

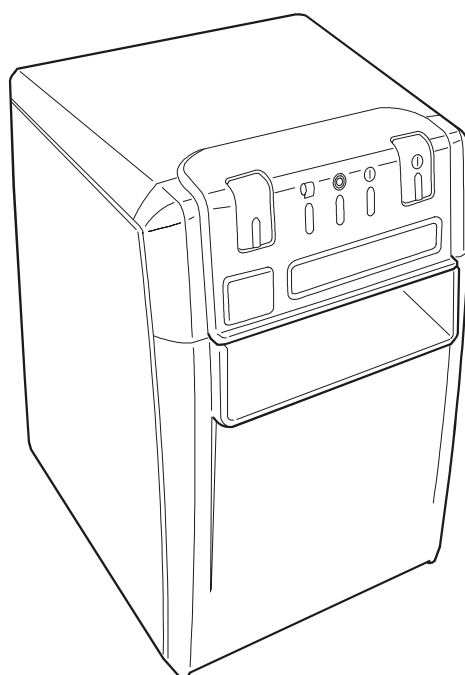
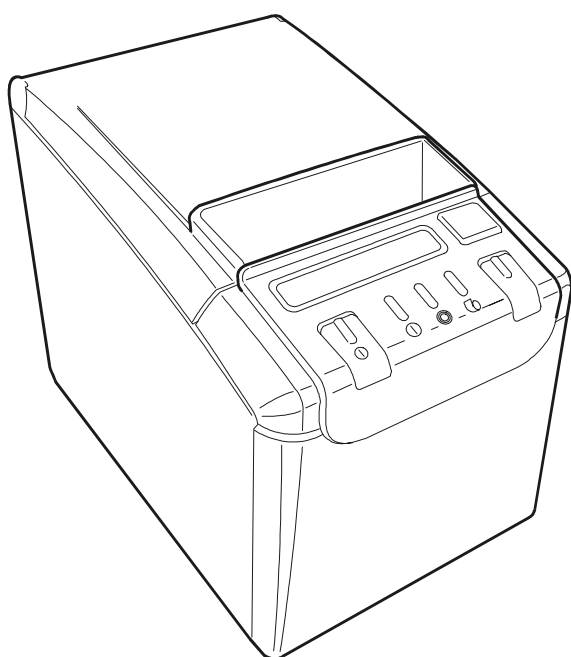
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**PRINTER**

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# **PRT 100**

**PROGRAMMER'S MANUAL**



**olivetti**

**PUBBLICAZIONE EMESSA DA:**

**Olivetti Tecnost, S.p.A.**

Documentazione

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# 1 Printer Characteristics

## 1.1 Introduction

This single-station (receipt only) thermal printer is addressed to the retail market. Widely used in the restaurant scenario, this printer model is also highly suitable for a number of other applications ranging from newspaper agents to department stores, specialty stores and certain supermarkets.

Among the outstanding features this receipt-only printer model has to offer is a ClamShell-type opening (for simplified paper roll loading), a very small footprint, an incorporated cutter the possibility of dual-color printing, an interchangeable interface slot and a drawer kick-out connector.

The printer can be installed vertically (so the paper is output frontward) or horizontally (so the paper is output upwards).

The following options are available:

- a. Slot pluggable interfaces:
  - 1. RS232 C serial (female 25-pin connector)
  - 2. RS232 C serial (female 9-pin connector) with RJ display connector
  - 3. USB with RJ display connector
  - 4. Bi-directional PARALLEL
- b. Wall mounting bracket (vertical position)
- c. Kit for using 58 and 60 mm wide paper rolls
- d. Spill resistance cover (available on specific request)

## 1.2 Main functional modules

The printer is made up of the following main modules:

- printing module
- cutter
- base board
- Slot pluggable interface
- external power supply

### 1.2.1 Printing module

The thermal printer module prints directly on thermal paper. It is equipped with a single 72 mm optimized thermal printhead with the following characteristics:

– Heat Element Structure	2 Heaters/dot
– Number of Heat Elements	576 dots
– Heat Element Pitch	0.125 mm (8.0 dots/mm)
– Print Width	72 mm + 0.2 mm
– Average Resistance Value	800 $\Omega$ + 3 %

It prints horizontally at 203 dpi (8 dots/mm).

The printing module has the following electronic sensors:

- **Near end of paper**
  - Detection method: microswitch
  - Almost out of paper detection adjustment: Via adjustment lever  
When the diameter of the paper on the roll is nearly reaching the core, the sensor detects the almost out of paper condition and lights up a yellow LED on the operator console. If the sensor is enabled (by ESC c 4), printing is interrupted.
    - Suggested paper roll core diameter is:  
internal 12.7 mm ( 0.5")  
external 17.7 mm ( 0.7")
- **Paper detection sensor**
  - Detection method: photosensor
  - The paper detection sensor is installed on the paper path and detects the presence of the paper when its light rays are beamed back by the paper installed. This photosensor is adjusted via console (refer to the adjustment procedure).  
The flashing of a yellow LED on the operator console signals the out of paper condition.
- **Cover Open**
  - Detection method: photosensor

This sensor automatically interrupts printing when the cover is opened. Close the cover to restore the normal operating conditions.

### 1.2.2 Cutter

- Cutting method: rotating blades.
- Type of cut: partial (an uncut border of 3.5 mm remains on the right-hand side if the printer is installed horizontally, on the left-hand side if it installed vertically).
- The receipt can also be cut manually by the operator.

The cutter mechanism is equipped with a photosensor that detects the home position of the cutter blades when the printer is powered on and after the cutting of the receipt. If the cutter blades are not repositioned correctly to their home position, the red Error LED on the console will begin to flash.

### 1.2.3 Base board

- Slot interface: Bus 16 bit
- CPU: H8S – 2633 clock 14.7456 MHz
- Programmable gate array: XILIMX XC25 Spartam 2
- RAM Base: 64Kx16 byte
- FirmWare: Flash 2 M byte
  - 1 Mb code
  - 1 Mb Login

### 1.2.4 Pluggable interface

Four different interface cards can be installed on the printer.

Slot pluggable interfaces:

1. Serial RS232 C (female 25 pin connector)
2. Serial RS232 C (female 9 pin connector) with RJ display connector
3. USB with RJ display connector
4. PARALLEL bi-directional

### 1.2.5 External power supply

- Switching type
- Input voltage: 110 – 220 Vac
- Output voltage: 24 Vdc

### 1.3 Paper Specifications

Type of paper:	Thermal
Format	Paper roll
Roll diameter	Max 100 mm
Paper width	80 $\pm$ 0.5 mm (3.15") standard 58-60 $\pm$ 0.5 mm (2.26-2.36") optional
Paper thickness	60 to 90 $\mu$ m
Suggested paper types:	
• Monochrome thermal paper	KF30D Kanzan
• Dual-color thermal paper	TBD

**Note:**

To avoid damaging the printhead and obtain an optimum print quality, it is suggested to use the thermal paper specified above or an equivalent type.

