMORY TEST, DYNAMIC RAM TEST, EEPROM TEST* and *CUTTER TEST,* the message OK appears if functioning and NOT OK if faulty.
• under *HEAD VOLTAGE* is given the voltage of the head.
• under *HEAD TEMPERATURE* is given the temperature of the head.
• under *POWER ON COUNTER* is given the number of power-ups made.
• under *PAPER PRINTED* is given the number of centimeters of paper printed.
• under *CUT COUNTER* is given the number of cuts made.

(Fig.1.2)

```
        * PRINTER SETUP *

INTERFACE............RS232
PROGRAM MEMORY TEST..OK
DYNAMIC RAM TEST.....OK
EEPROM TEST..........OK
CUTTER TEST..........OK
HEAD VOLTAGE     [V]    = 23.82
HEAD TEMPERATURE [°C]   = 27
POWER ON COUNTER        = 862
PAPER PRINTED    [cm]   = 7760
CUT COUNTER             = 333

RS232 Baud Rate (1)      : 115200 bps
RS232 Data length (1)    : 8 bits/chr
RS232 Parity (1)         : None
RS232 Handshaking (1)    : Xon/Xoff
Busy Condition (2)       : OffLine/RxFull
USB Address Number (3)   : 0
USB Status Monitor (4)   : Disabled
Autofeed                 : CR disabled
Print Mode               : Normal
Chars / inch             : A=15 B=20 cpi
Speed / Quality (5)      : Normal
Printing Width           : 76mm [80 PaperW]
Notch Alignment          : Enabled
Paper Threshold          : 2.5 V
Notch Distance [mm](6)   : 00.0
Current                  : Normal
PaperEnd Buffer Clear    : Disabled
PowerFail WakeUp mode (7): LAST PWR State
Print Density            : 0 %

[LF] Key to enter setup
[FF] Key to skip setup
```

Note (1) : *Parameter valid only on serial printer.*

Note (2) : *Parameter valid only wth serial interface; using this parameter, it is possible to select whether the Busy signal is activated when the printer is both in Off Line status and the buffer is full, or only if the reception buffer is full.*

Note (3) : *This parameter is displayed if the printer has an USB interface; it's used to identify univocally the USB printer by a numerical address code, if on the PC are connected two printers that are the same models for example two USB printers.*

Note (4) : *This parameter is displayed if the printer has an USB interface. The Status Monitor is an additional printing driver component that allows the printer status monitoring. It must be enabled only if it was installed the Status Monitor specific driver.*

The p
are:

1.3 CONFIGURATION

The printer permits the configuration of default parameters. The parameters that relate to configuration are:

- **RS232 Baud Rate:** 115200, 57600,38400, 19200[D], 9600, 4800, 2400, 1200.
- **RS232 Data length:** 7, 8 bits/char [D].
- **RS232 Parity:** None[D], even or odd.
- **RS232 Handshaking:** XON/XOFF or Hardware[D].
- **Busy condition**: OffLine/RxFull or RxFull[D] .
- **USB Address Number:** 0.
- **USB Status Monitor:** Disabled[D] or enabled.
- **Autofeed:** CR disabled[D] or CR enabled.
- **Print mode:** Normal[D] or reverse.
- **Chars/inch:** A=11 B=15 cpi, A=15 B=20 cpi[D].
- **Speed/Quality (5):** Normal, High Quality or High Speed[D].
- **Notch alignment:** Disabled[D] or enabled.
- **Notch Threshold(6):** 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5[D], 4.0, 4.5.
- **Notch distance(6) (mm):** 00.0[D].
- **PaperEnd Buffer Clear:** Disabled[D] or enabled.
- **PowerFail WakeUp mode(7):** LAST PWR State[D], Always OFF, Always ON.
- **Print Density:** -50%, -37%, -25%, -12%, 0[D],+12%,+25%,+37%, +50%.

General notes:

- The parameters marked with the symbol [D] are the default values.
- Settings remain active even after the printer has been turned off.

Note (5) : *"Current consumption" parameter is not setted by the user but it depends on the "Speed/Quality" parameter in this way:*

Speed/Quality	Current consumption
Normal	High Current
High Speed	
Low Speed	Low Current

Note (6) : *If the "Notch Alignment" parameter is "Disabled" this parameter doesn't appear in the "Printer Setup" ticket.*

Note (7) : *Using this parameter, when occurs a power fail the printer can be switched on automatically, without press On-Off key.*
-"LAST PWR State" : Put the printer in the previous state (ON or OFF) before a power fail;
-"Always ON" : The printer always switch on automatically, after a power fail;
-"Always OFF" : The printer switch on only pressing On-Off key, after a power fail.

1.1 PRINT DIRECTION

The printer has two print modes, selectable through the control characters: normal and reverse.

1.2 COMMAND DESCRIPTIONS

The table 1.1 shows the commmands list, ordered by their hexadecimal value.

LEGEND :

Symbol	**Function**
$	indicates the representation of the command hexadecimal value (for example $40 means HEX 40).
{ }	indicates an ASCII character not performable.
n, **m**, **t**, **x**, **y**	are optional parameters that can have different values.

1.2.1 ESC/POS Emulation

The following table lists all the commands for function management in ESC/POS™ Emulation of the keyboard and display. The commands can be transmitted to the printer at any moment, but they will only be carried out when the commands ahead of them have been executed. The commands are carried out when the circular buffer is free to do so.

COMMAND DESCRIPTION TABLE **(Tab.1.1)**

HEX	ASCII	Description	Note
$09	HT	Horizontal tab	
$0A	LF	Print and line feed	
$0C	FF	Print and return to standard mode in page mode	
$0D	CR	Print and carriage return	
$10 $04 n	DLE EOT n	Real-time status transmission	Only for serial version
$10 $05 n	DLE ENQ n	Real-time request to printer	
$10 $14 n m t	DLE DC4 n m t	Generate pulse at real-time	
$1B $0C	ESC FF	Print in page mode	

HEX	ASCII	Description	Note
$1B $20 n	ESC SP n	Set character right-side spacing	
$1B $21 n	ESC ! n	Set print mode	
$1B $24 nL nH	ESC $ nL nH	Set absolute position	
$1B $25 n	ESC % n	Select/cancel user-defined character set	
$1B $26 y c1 c2	ESC & y c1 c2	Define user-defined characters	
$1B $2A m nL nH d1...dk	ESC * m nL nH d1...dk	Select image print mode	
$1B $2D n	ESC - n	Turn underline mode on/off	
$1B $32	ESC 2	Select 1/6-inch line spacing	
$1B $33 n	ESC 3 n	Set line spacing using minimum units	
$1B $3D n	ESC = n	Select device	
$1B $3F n	ESC ? n	Cancel user-defined characters	
$1B $40	ESC @	Initialize printer	
$1B $44 n1...nk 00	ESC D n1...nk NUL	Set horizontal tab positions	
$1B $45 n	ESC E n	Select emphasized mode	
$1B $47 n	ESC G n	Select double-strike mode	
$1B $4A n	ESC J n	Print and feed the paper	
$1B $4C	ESC L	Select page mode	
$1B $4D n	ESC M n	Select character font	
$1B $52 n	ESC R n	Select international character set	
$1B $53	ESC S	Select standard mode	
$1B $54 n	ESC T n	Select print direction in page mode	
$1B $56 n	ESC V n	Select print mode 90° turned	
$1B $57 xL xH yL yH dxL dxH dyL dyH	ESC W xL xH yL yH dxL dxH dyL dyH	Set printing area in page mode	
$1B $5C nL nH	ESC \ nL nH	Set relative print position	
$1B $61 n	ESC a n	Select justification	
$1B $64 n	ESC d n	Print and feed paper n lines	
$1B $69	ESC i	Total cut	
$1B $70 m t1 t2	ESC p m t1 t2	Generate pulse	
$1B $74 n	ESC t n	Select character code table	
$1B $76	ESC v	Transmit printer status	Only on serial interface
$1B $7B n	ESC { n	Set/cancel upside-down character printing	
$1B $FA n xL xH yH yL	ESC { } n xL xH yH yL	Print graphic	
$1B $FB nL nH	ESC { } nL nH	Transmit graphic page to communication port	
$1B $FC n	ESC { } n	Transfer flash bank into RAM	
$1B $FD nL nH	ESC { } nL nH	Receive graphic page from communication port	
$1B $FE n	ESC { } n	Transfer RAM into flash bank	
$1B $FF n nL nH	ESC { } n nL nH	Receive graphic page from communication port	- For this command set the comunication protocol as "Hardware" - Only on serial interface
$1C $C0 $07	FS { } { }	Emits an acoustic signalling	
$1C $C0 $FF n	FS { } { } n	Emits an acoustic signalling in base of printer status	
$1C $EB	FS { }	Receive, save and play melody	
$1C $70 n m	FS p n m	Print NV image	
$1C $71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n	FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n	Define NV image	
$1D $21 n	GS ! n	Select character size	
$1D $24 nL nH	GS $ nL nH	Set absolute vertical print position in page mode	
$1D $2A x y d1..d(x x y x 8)	GS * x y d1..d(x x y x 8)	Define downloaded bit image	

HEX	ASCII	Description	Note
$1D $2F m	GS / m	Print downloaded bit image	
$1D $3A	GS :	Set start/end of macro definition	
$1D $42 n	GS B n	Turn white/black reverse printing mode on/off	
$1D $48 n	GS H n	Select printing position of HRI characters	
$1D $49 n	GS I n	Transmit printer ID	Only on serial interface
$1D $4C nL nH	GS L nL nH	Set left margin	
$1D $50 x y	GS P x y	Set horizontal and vertical motion unit	
$1D $56 m	GS V m	Select cut mode	
$1D $57 nL nH	GS W nL nH	Set printing area width	
$1D $5C nL nH	GS \ nL nH	Set relative print position in page mode	
$1D $5E r t m	GS { } r t m	Execute macro	
$1D $61 n	GS a n	Enable/Disable Automatic Status Back (ASB)	Only on serial interface
$1D $66 n	GS f n	Select font for HRI characters	
$1D $68 n	GS h n	Select height of bar code	
$1D $6B m 00	GS k m NUL	Print bar code	
$1D $72 n	GS r n	Transmit status	Only on serial interface
$1D $76 $30 m xL xH yL yH d1...dk	GS v 0 m xL xH yL yH d1...dk	Print raster bit image	
$1D $77 n	GS w n	Select horizontal side (enlargement) of bar code	
$1D $F6	GS { }	Ticket align at first printing line	
$1D $F8	GS { }	Ticket align at cut	

Given below are more detailed descriptions of each command.

