SMICE
Desktop Thermal Printer
with integrated power supply
112/80 mm
User Manual

COD. DOME - SMICE-PS   VERS. 1.00

PRINTER COMPONENTS

A. SMICE-PS - front exterior view

1- Printer base
2- Cover
3- Paper guide
4- Print mechanism + Cutter
5- Backlighting FEED key
6- Key "KEY2"
7- Paper opening
8- Paper control edges for 80mm roll
9- Plate
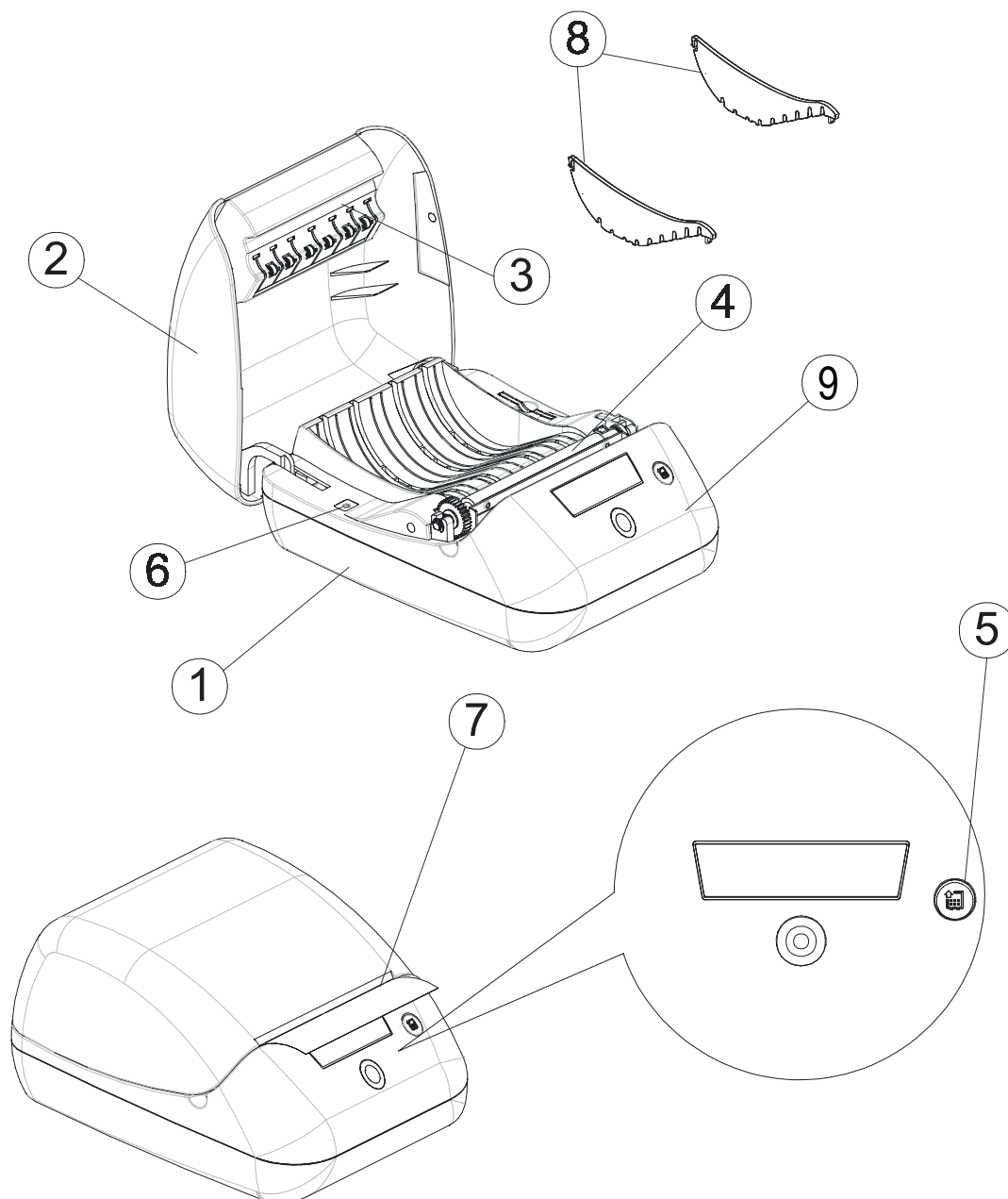
B. SMICE-PS - rear view

1- Interface connector
2- Drawer connector
3- Power supply connector
4- ON/OFF switch

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5. CHARACTER SETS

APPENDIX A. MISCELLANEOUS NOTES

MANUAL ORGANIZATION

In addition to the Introduction which contains information regarding the symbols used in the manual, general safety information, instructions for unpacking the printer and a brief description and main characteristics of the machine, this manual is divided into the following chapters:

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

Chapter 2: Contains interface data

Chapter 3: Contains a description of printer controls

Chapter 4: Contains printer technical data

Chapter 5: Contains the character sets (fonts) used by the printer
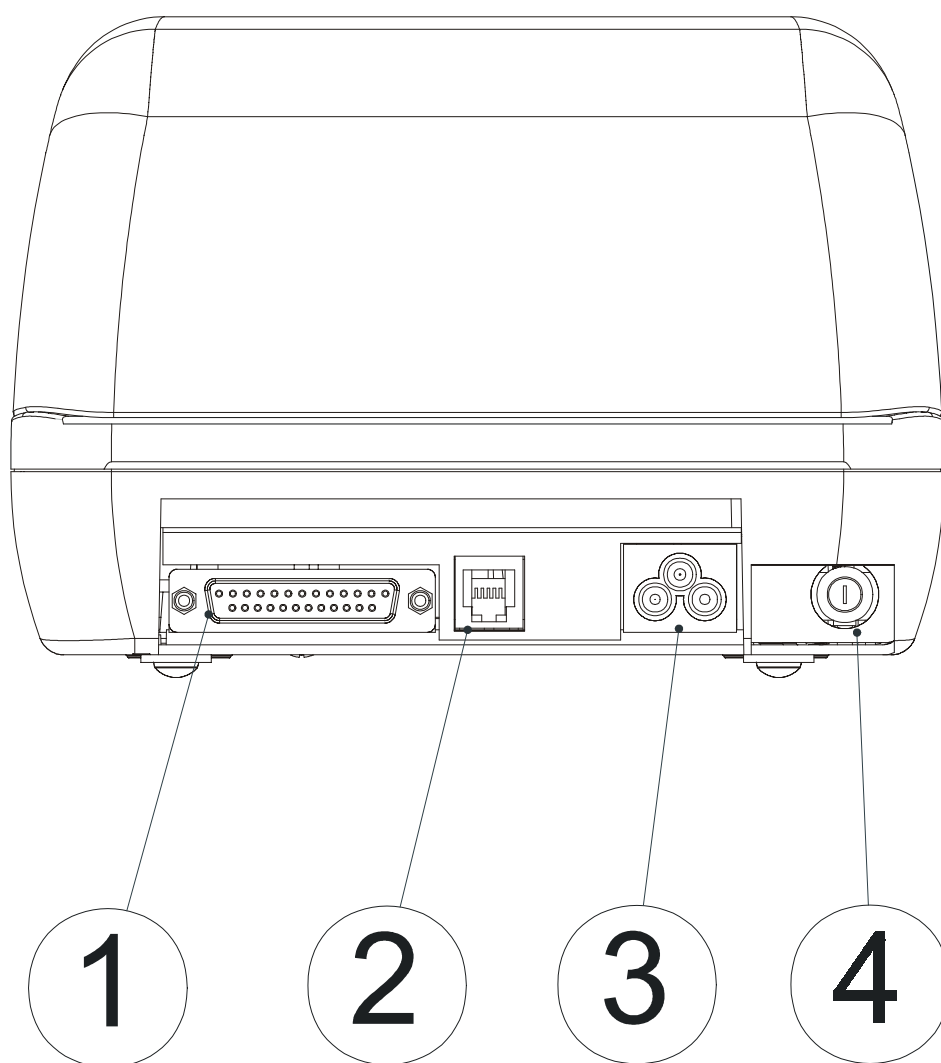
SYMBOLS USED IN THE MANUAL

NOTE
Gives important information or suggestions for printer use.

WARNING
Information indicated by this symbol must be followed carefully to avoid damaging the printer.

DANGER
Information indicated by this symbol must be followed carefully to avoid damage or operator injury.

GENERAL SAFETY INFORMATION

- Read and retain the instructions which follow.
- Follow all indications and instructions given on the printer.
- Before cleaning the printer, be sure to pull out the electrical cable.
- Use a damp cloth to clean the printer. Do not use liquid or spray products.
- Do not operate the printer near water.
- Make sure that the surface on which the printer rests is stable. If it is not, the printer could fall, seriously damaging it.

- Make sure that the printer rests on a hard (non-padded) surface and that there is sufficient ventilation.
- When positioning the printer, make sure its cables will not be damaged.
- Use the type of electrical power supply indicated on the printer label. If uncertain, contact your dealer.
- Make sure the electrical system that supplies power to the printer is equipped with a ground wire and is protected by a differential switch.
- If power is supplied to the printer using an extension cord, make sure that the total electrical input of the connected devices does not exceed the maximum current permitted by the type of extension in use or, in any case, a maximum of 15A.
- Do not block the ventilation openings.
- Do not insert objects inside the printer as this could cause short-circuiting or damage components that could jeopardize printer functioning.
- Do not spill liquids onto the machine.
- Do not carry out repairs on the machine yourself, except for the normal maintenance operations given in the user manual.
- Make sure that there is an easily-accessible outlet with a capacity of no less than 15A in the vicinity of where the printer is to be installed.
- Unplug the printer from the electrical mains and call a specialized repairman if any of the following conditions should arise:

  A. the power supply connector is damaged
  B. liquid has spilled into 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 given in the user manual have been followed
  E. the printer has been dropped and the cover is damaged
  F. printer performance is noticeably reduced
  G. the printer is not working

- Periodically perform scheduled maintenance on the printer to avoid dirt build-up that could compromise the correct, safe operation of the unit.

UNPACKING THE PRINTER

Remove the printer from the carton, taking care not to damage the packing materials which should be retained for future shipping/moving.
Make sure all components listed below are present and not damaged. If any part is missing and/or damaged, contact customer service.

1.   Upper tray
2.   Manual (or CD-rom)
3.   Upper packing frame
4.   Printer
5.   Paper roll
6.   Lower packing frame
7.   Lower tray
8.   Carton
9.   Power supply cable
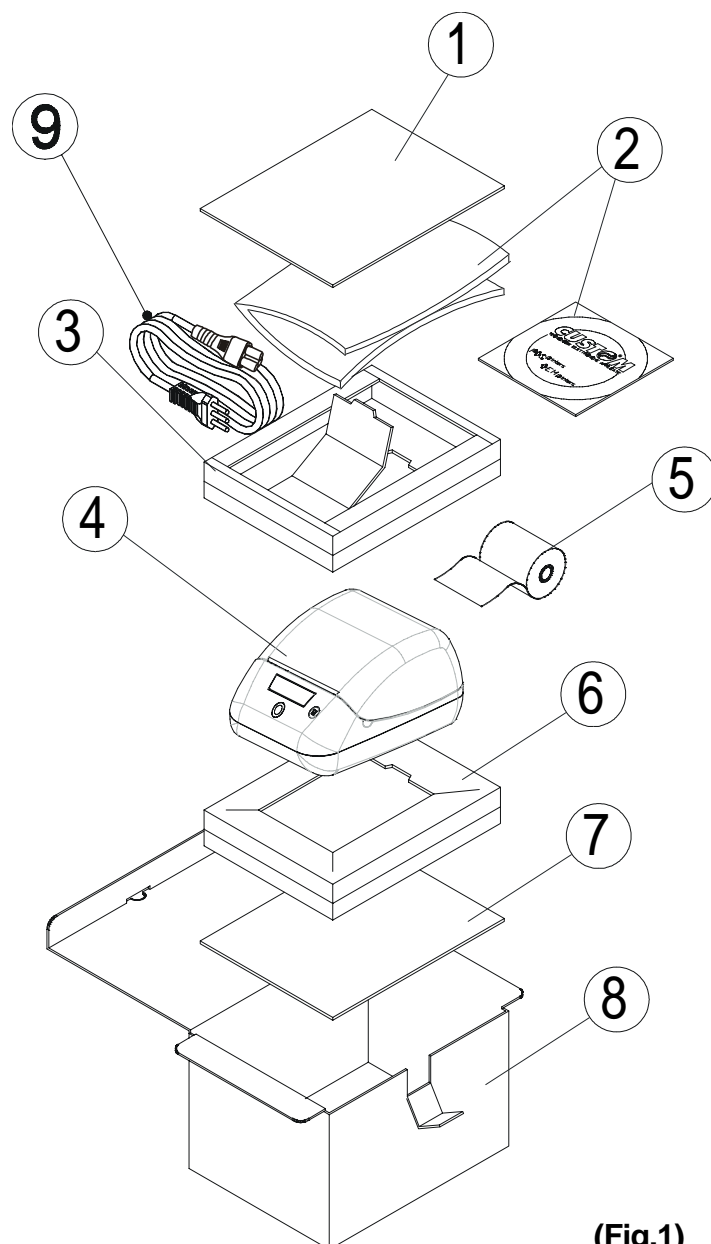
(Fig.1)

- Open the printer packaging
- Remove the protective tray
- Lift off the upper packing frame and remove the manual (or CD-rom)
- Lift out the printer and remove it from the plastic bag
- Store the carton, trays and other packing materials for future shipping/ moving

MAIN CHARACTERISTICS

It is a practical, easy-to-use, tabletop printer.
It offers an excellent solution for all industrial, professional and laboratory applications that require immediate data printout onto a receipt: POS, weighing systems, cashier systems, bookkeeping, receipts or fiscal

documents, security, checking and diagnosis.

It is equipped with a 200 dpi (8 dots/mm) thermal printing mechanism that utilizes 112mm-wide paper rolls. In addition to normal printing features, the printer includes a wide range of added functions:

- High-speed printing: 85 mm/sec (normal), 100 mm/sec. (High speed).
- Easy paper changing (automatic paper loading)
- ESC/POS™ emulation
- Paper width : 112/80 mm.
- Bar code UPC-A, UPC-E, EAN13, EAN8, CODE39, ITF, CODABAR, CODE93, CODE128 and CODE32
- 3 standard and international character fonts
- Programmable fonts
- Widht and height characters setting from 1 to 8, boldtype, italic, underlined, rotated 90°/180°
- Possility to define function macros for automatic operation repetition
- Graphic printing
- Printing density (from -50% to +150%)
- 1 programmable logo (832 x 630 dots).
- Serial interfaces (from 1200 to 115200 bps) : RS232, RS422, RS485, TTL.
- Alternatives interfaces : CENTRONICS.
- Reception buffer : from 16 bytes to 8 Kbytes.

PRINTER DESCRIPTION

The printer (fig.2) consists of a shell in ABS-V0 (1) equipped with a cover (2) that provides access to the paper roll and printing mechanism.

On the front are the backlighting FEED key (3); the "KEY2" key is located inside of the printer by side of the roll holder opening (4).