Dual-color printing can be obtained in two ways when using the dual-color thermal paper:

1. Via Set-up.
2. By running the **GS ( E** function 3 command.

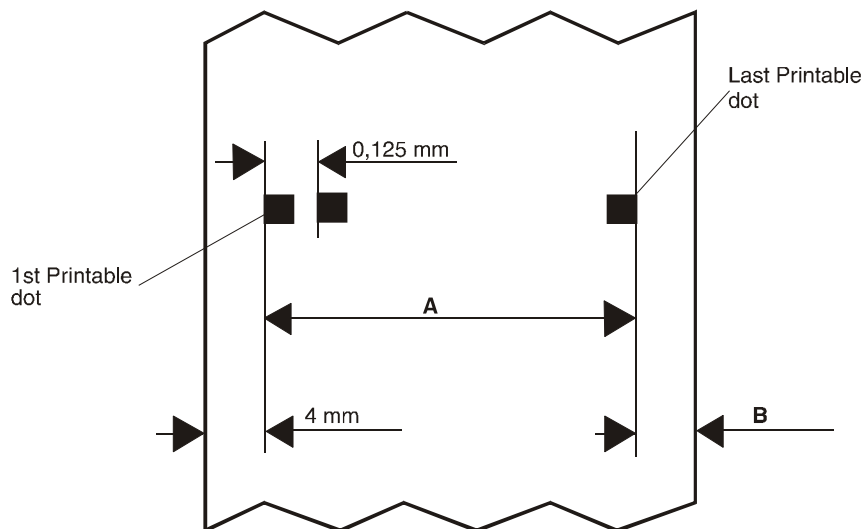
## 1.4 Printing specifications

Printing method	Direct thermal
Printing resolution	203 x 203 dpi (8 dot x mm)
Basic line feed	203" (1 step)
Colors	1 / 2
Max. printing speed	200 mm/sec
Fonts	10 x 19 / 13 x 27
Characters per inch	20 cpi (10 x 19 font B) / 15 cpi (13 x 27 font A)
Character size	1.26 x 2.39 mm / 1.69 x 3.38 mm (W x H)
Character sets	95 alphanumeric, 37 international, 128 x 10 graphic symbols
Data buffer	4 KB or 45 bytes
User Flash memory	384 KB
Max. no. of user logotypes	8192 (restricted to the memory available, 384 Kbytes)
Logotype resolution	Emulation: 180 x 180 dpi (printing 203 x 203 dpi)
Max. printing field	72 mm / 576 dots
Max. paper width	80 mm
Max. paper roll diameter	100 mm

### 1.4.1 Printable area

#### 80 mm wide paper

Paper width (mm)	Fonts	Chars per line	Dots per line	Right margin (B ± 0.5 mm)	Printable area (A ± 0.5 mm)
80	Font A (11+2)	42	546	7.7	68.3
	Font B (9 + 1)	56	560	6	70.0
	BIM		512	10	64.0
60	Font A (11+2)	32	416	4	52.0
	Font B (9 + 1)	42	470	3.5	52.5
	BIM		384	8	48.0
58	Font A (11+2)	30	390	5.3	48.7
	Font B (9 + 1)	40	400	4	50.0
	BIM		360		45.0



NOTE: To improve the reliability of the printhead, the printable area shifts one dot horizontally for each receipt that is automatically cut.

This automatic shift feature cannot be disabled and is performed cyclically every 8 receipts.

After 8 receipts cut automatically, the total displacement of the printable area will be 1 mm.

Upon completion of the 8 receipts, the printable area (1<sup>st</sup> printable dot) starts again from the original position (left margin = 4 mm).

## 1.4.2 Character specifications

- **Number of characters**  
Alphanumeric characters 95  
International characters 37
- **Character structure**  
Font A (11+2) 13 (columns) x 27 (lines)  
Font B (9 + 1) 10 (columns) x 19 (lines)  
The font to be used can be selected by means of a specific line command (**Esc \$ f N**) or by choosing the related Setup option.
- **Character size**  
Font A W 1.692 mm H 3.384 mm  
Font B W 1.269 mm H 2.397 mm

## 1.4.3 Printing speed

Monochrome alphanumeric printing	200 mm/sec
BIM up to 2" printing	70 mm/sec
BIM more than 2" printing	70 mm/sec

**Note:**

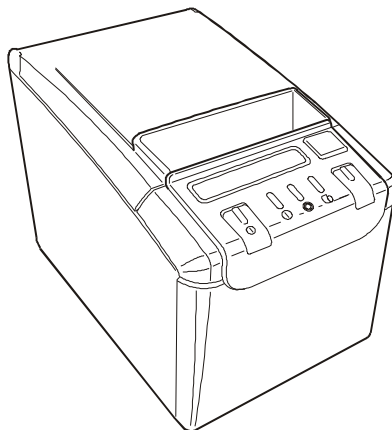
A slow transmission speed can be the cause of intermittent printing.

## 1.5 Physical and electrical characteristics

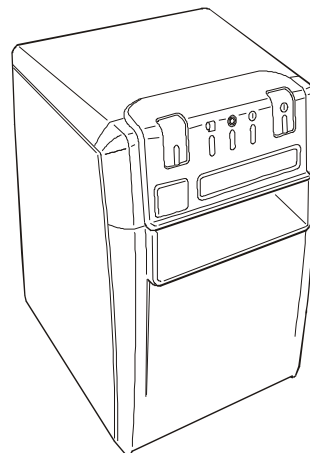
### 1.5.1 Physical characteristics

Width:	140 mm
Depth:	217 mm
Height:	157 mm
Weight:	1.9 Kg

Horizontal installation



Vertical installation



### 1.5.2 Electrical characteristics

Power supply voltage	24 Vdc +20% -10%
Stand-by	TBD
During printing	TBD
During receipt cutting	TBD

### 1.5.3 External power supply unit

The external power supply unit is equipped with an Epson-compatible connector.

All the voltages of the product's reference markets are supported and therefore this multi-range power supply unit can also support high operational tolerances.

Working temperatures:	0 – 40 °C
Input voltage range:	90 – 264 Vrms
Input frequency range:	47 – 63 Hz
Output voltage:	24 Vdc + 5%.
Output Power max:	72 W
Peak Power max:	76W for a Tonmax = 1.5mS with a Period of 2mS (Duty Cycle = 0.766)

### 1.5.4 Drawer driver and Display connector

A drawer connector is resident on the base board.