$09

[Name] **Horizontal tab**

[Format] ASCII HT
Hex 09
Decimal 9

[Description] Moves the print position to the next horizontal tab position.

[Notes] • Ignored unless the next horizontal tab position has been set.
• If the command is received when the printing position is at the right margin, the printer executes print buffer full printing and horizontal tab processing from the beginning of the next line.
• Horizontal tab positions are set using ESC D.

[Default]

[Reference] **$1B $44**

[Example]

$0A

[Name] **Print and line feed**

[Format] ASCII LF
Hex 0A
Decimal 10

[Description] Prints the data in the buffer and feeds one line based on the current line spacing.

[Notes] • Sets the print position to the beginning of the line.
• If the buffer is empty, the printing feeds of (character height + spacing gap) dot.

[Default]

[Reference] **$1B $32, $1B $33, $0D**
[Example]

$0C

[Name] **Print and return to standard mode in page mode**
[Format]

ASCII	FF
Hex	0C
Decimal	12

[Description] Prints the data in the buffer collectively and returns to standard mode.
[Notes]
- The buffer data is deleted after being printed.
- The printing area set by **$1B $57** is reset to the default setting.
- The printer does not execute paper cutting.
- This command sets the print position to the beginning of the line.
- This command is enabled only in page mode.

[Default]
[Reference] **$1B $4C, $1B $53**
[Example]

$0D

[Name] **Print and carriage return**
[Format]

ASCII	CR
Hex	0D
Decimal	13

[Description] When autofeed is “CR enabled”, this command functions in the same way as **$0A**, otherwise it is disregarded.
[Notes]
- Sets the print position to the beginning of the line.

[Default] See “Autofeed in setup” parameter.
[Reference] **$0A**
[Example]

$10 $04 n

[Name] **Real-time status transmission**
[Format]

ASCII	DLE	EOT	n
Hex	10	04	n
Decimal	16	4	n

[Range] $1 \leq n \leq 4, 17, 20$
[Description] 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 = 17	transmit print status
n = 20	transmit FULL STATUS

[Notes]
- Immediately executed even when the data buffer is full.
This status is transmitted whenever data sequence 10H 04H n is received.

[Default]
[Reference] See tables below.
[Example]

n=1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	RESERVED
1	-	-	-	RESERVED
2	-	-	-	RESERVED
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	-	-	-	RESERVED
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	-	-	-	RESERVED

n=2: Off-line status

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	RESERVED
1	-	-	-	RESERVED
2	Off	00	0	Cover closed.
	On	04	4	Cover opened.
3	Off	00	0	Paper isn't feeded by LINE FEED button.
	On	08	8	Paper is feeded by LINE FEED button.
4	-	-	-	RESERVED
5	Off	00	0	Paper present.
	On	20	32	Printing stop due to paper end.
6	Off	00	0	No error.
	On	40	64	Error.
7	-	-	-	RESERVED

n=3: Error status

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	RESERVED
1	-	-	-	RESERVED
2	-	-	-	RESERVED
3	Off	00	0	Cutter ok.
	On	08	8	Cutter error.
4	-	-	-	RESERVED
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error.
6	Off	00	0	No auto-recoverable error.
	On	40	64	Auto-recoverable error.
7	-	-	-	RESERVED

n=4: Paper roll sensor status

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	RESERVED
1	-	-	-	RESERVED
2,3	Off	00	0	Paper present in abundance.
	On	0C	12	Near paper end.
4	-	-	-	RESERVED
5, 6	Off	00	0	Paper present.
	On	60	96	Paper not present.
7	-	-	-	RESERVED

n=17: Print status

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	RESERVED
1	-	-	-	RESERVED
2	Off	00	0	Paper drag motor off.
	On	04	4	Paper drag motor on.
3	-	-	-	RESERVED
4	-	-	-	RESERVED
5	Off	00	0	Paper present.
	On	20	32	Paper absent.
6	-	-	-	RESERVED
7	-	-	-	RESERVED

n=20: FULL status (6 bytes)

1° byte = $10 (DLE)
2° byte = $0F
3° byte = Paper status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper present.
	On	01	1	Paper not present.
1	-	-	-	RESERVED
2	Off	00	0	Paper present in abundance.
	On	04	4	Near paper end.
3	-	-	-	RESERVED
4	-	-	-	RESERVED
5	Off	00	0	Ticket not present in output.
	On	20	32	Ticket present in output.
6	Off	00	0	Not virtual paper end ***(*)***.
	On	40	64	Virtual paper end ***(*)***.
7	-	-	-	RESERVED

(*) Virtual paper end is set when the paper length available, readed by $1D $E1**,** is 0.

4° byte = USER STATUS

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Cover closed.
	On	01	1	Cover opened.
1	Off	00	0	Cover closed.
	On	02	2	Cover opened.
2	-	-	-	RESERVED
3	Off	00	0	Drag paper motor off.
	On	08	8	Drag paper motor on.
4	-	-	-	RESERVED
5	Off	00	0	LF key released.
	On	20	32	LF key pressed.
6	Off	00	0	FF key released.
	On	40	64	FF key pressed.
7	Off	00	0	Notch not found under the sensor
	On	80	128	Found Notch under the sensor

5° byte = Recoverable error Status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Head temperature ok.
	On	01	1	Head temperature error.
1	Off	00	0	No COM error.
	On	02	2	RS232 COM error.
2	-	-	-	RESERVED
3	Off	00	0	Power supply voltage ok.
	On	08	8	Power supply voltage error.
4	-	-	-	RESERVED
5	Off	00	0	Acknowledge command.
	On	20	32	Not acknowledge command error.
6	Off	00	0	Free paper path.
	On	40	64	Paper jam.
7	Off	00	0	Notch search ok
	On	80	128	Error in Notch search

$10 $05 n

[Name] **Real-time request to printer**

[Format]

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

[Range] $1 \le n \le 2$

[Description] Responds to a request from the host computer, *n* specifies the request as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error after clearing the receive and print buffers

[Notes]

- This command is effective only when an auto-cutter error occurs.
- The printer starts processing data upon receiving this command.
- This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status.

• This command can not be executed when the printer is busy.

• The status is also transmitted whenever the data sequence of <10>H<05>H< n> (1 ≤ n ≤ 2) is received.

Example:

In **$1B $2A m nL nH dk**, d1 = <10>H, d2 = <05>H, d3 = <01>H

• This command should not be contained within another command that consists of two or more bytes.

Example:

If you attempt to transmit **$1B $33 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **$10 $05 2** interrupts before n is received, the code <10>H for **$10 $05 2** is processed as the code for **$1B $33** <10>H.

• **$10 $05 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **$1B $21**, **$1B $33**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **$1B $40**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.

• When the printer is disabled with **$1B $3D** (Select peripheral device), the error recovery functions **($10 $05 1** and **$10 $05 2**) are enabled, and the other functions are disabled.

[Reference] **$10 $04**

[Example]

$10 $14 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

m = indifferent

1 ≤ t ≤ 8

[Description] Outputs the pulse specified by the connector pin *2* as follows:

The pulse ON time is [t x 100 ms] and the OFF time is [t x 100 ms].

[Notes]

• When the printer is in an error status when this command is processed, this command is ignored.

• When the pulse is output to the connector pin specified while **$1B $70** or **$10 $14** is executed while this command is processed, this command is ignored.

• 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.

• This command cannot be executed when the printer is busy.

• If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.

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

• This command is effective even when the printer is disabled with **$1B $3D** (Select peripheral device).

[Reference] **$1B $70**

[Example]

$1B $0C

[Name] **Print data in page mode**

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

[Description] In page mode, prints all buffered data in the printing area collectively.

[Notes]
- This command is enabled only in page mode.
- After printing, the printer does not clear the buffered data, setting values for **$1B $54** and **$1B $57**, and the position for buffering character data.

[Reference] **$0C, $1B $4C, $1B $53**

[Example]

$1B $20 n

[Name] **Set right-side character spacing**

[Format]

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

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

[Description] Sets the character spacing for the right side of the character to [n x horizontal or vertical motion units].

[Notes]
- The right character spacing for double-width mode is twice the normal value. When the characters are enlarged, the right side character spacing is m (2 or 4) times the normal value.
- The horizontal and vertical motion units are specified by **$1D $50**. Changing the horizontal or vertical motion units does not affect the current right side spacing.
- The **$1D $50** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- The maximum right side character spacing is 32 mm.

[Default] n = 0

[Reference] **$1D $50**

[Example]

$1B $21 n

[Name] **Select print modes**

[Format]

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

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

[Description] Selects print modes using *n* (see table below):

Bit	Off/On	Hex	Decimal	Function	11/15 cpi	15/20 cpi
0	Off	00	0	Character font A selected.	18 x 24	14 x 24
	On	01	1	Character font B selected.	14 x 24	10 x 24
1	-	-	-	Undefined.		
2	-	-	-	Undefined.		
3	Off	00	0	Expanded mode not selected.		
	On	08	8	Expanded mode selected.		
4	Off	00	0	Double-height mode not selected.		
	On	10	16	Double-height mode selected.		
5	Off	00	0	Double-width mode not selected.		
	On	20	32	Double-width mode selected.		
6	Off	00	0	Italic mode not selected.		
	On	40	64	Italic mode selected.		
7	Off	00	0	Underline mode not selected.		
	On	80	128	Underline mode selected.		

[Notes]
• The printer can underline all characters, but cannot underline the spaces set by **$09**, **$1B $24**, **$1B $5C** and 90°/270° rotated characters.
• This command resets the left and right margin at default value (see **$1D $4C**, **$1D $57**).
• **$1B $45** can also be used to turn the emphasized mode on/off. However, the last-received setting command is the effective one.
• **$1B $2D** can also be used to turn the underlining mode on/off. However, the last-received setting command is the effective one.
• **$1D $21** can also be used to select character height/width. However, the last-received setting command is the effective one.