(Fig.2)
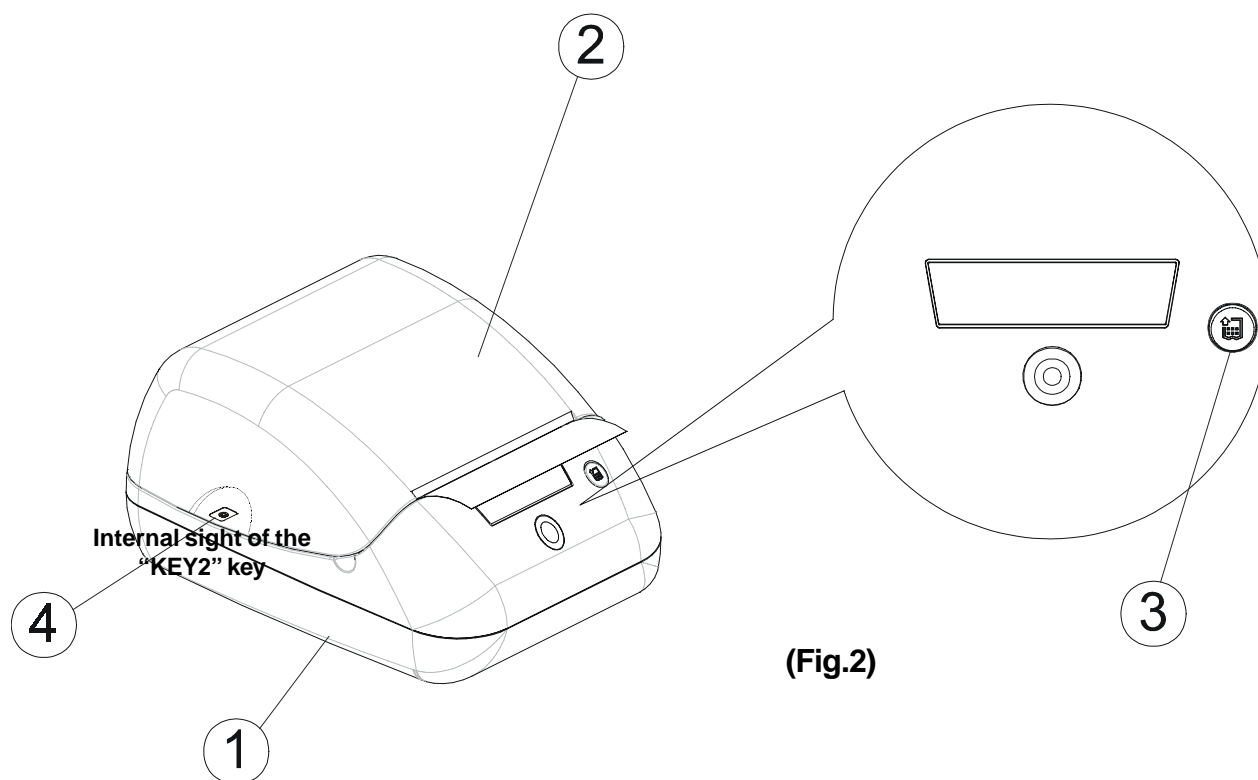
- FEED key. When the FEED key is pressed, the printer advances the paper. During machine power-up, pressing the FEED key, the printer performs the GRAPHIC TEST and the FONT TEST.
  - The GRAPHIC TEST allows to verify the print of logos stored with the **FS q** command (see paragraph 3.1), or without these, the print of logo located in the flash memory.
  - The FONT TEST allows to verify the print of characters font stored.

- ”KEY2” key. During machine power-up, pressing the ”KEY2” key, the printer goes in the SETUP procedure that allows to print and modify the mains setup parameters (see paragraph 1.2) besides to perform the Hexadecimal Dump function (see paragraph 1.3).

- The backlighting of the key displays the printer functioning status as follows:

(Tab.1)

LED status	Description
None	Printer OFF
Green	Printer ON : correct functioning (stand-by)
	Flashing : Data processing phase
Yellow	Printer in warning status : paper out, cover opened
Red	Printer in error status : power supply voltage incorrect, heading over temperature.

- ON/OFF key. When pressed, it turns on the printer (fig.3); when released, the printer shuts off.
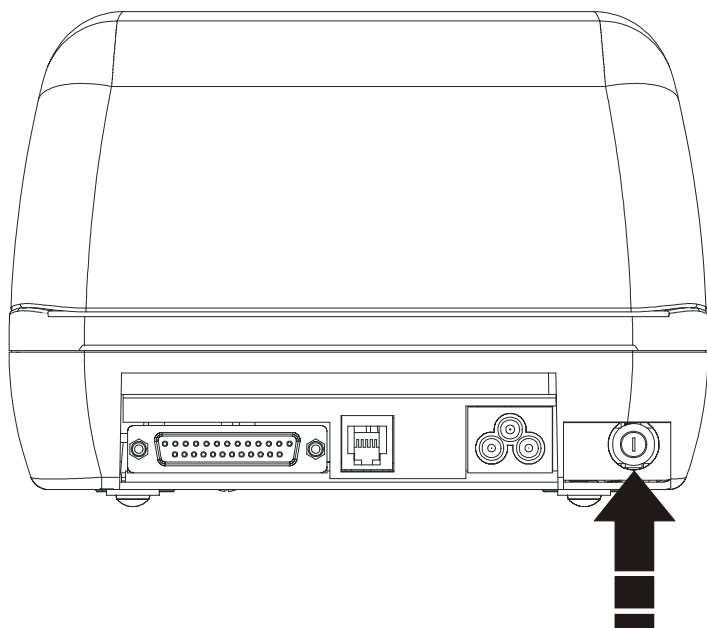
(Fig.3)
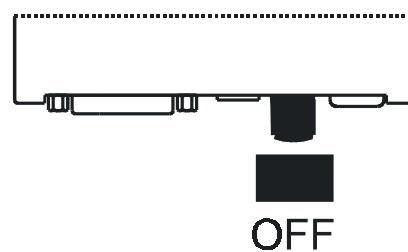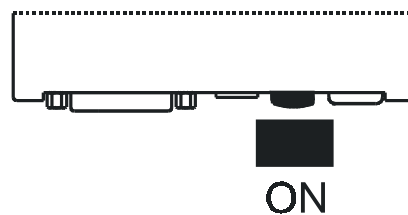
1.1 CONNECTIONS

(Fig.1.1)

1   6
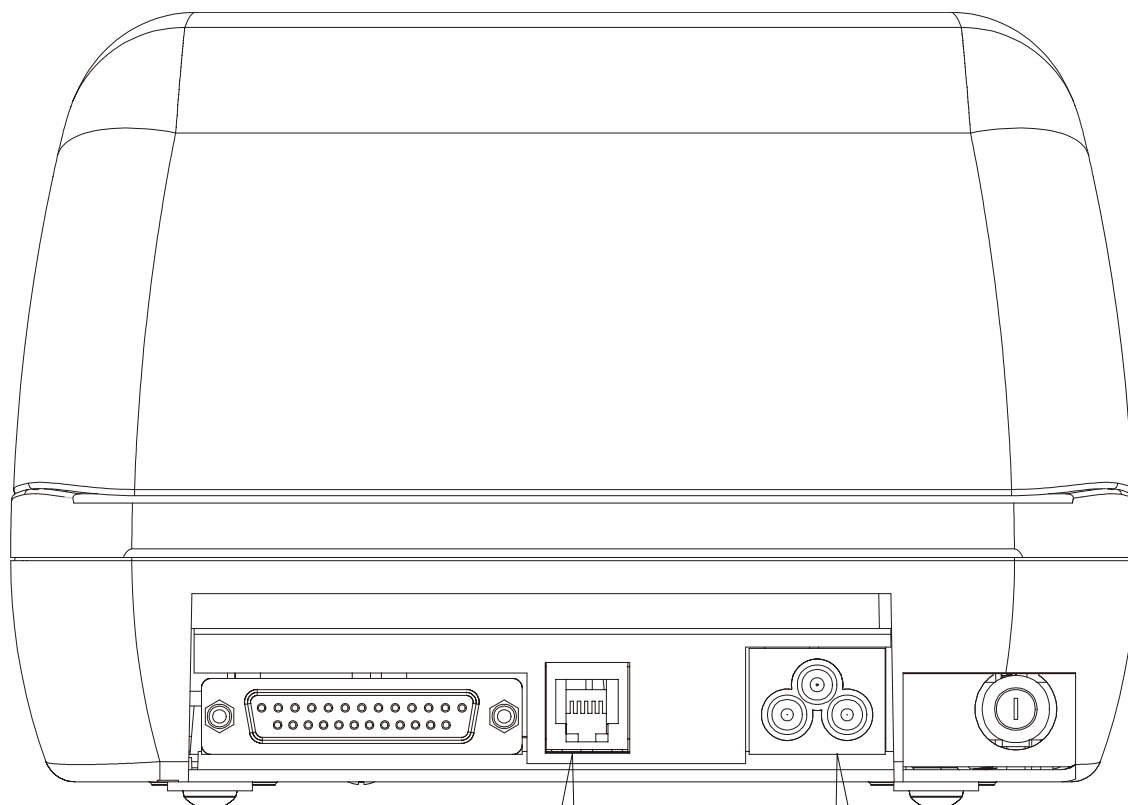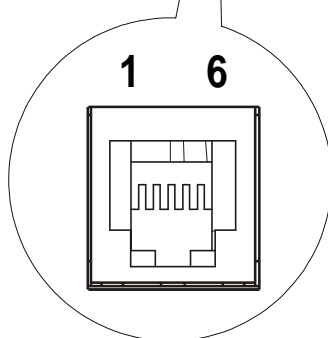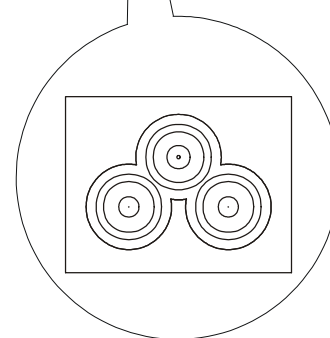
(Fig.1.1.B)   **(Fig.1.1.A)**

1.1.1 Power supply

The printer is equipped with a standard IEC320-C6 connector (IEC320-C6 standard) to connect directly to the main supply (see Fig. 1.1.A).

1.1.2 Connectors for Drawers 1 and 2

The impulse specified by the **ESC P** command is in output at these connectors. The host can confirm the status of input signals through the **DLE EOT**, **ESC u**, **GS r** commands.
The functions assigned to the pins in the connector are as follows:

PIN	SIGNAL	IN / OUT
1	GND	
2	TILL KICK-OUT DRIVE 1 SIGNAL	OUT
3	TILL OPEN/CLOSE SIGNAL	IN
4	+ 24 V	
5	TILL KICK-OUT DRIVE 2 SIGNAL	OUT
6	GND	

(Tab.1.2)

The solenoid must be connected between connector pins 2 or 5 and 4.

Pin 2 — Pin 4   Solenoid 1

Pin 5 — Pin 4   Solenoid 2

t1x2mS   t2x2mS   Output waveform
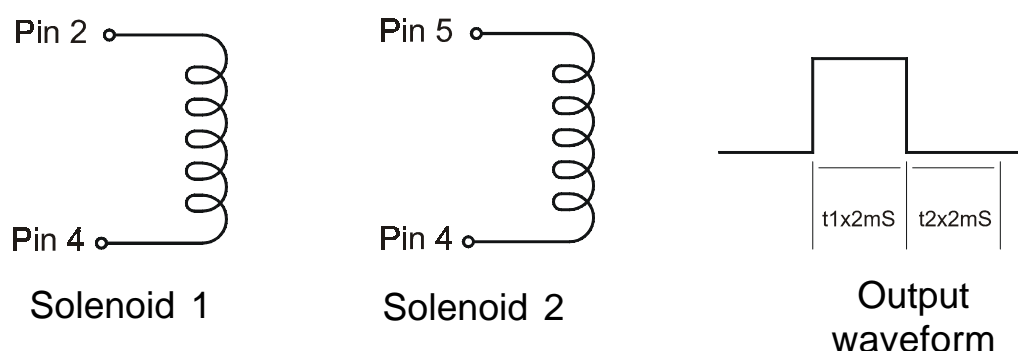
(Fig.1.2)

⚠ **WARNING:**
To avoid current overload, the resistance of the drawer kick-out solenoid must be $\geq 24\ \Omega$.

Drawer kick-out drive signal
Current: 1A (max 10 sec.) or less
Output waveform: t1 (ON time) and t2 (OFF time) are specified by **ESC P.**
In ON time phase (t1), output voltage is approx. 0V.
In OFF time phase (t2), the output signal is at high impedance.

1.2 SETUP

The printer indicates the functioning status in the print's configuration.

```
           * PRINTER SETUP *


PROGRAM MEMORY ....... OK
DYNAMIC RAM ................ OK
CUTTER ........................... OK
INTERFACE ..................... RS232 - TTL
HEAD VOLT [V]      = 24.00
HEAD TEMP. [°C]      = 22.0


Paper width                    : 112 mm
Printer emulation              : ESC/POS (TM)
Baud Rate                      : 9600 bps
Data length                    : 8 bits/chr
Parity                         : None
Handshaking                    : Xon/Xoff
Busy Condition                 : OffLine/RxFull
Receive error                  : Ignored
Rx buffer dimension            : 8K Bytes
Autofeed                       : CR disabled
Panel Key                      : Enabled
Print Mode                     : Normal
Chars / inch                   : A=11 B=15 cpi
Notch alignement               : Disabled
Speed / Quality                : Normal
Current consumption            : Normal
Red Printing                   : Disabled
Print Density                  : Normal


[KEY 2] Key to enter setup
[FEED] Key to skip setup
```

(Fig.1.3)

The printer can be configured with default parameters which are:

- **Paper width:** 112^D, 80.
- **Printer emulation:** ESC/POS™.
- **Baud Rate:** 115200, 57600, 38400, 19200, 9600^D, 4800, 2400, 1200.
- **Data length:** 7, 8^D bits/char.
- **Parity:** None^D, even or odd.
- **Handshaking:** XON/XOFF^D or Hardware.
- **Busy condition:** RxFull^D or OffLine/RxFull [1].

- **Receive error:** Ignored^D or Prints "?" **(2)**.
- **Reception buffer dimension:** 16, 64, 1K, 4K, 8K^D.
- **Autofeed:** CR disabled^D or CR enabled.
- **Front panel keys:** Enabled^D or disabled.
- **Print mode:** Normal^D or Reverse.
- **Characters/inch:** A=11 B=15 cpi^D, A=15 B=20 cpi .
- **Notch alignment:** Enabled or disabled$^{D\,(3)}$.
  With 'Enabled':$^{(3)}$
  • **Notch Threshold:** 0.5V, 1.0V, 1.5V, 2.0V, 2.5V, 3.0V, 3.5^{D}V, 4.0V, 4.5V (paragraph A.1).
  • **Alignment correction:** -2, -1.75, -1.50, -1.25, -1.00, -0.75,-0.50, -0.25, 0.00^D, 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00.

- **Speed/Quality:** Normal^D, Draft or High Quality.
- **Current consumption:** Normal^D, Low, High.
- **Red Printing:** Disabled^D or enabled.
- **Print Density:** -50%, -37%, -25%, -12%, Normale^D, +12%, +25%, +37%, +50%, +62%, +75%, +87%, +100%, +112%, +125%, +137%, +150%.

Notes : The parameters indicates with a ^{D} symbol are the default values.