Slot-pluggable Interface boards (9-pin RS 232 and USB) are available with **Display connector**.

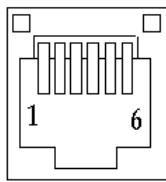
For the drawer opening driver specifications see **Drawer driver**.

For the display specifications see the section **Output connector**.

**Note:** The display works if first the parameter "DISPLAY: ENABLED" is selected via **setup** (see paragraph PRINTER SETUP).

### 1.5.5 Drawer driver

**Output connector:**



- 1 Frame ground
- 2 Drawer kick-out drive signal
- 3 Drawer open/close signal
- 4 + 24 V
- 5 Drawer kick-out drive signal
- 6 Signal ground

The driver for the drawers controls two solenoids and a drawer open/closed sensor, with the following characteristics:

Resistance of solenoids	24 ohm min
Output voltage	24 volts
Current	1 amp max.
Printer side connector	Molex 52065-6615

#### Drawer drive signals

Output signals: approximately +24V

Maximum current: 1A

The timing of the drive signals for drawers 1 and 2 can be controlled via software using the **ESC p m n1 n2** with the following parameters:

**m** = 0 drive signal pin 2

**m** = 1 drive signal pin 5

**n1** x 2 msec defines the ON timing (for details refer to the SW commands)

**n2** x 2 msec defines the OFF timing.

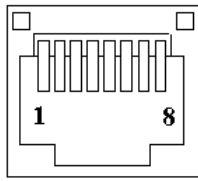
#### Warning:

To prevent an overcurrent condition, the drawer solenoid must have a resistance of 24 Ohms or greater.

#### Note:

- To connect the drawer, use a shielded cable.
- The two drive transistors should not be energized simultaneously. Use pin 4 to power the drawer.
- The resistance of the drawer solenoid must not be below the specified value otherwise an overcurrent could damage this component.

### 1.5.6 Display output connector



- 1 Safety ground
- 2 Transmit data to print
- 3 Receive data from printer
- 4 Indicates whether the printer can receive data or not
- 5 Indicates whether the display can receive data or not
- 6 Signal ground
- 7 Power supply terminal
- 8 Power supply retrace line

**Note:** The signal Transmitted Data (pin 2) is not connected; the signal Data Set Ready (pin 4) is always in ON state, by means of a pull-up resistor.  
For this reason, both signals are not included in the printer display data exchange.

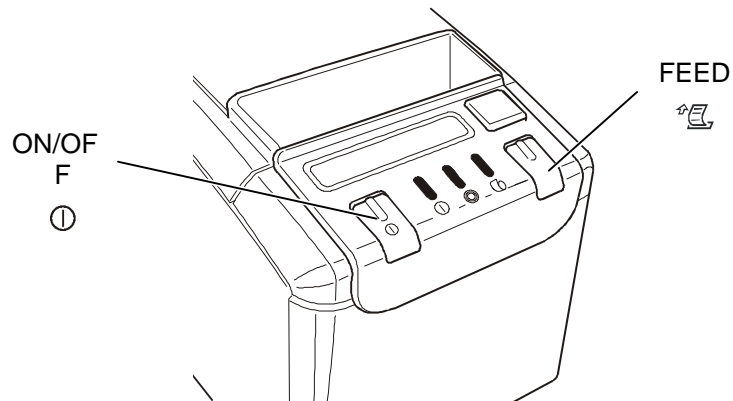
## 1.6 SOFTWARE COMPONENTS AND TOOLS

The software includes the following components:

- **Printer Driver:** Standard Windows printer driver.
- **Opos:** A standard component that enables other components to use the printer. It includes:
  - Opos for POS printers
  - Opos for Cash Drawer
  - Opos for Line Display
- **Resource Kit:** A set of utilities required for printer management. It includes:
  - Configuration Manager:
  - Firmware downloader
  - Setup
  - Logo downloader
- **POS-RKserver:** DCOM component (to drive and program the printer remotely using the Resource Kit).
- **Demo:** Demo program
- **Installation Kit:** for installing the program.

## 2 Control Panel

The printer's control panel consists of three LEDs and two buttons.



### 2.1 Buttons

The following table indicates the functions of the buttons on the control panel:

<b>ON/OFF</b>	<ul style="list-style-type: none"><li>Press once to power on the printer.</li><li>With the printer powered on, press for more than 2 seconds to power it off.</li></ul>
<b>FEED</b>	<ul style="list-style-type: none"><li>Press once to advance the paper one line feed.</li><li>Press and hold down to advance the paper continuously.</li></ul> <p>Press while powering on the printer to activate the Self-test.</p>

The buttons on the control panel also have other functions. Refer to the chapter entitled Printer Setup.

### 2.2 LEDs

There are three LEDs on the console, indicating respectively:

<b>LED 1 (P-ON)</b>	Off	Printer powered off
	On Green	Printer powered on and on-line.
	Flashing Green	<ul style="list-style-type: none"><li>Printhead overheated.</li><li>Printer busy.</li></ul>
<b>LED 2 (ERR)</b>	Off	The printer is in its normal operating condition
	On Red	Signals the following error conditions: <ul style="list-style-type: none"><li>Paper jam.</li><li>Cutter lock</li><li>Printer failure.</li></ul>
<b>LED 3 (ROLL)</b>	Off	Printer loaded with paper.
	On Yellow	Printer in almost out of paper condition.
	Flashing Yellow	Printer in out of paper condition.

### 3 Printer Set-up and Self printing modes

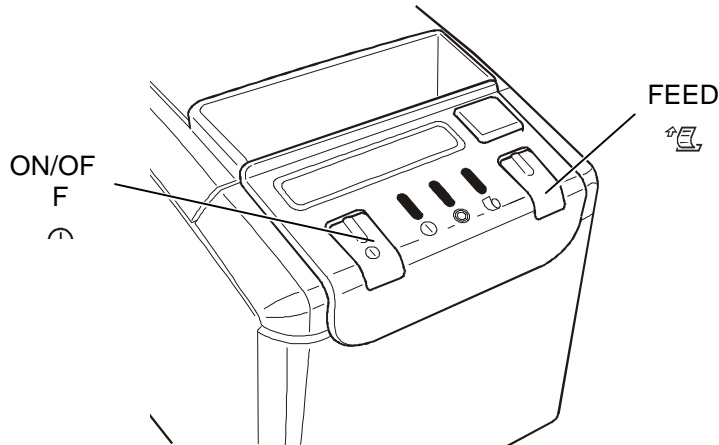
#### 3.1 Introduction

The PRT 100 printer can print in the Self-Test mode, can be configured in the Set-up mode and can print the characters received from the host in Hex Dump (hexadecimal coding) mode.