[Default] n = 0

[Reference] **$1B $2D, $1B $45, $1D $21**

[Example]

$1B $24 nL nH

[Name] **Set absolute print position**

[Format]

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

[Range]
$0 \le nL \le 255$
$0 \le nH \le 255$

[Description]
Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.

The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times$ (vertical or horizontal motion unit)] inches.

[Notes]
• Settings outside the specified printable area are ignored.
• The horizontal and vertical motion unit are specified by **$1D $50**.
• **$1D $50** can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount.
• In standard mode, the horizontal motion unit (x) is used.
• If the setting is outside the printing area width, it sets the absolute print position, but the left or right margin is set at default value.

[Default]

[Reference] **$1B $5C, $1D $50**

[Example]

$1B $25 n

[Name] **Select/cancel user-defined characters**

[Format]

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

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

[Description] Selects or cancels the user-defined character set.
When the Least Significant Bit (LSB) of n is 0, the user-defined character set is canceled.
When the LSB of n is 1, the user-defined character set is selected.

[Notes]
- Only the LSB of n is applicable.
- When the user-defined character set is canceled, the internal character set is automatically selected.

[Default] n=0

[Reference] **$1B $26, $1B $3F**

[Example]

$1B $26 y c1 c2 [x1 d1... d(y × x1)] ... [xk d1... d(y × x1)]

[Name] **Defines user-defined characters**

[Format]

ASCII	ESC	&	y	c1	c2
Hex	1B	26	y	c1	c2
Decimal	27	37	y	c1	c2

[Range]
$y = 3$
$32 \le c1 \le c2 \le 126$
$0 \le x \le 16$ (Font (18×24))
$0 \le x \le 13$ (Font (13×24))
$0 \le x \le 10$ (Font 10×24)
$0 \le d1 \ldots d (y \times xk) \le 255$
$k = c2 - c1 + 1$

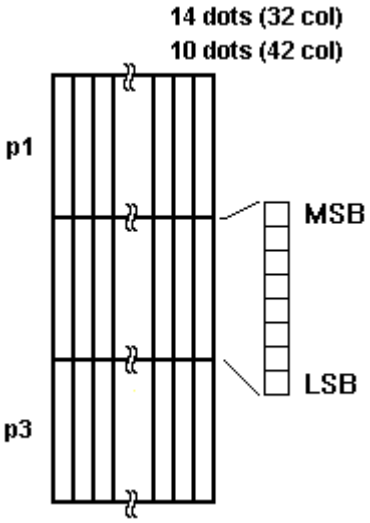
[Description] Defines user-defined characters.
Y specifies the number of bytes in the vertical direction.
C1 specifies the beginning character code for the definition, and C2 specifies the final code.
X specifies the number of dots in the horizontal direction.

[Notes]
- The allowable character code range is from ASCII 20H (32) to 7EH (126) (95 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- If c2 < c1, the command is not executed.
- d is the dot data for the characters. The dot pattern is in the horizontal direction starting from the left. Any remaining dots on the right remain blank.
- The data to define a user-defined character is (x x y) bytes.
- To print a dot, set the corresponding bit to 1; to not have it print, set to 0.
- This command can define different user-defined character patterns for each font. To select the font, use **$1B $21**.
- A user-defined character and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definitions are cleared when:
$1B $40 or
$1D $2A or
$1B $3F are executed or
the printer is reset or the power shut off.

[Default] Internal character set.

[Reference] **$1B $25, $1B $3F**

[Example]



$1B $2A m nL nH d1...dk

[Name] **Select bit image mode**

[Format]

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

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

$0 \le nL \le 255$

$0 \le nH \le 3$

$0 \le d \le 255$

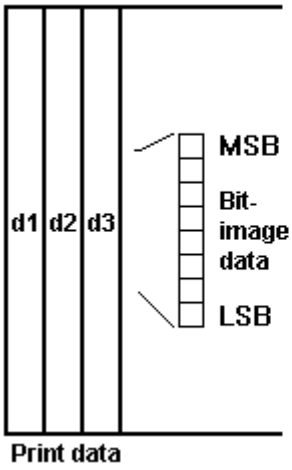
[Description] Selects a bit image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

m	Mode	Vertical direction		Horizontal direction (*1)	
		N. dots	DPI	DPI	N. of Data (k)
0	8 dot single density	8	67	100	nL + nH x 256
1	8 dot double density	8	67	200	nL + nH x 256
32	24 dot single density	24	200	100	(nL + nH x 256) x 3
33	24 dot double density	24	200	200	(nL + nH x 256) x 3

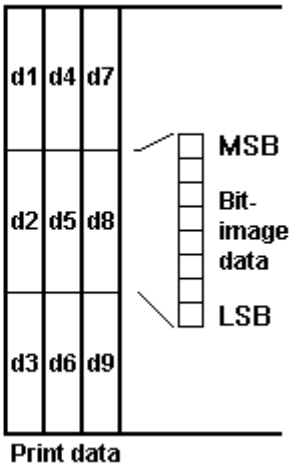
[Notes]

- The *nL* and *nH* commands indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated using: nL + nH $\times$ 256.
- If the bit image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit image data. Set a corresponding bit to 1 to print a dot, or to 0 to not print the dot.
- If the value of *m* is outside the specified range, *nL* and data following it are processed as normal data.
- If the width of the printing area set by **$1D $4C** and **$1D $57** is less than the width required by the data set using **$1B $2A** , the excess data are ignored.
- To print the bit image use **$1B $4A** or **$1B $64**.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by the emphasized, double-strike, underline (etc.) print modes, except for the upside-down mode.
- The relationship between the image data and the dots to be printed is as follows:

8-dot bit image



24-dot bit image



[Default]

[Reference]

[Example]

$1B $2D n

[Name] **Turn underline mode on/off**

[Format]

ASCII	ESC	-	n
Hex	1B	2D	n
Decimal	27	45	n

[Range] 0 ≤ n ≤ 2, 48 ≤ n ≤ 50

[Description] Turns underline mode on or off, based on the following values of *n*:
n = 0, 48 Turns off underline mode
n = 1, 49 Turns on underline mode (1-dot thick)
n = 2, 50 Turns on underline mode (2-dot thick)

[Notes]
• The printer can underline all characters, but cannot underline the space and right-side character spacing.
• The printer cannot underline 90°/270° rotated characters and white/black inverted characters.
• When underline mode is turned off by setting the value of *n* to 0 or 48, the data which follows is not underlined.
• Underline mode can also be turned on or off by using **$1B $21**. Note, however, that the last received command is the effective one.

[Default] n=0

[Reference] **$1B $21**

[Example]

$1B $32

[Name] **Select 1/6-inch line spacing**

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Selects 1/6-inch line spacing.

[Notes]

[Default]

[Reference] **$1B $33**

[Example]

$1B $33 n

[Name] **Set line spacing**

[Format]

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

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

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

[Notes]
- The horizontal and vertical motion unit are specified by **$1D $50**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- The **$1D $50** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount.
- In standard mode, the vertical motion unit is used.
- The maximum spacing is 32,5 mm.

[Default] n = 64 (1/6 inch)

[Reference] **$1B $32, $1D $50**

[Example]

$1B $3D n

[Name] **Select peripheral device**

[Format]

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

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

[Description] Select the device to which the host computer sends data, using *n* as follows:

n = 1, n = 3	Printer Enable
n = 2	Printer Disabled

[Notes]
- When the printer is disabled, it ignores all transmitted data until the printer is enabled through this command.

[Default] n = 1

[Reference]

[Example]

$1B $3F n

[Name] **Cancel user-defined characters**

[Format]

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

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

[Description] Cancels user-defined characters.

[Notes]
- This command cancels the pattern defined for the character code specified by *n*. After the user-defined character is cancelled, the corresponding pattern for the internal character is printed.
- This command deletes the pattern defined for the specified character code in the font selected by **$1B $21**.
- If the user-defined character has not been defined for the specified character code, the printer ignores this command.

[Default]

[Reference] **$1B $26**, **$1B $25**

[Example]

$1B $40

[Name] **Initialize printer**

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer mode to that in effect when power was turned on.

[Notes]
- The data in the receiver buffer is not cleared.
- The macro definitions are not cleared.

[Default]

[Reference]

[Example]

$1B $44 n1...nk 00

[Name] **Set horizontal tab positions**

[Format]

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

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

$0 \le k \le 32$

[Description] Sets horizontal tab positions
- *n* specifies the column number for setting a horizontal tab position calculated from the beginning of the line.
- *k* indicates the total number of horizontal tab positions to be set.

[Notes]
- The horizontal tab position is stored as a value of [character width x *n*] measured from the beginning of the line. The character width includes the right-side character spacing and double-width characters are set with twice the width of normal characters.
- This command cancels previous tab settings.
- When setting n = 8, the print position is moved to column 9.
- Up to 32 tab positions (*k* = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Send [*n*] *k* in ascending order and place a 0 NUL code at the end. When [*n*] *k* is less than or equal to the preceding value [*n*] *k*-1, the setting is complete and the data which follows is processed as normal data.
- **$1B $44 00** cancels all horizontal tab positions.
- The previously specified horizontal tab position does not change, even if the character width is modified.

[Default] Default tab positions are set at intervals of 8 characters (columns 9, 17, 25, …) for Font A when the right-side character spacing is 0.

[Reference]

[Example]

$1B $45 n

[Name] **Turn emphasized mode on/off**

[Format]

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

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

[Description] Turns emphasized mode on/off.
• When the LSB of *n* is 0, the emphasized mode is off.
• When the LSB of *n* is 1, the emphasized mode is on.

[Notes] • Only the LSB of *n* is effective.
• **$1B $21** also turns on and off the emphasized mode. However, the last received command is the effective one.

[Default] n = 0

[Reference] **$1B $21**

[Example]

$1B $47 n

[Name] **Turn double-strike mode on/off**

[Format]

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

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

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

[Notes] • Only the LSB of *n* is effective.
• Printer output is the same in double-strike and emphasized mode.

[Default] n = 0

[Reference] **$1B $45**

[Example]

$1B $4A n

[Name] **Print and paper feed**

[Format]

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

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

[Description] Prints the data in the print buffer and feeds the paper [n × (vertical or horizontal motion unit)] inches.