> **(1) NOTE:** *Parameter valid only on serial printer. Using this parameter, it is possible to select whether the Busy signal is activated when the printer is both in Off Line status (see section 2.5) and the buffer is full, or only if the buffer is full.*
> **(2) NOTE:** *Parameter valid only on serial printer. Using this parameter, it is possible to select whether when an erroneous character is received (erroneous baud rate, parity, data length), if the character "?" is printed out, or if the received character is simply ignored.*
> **(3) NOTE:** *with Notch alignment enabled the printer performs automatically the notch calibration.*

Finished the print's configuration (see figure 1.3), if the "KEY2" key is held down, the printer goes into setup procedure; until a key is pressed the printer stays in the Hexadecimal Dump function. Pressing the FEED key the printer quits directly from the configuration. Pressing the "KEY 2" key can be modify the printer's parameters, during this procedure with the FEED key modifies the parameter value and with the "KEY 2" key confirm it and advances to the next parameter. Once the configuration procedure has been completed, the settings are saved in permanent mode.

1.3 HEXADECIMAL DUMP

This function is used to display the characters received from the communication port; for each 10 characters received from the communication port, it prints out hexadecimal and ASCII codes (if the characters appear underlined, the buffer is full).
Below is shown a sample printer Setup printout.

```
48 65 78 61 64 65 63 69 6D 61        Hexadecima
6C 20 64 75 6D 70 20 66 75 6E        l dump fun
63 74 69 6F 6E 20 30 31 32 33        ction 0123
34 35 36 37 38 39 61 62 63 64        456789abcd
65 66 67 68 69 6A 6B 6C 6D 6E        efghijklmn
6F 70 71 72 73 74 75 76 77 78        opqrstuvwx
79 7A                                yz
```

1.4 MAINTENANCE

1.4.1 Changing the paper roll

To change the paper roll in the printer, proceed as follows:
1)   Open the printer cover and position the paper roll making sure it unrolls in the proper direction as shown in the figure 1.4;
2)   Position the beginning of the paper on the advertising sign of the rest plate (fig.1.5);
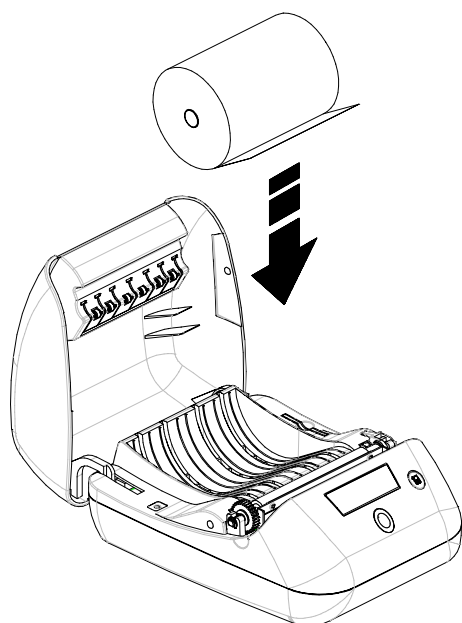
(Fig.1.4)   **(Fig.1.5)**
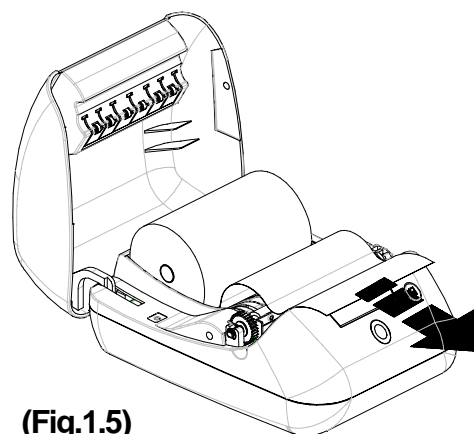
3) Close the cover (fig.1.6);
4) This starts the AUTOLOAD function, wait for the end of this procedure.
   The paper recede back into the printer ...   (fig.1.7);
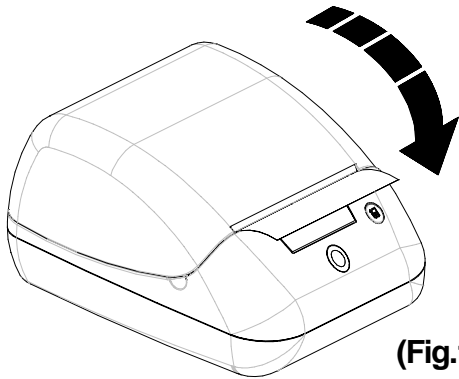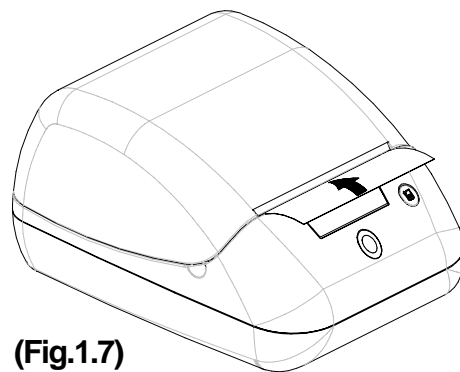
(Fig.1.6)   **(Fig.1.7)**

5) And then the paper re-emerge for a few centimeters, at the end of that
   procedure, the cutter will cut the paper (fig.1.8);
6) Remove the slip of paper. The printer is ready for use (fig.1.9).

ZAC ! ! !
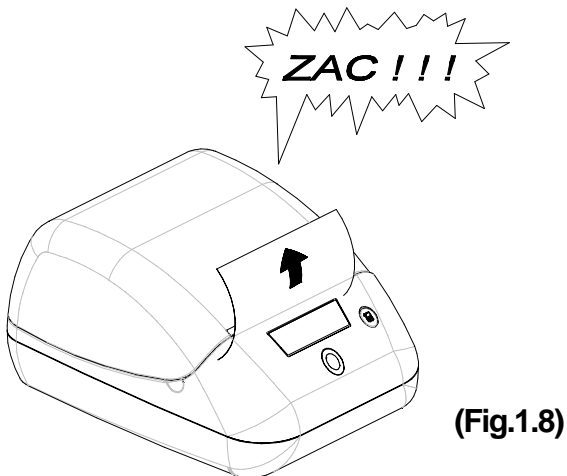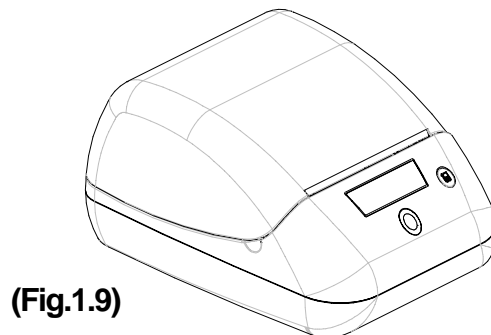
(Fig.1.8)   **(Fig.1.9)**
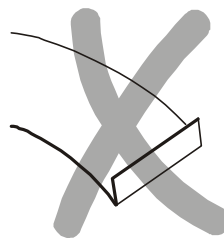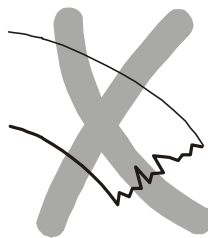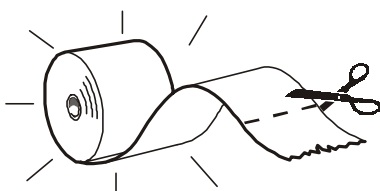
(Fig.1.10)

WARNING
Before inserting the paper, maker sure it has a cleanly-cut edge.

1.4.2 Cleaning

To clean the printer, use a vacuum cleaner or soft cloth.
Before cleaning the printer, unplug the electrical power supply cable.
Do not use alcohol, solvents or stiff-bristled brushes.
Do not let water or other liquids seep into the printer.

alcohol, solvent   **(Fig.1.11)**
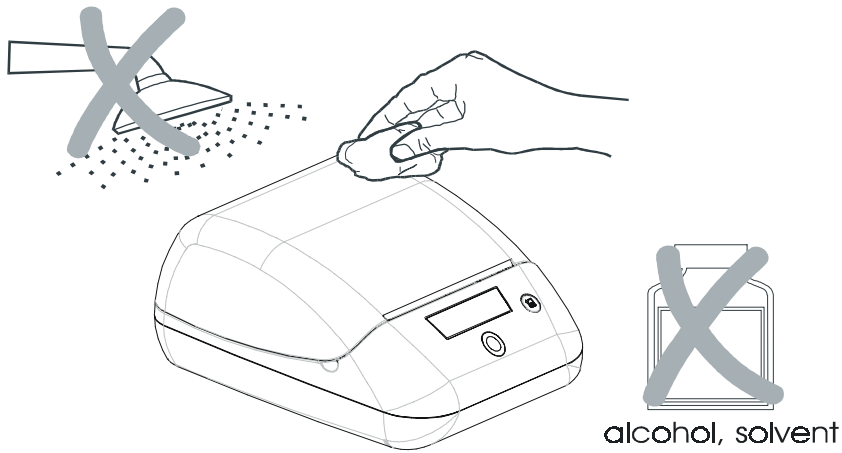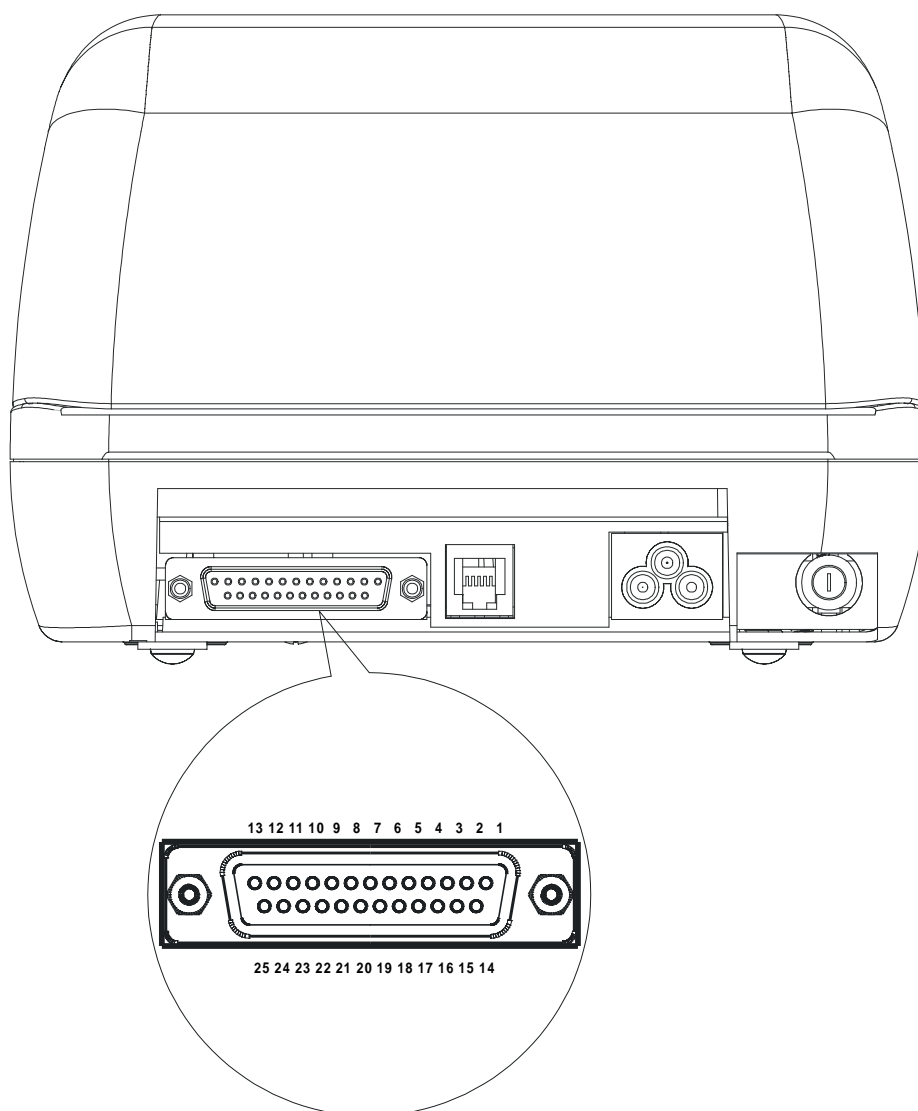
(Fig.2.1)

2.1 SERIAL - RS232 / TTL

The printer has an RS232 or TTL serial interface with a rectangular 25-pin female connector. The signals on the connector pins and their connection to the PC are shown in the table 2.1.

(Tab.2.1)

PIN	SIGNAL	IN/OUT	A	DESCRIPTION
2	TX	OUT	RX	Receive data. Serial output (from host)
3	RX	IN	TX	Transmit data. Serial input (towards host)
4	RTS	OUT	CTS	Ready to send. Ready to receive data (active at RS232 high level)
7	GND	-	GND	Signal ground
20	DSR	OUT	DSR	Data set ready. Printer is on and functioning (active at RS232 high level)

The diagrams below illustrate a sample connection between the printer and the Personal Computer using a 25- and 9-pin female connector.

(Fig.2.2)   SMICE ◄─────────────► PC

(Fig.2.3)   SMICE ◄─────────────► PC
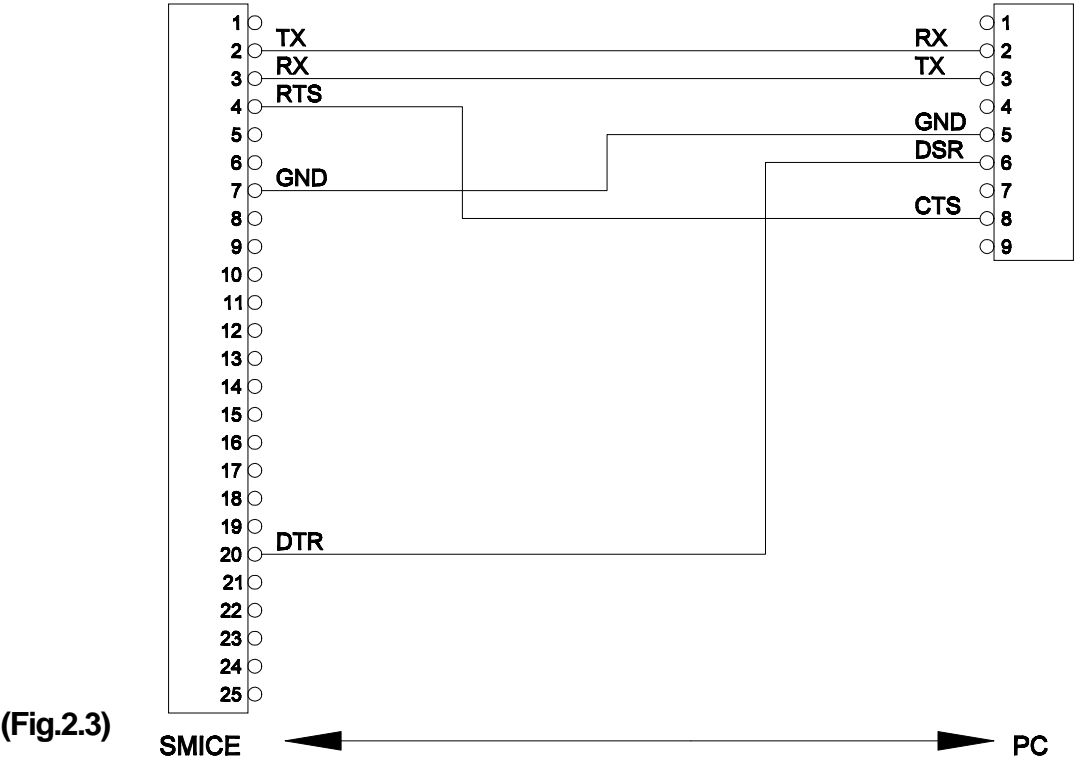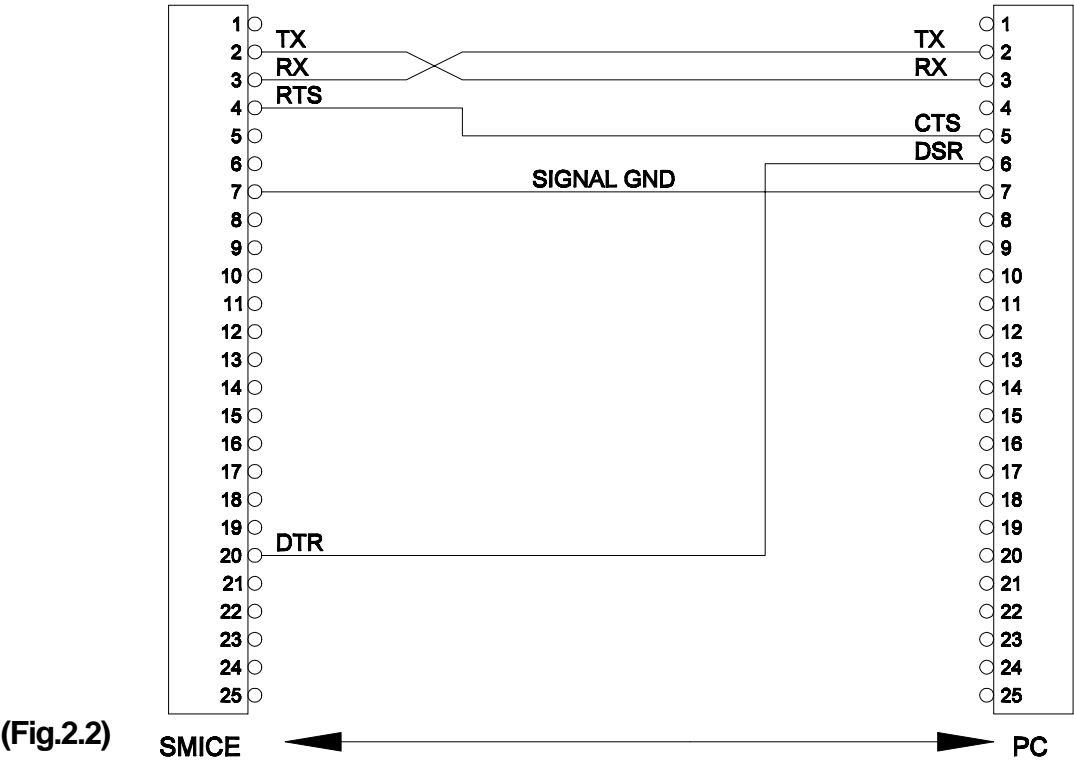
2.2 SERIAL - RS422