To access these modes, set the printer accordingly in the Printer Configuration Menu by proceeding as explained below.

#### 3.2 Printer Configuration Menu

Proceed as follows to access the printer configuration menu.



1. Printer powered off.
2. Power on the machine by pressing and holding down the **[ON/OFF]** button. Then simultaneously press the **[FEED]** button and keep both buttons pressed until all the LEDs light up.
3. Release both buttons.
4. The machine prints the following menu.

```
0 Self-test
1 Set-Up
2 Hex Dump
```

The number printed alongside the printer menu option indicates the number of times the **[ON/OFF]** button must be pressed to access the required environment.

5. Press the **[FEED]** button to confirm your choice and activate the procedure



3.3.1 SET-Up

The printer's setup is used to access the factory configuration parameter settings. These parameters are already programmed according to some predefined values (or those already set at factory level) and are used to provide special applications on the machine or the option that has already been installed. The parameters used in the printer setup may be altered in order to print according to user needs.

Provided below is information on the Setup mode.

- To access printer setup, press the **[ON/OFF]** button.
- Press the **[FEED]** button to confirm your choice and activate the procedure

The printer is now in setup mode and therefore prints some data including the list of the setup parameters and the values that were previously set (not necessarily the initial ones), the description of the two console buttons, and the first of the three menus available.

BOOT REL. 4.Hw VER. 001 FW Rel. 4.HwB Ver. 002		Set-up parameters and relative values
EMULATION : TM-T88 III BIT:8 BAUD:38400 STOP:1 PARITY:NONE HANDSHAKE:DTR RX ERROR:PRINT ? NATION:CP 437 CPI:15 CUTTER:YES DENSITY: 0 COLOR:MONOCHROME DISPLAY:DISABLE AUTO LF:NO RECEIVE BUFFER:4096 BUSY OFFLINE:YES		
CONSOLE KEY FUNCTIONS:		Description of button functions
ON/OFF key    NEXT ITEM FEED key      SELECTS THE ITEM		
I/O		

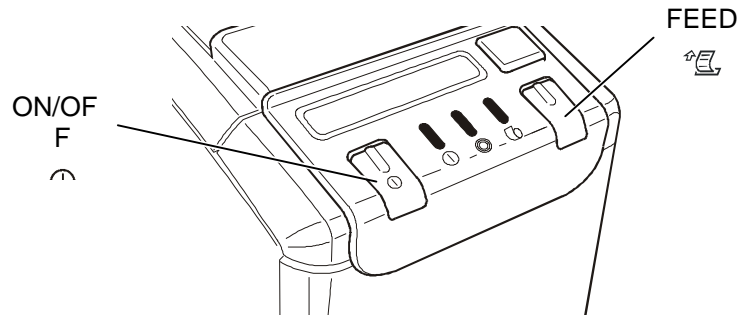
Now, you can start programming the printer and modifying the setup parameters according to your needs (see later sections)

### 3.3.2 Button Functions in the Setup Mode

The control panel buttons have the following functions in the Setup mode:

**[ON/OFF]** Prints the next parameter of the item selected or the next item of the menu

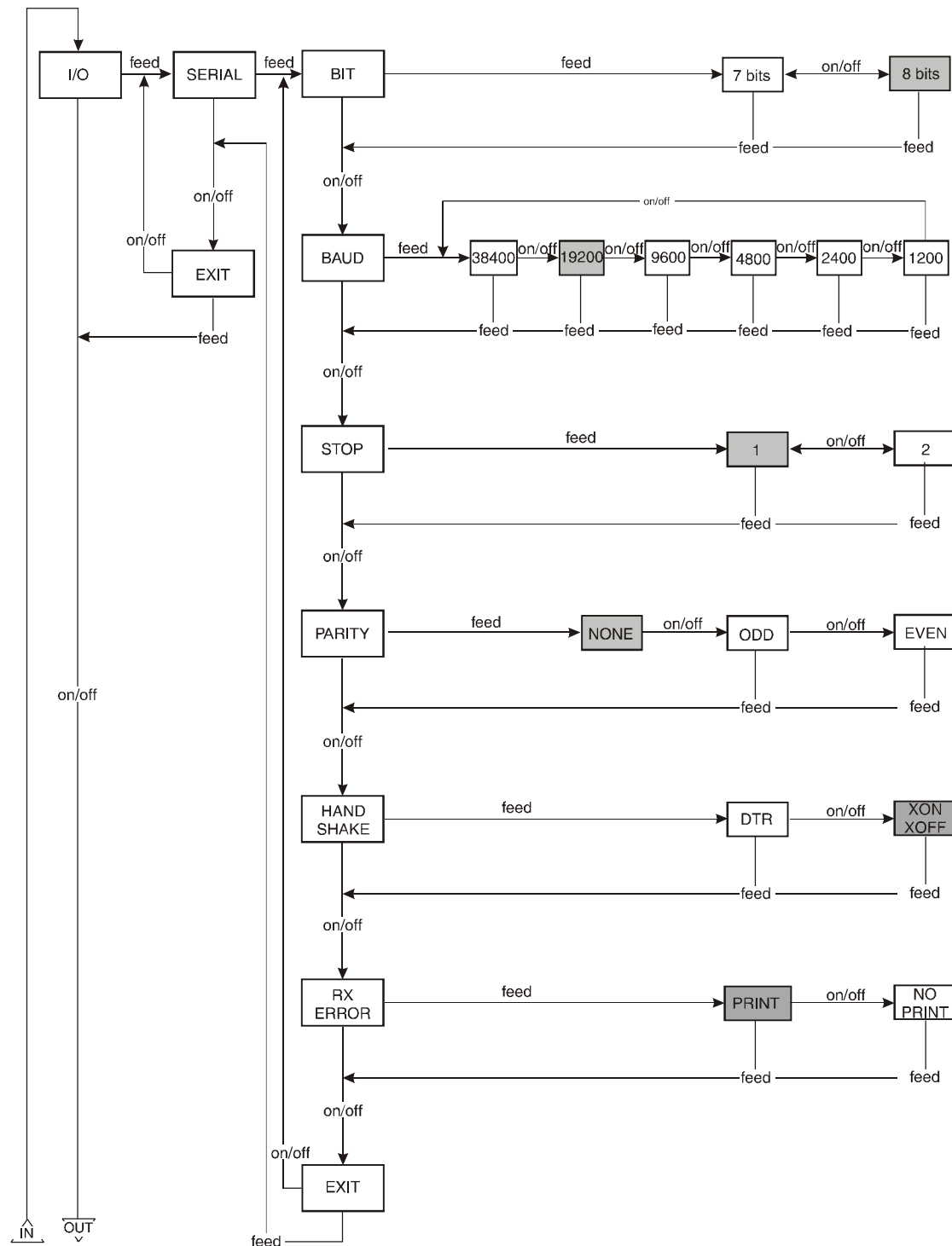
**[FEED]** Confirms selection of the last item or parameter printed; prints the first parameter of the item selected or the next item of the menu