[Notes] • After printing has been completed, this command sets the print starting position to the beginning of the line.
• The paper feed amount set by this command does not affect the values set by **$1B $32** or **$1B $33**.
• The horizontal and vertical motion units are specified by **$1D $50**.
• **$1D $50** can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount.
• In standard mode, the vertical motion unit is used.
• The maximum paper feed amount is 520 mm.

[Default]

[Reference] **$1D $50**

[Example]

$1B $4C

[Name] **Select page mode**

[Format]

ASCII	ESC	L	n
Hex	1B	4C	n
Decimal	27	76	n

[Description] Switches from standard mode to page mode.

[Notes]

• This command is enabled only when processed at the beginning of a line in standard mode.

• This command has no effect in page mode

• After printing by **$0C** is completed or by using **$1B $53**, the printer returns to standard mode.

• This command sets the position where data is buffered to the position specified by **$1B $54** within the printing area defined by **$1B $57**.

• This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:

1) Set right-side character spacing: **$1B $20**

2) Select default line spacing: **$1B $32, $1B $33**

• Only value settings is possible for the following commands in page mode; these commands are not executed.

1) Turn 90° clockwise rotation mode on/off: **$1B $56**

2) Select justification: **$1B $61**

3) Turn upside-down printing mode on/off: **$1B $7B**

4) Set left margin: **$1D $4C**

5) Set printable area width: **$1D $57**

• The following command is not available in page mode:

1) Print raster bit image: **$1D $76 $30**

• The printer returns to standard mode when power is turned on, the printer is reset, or **$1B $40** is used.

[Reference] **$0C, $1B $53, $1B $54, $1B $57, $1D $24, $1D $5C**

[Example]

$1B $4D n

[Name] **Select character font**

[Format]

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

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

[Description] Selects characters font.

n	Function
0, 48	Character font A (14 x 24) selected
1, 49	Character font B (10 x 24) selected

[Notes]

[Default]

[Reference] **$1B $C1**
[Example]

$1B $52 n

[Name] **Select an international character set**
[Format]

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

[Range] $0 \le n \le 10$
[Description] Selects the international character set *n* according to the table below:

	Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
n	Character set												
0	U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
1	France	#	$	à	°	ç	§	^	`	è	ù	è	"
2	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
3	United Kingdom	£	$	@	[	\	]	^	`	{	|	}	~
4	Denmark I	#	$	@	Æ	∅	Å	^	`	æ	ϕ	å	~
5	Sweden	#	¤	È	Ä	Ö	Å	Ü	è	ä	ö	å	ü
6	Italy	#	$	@	°	\	è	^	ù	à	ò	è	ì
7	Spain 1	Pt	$	@	¡	Ñ	¿	^	`	"	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	`	{	|	}	~
9	Norway	#	¤	È	Æ	∅	Å	Ü	è	æ	ϕ	å	ü
10	Denmark II	#	$	È	Æ	∅	Å	Ü	è	æ	ϕ	å	ü

[Default] n = 0
[Reference]
[Example]

$1B $53

[Name] **Select standard mode.**
[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] Switches from page mode to standard mode.
[Notes]
- This command is effective only in page mode.
- Data buffered in page mode are cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **$1B $57** are initialized.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:

1) Set right-side character spacing: **$1B $20**
2) Select default line spacing: **$1B $32, $1B $33**

• The following commands are enabled only to set in standard mode.

1) Set printing area in page mode: **$1B $57**

2) Select print direction in page mode: **$1B $54**

• The following commands are ignored in standard mode.

1) Set absolute vertical print position in page mode: **$1D $24**

2) Set relative vertical print position in page mode: **$1D $5C**

• Standard mode is selected automatically when power is turned on, the printer is reset, or command **$1B $40** is used.

[Reference] **$0C, $1B $4C**

[Example]

ESC T n

[Name] **Select print direction in page mode.**

[Format]

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

[Range] $0 \le n \le 3$

$48 \le n \le 51$

[Description] Select the print direction and starting position in page mode. n specifies the print direction and starting position as follows :

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

[Notes] • When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.

• This command sets the position where data is buffered within the printing area set by **$1B $57**.

• Parameters for horizontal or vertical motion units (x or y) differ as follows,depending on the starting position of the printing area:

1) If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction:

Commands using horizontal motion units: **$1B $20, $1B $24, $1B $5C**.

Commands using vertical motion units: **$1B $33, $1B $4A, $1D $24, $1D $5C**.

2) If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction:

Commands using horizontal motion units: **$1B $33, $1B $4A, $1D $24, $1D $5C**.

Commands using vertical motion units: **$1B $20, $1B $24, $1B $5C**.

Default] n = 0

[Reference] **$1B $24, $1B $4C, $1B $57, $1B $5C, $1D $24, $1D $50, $1D $5C**

[Example]

$1B $56 n

[Name] **Set 90° rotated print mode.**

[Format]

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

[Range] $0 \le n \le 1, 48 \le n \le 49$

[Description] Turns 90° rotation mode on/off. n is used as follows :

n	Function
0, 48	Turns off 90° rotation mode
0,49	Turns on 90° rotation mode

[Notes]
- When underlined mode is turned on, the printer does not underline 90° rotated characters. All the same it's possible select the underline mode.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height *and* double-width commands in normal mode.
- This command is not available in Page mode.
- If this command is entered in Page mode, the printer all the same save the setting.

Default] n = 0

[Reference] **$1B $21, $1B $2D**

[Example]

$1B $57 xL xH yL yH dxL dxH dyL dyH

[Name] **Set printing area in page mode.**

[Format]

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

[Range] $0 \le xL, xH, yL, yH, dxL, dxH, dyL, dyH \le 255$ (except dxL= dxH = 0 or dyL = dyH = 0)

[Description] The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as x0, y0, dx (inch), dy (inch), respectively.

Each setting for the printing area is calculated as follows:

x0 = [(xL + xH x 256) x (horizontal motion unit)]

y0 = [(yL + yH x 256) x (vertical motion unit)]

dx = [dxL + dxH x 256) x (horizontal motion unit)]

dy = [dyL + dyH x 256) x (vertical motion unit)]

The printing area is set as shown in the figure below.

[Notes]
- If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **$1B $54** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area -horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting

position).

• The horizontal and vertical motion unit are specified by **$1D $50**. Changing the horizontal or vertical motion unit does not affect the current printing area.

• The **$1D $50** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of minimum horizontal movement amount.

• Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width, and use the vertical motion unit (y) for setting the vertical starting position and printing area height.

• When the horizontal starting position , vertical starting position, printing area width, and printing area height are defined as X, Y, Dx, and Dy respectively, the printing area is set.

[Default]

[Reference]

[Example]

$1B $5C nL nH

[Name] **Set relative print position**

[Format]

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

[Range] $0 \le nL \le 255$
$0 \le nH \le 255$

[Description] Sets the print starting position based on the current position by using the horizontal or vertical motion unit.
Sets the distance from the current position to [(nL+ nH $\times$ 256) $\times$ (horizontal or vertical motion unit)].

[Notes]

• It's possible to print further on the right margin set for every font. In this case the printing continues up to the maximum border of the printer mechanism and then begins a new row.

• Any setting that exceeds the printable area is ignored.
• When the starting position is specified by *n* motion units to the right:
nL + nH $\times$ 256 = n
When the starting position is specified by *n* motion units to the left (negative direction), use the complement of 65536:

nL + nH $\times$ 256 = 65536 – n

• If setting exceeds the printing area width, the left or right margin is set to the default value.
• The horizontal and vertical motion unit are specified by **$1D $50**.
• **$1D $50** can change the horizontal (and vertical) motion units. However, the value cannot be less than the minimum horizontal movement amount.
• In standard mode, the horizontal motion unit is used.

• Setting the right value, it's possible to print characters over the right edge.

[Default]

[Reference] **$1B $24**, **$1D $50**

[Example]

$1B $61

[Name] **Select justification**

[Format]

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

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

[Description] Aligns all data in one line to the specified position.
n selects the type of justification as follows:

n	Justification
0, 48	Flush left
1, 49	Centered
2, 50	Flush right

[Notes]
- This command is only enabled when inserted at the beginning of a line.
- Lines are justified within the specified printing area.
- Spaces set by **$1B $24** and **$1B $5C** will be justified according to the previously-entered mode.

[Default] n = 0

[Reference]

[Example]

Flush left

```
ABC
ABCD
ABCDE
```

Centered

```
 ABC
 ABCD
 ABCDE
```

Flush right

```
  ABC
 ABCD
ABCDE
```

$1B $64 n

[Name] **Print and feed paper *n* rows**

[Format]

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

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

[Description] Prints the data in the print buffer and feeds the paper *n* rows.

[Notes]
- n rows paper feed is equivalent to (n x char height + line spacing set).
- Sets the print starting position at the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 254 rows. Even if a paper feed amount of more than 254 rows is set, the printer feeds the paper only 254 rows.

[Default]

[Reference] **$1B $32, $1B $33**

[Example]

$1B $69

[Name] **Total cut**

[Format]

ASCII	ESC	i
Hex	1B	69
Decimal	27	105

[Description] This command enables cutter operation. If there is no cutter, a disabling flag is set and any subsequent cut commands will be ignored.

[Notes]
- The printer waits to complete all paper movement commands before it executes a total cut.

[Default]

[Reference]

[Example]

$1B $70 m t1 t2

[Name] **Generate pulse**

[Format]

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

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

[Description] Outputs the pulse specified by t1 and t2 to connector pin *m* as follows:

m	**Connector pin**
0, 1, 48, 49	Drawer kick-out connector pin 2

[Notes]
- The pulse ON time is [*t1* × 2 ms] and the OFF time is [*t2* × 2 ms].
- If *t2* < *t1*, the OFF time is [*t1* × 2 ms].

[Default]

[Reference]

[Example]

$1B $74 n

[Name] **Select character code table**

[Format]

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

[Range] n = 0, 2, 3, 4, 5, 19, 255

[Description] Selects a page *n* from the character code table, as follows:

n	Page
0	0 (PC437 [U.S.A., Standard Europe])
2	2 (PC850 [Multilingual])
3	3 (PC860 [Portuguesel])
4	4 (PC863 [Canadian-French])
5	5 (PC865 [Nordic])
19	19 (PC858 for Euro symbol at position 213)
255	Space page

[Notes]

[Default] n = 0

[Reference] See character code tables

[Example] For printing Euro symbol (•), the command sequence is:
1B, 74, 13, D5

$1B $76 (ONLY FOR SERIAL INTERFACE)

[Name] **Transmit paper sensor status**

[Format]

ASCII	ESC	v
Hex	1B	76
Decimal	27	118

[Description] When this command is received, transmit the current status of the paper sensor.