The printer has an RS422 serial interface with a rectangular 25-pin female connector. The signals on the connector pins and their connection to a device are shown in the table 2.2.

(Tab.2.2)

PIN	SIGNAL	IN/OUT	DESCRIPTION
12	TX422-	OUT	Receive data. Serial output (from host)
13	TX422+	OUT	Receive data. Serial output (from host)
23	RX422-	IN	Transmit data. Serial input (towards host)
24	RX422+	IN	Transmit data. Serial input (towards host)

The diagram below illustrates the connection between the printer and a device using an RS422 interface.

(Fig.2.4)   SMICE   ←————————————→   DEVICE
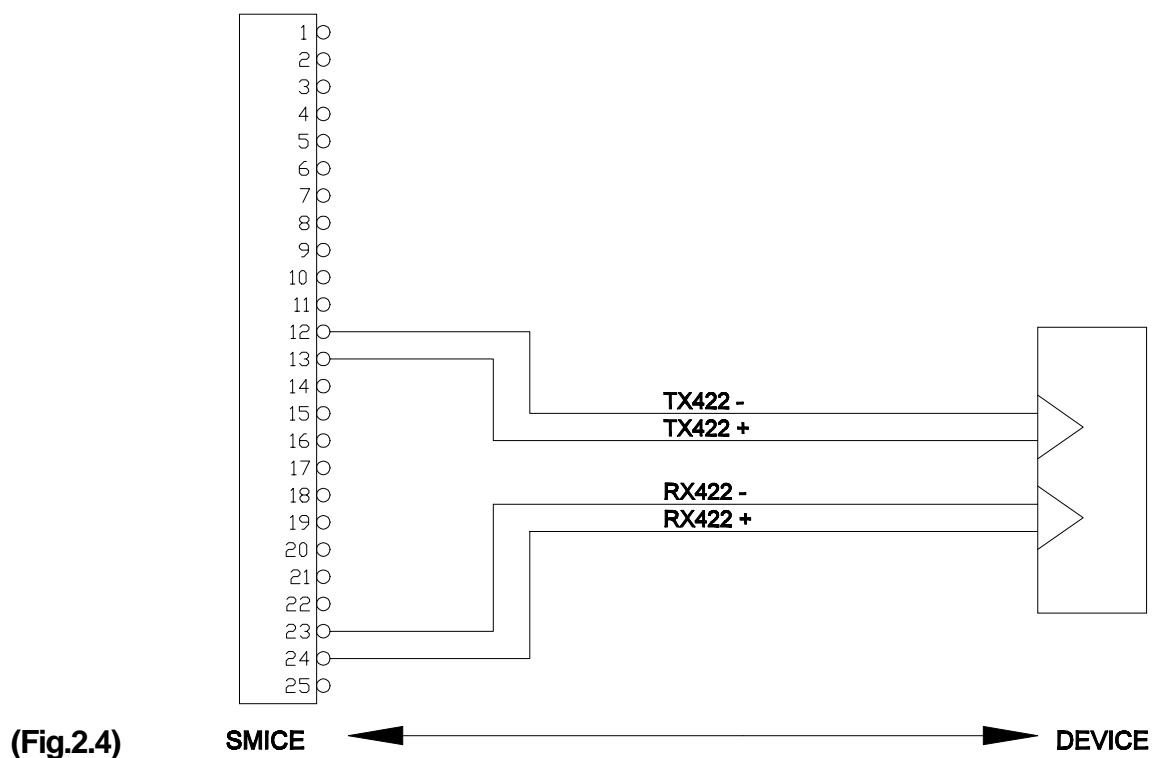
2.3 SERIAL - RS485

The printer has an RS485 serial interface with a rectangular 25-pin female connector. The signals on the connector pins and their connection to a device are shown in the following table.

(Tab.2.3)

PIN	SIGNAL	IN/OUT	DESCRIPTION
23	RS485-	IN	Transmit data. Serial input (towards host)
24	RS485+	OUT	Receive data. Serial output (from host)

The diagram below illustrates the connection between the printer and a device using an RS485 interface.
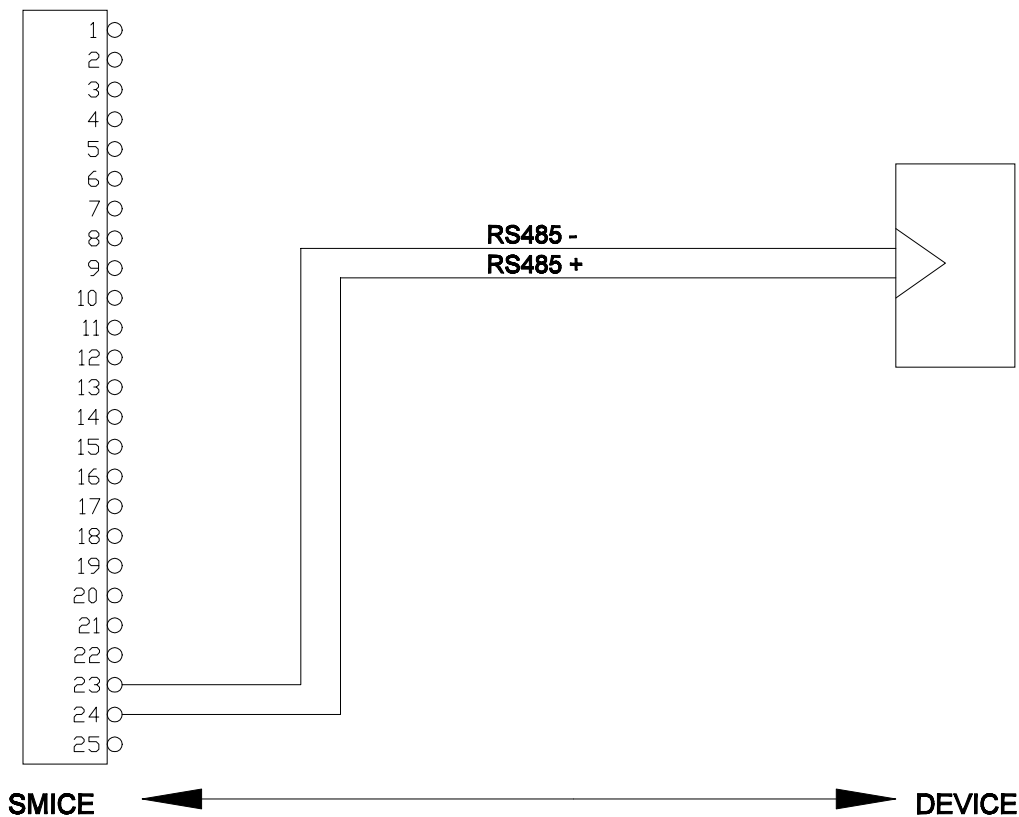
(Fig.2.5)

2.4 PARALLEL - CENTRONICS

The printer has a Centronics parallel interface with a rectangular 25-pin female connector that uses a 25-pin female connector.
The connector signals are given in the table below.

(Tab.2.4)

PIN	SIGNALE	DIRECTION
1	Strobe	In
2	Data bit 0	In
3	Data bit 1	In
4	Data bit 2	In
5	Data bit 3	In
6	Data bit 4	In
7	Data bit 5	In
8	Data bit 6	In
9	Data bit 7	In
10	ACK	Out
11	BUSY	Out
12	PAPER END	Out
13	SELECT	Out
14	AUTO FEED	In
15	FAULT	Out
16	RESET	In
17	SELECT INPUT	In
18-25	GND	-

2.5 OFF LINE

OFF LINE:
The printer is OFF LINE under one or more of the following conditions:
- During power-up until the printer has performed all initialization routines;
- When the cover is open;
- When the FEED key is pressed;
- When the paper runs out;
- When a macro is being performed;
- When the voltage is not correct.

3.1 COMMAND DESCRIPTIONS

3.1.1 ESC/POS Emulation

The following table lists all the commands for function management in ESC/POS™ Emulation of the printer. 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.
.

(Tab.3.1)   COMMAND DESCRIPTION TABLE

ASCII	HEX	Description
BS	$08	Back space
HT	$09	Horizontal tab
LF	$0A	Print and line feed
FF	$0C	Print and return to standard mode in page mode
CR	$0D	Print and carriage return
DLE EOT n	$10 $04 (n)	Real-time status transmission
DLE ENQ n	$10 $05 (n)	Real-time request to printer
DLE DC4 n m t	$10 $14 n m t	Generate pulse at real-time
CAN	$18	Cancel print data in page mode
ESC SP n	$1B $20 (n)	Set character right-side spacing
ESC ! n	$1B $21 (n)	Set print mode
ESC $ nL nH	$1B $24 nL nH	Set absolute position
ESC % n	$1B $25 (n)	Select/cancel user-defined character set
ESC & y c1 c2	$1B $26 y c1 c2	Define user-defined characters
ESC (v nL nH	$1B $28 $76 nL nH	Set relative vertical print position
ESC * m nL nH d1...dk	$1B $2A m nL nH d1...dk	Select image print mode
ESC - n	$1B $2D (n)	Turn underline mode on/off
ESC 0	$1B $30	Select 1/8-inch line spacing
ESC 2	$1B $32	Select 1/6-inch line spacing
ESC 3 n	$1B $33 (n)	Set line spacing using minimum units

ASCII	HEX	Description
ESC 4 n	$1B $34 (n)	Set/reset script mode
ESC = n	$1B $3D (n)	Select device
ESC ? n	$1B $3F (n)	Cancel user-defined characters
ESC @	$1B $40	Initialize printer
ESC D n1...nk NUL	$1B $44 n1...nk 00	Set horizontal tab positions
ESC E n	$1B $45 (n)	Select emphasized mode
ESC G n	$1B $47 (n)	Select double-strike mode
ESC J n	$1B $4A (n)	Print and feed paper
ESC L	$1B $4C	Select page mode
ESC M n	$1B $4D n	Select character font
ESC R n	$1B $52 (n)	Select international character set
ESC S	$1B $53	Select standard mode
ESC T n	$1B $54 n	Select print direction in page mode
ESC V n	$1B $56 (n)	Select print mode 90° turned
ESC W xL xH yL yH dxL dxH dyL dyH	$1B $57 xL xH yL yH dxL dxH dyL dyH	Set printing area in page mode
ESC \ nL nH	$1B $5C nL nH	Set relative print position
ESC a n	$1B $61 (n)	Select justification
ESC c 3 n	$1B $63 $33 (n)	Select paper sensor(s) to output paper end signals
ESC c 5 n	$1B $63 $35 (n)	Enable/disable front panel buttons
ESC d n	$1B $64 (n)	Print and feed paper n lines
ESC i	$1B $69	Total cut
ESC m	$1B $6D	Partial cut
ESC p m t1 t2	$1B $70 m t1 t2	Generate pulse
ESC r n	$1B $72 (n)	Set/reset red printing mode
ESC t n	$1B $74 (n)	Select character code table
ESC u n	$1B $75 (n)	Transmit peripheral device status
ESC v	$1B $76	Transmit printer status
ESC { n	$1B $7B (n)	Set/cancel upside-down character printing
ESC ⊥ n	$1B $C1 (n)	Set/cancel cpi mode

ASCII	HEX	Description
ESC · n xL xH yH yL	$1B $FA n xL xH yH yL	Print graphic
ESC ¹ nL nH	$1B $FB nL nH	Transmit graphic page to communication port
ESC ³ n	$1B $FC (n)	Transfer flash bank into graphic page
ESC ² nL nH	$1B $FD nL nH	Receive graphic page from communication port
ESC ¦ n	$1B $FE (n)	Transfer graphic page into flash bank
ESC FF	$1B $FF	Print data in page mode
FS p n m	$1C $70 n m	Print NV bit image
FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n	$1C $71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n	Define NV bit image
GS ! n	$1D $21 (n)	Select character size
GS $ nL nH	$1D $21 nL nH	Set absolute vertical print position in page mode
GS * x y d1..d(x x y x 8)	$1D $2A x y d1..d(x x y x 8)	Define downloaded bit image
GS / m	$1D $2F m	Print downloaded bit image
GS :	$1D $3A	Set start/end of macro definition
GS B n	$1D $42 (n)	Turn white/black reverse printing mode on/off
GS C 0 n m	$1D $43 $30 n m	Select counter print mode
GS C 1 aL aH bL bH n r	$1D $43 $31 aL aH bL bH n r	Select count mode (A)
GS \ nL nH	$1D $5C nL nH	Set relative vertical print position in page mode
GS C 2 nL nH	$1D $43 $32 nL nH	Select counter
GS C ; sa ; sb ; sn ; sr ; sc ;	$1D $43 $3B sa $3B sb $3B sn $3B sr $3B sc $3B	Select count mode (B)
GS H n	$1D $48 (n)	Select printing position of HRI characters

ASCII	HEX	Description
GS I n	$1D $49 (n)	Transmit printer ID
GS L nL nH	$1D $4C nL nH	Set left margin
GS P x y	$1D $50 x y	Set horizontal and vertical motion units
GS W nL nH	$1D $57 nL nH	Set printing area width
GS ^ r t m	$1D $5E r t m	Execute macro
GS a n	$1D $61 n	Enable/ Disable Automatic Status Back (ASB)
GS c	$1D $63	Print counter
GS f n	$1D $66 (n)	Select font for HRI characters
GS h n	$1D $68 (n)	Select height of bar code
GS k m NUL	$1D $6B m 00	Print bar code
GS r n	$1D $72 (n)	Transmit status
GS v 0 m xL xH yL yH d1...dk	$1D $76 $30 m xL xH yL yH d1...dk	Print raster bit image
GS w n	$1D $77 (n)	Select horizontal side (enlargement) of bar code
GS | n	$1D $7C (n)	Set printing density
GS ~ n	$1D $7E (n)	Set superscript/subscript
GS - n	$1D $F0 (n)	Set printing speed
GS ± n	$1D $F1 (n)	Set current print consumption
GS ÷	$1D $F6	Ticket align at first line
GS °	$1D $F8	Ticket align at cut

Given below are more detailed descriptions of each command.