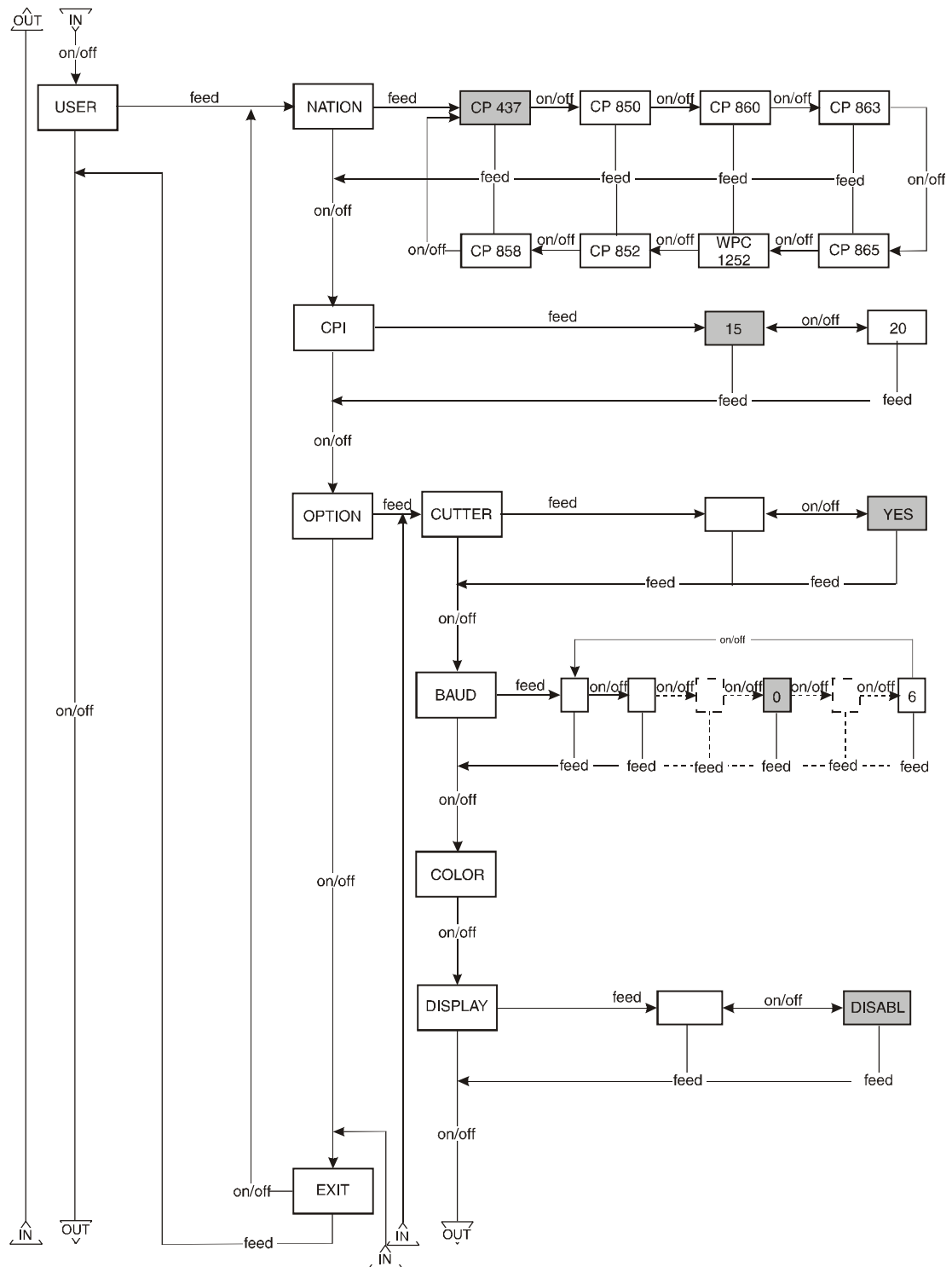


### 3.3.3 Navigating through Printer Setup

#### 3.3.3.1 Flow Chart

The following flow chart shows how to navigate through printer setup. The factory defaults are enclosed in gray boxes.







### 3.3.4 Notes and Meaning of the Parameters

The setup parameters that follow are in alphabetical order to simplify consultation.

The values in bold are the factory default values.

I/O	Interface menu (Input/Output)
SERIAL	Serial interface parameters menu selection.
BIT: 7, <b>8</b>	Data format, 7 or 8 bits.
BAUD: 1200, 4800, ..., <b>38400</b>	Data transmission/reception rate.
STOP: <b>1</b> , 2	Number of stop bits.
PARITY: <b>NONE</b> , ODD, EVEN	Parity control type.
HANDSHAKE: <b>DTR</b> - XON/XOFF	Data handshaking protocol
RX ERROR: <b>PRINT ?</b> , IGNORED	Data receive error: print a "?" or ignore.
NATION: <b>437</b> , 850 ...	Character set national variants
CPI: <b>15</b> , 20	Print pitch selection, expressed as a number of characters per inch.
CUTTER: <b>YES</b> , NO	Cutter: (NO:disable - YES:enable)
DENSITY: -7, -6, ..., <b>0</b> , 1, ..., 7	The print density
DISPLAY: <b>DISABLE</b> , ENABLE	ENABLE: printer ready to receive data DISABLE: printer not ready to receive data
AUTO LF: <b>NO</b> , YES	Auto line feed: (NO:disable – YES:enable)
RECEIVE BUFFER: <b>4096</b> , 42	The receive buffer in byte.
BUSY OFFLINE: <b>YES</b> - NO	The printer is BUSY if it is: - off-line or in receive buffer full (YES); - only in receive buffer full (NO).
PRINT	Print the current setup parameters.
SAVE & EXIT	Stores the pre-settings selected in the current SET-UP section.and exit
DEFAULT	Restore the setup parameter values set in the factory
RESTART	Reinitialize the setup procedure, without storing the pre-settings set before.

### 3.3.5 How to select the parameters

After access to the setup - see the section Setup - the machine prints the first main menu "I/O".