[Notes] • This command is executed immediately, even when the data buffer is full (Busy).
The status to be transmitted is shown in the table below:

Bit	Off/On	Hex	Decimal	Function
0,1	Off	00	0	Near paper-end sensor: Paper present
	On	03	3	Near paper-end sensor: Paper not present
2,3	Off	00	0	Paper-end sensor: Paper present
	On	(0C)	(12)	Paper-end sensor: Paper not present
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

[Default]

[Reference]

[Example]

ESC { n

[Name] **Turn upside-down printing mode on/off**

[Format]

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

[Range] 0 ≤ n ≤ 255

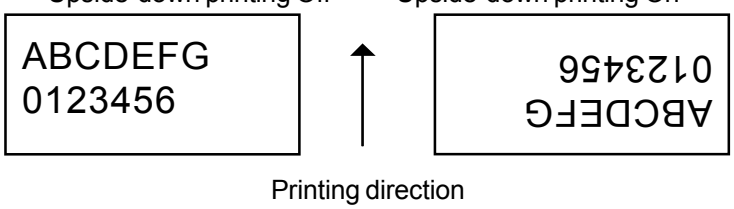
[Description] Turns upside-down printing mode on or off.
• When the LSB of *n* is 0, the upside-down printing mode is off.
• When the LSB of *n* is 1, the upside-down printing mode is on.

[Notes] • Only the LSB of *n* is effective.
• This command is valid only if entered at the beginning of a line.
• In upside-down printing mode, the printer rotates the line to be printed 180° and then prints it.

[Default] n = 0

[Reference]

[Example]



$1B $FA n xH xL yH yL

[Name] **Print graphic (608x862).**

[Format]

ASCII	ESC	{ }	n	xH	xL	yH	yL
Hex	1B	FA	n	xH	xL	yH	yL
Decimal	27	250	n	xH	xL	yH	yL

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

$0 \le xH, xL, yH, yL \le 3$

[Description] Prints graphic logo from flash or current graphic page located in ram. *n* selects the graphic source as follows:

n	Function
0	Print graphic page from ram (used at the moment)
1	Print logo 1 from flash
2	Print logo 2 from flash

xL + *xH* × 256 specifies the starting dotline (1 ÷ 862).
yL + y*H* × 256 specifies the number of lines to print.

[Notes] • If (*xL* + (*xH* × 256)) > 862 the printer does not execute the command.
• If (*xL* + (*xH* × 256) + *yL* +(y*H* × 256))> 862 the printer prints only 862 - *xL* + (*xH* × 256) +1 dotline.

[Default]

[Reference]

[Example]

$1B $FB nL nH

[Name] **Transmit graphic page to communication port**

[Format]

ASCII	ESC	{ }	nL	nH
Hex	1B	FB	nL	nH
Decimal	27	251	nL	nH

[Description] Transmits [*nL* + (*nH* × 256)] word of graphic page used at the moment to the communication port.

[Default]

[Reference] **$1B $FC, $1B $FD, $1B $FE**

[Example]

$1B $FC n

[Name] **Transfer flash bank into RAM**

[Format]

ASCII	ESC	{ }	n
Hex	1B	FC	n
Decimal	27	252	n

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

[Description] Transfers flash bank into RAM used at the moment (65520 bytes). *n* selects the flash bank as follows:

n	Function
1	Transfers flash bank logo 1 into ram
2	Transfers flash bank logo 2 into ram

[Notes]

[Default]

[Reference] **$1B $FA, $1B $FD, $1B $FE**

[Example]

$1B $FD nL nH

[Name] **Receive graphic page from communication port**

[Format]

ASCII	ESC	{ }	nL	nH
Hex	1B	FD	nL	nH
Decimal	27	253	nL	nH

[Range] $0 \le nL, nH \le 255$

[Description] Receives [$nL + (nH \times 256)$] words from the port and puts them into the ram bank.

[Notes]
- The number of data bytes received is [$nL + (nH \times 256)$] $\times 2$.
- Each word is first received as MSByte and then as LSByte.
- If [$nL + (nH \times 256)$] is greater than 32768, the data which follows is processed as normal data.
- The flash bank dimensions for the graphic print are :

with 112mm paper width have 832 horizontals dots (104 bytes/dot line) x 630 verticals dots (65520 bytes).

with 80mm paper width have 640 horizontals dots (80 bytes/dot line) x 819 verticals dots (65520 bytes).

[Default]

[Reference] **$1B $FA, $1B $FC, $1B $FE**

[Example]

$1B $FE n

[Name] **Transfer RAM into flash bank**

[Format]

ASCII	ESC	{ }	n
Hex	1B	FE	n
Decimal	27	254	n

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

[Description] Transfers the RAM used at the moment into the flash bank (65520 bytes).
n selects the bank as follows:

n	Function
1	Transfers RAM used at the moment into flash bank logo 1
2	Transfers RAM used at the moment into flash bank logo 2

[Notes]

[Default]

[Reference] **$1B $FA, $1B $FD, $1B $FC**

[Example]

$1B $FF n nL nH

[Name] **Riceive the graphic page from the comunication port.**

[Format]

ASCII	ESC	{ }	n	nL	nH
Hex	1B	FF	n	nL	nH
Decimal	27	255	n	nL	nH

[Range] $1 \le n \le 2$

$0 \le nL, nH \le 255$

[Description] Riceive [$nL + (nH \times 256)$] word from the comunication port and save them in the flash bank specified by n as shown in the following table:

n	Function
1	Save logo in the flash bank 1
2	Save logo in the flash bank 2

[Notes]
- Set the comunication protocol on "Hardware" for this command.
- The number of received data bytes is [*nL* + (*nH* × 256)] × 2.
- Every word is received first as MSByte and then as LSByte.
- If [*nL* + (*nH* × 256)] is more than 32756, the following data are processed as normal data.
- In the horizontal dotline there are 38 words.
- The flash bank for graphic print dimensions are: 608 horizontal dots (76 bytes/line) × 862 vertical dots (65512 bytes).

[Default]

[Reference]

[Example]

$1C $C0 $07

[Name] **Emits an acoustic signalling.**

[Format]

ASCII	FS	{ }	{ }
Hex	1C	C0	07
Decimal	28	192	7

[Description] When this command is received the printer emits a beep as acoustic signalling.

[Note]

[Default]

[Reference]

[Example]

$1C $C0 $FF n

[Name] **Emits an acoustic signalling in base of printer status.**

[Format]

ASCII	FS	{ }	{ }	n
Hex	1C	C0	FF	n
Decimal	28	192	255	n

[Description] Transmits an acoustic signalling in base of printer status as indicated by n value :

Bit	Off/On	Hex	Decimal	Function
0	On	01	1	If a paper end is detectedA beep signal is emitted
1	On	02	2	If a near paper end is detected a beep signal is emitted
2	On	04	4	If a cover open is detected a beep signal is emitted
3	-	-	-	Not defined
4	-	-	-	Not defined.
5	-	-	-	Not defined.
6	-	-	-	Not defined.
7	-	-	-	Not defined.

[Note]
- The acoustic signalling is emitted when the event defined by n value is generated.

[Default]

[Reference]

[Example]

$1C $EB

[Name] **Received, save, execute melody**

[Format]

①	ASCII	FS	EB	m	nh	nl	b1....bn	
	Hex	1C	EB	m	nh	nl	b1....bn	
	Decimal	28	235	m	nh	nl	b1....bn	
②	ASCII	FS	EB	m	s	nh	nl	osh osl
	Hex	1C	EB	m	s	nh	nl	osh osl
	Decimal	28	235	m	s	nh	nl	osh osl

[Description]

① • This command is used for receiving and saving a melody.

• m selected one of the following modes:

m	Description
"r", "R"	Receive the notes and put them in the RAM (volatile memory)
"w", "W"	Receive the notes and put them in the EEPROM (no-volatile memory)

• “nh” and “nl” are the exact number of note to receive and must be inserted an even number

• bn = nh x 256 + nl

② • This command needs to execute a melody

• m identifies, the following modes:

m	Description
"p", "P"	Play, execute one of 2 melodies (saved in RAM or EEPROM)

• s select one of the following mode:

s	Description
"r", "R"	Play the notes in the RAM
"e", "E"	Play the notes in the EEPROM

• “nh” and “nl” are the number of notes to play and must be an even number.

• “osh” and “osl” are offset and indicate to which note must begin playing.

[Note]

• The melody can have one’s best an extention of 512 byte.

• every notes is composed from 2 bytes (1b for the note and 1b for the lenght that will be expressed in multiples of 5 ms).

• Follows the table with the respectives notes to put into the byte of reference for the note (es. the byte 86 correspond of the note SI_4) and the frequency of the note.

Note	Byte of reference	Note frequency	Note	Byte of reference	Note frequency
No Note	00	Pause	DO_6	40	4186.0 Hz
LA_4	96	1760.0 Hz	DO_D_6	37	4434.9 Hz
LA_D_4	90	1864.6 Hz	RE_6	35	4698.6 Hz
SI_4	86	1975.5 Hz	RE_D_6	33	4978.0 Hz
DO_5	81	2093.0 Hz	MI_6	31	5274.0 Hz
DO_D_5	76	2217.5 Hz	FA_6	29	5587.6 Hz
RE_5	73	2349.3 Hz	FA_D_6	27	5919.9 Hz
RE_D_5	68	2489.0 Hz	SOL_6	25	6271.9 Hz
MI_5	64	2637.0 Hz	SOL_D_6	24	6644.9 Hz
FA_5	60	2793.8 Hz	LA_6	23	7040.0 Hz
FA_D_5	56	2959.9 Hz	LA_D_6	20	7902.1 Hz
SOL_5	53	3135.9 Hz	SI_6	19	8372.0 Hz
SOL_D_5	50	3322.4 Hz	DO_7	18	8869.8 Hz
LA_5	47	3520.0 Hz	DO_D_7	17	9397.2 Hz
LA_D_5	44	3729.3 Hz	RE_7	16	9956.0 Hz
SI_5	42	3951.0 Hz	RE_D_7	15	10548.0 Hz

[Reference]

[Example] - Follows an example of how is composed the buffer for the melody

b1	b2	b3	b4	b5	b6	...	b511	b512
n1	**l1**	**n2**	**l2**	**n3**	**l3**	**...**	**n256**	**l256**

Where :- b is the number of the busy byte (b512 is the maximum byte to put into). **It's not necessary that the melody must be composed from all 512 bytes.**

- n is the byte that corrispond to the note
- l is the lenght of th note

- Example of the save of one note in the Ram

1C EB 52 0 1 50 FF

- Example of the play of one note in the Ram

1C EB 50 72 0 1 0 0

$1C $70 n m

[Name] **Print a NV bit image.**

[Format]

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

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

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

[Description] Print a NV bit image n using the mode specified by m :

m	Mode
0,48	Normal
1, 49	Double-width
2, 50	Double-height
3, 51	Quadruple

• *n* is the number of the NV bit image (defined using the **$1C $71** command).