BS

[Name]	**Back space**	
[Format]	ASCII	BS
	Hex	08
	Decimal	8
[Description]	Moves print position to previous character.	
[Notes]	Can be used to put two characters at the same position.	
[Default]		

[Reference]

[Example]

HT

[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]   **ESC D**

[Example]

LF

[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.

[Default]

[Reference]   **ESC 2, ESC 3**

[Example]

FF

[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 **ESC W** 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]	**ESC FF, ESC L, ESC S**
[Example]	

CR

[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 **LF**, otherwise it is disregarded.
[Notes]	• Sets the print position to the beginning of the line.
[Default]	See "Autofeed in setup" parameter.
[Reference]	**LF**
[Example]	

DLE EOT n

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

[Format]

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

[Range] $1 \leq n \leq 17$

[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 = 4   transmit paper roll sensor status
n = 17 transmit print status

[Notes]   • Immediately executed even when the data buffer is full. This status is transmitted whenever data sequence 10H 04H n ($1 \leq n \leq 17$) is received.

[Default]

[Reference]   See tables below.

[Example]

n=1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer kick-out signal Low (pin 3).
	On	04	4	Drawer kick-out signal High (pin 3).
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n=2: Off-line status

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

n=3: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Not used. Fixed to Off.
3	Off	00	0	Cutter OK.
	On	08	8	Cutter error.
4	On	10	16	Not used. Fixed to On
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurs (cutter, memory, RTCK,FPGA).
6	Off	00	0	No auto-recoverable error.
	On	40	64	Auto-recoverable error (overtemperature, parity, wrong command).
7	Off	00	0	Not used. Fixed to Off

n=4: Paper roll sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Not used. Fixed to Off.
3	Off	00	0	Not used. Fixed to Off.
4	On	10	16	Not used. Fixed to On
5, 6	On	60	96	Fixed to On. Paper end detected by paper end sensor.
7	Off	00	0	Not used. Fixed to Off

n=17: Print status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Paper drag motor off.
2	On	04	4	Paper drag motor on
3	Off	00	0	Not used. Fixed to Off.
4	On	10	16	Not used. Fixed to On
5	Off	00	0	Paper adeguate
5	On	20	32	The print is stopped; paper out error occurs.
6	Off	00	0	Motor temperature OK
6	On	40	64	Overtemperature motor error occurs
7	Off	00	0	Not used. Fixed to Off

DLE ENQ n

[Name]	**Real-time request to printer**		
[Format]	ASCII	DLE	ENQ n
	Hex	10	05 n
	Decimal	16	5 n

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

[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 **ESC * 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 **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **DLE ENQ 2** interrupts before n is received, the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3** <10>H.

• **DLE ENQ 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 **ESC !**, **ESC** 3, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. 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 **ESC =** (Select peripheral device), the error recovery functions **(DLE ENQ 1** and **DLE ENQ** 2) are enabled, and the other functions are disabled.

[Reference]   **DLE EOT**

[Example]

DLE DC4 n m t

[Name]	**Generate pulse at real-time**
[Format]	ASCII DLE DC4 n m t
	Hex 10 14 n m t
	Decimal 16 20 n m t
[Range]	n = 1
	m = 0,1
	$1 \le t \le 8$

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

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

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 **ESC p** or **DLE DC4** 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 **ESC =** (Select peripheral device).

[Reference] **ESC p**

CAN

[Name]	**Cancel print data in page mode**
[Format]	ASCII CAN
	Hex 18
	Decimal 24
[Description]	In page mode, deletes all the print data in the current printable area.
[Notes]	• This command is enabled only in page mode.
	• If data that existed in the previously specified printing area also exists in the currently specified printing area, it is deleted.
[Default]	
[Reference]	**ESC L**, **ESC W**
[Example]	

ESC SP n

[Name]	**Set right-side character spacing**
[Format]	ASCII ESC SP n
	Hex 1B 20 n
	Decimal 27 32 n
[Range]	$0 \le n \le 255$
[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 **GS P**. Changing the horizontal or vertical motion units does not affect the current right side spacing.
	• The **GS P** 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 spacing is 255/200 inches.
[Default]	n = 0
[Reference]	**GS P**

[Example]

ESC ! 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	13 x 24
	On	01	1	Character font B selected.	13 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 **HT**, **ESC $**, **ESC ** and 90°/270° rotated characters.
• When characters are enlarged to different heights on one line, the characters are aligned at the baseline or topline (see **GS ~**).
• This command resets the left and right margin at default value (see **GS L**, **GS W**).
• **ESC E** can also be used to turn the emphasized mode on/off. However, the last-received setting command is the effective one.
• **ESC -** can also be used to turn the underlining mode on/off. However, the last-received setting command is the effective one.
• **ESC 4** can also be used to turn the italic mode on/off. How-

ever, the last-received setting command is the effective one.
• **GS !** can also be used to select character height/width. However, the last-received setting command is the effective one.

[Default]   n = 0

[Reference]   **ESC -, ESC E, ESC 4, GS !**

[Example]

ESC $ nL nH

[Name]	**Set absolute print position**			
[Format]	ASCII	ESC $	nL	nH
	Hex	1B 24	nL	nH
	Decimal	27 36	nL	nH

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

[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 × 256) × (vertical or horizontal motion unit)] inches.

[Notes]   • Settings outside the specified printable area are ignored.
• The horizontal and vertical motion unit are specified by **GS P**.
• **GS P** 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]   **ESC \, GS P**

[Example]

ESC % n

[Name]	**Select/cancel user-defined characters**		
[Format]	ASCII	ESC %	n
	Hex	1B 25	n
	Decimal	27 37	n
[Range]	$0 \leq n \leq 255$		
[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]	**ESC &, ESC ?**		
[Example]			

ESC & y c1 c2 [x1 d1…d(y x x1)]…[xkd1…d(y x xk)]

[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				
	$32 \leq c1 \leq c2 \leq 126$				
	$0 \leq x \leq 16$ (Font (18×24))				
	$0 \leq x \leq 10$ (Font (10×24))				
	$0 \leq x \leq 8$ (Font 8×24)				
	$0 \leq d1 \ldots d (y \times xk) \leq 255$				
	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 **ESC !**.

• A user-defined character and a downloaded bit image can-not be defined simultaneously. When this command is executed, the downloaded bit image is cleared.

• The user-defined character definitions are cleared when:

ESC @ or

GS * or

ESC ? are executed or

the printer is reset or the power shut off.

[Default]	Internal character set.
[Reference]	**ESC %, ESC ?**

[Example]

18 dots (11 cpi)
13 dots (15 cpi)
10 dots (20 cpi)

ESC (v nL nH

[Name]	**Set relative vertical print position**				
[Format]	ASCII	ESC (	v	nL	nH
	Hex	1B 28	76	nL	nH
	Decimal	27 10	118	nL	nH

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

$0 \leq nH \leq 255$

[Description] Sets the print vertical position based on the current position by using the horizontal or vertical motion unit.

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

[Notes]   • When the starting position is specified by N motion unit to the bottom :

nL + nH x 256 = N

When the starting position is specified by N motion unit to the top (negative direction), use the complement of 65536 :

nL + nH x 256 = 65536 - N

• The horizzontal and vertical motion unit are specified by **GS P**.

• The **GS P** 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 vertical motion unit is used.

[Default]

[Reference]   **GS P**

[Example]

ESC * m nL nH d1...dk

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

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

$0 \leq nL \leq 255$

$0 \leq nH \leq 3$

$0 \leq d \leq 255$

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

m		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 **GS L** and **GS W** is less than the width required by the data set using **ESC ***, the excess data are ignored.
• To print the bit image use **LF**, **CR**, **ESC J** or **ESC d**.
• 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:
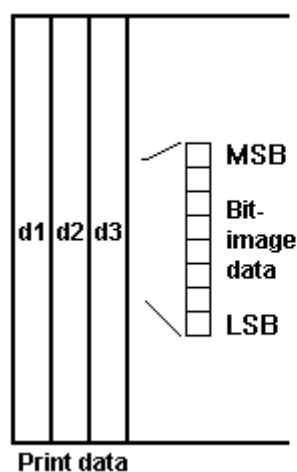
8-dot bit image   24-dot bit image

[Default]
[Reference]
[Example]

ESC - n

[Name]	**Turn underline mode on/off**
[Format]	ASCII ESC - n
	Hex 1B 2D n
	Decimal 27 45 n
[Range]	$0 \leq n \leq 2$, $48 \leq n \leq 50$

[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 set by **HT** 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 **ESC !**. Note, however, that the last received command is the effective one.

[Default]   n=0

[Reference]   **ESC !**
[Example]

ESC 0

[Name]   **Select 1/8-inch line spacing**
[Format]   ASCII   ESC 0
                Hex   1B   30
                Decimal   27   48
[Description]   Selects 1/8-inch line spacing
[Notes]
[Default]
[Reference]   **ESC 2, ESC 3**
[Example]

ESC 2

[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]   **ESC 0, ESC 3**
[Example]

ESC 3 n

[Name]   **Set line spacing**
[Format]   ASCII   ESC 3   n
                Hex   1B   33   n
                Decimal   27   51   n
[Range] $0 \leq n \leq 255$
[Description]   Sets line spacing to [$n \times$ (vertical or horizontal motion unit)] inches.
[Notes]   • The horizontal and vertical motion unit are specified by

GS P. Changing the horizontal or vertical motion unit does not affect the current line spacing.

• The **GS P** 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.

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

[Reference]   **ESC 0, ESC 2, ESC P**

[Example]

ESC 4 n

[Name]   **Set/reset italic mode**

[Format]   ASCII   ESC 4   n

               Hex   1B   34   n

               Decimal   27   52   n

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

[Description] Turns italic mode on or off, based on the following values of *n*:

n	Function
0, 48	Turns off italic mode
1, 49	Turns on italic mode

[Notes]   • The printer can print any character in italic mode.

• When italic mode is turned off by setting the value of *n* to 0 or 48, the data which follows is printed in normal mode.

• Italic mode can also be turned on or off using **ESC !**. Note, however, that the last received command is the effective one.

[Default]   n = 0

[Reference]   **ESC !**

[Example]

ESC = 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:			

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled
	On	01	1	Printer enabled
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	-	-	-	Undefined
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Pass-trough function disabeld
	On	80	128	Pass-trough function enabeld

[Notes]	• When the printer is disabled, it ignores all transmitted data until the printer is enabled through this command.
[Default]	n = 1
[Reference]	
[Example]	

ESC ? n

[Name]	**Cancel user-defined characters**			
[Format]	ASCII	ESC ?	n	
	Hex	1B	3F	n
	Decimal	27	63	n
[Range]	$32 \le n \le 126$			
[Description]	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 **ESC !**.

• If the user-defined character has not been defined for the specified character code, the printer ignores this command.

[Default]

[Reference] **ESC &**, **ESC %**

[Example]

ESC @

[Name]	**Initialize printer**		
[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer 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]

ESC D [n1...nk] NUL

[Name]	**Set horizontal tab positions**			
[Format]	ASCII	ESC D	n1...nk	NUL
	Hex	1B 44	n1...nk	00
	Decimal	27 68	n1...nk	0

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

$0 \leq k \leq 32$

[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, by sending **HT**.

• 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.

• **ESC D NUL** 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]   **HT**

[Example]

ESC E n

[Name]	**Turn emphasized mode on/off**
[Format]	ASCII ESCE 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.
	• **ESC !** also turns on and off the emphasized mode. However, the last received command is the effective one.
[Default]	n = 0
[Reference]	**ESC !**
[Example]	

ESC G n

[Name]	**Turn double-strike mode on/off**		
[Format]	ASCII	ESC	G	n
Hex		1B	47	n
Decimal	27	71	n

[Range]　　　　0 ≤ n ≤ 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]　**ESC E**

[Example]

ESC J n

[Name]	**Print and paper feed**
[Format]	ASCII　ESC J　n
Hex	1B　4A　n
Decimal	27　74　n

[Range]　　　　0 ≤ n ≤ 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 **ESC 2** or **ESC 3**.
• The horizontal and vertical motion units are specified by **GS P**.
• **GS P** 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 4095 mm (161 inches).

[Default]

[Reference] **GS P**
[Example]

ESC L n

[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 **FF** is completed or by using **ESC** S, the printer returns to standard mode.

• This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.

• 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: **ESC SP, FS S**

 2) Select default line spacing: **ESC 2, ESC 3**

• 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: **ESC V**

2) Select justification: **ESC a**

3) Turn upside-down printing mode on/off: **ESC {**

4) Set left margin: **GS L**

5) Set printable area width: **GS W**

• The following command is ignored in page mode:

1) Execute test print: **GS (A**

• The following command is not available in page mode:

1) Print NV bit image: **FS p**

2) Define NV bit image: **FS q**

3) Write to user NV memory: **FS g 1**

4) Print raster bit image: **GS v 0**

• The printer returns to standard mode when power is turned on, the printer is reset, or **ESC @** is used.

[Reference]   **FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS $, GS **

ESC M n

[Name]   **Select character font**

[Format]   ASCII   ESC   M   n

     Hex   1B   4D   n

     Decimal   27   77   n

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

[Description]   Selects characters font.

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

[Notes]

[Default]

[Reference]

[Example]

ESC R n

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

[Format]   ASCII   ESCR   n

     Hex   1B   52   n

     Decimal   27   82   n

[Range] $0 \leq n \leq 10$

[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	Ø	Å	^	`	æ	ø	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	Ø	Å	Ü	è	æ	ø	å	ü
10	Denmark II	#	$	È	Æ	Ø	Å	Ü	è	æ	ø	å	ü

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

ESC S

[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 **ESC W** 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: **ESC SP, FS S**

2) Select default line spacing: **ESC 2, ESC 3**

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

1) Set printing area in page mode: **ESC W**

2) Select print direction in page mode: **ESC T**

• The following commands are ignored in standard mode.

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

2) Set relative vertical print position in page mode: **GS **

• Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

[Reference]   **FF, ESC FF, ESC L**

ESC T n

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

[Format]

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

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

$48 \leq n \leq 51$

[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 **ESC W**.

• 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: **ESC SP, ESC $, ESC **

Commands using vertical motion units: **ESC 3, ESC J, GS $, GS **.

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: **ESC 3, ESC J, GS $, GS **

Commands using vertical motion units: **ESC SP, ESC $, ESC **.