At this point there are two alternatives:

1. If you press the **[FEED]** button (you select the menu), the machine prints the first parameter of this menu "USER: NATION".
2. If you press the **[ON/OFF]** button (you do not select the menu USER), the machine prints the second main menu "I/O".

Assuming your selection was 1, there are again two alternatives:

- a If you press the **[FEED]** button (you select the parameter USER: NATION), the machine prints the first value of the parameter "NATION: 437".
- b If you press the **[ON/OFF]** button (you do not select "NATION"), the machine prints "CPI", the second parameter of the menu USER.

..... and so on.

In brief:

1. In setup mode, the machine prints and proposes one item or one parameter at a time.
2. The item or parameter can be accepted and selected with the **[FEED]** button or refused with the **[ON/OFF]** button.

### 3.4 Hex-Dump

Provided below is information on how to access the Hex-dump mode.

- To access printer setup, press the **[ON/OFF]** button twice.
- Press the **[FEED]** button to confirm your choice and activate the procedure

The printer prints the hexadecimal codes indicated below.

```
1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65 20
33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F
64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48
07 43 6F 64 65 20 33 39 0A 1B 40 1D 48 32
1D 6B 48 07 43 6F 64 65 20 33 39 0A 1B 40
1D 48 32 1D 6B 48 07 43 6F 64 65 20 33 39
0A 1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65
20 33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43
6F 64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B
48 07 43 6F 64 65 20 33 39 0A 1B 40 1D 48
32 1D 6B 48 07 43 6F 64 65 20 33 39 0A 1B
40 1D 48 32 1D 6B 48 07 43 6F 64 65 20 33
39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F 64
65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48 07
43 6F 64 65 20 33 39 0A 1B 40 1D 48 32 1D
6B 48 07 43 6F 64 65 20 33 39 0A 1B 40 1D
48 32 1D 6B 48 07 43 6F 64 65 20 33 39 0A
1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65 20
33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F
64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48
07 43 6F 64 65 20 33 39 0A 1B 40 1D 48 32
1D 6B 48 07 43 6F 64 65 20 33 39 0A
```

## 4 COMMANDS - OVERVIEW

### 4.1 Emulations

The PRT 100 interprets the data received from the line in the form of special code sequences. If any of these sequences are sent, the printer performs the function that it represents. There is no common method of controlling data. The leading printer manufacturers have created their own control "standards" according to the printing technology, applications to be used, etc. Other manufacturers have adapted to these standards, by making printers that try to behave like ("emulate") the original leading printers; hence the concept of "EMULATION".

The PRT 100 uses the Epson TM-T88III series emulation code set.

### 4.2 PRT 100 Command Index, by function (Epson TM-T88III emulation)

With the **TM-T88III** emulation the machine recognizes all the commands below, grouped according to their functions:

- Standard commands
- Print Margins
- Line Feed
- Print Pitches
- Printer Control
- Controlling optional devices
- Graphics and user-defined characters
- Page Modes
- Bar Code
- Various

**NOTA:** Nel gruppo di comandi relativi al Print Modes si trovano i commands codes della funzionalità PAGE MODE. Per una migliore comprensione di questa modalità fare riferimento all'appendice H.

#### 4.2.1 Standard commands

HT	09	9	Horizontal tab	4-9
LF	0A	10	Print and line feed	4-9
FF	0C	12	Print and eject slip paper	4-9
CR	0D	13	Carriage return	4-10
CAN	18	24	Cancel print data in page mode	4-10

#### 4.2.2 Print Margins

ESC W ..	1B 57 ..	27 87 ..	Set printing area in page mode	4-34
ESC a n	1B 61 n	27 97 n	Select justification	4-47
GS L ..	1D 4C ..	29 76 ..	Set left margin	4-56
GS W ..	1D 57 ..	29 87 ..	Set printing area width	4-59

#### 4.2.3 Line Feed

ESC J n	1B 4A n	27 74 n	Print and feed paper	4-28
ESC 2	1B 32	27 50	Select default line spacing	4-24
ESC 3 n	1B 33 n	27 51 n	Set line spacing	4-25
ESC d n	1B 64 n	27 100 n	Print and feed n lines	4-40
GS P ..	1D 50 ..	29 80 ..	Set horizontal and vertical motion units	4-57

#### 4.2.4 Print Pitches

ESC SP n	1B 20 n	27 32 n	Set right-side character spacing	4-16
GS ! n	1D 21 n	29 33 n	Select character size	4-47
GS P ..	1D 50 ..	29 80 ..	Set horizontal and vertical motion units	4-57

#### 4.2.5 Printer control

DLE EOT n	10 04 n	16 4 n	Real-time status transmission	4-11
DLE ENQ n	10 05 n	16 5 n	Real-time request to printer	4-14
DLE DC4 ..	10 14 ..	16 20 ..	Generate pulse at real-time	4-25
ESC @	1B 40	27 64	Initialize printer	4-26
GS I n	1D 49 n	29 73 n	Transmit printer ID	4-54
GS a n	1D 61 n	29 97 n	Enable/Disable Automatic Status Back	4-63
GS r n	1D 72 n	29 114 n	Transmit status	4-70

#### 4.2.6 Controlling optional devices

ESC = n	1B 3D n	27 61 n	Select peripheral device	4-25
ESC p ..	1B 70 ..	27 112 ..	Generate pulse	4-40

#### 4.2.7 Graphics and user-defined characters

ESC * ..	1B 2A ..	27 42 ..	Select bit-image mode	4-22
ESC % n	1B 25 n	27 37 n	Select/cancel user-defined character set	4-18
ESC & ..	1B 26 ..	27 38 ..	Define user-defined characters	4-19
ESC ? n	1B 3D n	27 61 n	Cancel user-defined characters	4-26
FS p ..	1C 70 ..	28 112 ..	Print NV bit image	4-43
FS q ..	1C 71 ..	28 113 ..	Define NV bit image	4-44
GS * ..	1D 2A ..	29 42 ..	Define downloaded bit image	4-49
GS / n	1D 2F n	29 47 n	Print downloaded bit image	4-51
GS v 0 ..	1D 76 30 ..	29 118 48 ..	Print raster bit image	4-72

#### 4.2.8 Print Modes

ESC ! n	1B 21 n	27 33 n	Select print mode(s)	4-17
ESC FF	1B 0C	27 12	Print data in page mode	4-15
ESC - n	1B 2D n	27 45 n	Turn underline mode on/off	4-24
ESC E n	1B 45 n	27 69 n	Turn emphasized mode on/off	4-27
ESC G n	1B 47 n	27 71 n	Turn double-strike mode on/off	4-28
ESC L	1B 4C	27 76	Select page mode	4-29
ESC M n	1B 4D n	27 77 n	Select character font	4-30
ESC S	1B 53	27 83	Select standard mode	4-31
ESC T n	1B 54 n	27 84 n	Select print direction in page mode	4-32
ESC V n	1B 56 n	27 86 n	Turn 90° clockwise rotation mode on/off	4-33
GS B n	1D 42 n	29 66 n	Turn white/black reverse printing mode on/off	4-53
GS b n	1D 62 n	29 98 n	Turn smoothing mode on/off	4-66