• *m* specifies the bit image.

[Notes]

• NV bit image means a bit image which is defined in a non-volatile memory by **$1C $71** and printed by **$1C $70**.

• This command is not effective when the specified NV bit image has not been defined.

• In standard mode, this command is effective only when there is no data in the print buffer.

• In page mode, this command is not effective.

• This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.

• If the printing area width set by **$1D $4C** and **$1D $57** for the NV bit image is less than one vertical line, the following processing is executed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot (one half dot for slip paper) in normal mode (m=0, 48) and in double-height mode (m=2, 50), and it means 2 dots (two half dots for slip paper) in double-width mode (m=1, 49) and in quadruple mode (m=3, 51).

1) The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.

2) If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.

• If the downloaded bit image to be printed exceeds one line, the excess data is not printed.

• This command feeds dots (for the height n of the NV bit image) in normal and double-width modes, and (for the height n x 2 of the VN bit image) in double-height and quadruple modes, regardless of the line spacing specified by **$1B $32** or **$1B $33**.

• After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

[Reference] **$1C $71**

[Example]

$1C $71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Name] **Define a NV bit image.**

[Format]

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

[Range]

$1 \le n \le 255$

$0 \le xL \le 255$

$0 \le xH \le 3$ (when $1 \le (xL + xH \times 256) \le 1023$

$0 \le yL \le 1$ (when $1 \le (yL + yH \times 256) \le 288$

$0 \le d \le 255$

$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$

Total defined data area = 3M bits (384K bytes)

[Description] Define the NV bit image specified by n.

• *n* specifies the number of the defined NV bit image.

• xL, xH specifies (xL + xH x 256) x 8 dots in the horizontal direction for the NV bit image you are defining.

• yL, yH specifies (yL + yH x 256) x 8 dots in the vertical direction for the NV bit image you are defining.

[Notes]

• Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.

• The printer executes a hardware reset after the procedure to place the image into the non-volatile memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on.

• During processing this command, the printer is in BUSY when writing the data to the user NV memory and stops receiving data. Therefore it is prohibitted to transmit the data including the real-time commands during the execution of this command.

• This command cancels all NV bit images that have already been defined by this command. The printer can not redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.

• From the beginning of the processing of this command till the finish of hardware reset, mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the PAPER FEED button, etc.) cannot be executed.

• NV bit image means a bit image which is defined in a non-volatile memory by **$1C $71** and printed by **$1C $70**.

• In standard mode, this command is effective only when processed at the beginning of the line.

• In page mode, this command is not effective.

• This command is effective when 7 bytes <FS~yH> is processed as a normal value.

• When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.

• In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.

• In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the non-volatile images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.

• The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.

• This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command **$1C $70**.

• A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Thefore, when only one NV bit image is defined, n=1.

• The printer processes a data group [xL xH yL yH d1...dk] once.

• The printer uses ([data: (xL + xH x 256) x (yL + yH x 256) x 8] + [header :4]) bytes of non-volatile memory.

• The definition area in this printer is a maximum of 3M bits (384K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 3M bytes (384K bytes).

• The printer is busy immediately before writing into non-volatile memory.

• The printer does not transmit ASB status and executes status detection during processing of this command even when ASB is specified.

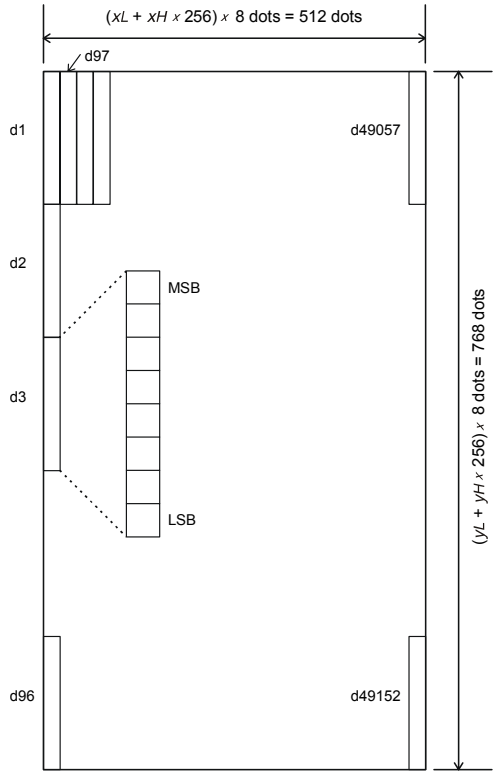
• When this command is received during macro definition, the printer ends macro definition, and begins executing this command.

• Once a NV bit image is defined, it is not erased by executing **$1B $40**, reset, and power off.

• This command executes only definition of a NV bit image and does not execute printing. Printing of the NV bit image is executed by the **$1C $70** command.

[Reference] **$1C $70**

[Example] When xL = 64, xH = 0, yL = 96, yH = 0



$1D $21 n

[Name] **Select character size**

[Format]

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

[Range] $0 \le n \le 7$, $16 \le n \le 23$, $32 \le n \le 39$,
$48 \le n \le 55$, $64 \le n \le 71$, $80 \le n \le 87$
$96 \le n \le 103$, $112 \le n \le 119$

[Description] Selects character height and width, as follows:
• Bits 0 to 3: to select character height (see table 2).
• Bits 4 to 7: to select character width (see table 1).

Table 1 Select Character Width

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (width = 2x)
20	32	3 (width = 3x)
30	48	4 (width = 4x)
40	64	5 (width = 5x)
50	80	6 (width = 6x)
60	96	7 (width = 7x)
70	112	8 (width = 8x)

Table 2 Select character height

Hex	Decimal	Height
00	0	1 (normal)
01	1	2 (height = 2x)
02	2	3 (height = 3x)
03	3	4 (height = 4x)
04	4	5 (height = 5x)
05	5	6 (height = 6x)
06	6	7 (height = 7x)
07	7	8 (height = 8x)

[Notes]
- This command is effective for all characters (except HRI characters).
- If *n* falls outside the defined range, this command is ignored.
- Characters enlarged to different heights on the same line are aligned at the baseline or topline.
- **$1B $21** can also be used to select character size. However, the setting of the last received command is the effective one.

[Default] n = 0

[Reference] **$1B $21**

[Example]

$1D $24 nL nH

[Name] **Set absolute vertical print position in page mode**

[Format]

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

[Range] $0 \le nL \le 255$, $0 \le nH \le 255$

[Description]
- Set the absolute vertical print starting position for buffer character data in page mode.
- This command sets the absolute print position to [(nL + nH x 256) x (vertical or horizontal motion unit)] inches.

[Notes]
- This command is effective only in page mode.
- If the [(nL + nH x 256) x (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move.
- The reference starting position is that specified by **$1B $54**.
- This command operates as follows, depending on the starting position of the printing area specified by **$1B $54**:

1) When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.

2) When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.

- The horizontal and vertical motion unit are specified by **$1D $50**.
- The **$1D $50** command can change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

[Reference] **$1B $24**, **$1B $54**, **$1B $57**, **$1B $5C**, **$1D $50**, **$1D $5C**

[Example]

$1D $2A x y d1..d(x x y x 8)

[Name] **Define dowloaded bit image**

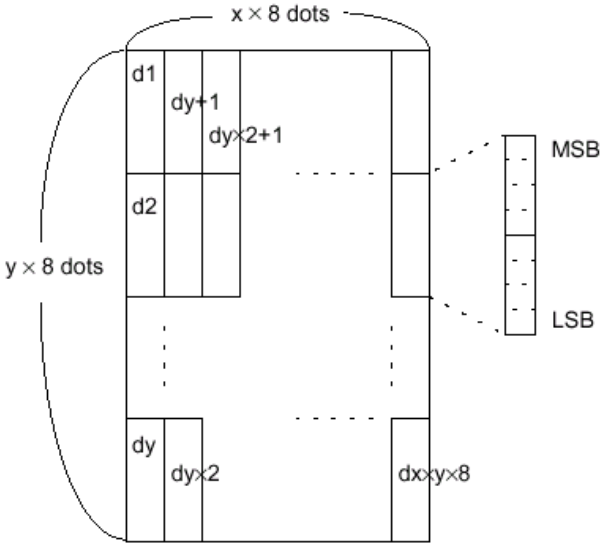
[Format]

ASCII	GS	*	**x**	**y**	d1...d(**x** x **y** x 8)
Hex	1D	2A	**x**	**y**	d1...d(**x** x **y** x 8)
Decimal	29	42	**x**	**y**	d1...d(**x** x **y** x 8)

[Range]
$1 \le \mathbf{x} \le 255$
$1 \le \mathbf{y} \le 48$
$\mathbf{x} \times \mathbf{y} \le 1536$
$0 \le d \le 255$

[Description] Defines a downloaded bit image using the number of dots specified by x and y.
• x specifies the number of dots in the horizontal direction.
• y specifies the number of dots in the vertical direction.

[Notes]
• The number of dots in the horizontal direction is **x** x 8, in the vertical direction it is **y** x 8.
• If **x** x **y** is out of the specified range, this command is disabled.
• The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
• The downloaded bit image definition is cleared when:
1) **$1B $40** is executed.
2) **$1B $26** is executed.
Printer is reset or the power is turned off.
• The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **$1D $5C**

[Example]

GS / m

[Name] **Print dowloaded bit image**

[Format]

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

[Description] Prints a downloaded bit image using the mode specified by m. *m* selects a mode from the table below :

m	Mode
0,48	Normal
1, 49	Double-width
2, 50	Double-height
3, 51	Quadruple

[Notes]
- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in the print modes (emphasized, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- If the printing area width set by **$1D $4C** and **$1D $57** is less than the bit image horizontal size, the following processing is performed:

1) The printing area width is extended toward the right side up to hold the bit image. In this case, printing does not exceed the printable area.