Default]	n = 0
[Reference]	**ESC** $, **ESC** L, **ESC** W, **ESC** \, **GS** $, **GS** P, **GS** \

ESC V n

[Name]	**Set 90° rotated print mode.**
[Format]	ASCII ESC V n
	Hex 1B 56 n
	Decimal 27 86 n
[Range]	0 ≤ n ≤ 1
	48 ≤ n ≤ 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]   **ESC !, ESC -**

ESC W 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] $0 \leq$ xL, xH, yL, yH, dxL, dxH, dyL, dyHn $\leq$ 255 (except dxL= dxH = 0 or dyL = dyHn = 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 ´ 256) ´ (horizontal motion unit)]

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

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

dy = [dyL + dyH ´ 256) ´ (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 **ESC T** 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 **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.

• The **GS P** 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]

ESC \ nL nH

[Name]	**Set relative print position**			
[Format]	ASCII	ESC \	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH
[Range]	$0 \leq nL \leq 255$			
	$0 \leq nH \leq 255$			
[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]	• 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 **GS P**.

• **GS P** 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.

[Default]

[Reference] **ESC $**, **GS P**

[Example]

ESC a n

[Name]	**Select justification**
[Format]	ASCII ESCa n
	Hex 1B 61 n
	Decimal 27 97 n
[Range]	$0 \le n \le 2$, $48 \le n \le 50$

[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 **HT**, **ESC $** and **ESC ** will be justified according to the previously-entered mode.

[Default] n = 0

[Reference]

[Example]

Flush left	Centered	Flush right
ABC ABCD ABCDE	ABC ABCD ABCDE	ABC ABCD ABCDE

ESC c 3 n

[Name]	**Select paper sensor(s) to output paper end signals**
[Format]	ASCII ESC c 3 n
	Hex 1B 63 33 n
	Decimal 27 99 51 n
[Range]	$0 \le n \le 255$
[Description]	Selects the paper sensor(s) to output paper end signals.

• Each bit of n is used as follows :

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll end sensor disabled.
	On	01	1	Paper roll end sensor enabled.
1-7	-	-	-	Undefined.

[Notes]	• Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.
	• If bit 0 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.
	• When all the sensors are disabled, the paper end signal always outputs a paper present status.
[Default]	n = 15
[Reference]	
[Example]	

ESC c 5 n

[Name]	**Enable/disable front panel buttons**
[Format]	ASCII ESCc 5 n
	Hex 1B 63 35 n
	Decimal 27 99 53 n
[Range]	$0 \le n \le 255$
[Description]	Enables/disables the buttons on the front panel.
	• When the LSB of *n* is 0, the panel buttons are enabled.
	• When the LSB of *n* is 1, the panel buttons are disabled.
[Notes]	• Only the LSB of *n* is effective.

• On the printer, the panel buttons are FEED and KEY2.
• When the panel buttons are disabled, the buttons may only be used after the printer has been reset.

[Default]	n = 0
[Reference]	See "Panel Key" parameter from setup.
[Example]	

ESC d n

[Name]	**Print and feed paper *n* rows**		
[Format]	ASCII	ESCd	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]	• 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]	**ESC 2, ESC 3**
[Example]	

ESC i

[Name]	**Total cut**	
[Format]	ASCII	ESCi
	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.	
	• With the SMICE-PS printer, the type of cutter determines	

whether a total or partial cut is made.

[Default]
[Reference]
[Example]

ESC m

[Name]	**Partial cut**
[Format]	ASCII ESC m
	Hex 1B 6D
	Decimal 27 109
[Description]	This command enables cutter operation.
[Notes]	• The printer waits to complete all paper movement commands before it executes a total cut.
[Default]	
[Reference]	
[Example]	

ESC p m t1 t2

[Name]	**Generate pulse**
[Format]	ASCII ESC p m t1 t2
	Hex 1B 70 m t1 t2
	Decimal 27 112 m t1 t2

[Range] $m = 0, 1, 48, 49$

$0 \le t1 \le 255$

$0 \le t2 \le 255$

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

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

[Notes]   • The pulse ON time is [$t1 \times 2$ ms] and the OFF time is [$t2 \times 2$ ms].

• If $t2 < t1$, the OFF time is [$t1 \times 2$ ms].

[Default]
[Reference]

ESC r n

[Name]	**Set/reset red printing mode**
[Format]	ASCII ESC r n
	Hex 1B 72 n
	Decimal 27 114 n
[Range]	$0 \leq n \leq 1, 48 \leq n \leq 49$
[Description]	Sets and resets red printing mode.

n   **Function**

0, 48   Reset red printing mode

1, 49   Set red printing mode

[Notes]	• The printer prints only entire lines in red, not individual characters.
	• The printer prints red only if enabled (see Setup).
[Default]	*n* = 0
[Reference]	
[Example]	

ESC t n

[Name]	**Select character code table**
[Format]	ASCII ESCt 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

ESC u n

[Name]   **Transmit peripheral device status**

[Format]   ASCII   ESC u   n

                Hex   1B   75   n

                Decimal   27   117   n

[Range]   n = 0, 48

[Description]   Transmits the status of connector pin n upon receiving this command, using n as follows:

n	Connector Pin
0, 48	Drawer kick-out connector pin 3

[Notes]   • This command is executed when the data is processed in the data buffer. There may be a time lag between receiving the command and transmitting the status, depending on data buffer status.
                • When the connector is not used, the bit 0 value is always 1.
                • The status to be transmitted is shown in the table below:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Pin 3 low level
	On	01	1	Pin 3 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.

[Default]

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

                See drawer connector

[Example]

ESC v

[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	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.

[Default]

[Reference]   **DLE EOT**

[Example]

ESC { n

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

[Format]   ASCII   ESC{   n

            Hex   1B 7B n

            Decimal 27   123 n

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

[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]

Upside-down printing Off   Upside-down printing On

ABCDEFG
0123456

↑

0123456
ABCDEFG

Printing direction
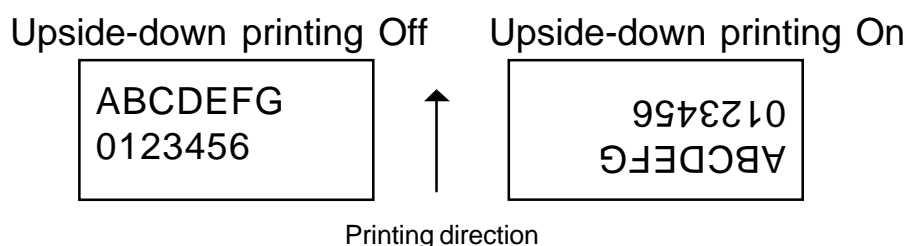
ESC ⊥ n

[Name] **Set/cancel cpi mode**
[Format] ASCII   ESC⊥   n
Hex   1B   C1   n
Decimal   27   193 n
[Range] $0 \le n \le 1$, $48 \le n \le 49$
[Description] Sets cpi mode based on the following values of *n*:

n	Function
0, 48	Font A = 11 cpi Font B = 15 cpi
1, 49	Font A = 15 cpi Font B = 20 cpi

[Default] n = 0
[Reference] **ESC !**

ESC · n xH xL yH yL

[Name]	**Print graphic.**						
[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] $0 \leq n \leq 3$

$0 \leq$ *xH*, *xL*, *yH*, *yL* ≤ 255

[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

The maximum printable vertical dimension *dhmax* is :

• if paper width is 112mm *dhmax* = 630

• if paper width is 80mm *dhmax* = 819

xL + *xH* $\times$ 256 specifies the starting dotline (1 $\div$ *dhmax*).
yL + *yH* $\times$ 256 specifies the number of lines to print.

[Notes] • If (*xL* + (*xH* $\times$ 256)) > *dhmax* the printer does not execute the command.
• If (*xL* + (*xH* $\times$ 256) + *yL* +(*yH* $\times$ 256))> *dhmax* the printer prints only *dhmax* - *xL* + (*xH* $\times$ 256) +1 dotline.

[Default]

[Reference] **ESC ³, ESC ², ESC ⁞**

[Example] To print from ram bank dotline 100 to dotline 299, send:
1BH FAH 00H 00H 64H 00H C7H

ESC ¹ nL nH

[Name]	**Transmit graphic page to communication port**			
[Format]	ASCII	ESC ¹	nL	nH
	Hex	1B FB	nL	nH
	Decimal	27 251	nL	nH

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

[Default]

[Reference]   **ESC ³, ESC ², ESC ⁞**

[Example]

ESC ³ n

[Name]	**Transfer flash bank into graphic page**			
[Format]	ASCII	ESC ³	n	
	Hex	1B	FC	n
	Decimal	27	252	n

[Range]   1 ≤ n ≤ 3

[Description]   Transfers flash bank into graphic page used at the moment (65520 bytes).

n selects the flash bank as follows:

n	Function
1	Transfers flash bank logo 1 into ram

[Notes]

[Default]

[Reference]   **ESC ·, ESC ², ESC ⁞**

[Example]

ESC ² nL nH

[Name]	**Receive graphic page from communication port**				
[Format]	ASCII	ESC ²	nL	nH	
	Hex	1B	FD	nL	nH
	Decimal	27	253	nL	nH

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

[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]   **ESC ·, ESC ³, ESC ⁞**

[Example]

ESC ⁞ n

[Name]	**Transfer graphic page into flash bank**
[Format]	ASCII ESC ⁞ n
	Hex 1B FE n
	Decimal 27 254 n
[Range]	1 ≤ n ≤ 3
[Description]	Transfers the graphic page used at the moment into the flash bank (65520 bytes).
	n selects the bank as follows:

n	Function
1	Transfers graphic page used at the moment into flash bank logo 1

[Notes]

[Default]

[Reference]   **ESC ·, ESC ², ESC ³**

[Example]

ESC FF

[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 **ESC T** and **ESC W**, and the position for buffering character data.
[Reference]	**FF, ESC L, ESC S**

FS p 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] $1 \leq n \leq 255$

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

[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 **FS q** command).

• *m* specifies the bit image.

[Notes]   • NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS** p.

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

• This command is available only when paper roll is selected using **ESC c 0**.

• 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 **GS L** and **GS W** for the NV bit image is less than one vertical line, the following process-ing 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 qua-

druple 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 ESC 2 or **ESC** 3.

• 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]   **FS q**

FS q 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] $1 \leq n \leq 255$

$0 \leq xL \leq 255$

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

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

$0 \leq d \leq 255$

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

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 **FS q** and printed by **FS** p.

• 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 **FS p**.

• 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.

• This command defines NV bit image printing on a paper roll without being affected by the sheet setting selected in **ESC c** 1.

• 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 **ESC** @, 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 **FS p** command.

[Reference]   **FS p**

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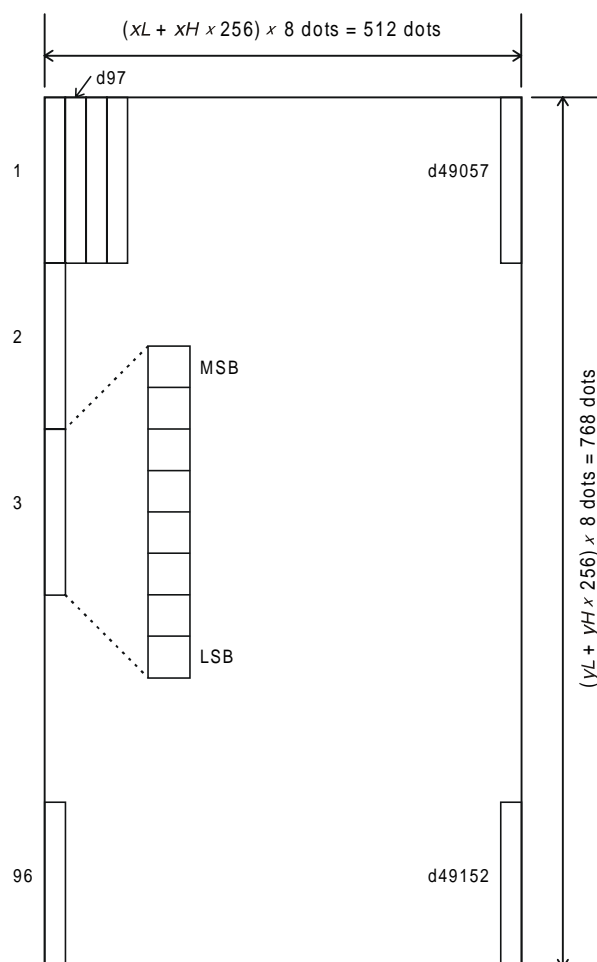
GS ! n

[Name]	**Select character size**		
[Format]	ASCII	GS	!	n
	Hex	1D	21	n
	Decimal	29	33	n

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

[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 (see **GS ~**).
- **ESC !** can also be used to select character size. However, the setting of the last received command is the effective one.

[Default] n = 0

[Reference] **ESC !**

[Example]

GS $ nL nH

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

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

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

[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 **ESC T**.

• This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:

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 **GS P**.

• The **GS P** 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]   **ESC $**, **ESC T**, **ESC W**, **ESC **, **GS P**, **GS **

GS * 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] $1 \leq$ **x** ≤ 255

$1 \leq$ **y** ≤ 48

x $_x$ **y** ≤ 1536

$0 \leq d \leq 255$

[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) **ESC @** is executed.

2) **ESC &** is executed.

3) **FS q** 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.
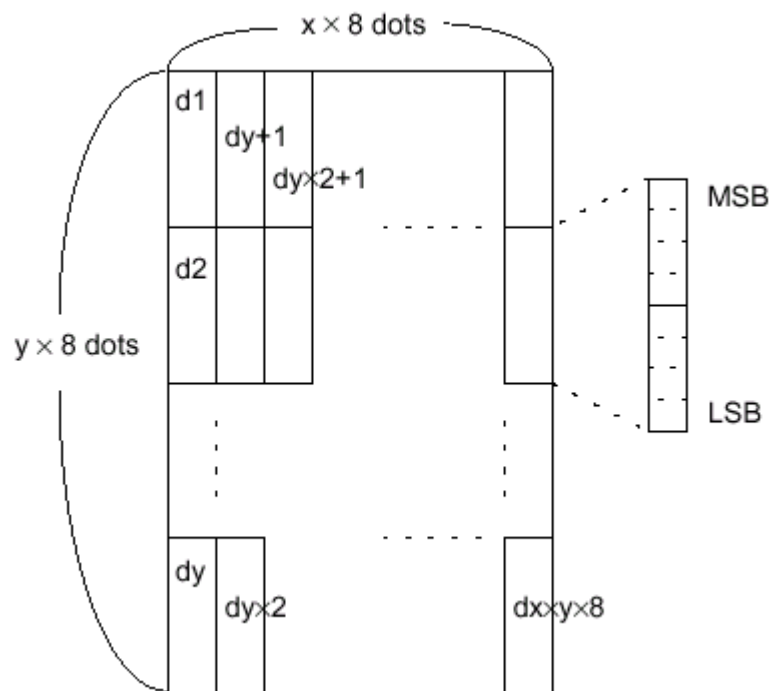
[Reference]   **GS **

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 **GS L** and **GS W** is less than one line in vertical, the following processing is performed only on the line in question:

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

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

[Reference]   **GS** *

[Example]

GS :

[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 **GS ^** 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 **ESC @** command. Therefore, **ESC @** may be included in the content of macro definitions.
	• If the printer receives **GS :** a second time after previously receiving **GS :**, 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]	**GS ^**
[Example]	

GS B 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 ≤ n ≤ 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 **HT, ESC $** and **ESC \.**
- 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]	

GS C 0 n m

[Name]	**Select counter print mode**

[Format]

ASCII	GS	C	0	n	m
Hex	1D	43	30	n	m
Decimal	29	67	48	n	m

[Range]
$0 \leq n \leq 5$
$m = 0, 1, 2, 48, 49, 50$

[Description] Selects a print mode for the serial number counter.
- *n* specifies the number of digits to be printed as follows: when $n = 0$, the printer prints the actual digits indicated by the numeric value.
when $n = 1$ to 5, the command sets the number of digits to be printed.
- m specifies the printing position within the entire range of printed digits as follows:

m	Printing position	Processing of digits less than those specified
0, 48	Flush right	Adds spaces to the left
1, 49	Flush right	Adds a '0' to the left
2, 50	Flush left	Adds spaces to the right

[Notes]   • If n or m is out of the defined range, the previously set print mode is not changed.
      • If $n = 0$, m is not applicable.