#### 4.2.9 Character Sets

ESC R n	1B 52 n	27 82 n	Select an international character set	4-30
ESC t n	1B 74 n	27 116 n	Select character code table	4-41

#### 4.2.10 Bar Code

GS f n	1D 66 n	29 102 n	Select font for HRI characters	4-66
GS h n	1D 68 n	29 104 n	Set bar code height	4-66
GS k ..	1D 6B ..	29 107 ..	Print bar code	4-67
GS w n	1D 77 n	29 119 n	Set bar code width	4-73

#### 4.2.11 Various

ESC \$ ..	1B 24 ..	27 36 ..	Set absolute print position	4-18
ESC D ..	1B 44 ..	27 68 ..	Set horizontal tab positions	4-27
ESC \ ..	1B 5C ..	27 92 ..	Set relative print position	4-36
ESC { n	1B 7B n	27 123 n	Turns on/off upside-down printing mode	4-42
ESC c 3 n	1B 63 33 n	27 99 51 n	Enable/disable paper end signal	4-38
ESC c 4 n	1B 63 34 n	27 99 52 n	Select paper sensor(s) to stop printing	4-39
ESC c 5 n	1B 63 35 n	27 99 53 n	Enable/disable panel buttons	4-39
GS \$ n	1D 24 n	29 36 n	Set absolute vertical print position in page mode	4-48
GS ( A ..	1D 28 41 ..	29 40 65 ..	Execute test print	4-50
GS :	1D 3A	29 58	Start/end macro definition	4-52
GS H n	1D 48 n	29 72 n	Select printing position of HRI characters	4-53
GS V ..	1D 56 ..	29 86 ..	Select cut mode and cut paper	4-58
GS \ ..	1D 5C ..	29 92 ..	Set relative vertical print position in page mode	4-61
GS ^ ..	1D 5E ..	29 94 ..	Execute macro	4-62

### 4.3 PRT 100 Epson TM-T88III Series Command Index (by code)

With the **TM-T88III** emulation the machine recognizes all the commands listed below, sorted according to their codes.

ASCII	Hex	Decimal	Description	
HT	09	9	Horizontal tab	4-9
LF	0A	10	Print and line feed	4-9
FF	0C	12	Print and eject slip paper	4-9
CR	0D	13	Carriage return	4-10
CAN	18	24	Cancel print data in page mode	4-10
DLE EOT n	10 04 n	16 4 n	Real-time status transmission	4-11
DLE ENQ n	10 05 n	16 5 n	Real-time request to printer	4-14
DLE DC4 ..	10 14 ..	16 20 ..	Generate pulse at real-time	4-15
ESC FF	1B 0C	27 12	Print data in page mode	4-15
ESC SP n	1B 20 n	27 32 n	Set right-side character spacing	4-16
ESC ! n	1B 21 n	27 33 n	Select print mode(s)	4-17
ESC \$ ..	1B 24 ..	27 36 ..	Set absolute print position	4-18
ESC % n	1B 25 n	27 37 n	Select/cancel user-defined character set	4-18
ESC & ..	1B 26 ..	27 38 ..	Define user-defined characters	4-19
ESC * ..	1B 2A ..	27 42 ..	Select bit-image mode	4-22
ESC - n	1B 2D n	27 45 n	Turn underline mode on/off	4-24
ESC 2	1B 32	27 50	Select default line spacing	4-24
ESC 3 n	1B 33 n	27 51 n	Set line spacing	4-25
ESC = n	1B 3D n	27 61 n	Select peripheral device	4-25
ESC ? n	1B 3D n	27 61 n	Cancel user-defined characters	4-26
ESC @	1B 40	27 64	Initialize printer	4-26
ESC D ..	1B 44 ..	27 68 ..	Set horizontal tab positions	4-27
ESC E n	1B 45 n	27 69 n	Turn emphasized mode on/off	4-27
ESC G n	1B 47 n	27 71 n	Turn double-strike mode on/off	4-28
ESC J n	1B 4A n	27 74 n	Print and feed paper	4-28
ESC L	1B 4C	27 76	Select page mode	4-29
ESC M n	1B 4D n	27 77 n	Select character font	4-30
ESC R n	1B 52 n	27 82 n	Select an international character set	4-30
ESC S	1B 53	27 83	Select standard mode	4-31
ESC T n	1B 54 n	27 84 n	Select print direction in page mode	4-32
ESC V n	1B 56 n	27 86 n	Turn 90° clockwise rotation mode on/off	4-33
ESC W ..	1B 57 ..	27 87 ..	Set printing area in page mode	4-34
ESC \ ..	1B 5C ..	27 92 ..	Set relative print position	4-36
ESC a n	1B 61 n	27 97 n	Select justification	4-37
ESC c 3 n	1B 63 33 n	27 99 51 n	Enable/disable paper end signal	4-38
ESC c 4 n	1B 63 34 n	27 99 52 n	Select paper sensor(s) to stop printing	4-39
ESC c 5 n	1B 63 35 n	27 99 53 n	Enable/disable panel buttons	4-39
ESC d n	1B 64 n	27 100 n	Print and feed n lines	4-40
ESC p ..	1B 70 ..	27 112 ..	Generate pulse	4-40
ESC t n	1B 74 n	27 116 n	Select character code table	4-41
ESC { n	1B 7B n	27 123 n	Turns on/off upside-down printing mode	4-42
FS p ..	1C 70 ..	28 112 ..	Print NV bit image	4-43
FS q ..	1C 71 ..	28 113 ..	Define NV bit image	4-44
GS ! n	1D 21 n	29 33 n	Select character size	4-47
GS \$ n	1D 24 n	29 36 n	Set absolute vertical print position in page mode	4-48