2) If the printing area width cannot be extended toward the right side, because there's no more printing area, the left margin is reduced to accommodate the bit image.

[Reference] **$1D $2A**

[Example]

$1D $3A

[Name] **Start/end macro definition**

[Format]

ASCII	GS	:	
Hex	1D	3A	
Decimal	29	58	

[Description] Starts or ends macro definition.

[Notes]
- Macro definition starts when this command is received during normal operation.
- When **$1D $5E** is received during macro definition, the printer ends macro definition and clears all definitions.
- Macros are not defined when power is turned on to the machine.
- Macro content is not cancelled by the **$1B $40** command. Therefore, **$1B $40** may be included in the content of macro definitions.
- If the printer receives **$1D $3A** a second time after previously receiving **$1D $3A**, the printer remains in macro undefined status.
- The contents of the macro can be defined up to 1024 bytes. If the macro definition exceeds 1024 bytes, excess data is not stored.

[Default]

[Reference] **$1D $5E**

[Example]

$1D $42 n

[Name] **Turn white/black reverse printing mode on/off**

[Format]

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

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

[Description] Turns white/black reverse printing mode on or off.

• When the LSB of *n* is 0, white/black reverse printing is turned off.
• When the LSB of *n* is 1, white/black reverse printing is turned on.

[Notes] • Only the LSB di *n* is effective.
• This command is available for both built-in and user-defined characters.
• This command does not affect bit image, downloaded bit image, bar code, HRI characters and spacing skipped by **$1B $24** and **$1B $5C.**
• This command does not affect white space between lines.
• White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it will be disabled (but not cancelled) when white/black reverse mode is selected.

[Default] n = 0

[Reference]

[Example]

$1D $48 n

[Name] **Select printing position of Human Readable Interpretation (HRI) characters**

[Format]

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

[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51

[Description] Selects the printing position of HRI characters when printing bar codes. *n* selects the printing positions as follows:

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

[Notes] • HRI characters are printed using the font specified by **$1D $66**.

[Default] n = 0

[Reference] **$1D $66, $1D $6B**

[Example]

$1D $49 n (ONLY FOR SERIAL INTERFACE)

[Name] **Transmit printer ID**

[Format]

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

[Range] 1 ≤ n ≤ 3, 49 ≤ n ≤ 51

[Description] Transmits the printer ID specified by *n* follows:

n	Printer ID	Specification
1, 49	Printer model ID	$73
2, 50	Type ID	See table below
3, 51	ROM version ID	Depends on ROM version (4 character)

n = 2, 50 Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	2-byte character codes not supported
1	Off	00	0	Autocutter not supplied
				Autocutter supplied
2	Off	00	0	Thermal paper w/o label
	On	04	4	Thermal paper w/label
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

[Notes]
• When the DTR/DSR command is selected, the printer only transmits 1 byte (printer ID) following confirmation that the host is ready to receive data. If the host is not ready, the printer waits until it is ready.
• When the XON/XOFF command is selected, the printer only transmits 1 byte (printer ID) without confirmation that the host is ready to receive data.
• This command is executed when the data is processed in the data buffer. Therefore, there could be a time lag between command reception and data transmission, depending on data buffer status.

[Default]

[Reference]

[Example]

$1D $4C nL nH

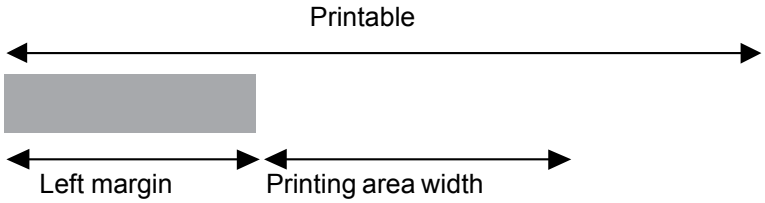
[Name] **Set left margin**

[Format]

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

[Range] $0 \le nL, nH \le 255$

[Description] Sets the left margin.
• The left margin is set to $[(nL + nH \times 256) \times (\text{horizontal motion unit})]$ inches.



[Notes]
• This command is enabled only if set at the beginning of the line.
• If the setting exceeds the printable area, the maximum value of the printable area is used.
• If the left margin + printing area width is greater than the printable area, the printing area width is set at maximum value.
• The horizontal and vertical motion unit are specified by **$1D $50**. Changing the horizontal or vertical motion unit does not affect the current left margin.
• The **$1D $50** command can change the horizontal (and vertical) motion unit.
• However, the value cannot be less than the minimum horizontal movement amount and it must be in even units of the minimum horizontal movement amount.

[Default]

[Reference] **$1D $50, $1D $57**

[Example]

$1D $50 x y

[Name] **Set horizontal and vertical motion units**

[Format]

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

[Range] 0 ≤ nL, nH ≤ 255

[Description] Sets the horizontal and vertical motion units to 1/x inch and 1/y inch respectively.
When *x* is set to 0, the default setting value is used.
When *y* is set to 0, the default setting value is used.

[Notes]
• The horizontal direction is perpendicular to the paper feed direction.
• In standard mode, the following commands use *x* or *y*, regardless of character rotation (upside-down or 90° clockwise rotation):
① **Commands using *x* :** $1B $20, $1B $24, $1B $5C, $1D $4C, $1D $57**.**
② **Commands using y :** $1B $33, $1B $4A**.**
• This command does not affect the previously specified values.
• The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch or an exact multiple of that value.

[Default] x = 204, y = 408

[Reference] **$1B $20, $1B $24, $1B $5C, $1B $33, $1B $4A, $1D $4C, $1D $57**

[Example]

$1D $56 m

[Name] **Select cut mode**

[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 m = 0, 1, 48, 49
② m = 65, 66, 0 ≤ n ≤ 255

[Description] Selects cut mode and executes the cut command. *m* selects cut mode as follows:

m	Function
0, 48	Total cut.
1, 49	Partial cut.
65	Form feed (cut position + [n x vertical motion unit]) and total cut
69	Form feed (cut position + [n x vertical motion unit]) and partial cut

[Notes]
• This command is only enabled if set at the beginning of the line.
• The horizontal and vertical motion units are specified by **$1B $50**.
• If you execute the command, desable the parameter “Total Cut”, the cut will be partial. If you want to effect a total cut you have to enable the parameter on the Set Up.

[Default]

[Reference] **$1B $69, $1B $6D**

[Example]

$1D $57 nL nH

[Name] **Set printing area width**

[Format]

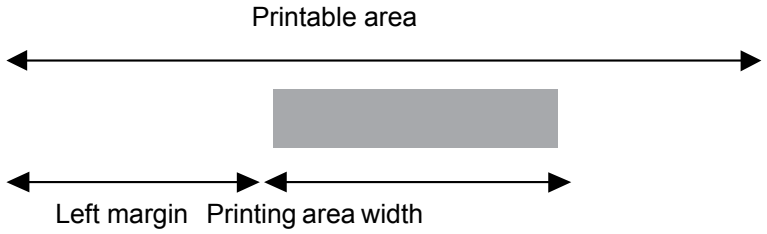
ASCII	GS	W	nL	nH
Hex	1D	57	nL	nH
Decimal	29	87	nL	nH

[Range] 0 ≤ nL, nH ≤ 255

0 ≤ nL + nH x 256) ≤ 832

[Description] Sets the printing area width to the area specified by *nL* and *nH*.

• The left margin is set to [(nL + nH × 256) × (horizontal motion unit)] inches.



[Notes]

• This command is only enabled if set at the beginning of the line.
• If the right margin is greater than the printable area, the printing area width is set at maximum value.
• If the printing area width = 0, it is set at the maximum value.
• The horizontal and vertical motion units are specified by **$1D $50**. Changing the horizontal or vertical motion unit does not affect the current left margin.
• The **$1D $50** command can change the horizontal (and vertical) motion unit.
• However, the value cannot be less than the minimum horizontal movement amount and it must be in even units of the minimum horizontal movement amount.

[Default]

[Reference] **$1D $4C, $1D $50**

[Example]

$1D $5C nL nH

[Name] **Set relative vertical print position in page mode**

[Format]

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

[Range] 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255

[Description]

• Sets the relative vertical print starting position from the current position in page mode.

• This command sets the distance from the current position to [(*nL* + *nH* x 256) x vertical or horizontal motion unit] inches.

Notes]

• This command is ignored unless page mode is selected.

• When *N* is specified to the movement downward:

nL + nH x 256 = *N*

• When *N* is specified to the movement upward (the negative direction), use the complement of 65536.

• When *N* is specified to the movement upward:

nL + nH x 256 = 65536 - *N*

• Any setting that exceeds the specified printing area is ignored.

• This command function as follows, depending on the print starting position set by **$1B $54**:

1) When the starting position is set to the upper left or lower right of the printing, the

vertical motion unit (y) is used.

2) When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (x) is used.

• The horizontal and vertical motion unit are specified by **$1D $50**.

• The **$1D $50** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

[Reference] **$1B $24**, **$1B $54**, **$1B $57**, **$1B $5C, $1D $24**, **$1D $50**

[Example]

$1D $5E r t m

[Name] **Execute macro**

[Format]

ASCII	GS	{ }	r	t	m
Hex	1D	5E	r	t	m
Decimal	29	94	r	t	m

[Range] $0 \le r, t \le 255$

$0 \le m \le 1$

[Description] Executes a macro.
• *r* specifies the number of times to execute the macro.
• *t* specifies the waiting time for executing the macro.
The waiting time is $t \times 100$ msec. for each macro execution.
• *m* specifies macro executing mode:
When the LSB of *m* = 0, the macro is executed *r* times continuously at the interval specified by *t*.
When the LSB of *m* = 1, after waiting for the period specified by *t*, the LED indicator blinks and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation *r* times.