[Default] $n = 0$, $m = 0$

[Reference] **GS C 1, GS C 2, GS C ;, GS c**

[Example] $n = 3, m = 0$ $n = 3, m = 1$ $n = 3, m=2$
         □□1   001   1□□

□ indicates a space

GS C 1 aL aH bL bH n r

[Name]   **Select count mode (A).**

[Format]

	ASCII	GS	C	1	aL	aH	bL	bH	n	r
	Hex	1D	43	31	aL	aH	bL	bH	n	r
	Decimal	29	67	49	aL	aH	bL	bH	n	r

[Range] $0 \leq \text{aL, aH} \leq 255$

       $0 \leq \text{bL, bH} \leq 255$

       $0 \leq \text{n, r} \leq 255$

[Description] Selects a count mode for the serial number counter.
      • *aL*, *aH* or *bL*, *bH* specify the counter range.
      • *n* indicates the unit amount when counting up or down.
      • *r* indicates the repetition number when the counter value is fixed.

[Notes]   • Count-up mode is specified when:
      $[aL + (aH \times 256)] < [bL + (bH \times 256)]$ and $n \neq 0$ and $r \neq 0$
      • Count-down mode is specified when:
      $[aL + (aH \times 256)] > [bL + (bH \times 256)]$ and $n \neq 0$ and $r \neq 0$
      • Counting stops when:
      $[aL + (aH \times 256)] = [bL + (bH \times 256)]$ or $n = 0$ or $r = 0$
      • Setting the count-up mode, the minimum counter value is $[aL + (aH \times 256)]$ and the maximum value is $[bL + (bH \times 256)]$. If the counting up reaches a value that exceeds the maximum, it resets to the minimum value.
      • Setting the count-down mode, the maximum counter value is $[aL + (aH \times 256)]$ and the minimum value is $[bL + (bH \times 256)]$. If the counting down reaches a value less than the minimum, it resets to the maximum value.
      • When this command is executed, the internal count that indicates the repetition number specified by *r* is cleared.

[Default]   aL = 1, aH = 0, bL = 255, bH = 255, n = 1, r = 1
[Reference]   **GS C 0, GS C 2, GS C ;, GS c**
[Example]

GS \ nL nH

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

[Format]

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

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

[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 **ESC T**:

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 **GS P**.

• The **GS P** 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]   **ESC $**, **ESC T**, **ESC W**, **ESC **, **GS $**, **GS P**
[Example]

GS C 2 nL nH

[Name]	**Set counter**				
[Format]	ASCII	GS C	2	nL	nH
	Hex	1D 43	32	nL	nH
	Decimal	29 67	50	nL	nH

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

[Description] Sets the serial number counter value.

• *nL* and *nH* determine the value of the serial number counter set by [*nL* + (*nH* $\times$ 256)].

[Notes] • In count-up mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C 1** or **GS C ;** it is forced to convert to the minimum value through **GS c**.

• In count-down mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C 1** or **GS C ;** it is forced to convert to the maximum value through **GS c**.

[Default] nL = 1, nH = 0

[Reference] **GS C 0, GS C 1, GS C ;, GS c**

[Example]

GS C ; sa ; sb ; sn ; sr ; sc ;

[Name]	**Select count mode (B)**										
[Format]	ASCII	GS C	;	sa ;	sb ;	sn ;	sr ;	sc ;			
	Hex	1D 43	3B	sa 3B	sb 3B	sn 3B	sr 3B	sc 3B			
	Decimal	29 67	59	sa 59	sb 59	sn 59	sr 59	sc 59			

[Range] $0 \leq sa, sb, sc \leq 65535$

$0 \leq sn, sr \leq 255$

These values are all character strings.

[Description] Selects a count mode for the serial number counter and specifies the value of the counter.

• *sa*, *sb*, *sn*, *sr* and *sc* are all displayed as ASCII characters using codes from '0' to '9'.

• *sa* and *sb* specify the counter range.

• *sn* indicates the unit amount for counting up or down.

• *sr* indicates the repetition number when the counter value is fixed.

• *sc* indicates the counter value.

[Notes] • Count-up mode is specified when:
$sa < sb$ and $sn \neq 0$ and $sr \neq 0$
• Count-down mode is specified when:
$sa > sb$ and $sn \neq 0$ and $sr \neq 0$
• Counting stops when:
$sa = sb$ or $sn = 0$ or $sr = 0$
• In setting count-up mode, the minimum value of the counter is *sa* and the maximum value is *sb*. If counting up reaches a value exceeding the maximum, it resets to the minimum value. If the counter value set by *sc* is outside the counter operation range, the counter value is forced to convert to the minimum value by executing **GS c**.
• In setting count-down mode, the maximum value of the counter is *sa* and the minimum value is *sb*. If counting down reaches a value less than the minimum, it resets to the maximum value. If the counter value set by *sc* is outside the counter operation range, the counter value is forced to convert to the maximum value by executing **GS c**.
• Parameters *sa* to *sc* can be omitted. If omitted, they remain unchanged.
• Parameters *sa* to *sc* cannot contain characters other than '0' to '9'.

[Default] sa = 1, sb = 65535, sn = 1, sr = 1, sc = 1
[Reference] **GS C 0, GS C 2, GS C 1, GS c**
[Example]

GS H 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] $0 \leq n \leq 3$, $48 \leq n \leq 51$

[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 **GS f**.
[Default]   n = 0
[Reference]   **GS f, GS k**
[Example]

GS I n (ONLY WITH SERIAL INTERFACE)

[Name]   **Transmit printer ID**
[Format]   ASCII   GS   I   n
                Hex   1D   49   n
                Decimal   29   73   n
[Range] $1 \le n \le 4, 49 \le n \le 52$
[Description]   Transmits the printer ID specified by *n* follows:

n	Printer ID	Specification
1, 49	Printer model ID	30H
2, 50	Type ID	See table below
3, 51	ROM version ID	Depends on ROM version (4 character)
4, 52	Printer version ID	See table below

n = 2, 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]

GS L nL nH

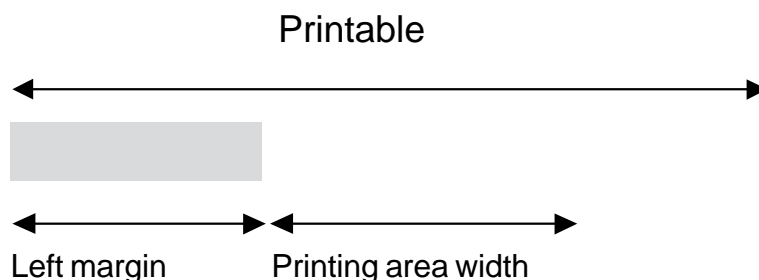| [Name]	**Set left margin**				
[Format]	ASCII	GS	L	nL	nH
	Hex	1D	4C	nL	nH
	Decimal	29	76	nL	nH

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

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

Printable

Left margin   Printing area width

[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 **GS P**. Changing the horizontal or vertical motion unit does not affect the current left margin.
• The **GS P** 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]   **GS P, GS W**
[Example]

GS P x y

[Name]	**Set horizontal and vertical motion units**			
[Format]	ASCII	GS	P	x	y
	Hex	1D	50	x	y
	Decimal	29	80	x	y

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

[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):

➊ **Commands using *x* :** ESC SP, ESC $, ESC \, GS L, GS W**.**

➋ **Commands using y :** ESC 3, ESC J**.**

• 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]   **ESC SP, ESC $, ESC \, ESC 3, ESC J, GS L, GS W**

[Example]

Œ GS V m, , GS V m n

[Name]   **Select cut mode**

[Format]   ➊   ASCII GS   V   m

Hex	1D	56	m
Decimal	29	86	m

➋   ASCII GS   V   m   n

Hex	1D	56	m	n
Decimal	1D	86	m	n
Decimal	29	86	m	n

[Range]   ➊   m = 0, 1, 48, 49
                 ➋   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 **GS P**.

[Default]
[Reference] **ESC i, ESC m**
[Example]

GS W nL nH

[Name]	**Set printing area width**

[Format]

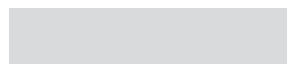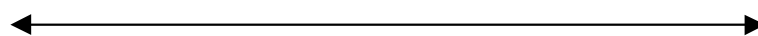|				
ASCII	GS	W	nL	nH
Hex	1D	57	nL	nH
Decimal	29	87	nL	nH

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

$0 \le nL + nH \times 256) \le 832$

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

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

<p align="center">Printable area</p>

Left margin   Printing area width

[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 **GS P**. Changing the horizontal or vertical motion unit does not affect the current left margin.

• The **GS P** 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]	**GS L, GS P**
[Example]	

GS ^ r t m

[Name]	**Execute macro**				
[Format]	ASCII	GS	^	r	t	m
	Hex	1D	5E	r	t	m
	Decimal	29	94	r	t	m

[Range]　　　　$0 \leq r, t \leq 255$

　　　　　　　$0 \leq m \leq 1$

[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]　**GS :**

[Example]

GS a n

[Name]	**Enable/Disable Automatic Status Back (ASB)**	
[Format]	ASCII	GS a
	Hex	1D 61 n
	Decimal	29 97 n
[Range]	$0 \leq n \leq 255$	
[Description]	Enables or disables ASB and specifies the status items to include, using *n* as follows :	

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	On-line/off-line status disabled.
	On	02	2	On-line/off-line status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-	-	-	Undefined

[Notes]	• If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
	• If all status items are disabled, the ASB function is also disabled.
	• If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission is possible at the first time from when the printer is turned on.
	• The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
	• Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
	• When the printer is disabled by **ESC =** (Select peripheral

device), the four status bytes are transmitted whenever the status changes.

• When using **DLE EO**T, **GS** I ll l, or **GS** r, the status transmitted by these commands and ASB status must be differentiated, according to the procedure in Appendix G, Transmission Status Identification.

• The status to be transmitted are as follows:

First byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off
1	Off	00	0	Not used. Fixed to Off
2	Off	00	0	Drawer kick-out connector pin 3 is LOW
	On	04	4	Drawer kick-out connector pin 3 is HIGH
3	Off	00	0	On-line
	On	08	8	Off-line
4	On	10	16	Not used. Fixed to Off
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed by using the PAPER FEED button.
	On	40	64	Paper is being fed by using the PAPER FEED button.
7	Off	00	0	Not used. Fixed to Off

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined
1	-	-	-	Undefined
2	-	-	-	Undefined
3	Off	00	0	No auto cutter error
	On	08	8	Auto cutter error occurred
4	Off	00	0	Not used. Fixed to Off
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred
7	Off	00	0	Not used. Fixed to Off

Bit 3:If these errors occur due to paper jams or the like, it is possible to recover by **correcting the cause of the error and executing DLE ENQ n** ($1 \leq n \leq 2$). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.

Bit 6:When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open during printing, bit 6 is On.Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0,1	Off	00	0	Paper roll near-end sensor; paper adequate.
	On	03	3	Paper roll near-end sensor; paper near end.
2,3	Off	00	0	Paper roll sensor; paper present.
	On	0C	12	Paper roll sensor; paper not present.
4	Off	00	0	Not used. Fixed to Off
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0-3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off

[Default] $n = 0$ when DIP SW 2-1 is off, $n = 2$ when DIP SW 2-1 is on.
[Reference]   **DLE EOT, GS r**

GS c

[Name]	**Print counter**		
[Format]	ASCII	GS	c
	Hex	1D	63
	Decimal	29	99

[Description]   Sets the serial counter value in the print buffer and increments or decrements the counter value.

[Notes]   • After setting the current counter value in the print buffer as print data (a character string), the printer counts up or down based on the count mode set. The counter value in the print

buffer is printed when the printer receives a print command or the buffer is full.
- The counter print mode is set using **GS C 0**.
- The counter mode is set using **GS C 1** or **GS C ;**.
- In count-up mode, if the counter value set by this command goes out of the counter operation range set by **GS C 1** or **GS C ;** it is forced to revert to the minimum value.
- In count-down mode, if the counter value set by this command goes out of the counter operation range set by **GS C 1** or **GS C ;** it is forced to revert to the maximum value.

[Default]
[Reference]   **GS C 0, GS C1, GS C 2, GS C ;**
[Example]

GS f n

[Name]	**Select font for HRI characters**
[Format]	ASCII GS f n
	Hex 1D 66 n
	Decimal 29 102 n
[Range]	n = 0, 1, 48, 49
[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 **GS H**.

[Default]   n = 0
[Reference]   **GS H, GS k**
[Example]

GS h n

[Name]	**Set bar code height**			
[Format]	ASCII	GS	h	n
	Hex	1D	68	n
	Decimal	29	104	n

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

[Description]   Sets the height of the bar code.
                      n specifies the number of vertical dots.

[Notes]

[Default]   n = 162 (20.25 mm)

[Reference]   **GS k**

[Example]

Œ GS k m [d1…dk] NUL   ,   GS k m n [d1…dn]

[Name]	**Print bar code**				
[Format]	① ASCII	GS	k	m	NUL
	Hex	1D	6B	m	00
	Decimal	29	107	m	0
	② ASCII	GS	k	m	n
	Hex	1D	6B	m	n
	Decimal	29	107	m	n

[Range]   ① $0 \leq m \leq 20$
                      ② $65 \leq m \leq 90$

[Description]   Selects a bar code system and prints the bar code.
                      m selects a bar code system as follows:

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

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

[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 **ESC 2** or **ESC 3**.
• 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.
• The printer 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

[Default]
[Reference]   **GS H, GS f, GS h, GS w**
[Example]

GS r n

[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 **ESC v**).
                2, 50   Transmits drawer connector status (as for **ESC u 0**).

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] **DLE EOT, ESC u, ESC v**

[Example]

GS v 0 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] $0 \leq m \leq 3$, $48 \leq m \leq 51$

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$ ($1 \leq xL + xH \times 256 \leq 65535$)

$0 \leq yL \leq 255$

$0 \leq yH \leq 8$ ($1 \leq yL + yH \times 256 \leq 2047$)

$0 \leq d \leq 255$

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

(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.

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

• 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.

• If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the mini- mum width only on the line in question. The minimum width means 1 dot in normal (m=0, 48) and double-height (m=2, 50), 2 dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.

• Data outside the printing area is read in and discarded on a dot-by-dot basis.

• The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is not a mul- tiple of 8, print speed may decline.

• The **ESC a** (Select justification) setting is also effective on

raster bit images.

• When this command is received during macro definition, the printer ends macro definition, and begins executing this command. The definition of this command should be cleared.

• d indicates the bit image data. Set time a bit to 1 prints a dot and setting it to 0 does not print a dot.