[Notes] • This command has an interval of ($t \times 100$ msec.) after a macro is executed by *t*.
• If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
• If the macro is not defined or if *r* is 0, nothing is executed.
• When the macro is executed by pressing the FEED button (*m*=1), the paper cannot be fed using the FEED button.

[Default]

[Reference] **$1D $3A**

[Example]

$1D $66 n

[Name] **Select font for HRI characters**

[Format]

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

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

[Description] Selects a font for the HRI characters used when printing a bar code. *n* selects a font from the following table:

n	Font
0, 48	Font A
1, 49	Font B

[Notes] HRI characters are printed at the position specified by **$1D $48**.

[Default] n = 0
[Reference] **$1D $48, $1D $6B**
[Example]

$1D $68 n

[Name] **Set bar code height**

[Format]

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

[Range] 1 ≤ n ≤ 255
[Description] Sets the height of the bar code.
n specifies the number of vertical dots.
[Notes]
[Default] n = 162 (20.25 mm)
[Reference] **$1D $6B**
[Example]

$1D $6D m 00

[Name] **Print bar code**

[Format]

①	ASCII	GS	k	m	NUL	[d1..dk]
	Hex		1D	6B	m 00	[d1..dk]
	Decimal	29	107	m	0	[d1..dk]
②	ASCII	GS	k	m	n	[d1..dn]
	Hex		1D	6B	m n	[d1..dn]
	Decimal	29	107	m	n	[d1..dn]

[Range] ① 0 ≤ m ≤ 20
② 65 ≤ m ≤ 90
[Description] Selects a bar code system and prints the bar code. *m* selects a bar code system as follows:

②	65	UPC-A	11 ≤ n ≤ 12	48 ≤ d ≤ 57
	66	UPC-E	11 ≤ n ≤ 12	48 ≤ d ≤ 57
	67	EAN13 (JAN)	12 ≤ n ≤ 13	48 ≤ d ≤ 57
	68	EAN8 (JAN)	7 ≤ n ≤ 8	48 ≤ d ≤ 57
	69	CODE39	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 90, 32, 36, 37, 43, 45, 46, 47
	70	ITF	1 ≤ n ≤ 255	48 ≤ d ≤ 57
	71	CODABAR	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d1 ≤ 68, 36, 43, 45, 46, 47, 58
	72	CODE93	1 ≤ n ≤ 255	0 ≤ d ≤ 127
	73	CODE128	2 ≤ n ≤ 255	0 ≤ d ≤ 127
	90	CODE32	8 ≤ n ≤ 9	48 ≤ d ≤ 57

	m	Bar code system	No. of characters	Remarks
❶	0	UPC-A	11 ≤ k ≤ 12	48 ≤ d ≤ 57
	1	UPC-E	11 ≤ k ≤ 12	48 ≤ d ≤ 57
	2	EAN13 (JAN)	12 ≤ k ≤ 13	48 ≤ d ≤ 57
	3	EAN8 (JAN)	7 ≤ k ≤ 8	48 ≤ d ≤ 57
	4	CODE39	1 ≤ k	48 ≤ d ≤ 57, 65 ≤ d ≤ 90, 32, 36, 37, 43, 45, 46, 47
	5	ITF	1≤ k (even number)	48 ≤ d £ 57
	6	CODABAR	1 ≤ k	48 ≤ d ≤ 57, 65 ≤ d1 ≤ 68, 36, 43, 45, 46, 47, 58
	7	CODE93	1 ≤ k ≤ 255	1 ≤ d ≤ 127
	8	CODE128	2 ≤ k ≤ 255	1 ≤ d ≤ 127
	20	CODE32	8 ≤ k ≤ 9	48 ≤ d ≤ 57

[Notes]
• If *d* is outside of the specified range, the printer prints the following message: “BAR CODE GENERATOR IS NOT OK!” and processes the data which follows as normal data.
• If the horizontal size exceeds the printing area, the printer only feeds the paper.
• This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **$1B $32** or **$1B $33**.
• After printing the bar code, this command sets the print position to the beginning of the line.
• This command is not affected by print modes (emphasized, double- strike, underline or character size), except for upside-down and justification mode.

[Notes per ①]
• This command ends with a NUL code.
• When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 11 (without check digit) or 12 (with check digit) bytes bar code data.
• When the bar code system used is EAN13, the printer prints the bar code data after receiving 12 (without check digit) or 13 (with check digit) bytes bar code data.
• When the bar code system used is EAN8, the printer prints the bar code data after receiving 7 (without check digit) or 8 (with check digit) bytes bar code data.
• The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

[Notes per ②]
• If *n* is outside of the specified range, the printer stops command processing and processes the following data as normal data.

When CODE93 is used the printer:
• prints an HRI character (o) as a start character at the beginning of the HRI character string
• prints an HRI character (o) as a stop character at the end of the HRI character string.
• The printer prints an HRI character (n) as a control character (00H to 1FH and 7FH).

When CODE128 is used:
• When using CODE128 in this printer, please note the following regarding data transmission:
• The top part of the bar code data string must be a code set selection character (CODE A, CODE B or CODE C) which selects the first code set.
• Special characters are defined by combining two characters “{“ and one character. ASCII character “{” is defined by transmitting “{“ twice, consecutively.

Specific character	Data transmission		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
'{'	{{	7B, 7B	123, 123

When UPC-E is used, introducing the barcode characters, the printer prints

Transmitted data											Printing data					
d1	**d2**	**d3**	**d4**	**d5**	**d6**	**d7**	**d8**	**d9**	**d10**	**d11**						
0	0 - 9	0 - 9	0	0	0	0	0	0 - 9	0 - 9	0 - 9	d2	d3	d9	d10	d11	0
0	0 - 9	0 - 9	1	0	0	0	0	0 - 9	0 - 9	0 - 9	d2	d3	d9	d10	d11	1
0	0 - 9	0 - 9	2	0	0	0	0	0 - 9	0 - 9	0 - 9	d2	d3	d9	d10	d11	2
0	0 - 9	0 - 9	3 - 9	0	0	0	0	0	0 - 9	0 - 9	d2	d3	d4	d10	d11	3
0	0 - 9	0 - 9	0 - 9	1 - 9	0	0	0	0	0	0 - 9	d2	d3	d4	d5	d11	4
0	0 - 9	0 - 9	0 - 9	0 - 9	1 - 9	0	0	0	0	5 - 9	d2	d3	d4	d5	d6	d11

[Default]

[Reference] **$1D $48, $1D $66, $1D $68, $1D $77**

[Example] ① Example of print the Bar Code 39
1D 6B 04 54 45 53 54 00

② Example of print the Bar Code 39
1D 6B 45 04 54 45 53 54

$1D $72 n (ONLY FOR SERIAL INTERFACE)

[Name] **Transmit status**

[Format]

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

[Range] $1 \le n \le 2, 49 \le n \le 50$

[Description] Transmits the status specified by *n* as follows:

n	**Function**
1, 49	Transmits paper sensor status (as for **$1B $76**).

Paper sensor status (n = 1, 49)

Bit	Off/On	Hex	Decimal	Function
0,1	Off	00	0	Not used
	On	03	3	Not used
2,3	Off	00	0	Paper end sensor: paper present
	On	0C	12	Paper end sensor: paper not present
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

Drawer connector status (n = 2, 50)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Connector pin 3 at low level
	On	01	1	Connector pin 3 at high level
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

[Notes] • This command is executed when the data is processed in the data buffer. Therefore, there may be a time lag between receiving the command and transmitting the status, depending on data buffer status.

[Default]

[Reference] **$10 $04, $1B $76**

[Example]

$1d $76 $30 m xL xH yL yH d1...dk

[Name] **Print raster bit image.**

[Format]

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

[Range] $0 \le m \le 3, 48 \le m \le 51$
$0 \le xL \le 255$
$0 \le xH \le 255$ ($1 \le xL + xH \times 256 \le 65535$)
$0 \le yL \le 255$
$0 \le yH \le 8$ ($1 \le yL + yH \times 256 \le 2047$)
$0 \le d \le 255$
$k = (xL + xH \times 256) + (yL + yH \times 256)$
(except for k = 0)

[Description] Selects raster bit image mode. The value of m selects the mode as follows:

m	Mode
0,48	Normal
1, 49	Double-width
2, 50	Double-height
3, 51	Quadruple

• xL, xH selects the number of data bits (xL + xH x 256) in the horizontal direction for the bit image.

• yL, yH selects the number of data bits (yL + yH x 256) in the vertical direction for the bit image.

• k shows the number of data of the image. It's an explanation parameter so it isn't necessary to transmit it.

• d shows the data of the image.

[Notes]

• In standard mode for receipt paper, this command is effective only when there is no data in the print buffer.

• The data (d) identify as 1 a printed bit and as 0 a non printed bit.

• If a raster bit image is longer than one line, the surplus data aren't printed.

• This command has no effect in all print modes (character size, emphasized,double-strike, upside-down, underline, hite/black reverse printing, etc.) for raster bit image, except the reverse mode (90° anticlockwise rotation).

• This command feed the paper as much as is necessary to print the raster bit image, though the spacing set by **$1B $32** or **$1B $33**.

• Don't use this command during a macro execution because it can't be included in a macro.

• After the printing, the printing position moves to the beginning of the line.

• The following table shows the report between the image data and the printing result:

d1	**d2**	**...**	**dx**
dX+1	**dX+2**	**...**	**dX x 2**
:	**:**	**...**	**:**
...	**dk-2**	**dk-1**	**dk**

[Reference]

[Example]

$1D $77 n

[Name] **Set bar code width**

[Format]

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

[Range] $1 \le n \le 6$

[Description] Sets the horizontal size of the bar code. *n* specifies the bar code width as follows:

n	Module width (mm)
1	0.125
2	0.25
3	0.375
4	0.5
5	0.625
6	0.75

[Notes]

[Default] n = 3

[Reference] **$1D $6B**

[Example]

$1D $F6

[Name] **Align the print head with the notch.**

[Format]

ASCII	GS	{}
Hex	1D	F6
Decimal	29	246

[Description] Set the print head notch alignment.

[Notes]

[Reference] $1D $F8

[Example]

$1D $F8

[Name] **Align the autocutter with the notch.**

[Format]

ASCII	GS	{}
Hex	1D	F8
Decimal	29	248

[Description] Set the autocutter notch alignment.

[Notes]

[Reference] $1D $F6

[Example]