X = xL + xH x 256

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

[Reference]
[Example]

GS w 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]   **GS k**
[Example]

GS | n

[Name]	**Set printing density**
[Format]	ASCII GS	n
	Hex 1D 7C n
	Decimal 29 124 n
[Range]	$0 \le n \le 12$, $48 \le n \le 57$, $65 \le n \le 67$
[Description]	Sets printing density.

n specifies printing density as follows:

n	Printing density
0, 48	- 50%
1, 49	- 37.5%
2, 50	- 25%
3, 51	- 12%
4, 52	Normal
5, 53	+ 12.5%
6, 54	+ 25%
7, 55	+ 37.5 %
8, 56	+ 50%
9, 57	+ 62.5 %
10, 65	+ 75%
11, 66	+ 87.5 %
12, 67	+ 100%

[Notes]	• Printing density reverts to the default value when the printer is reset or turned off.
[Default]	n = 4
[Reference]	
[Example]	

GS ~ n

[Name]	**Set superscript/subscript**
[Format]	ASCII GS ~ n
	Hex 1D 7E n
	Decimal 29 126 n
[Range]	n = 0, 1, 48, 49
[Description]	Sets superscript or subscript character position.

n specifies the position as follows:

n	Function
0, 48	Subscript character position
1, 49	Superscript character position

[Notes] • This command is executed if there are characters of different height on the same line.

[Default] n = 0

[Reference] **ESC !, GS !**

[Example]

GS - n

[Name] **Set printing speed**

[Format]
ASCII	GS	-	n
Hex	1D	F0	n
Decimal	29	240	n

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

[Description] Sets printing speed.
n specifies the printing speed as follows:

n	Printing speed
0	Low
1	Normal
2	High

[Notes] • Printing speed reverts to the default value when the printer is reset or turned off.

[Default] n = 1

[Reference]

[Example]

GS ± n

[Name]	**Set current consumption in printing**
[Format]	ASCII GS ± n
	Hex 1D F1 n
	Decimal 29 241 n
[Range]	$0 \le n \le 2$
[Description]	Sets current consumption in printing.
	n specifies the absorption as follows:

n	Absorption in printing
0	Low (256 maximum dots ON at the same time - 2A rms)
1	Normal (512 maximum dots ON at the same time - 3A rms)
2	High (832 maximum dots ON at the same time - 5A rms)

[Notes]	• The medium current in printing is indicated with 50% dots ON.
	• The current absorption in printing reverts to the default value when the printer is reset or turned off.
[Default]	n = 1
[Reference]	
[Example]	

GS ÷

[Name]	**Ticket align at the first printing line**
[Format]	ASCII GS ÷
	Hex 1D F6
	Decimal 29 246
[Description]	This command searchs a paper notch and then align the ticket at the first printing line.
[Notes]	
[Reference]	**GS 0xF8**
[Example]	

GS °

[Name]	**Ticket align at cut**		
[Format]	ASCII	GS	°
	Hex	1D	F8
	Decimal	29	248

[Description]   This command searchs a paper notch and then align the ticket at cut.

[Notes]

[Reference]   **GS 0xF6**

[Example]

4.1 TECHNICAL DATA

The main technical features of this printer model are listed in Table 4.1.

(Tab.4.1)

Resolution	200 DPI (8 dot/mm)
Paper roll dimensions	111.5/79.5 mm ± 0.5mm Ø80 mm ± 0.5mm
Sensors	Paper out, cover open, head temperature
Print method	Thermal fixed head (8 dot/mm)
Print direction	Normal, 90°, 180°, 270°
Print formats	Height/width from 1 to 8, expanded, negative, underlined, script.
Character fonts	PC437, PC850, PC860, PC863, PC865, PC858 (euro).
Available communication interfaces	RS232, RS485/422/TTL
Driving's device	Cash Drawer
Baud rate	From 1200 to 115200 bps
Reception buffer	From 16 bytes to 8 Kbytes
Flash memory	256 Kbytes
Graphic memory	1 logo of 832 x 630 dots
Printing speed (dotline/sec)	680 (Speed/Quality=normal)
Power supply	24 Vdc +/- 10%
Absorption	1.5A
Environmental conditions	
Operating temperature	0 °C – 50 °C
Relative humidity	35% – 85% w/o condensation
Storage temperature/humidity	-20 °C – +70 °C / 10% – 90%
Options	Centronics
Dimensions	242mm x 186mm x H132mm
Weight	1.8 Kg

ESC/POS™ emulation			
Paper from 112 mm	**11 cpi**	**15 cpi**	**20 cpi**
Number of columns	42	64	80
Characters / sec	892	1360	1700
Lines / sec	21.25	21.25	21.25
Paper from 80 mm	**11 cpi**	**15 cpi**	**20 cpi**
Number of columns	32	42	56
Characters / sec	680	892	1190
Lines / sec	21.25	21.25	21.25
Character (W x H mm)			
Normal	2.3 x 3	1.7 x 3	1.2 x 3
Double height	4.6 x 3	9.4 x 3	2.4 x 3
Double width	2.3 x 6	1.7 x 6	1.2 x 6
Double height and width	4.6 x 6	3.4 x 6	2.4 x 6
Quadruple width	3.2 x 3	6.8 x 3	4.8 x 3
Quadruple height	2.3 x 12	1.7 x 12	1.2 x 12
Quadruple height and width	9.2 x 12	6.8 x 12	4.8 x 12

4.2 DIMENSIONS

Figure 4.1 illustrates the overall dimensions for the tabletop printer.

(Fig.4.1)
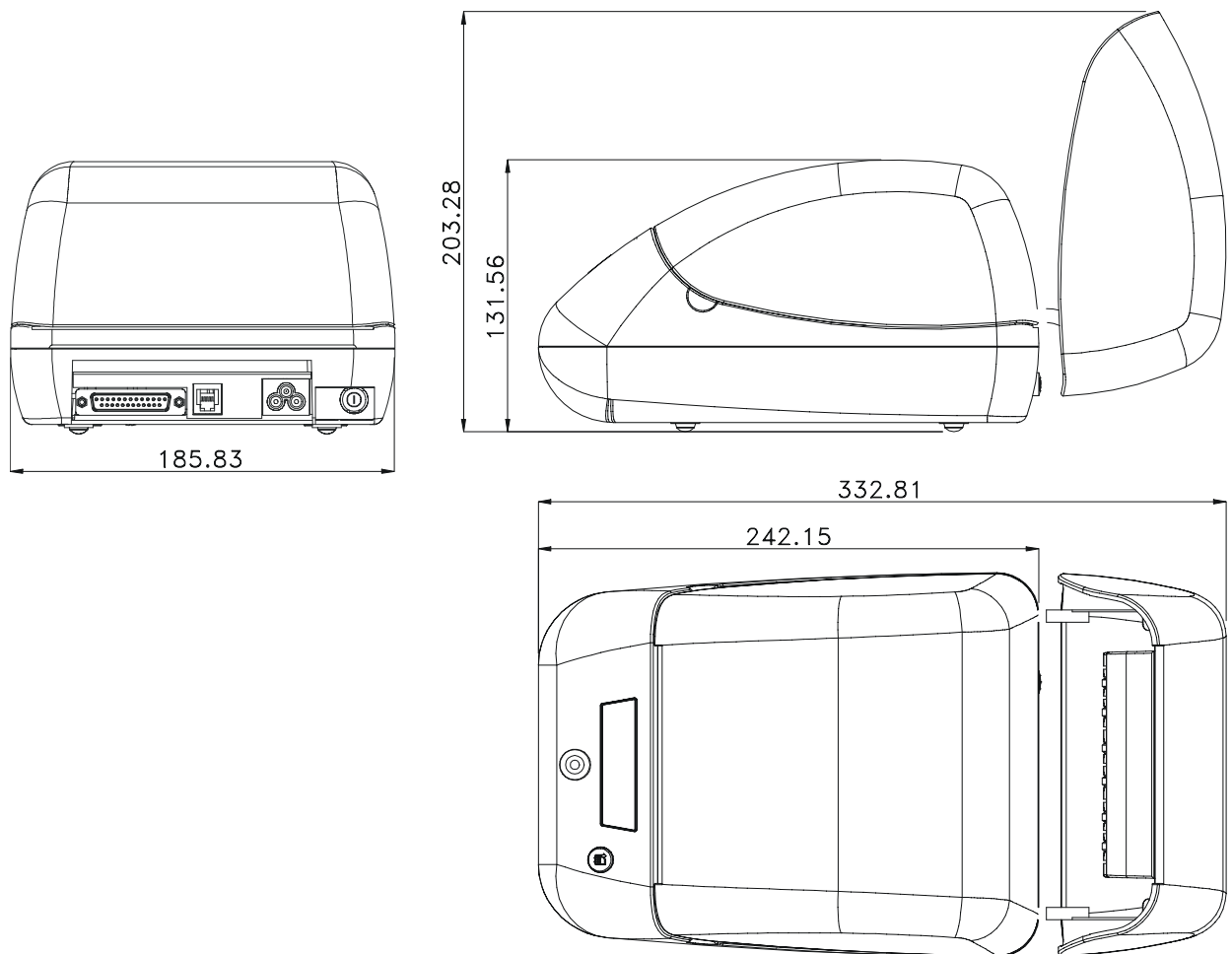
5.1 CHARACTER SETS

The printer has three font of different width (11 cpi, 15 e 20 cpi), which can be called up through the programming (paragraph 1.2) or through the control characters (paragraph 3.2). Each of these font has the following code table : PC437, PC850, PC860, PC863, PC865, PC858.
In 5.1 and 5.2 figures are shown the examples of 11 cpi of width.

FONT 11 cpi

PC437
(Usa, Standard Europe)

PC850
(Multilingual)

PC860
(Portuguese)

PC863
(Canadian-French)

(Fig.5.1)

PC865
(Nordic)

PC858
(Euro symbol)

(Fig.5.2)

For printing Euro symbol (€), the command sequence is:
1B, 74, 13, D5 (see Chapter 3).

A.1 TICKET ALIGNMENT

A.1.1 Ticket alignment

Paper stock with alignment marks is permitted so that tickets of a fixed length or with pre-printed areas may be utilized.
To guarantee proper alignment, the "Notch alignment" parameter must be enabled under setup using the keys (see: setting configuration parameters) and the alignment sensor must be calibrated.

A.1.2 Alignment sensor calibration

Calibration is required for precise definition of the PWM duty-cycle of the alignment sensor driver so that it can be adapted to the type of paper stock being utilized (e.g., stock with colored background) and so that the black mark will be detected as it passes over the sensor.
In the printer, if the "Notch alignment" parameter has been enabled under setup using the keys (see: setting configuration parameters), sensor calibration is performed automatically and, when complete, a receipt will be printed out as shown in Fig. A.1, indicating the PWM value detected and the signal calibration threshold.
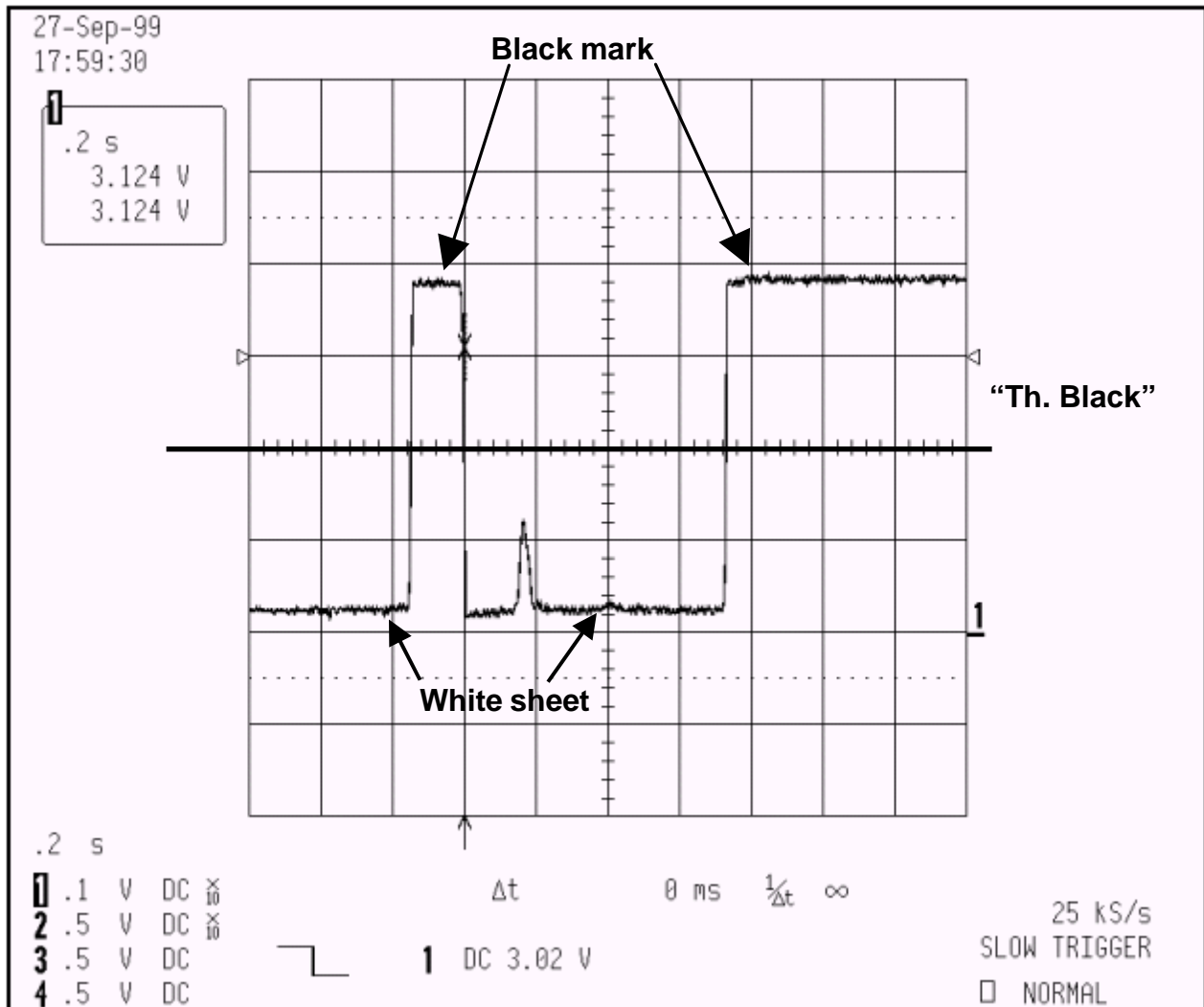
```
* NOTCH AUTOSET *

PWM duty cicle          : 14 %

Th. Black               : 3.5V
```
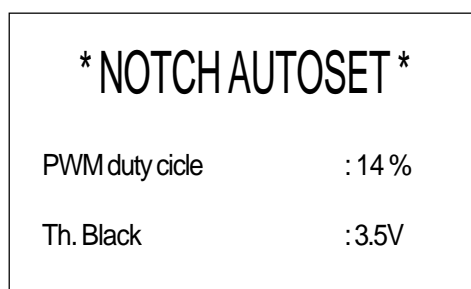
(Fig.A.1)

The "Th. Black" threshold indicates the voltage level above which the paper stock is considered black. "Th. Black" is utilized during the alignment phase and identifies the voltage above which the sensor is considered to be over the mark.

The figure A.2 illustrates the feed travel of a ticket passing under the sensor. Note the points at which the ticket is considered white and where the black mark is detected.

(Fig.A.2)