GS * ..	1D 2A ..	29 42 ..	Define downloaded bit image	4-49
GS ( A ..	1D 28 41 ..	29 40 65 ..	Execute test print	4-50
GS / n	1D 2F n	29 47 n	Print downloaded bit image	4-51
GS :	1D 3A	29 58	Start/end macro definition	4-52
GS B n	1D 42 n	29 66 n	Turn white/black reverse printing mode on/off	4-53
GS H n	1D 48 n	29 72 n	Select printing position of HRI characters	4-53
GS I n	1D 49 n	29 73 n	Transmit printer ID	4-54
GS L ..	1D 4C ..	29 76 ..	Set left margin	4-56
GS P ..	1D 50 ..	29 80 ..	Set horizontal and vertical motion units	4-57
GS V ..	1D 56 ..	29 86 ..	Select cut mode and cut paper	4-58
GS W ..	1D 57 ..	29 87 ..	Set printing area width	4-59
GS \ ..	1D 5C ..	29 92 ..	Set relative vertical print position in page mode	4-61
GS ^ ..	1D 5E ..	29 94 ..	Execute macro	4-62
GS a n	1D 61 n	29 97 n	Enable/Disable Automatic Status Back	4-63
GS b n	1D 62 n	29 98 n	Turn smoothing mode on/off	4-66
GS f n	1D 66 n	29 102 n	Select font for HRI characters	4-66
GS h n	1D 68 n	29 104 n	Set bar code height	4-66
GS k ..	1D 6B ..	29 107 ..	Print bar code	4-67
GS r n	1D 72 n	29 114 n	Transmit status	4-70
GS v 0 ..	1D 76 30 ..	29 118 48 ..	Print raster bit image	4-72
GS w n	1D 77 n	29 119 n	Set bar code width	4-73

## 4.4 List of Epson TM-T88III Series Emulation Environment

Command	Name	Command classification		Standard mode	Page mode	GS P function
		Execut.	Setting			
<b>LF</b>	Decimal code: Print and line feed	O		O	O	
<b>FF</b>	Print and return to standard mode (in page mode)	O		Ignored	O	
<b>CR</b>	Print and carriage return	O		O	O	
<b>CAN</b>	Cancel print data in page mode	O		Ignored	O	
<b>DLE EOT</b>	Real-time status transmission	O		O	O	
<b>DLE ENQ</b>	Real-time request to printer	O		O	O	
<b>DLE DC4</b>	Generate pulse at real-time	O		O	O	
<b>ESC FF</b>	Print data in page mode	O		Ignored	O	
<b>ESC SP</b>	Set right-side character spacing		O	O	O	O
<b>ESC !</b>	Select print mode(s)		O	O	O	
<b>ESC \$</b>	Set absolute print position	O		O	O	O
<b>ESC %</b>	Select/cancel user-defined character set		O	O	O	
<b>ESC &amp;</b>	Define user-defined characters		O	O	O	
<b>ESC *</b>	Select bit-image mode	O		O	O	
<b>ESC -</b>	Turn underline mode on/off		O	O	O	
<b>ESC 2</b>	Select default line spacing		O	O	O	
<b>ESC 3</b>	Set line spacing		O	O	O	O
<b>ESC =</b>	Select peripheral device		O	O	O	
<b>ESC ?</b>	Cancel user-defined characters		O	O	O	
<b>ESC @</b>	Initialize printer	O	O	O	O	
<b>ESC D</b>	Set horizontal tab positions		O	O	O	
<b>ESC E</b>	Turn emphasized mode on/off		O	O	O	
<b>ESC G</b>	Turn double-strike mode on/off		O	O	O	
<b>ESC J</b>	Print and feed paper	O		O	O	O
<b>ESC L</b>	Select page mode	O		(O)	Ignored	
<b>ESC M</b>	Select character font			O	O	
<b>ESC R</b>	Select an international character set		O	O	O	
<b>ESC S</b>	Select standard mode	O		Ignored	O	
<b>ESC T</b>	Select print direction in page mode		O	††	O	
<b>ESC V</b>	Turn 90° clockwise rotation mode on/off		O	O	††	
<b>ESC W</b>	Set printing area in page mode		O	††	O	O
<b>ESC \</b>	Set relative print position	O		O	O	O
<b>ESC a</b>	Select justification		O	(O)	††	
<b>ESC c 3</b>	Select paper sensor(s) to output paper-end signals		O	O	O	
<b>ESC c 4</b>	Select paper sensor(s) to stop printing		O	O	O	
<b>ESC c 5</b>	Enable/disable panel buttons		O	O	O	
<b>ESC d</b>	Print and feed n lines	O		O	O	
<b>ESC p</b>	General pulse	O		O	O	
<b>ESC t</b>	Select character code table		O	O	O	
<b>ESC {</b>	Turn upside-down printing mode on/off		O	(O)	††	
<b>FS p</b>	Print NV bit image	O		O	Disabled	
<b>FS q</b>	Define NV bit image		O	(O)	Disabled	
<b>GS !</b>	Select character size		O	O	O	
<b>GS \$</b>	Set absolute vertical print position in page mode	O		Ignored	O	O
<b>GS *</b>	Define downloaded bit image		O	O	O	
<b>GS ( A</b>	Execute test print	O		O	Disabled	
<b>GS /</b>	Print downloaded bit image	O		†	O	
<b>GS :</b>	Start/end macro definition	O	O	O	O	
<b>GS B</b>	Turn white/black reverse printing mode on/off		O	O	O	
<b>GS H</b>	Select printing position of HRI characters		O	O	O	

Command	Name	Command classification		Standard mode	Page mode	GS P function
		Execut.	Setting			
<b>GS I</b>	Transmit printer ID	O		O	O	
<b>GS L</b>	Set left margin		O	(O)	#	O
<b>GS P</b>	Set horizontal and vertical motion units		O	O	O	
<b>GS V</b>	Select cut mode and cut paper	O		(O)	O	O
<b>GS W</b>	Set printing area width		O	(O)	#	O
<b>GS \</b>	Set relative vertical print position in page mode			Ignored	O	O
<b>GS ^</b>	Execute macro	O		O	O	
<b>GS a</b>	Enable/disable Automatic Status Back (ASB)	O	O	O	O	
<b>GS b</b>	Turn smoothing mode on/off		O	O	O	
<b>GS f</b>	Select font for HRI characters		O	O	O	
<b>GS h</b>	Set bar code height		O	O	O	
<b>GS k</b>	Print bar code	O		†	O	
<b>GS r</b>	Transmit status	O		O	O	
<b>GS v 0</b>	Print raster bit image	O		†	Disabled	
<b>GS w</b>	Set bar code width		O	O	O	

#### Command classification

Executing: Printer executes the command, which does not then affect the following data.

Setting: Printer uses flags to make settings, and those settings affect the following data.

Standard mode (stampa riga per riga)

O: Enabled.

(O): Enabled only when the command is set at the beginning of a line.

# Enabled only when data is not present in the printer buffer.

Page mode (definizione e stampa di una intera area, vedi Appendice H)

O: Enabled.

# Only value setting is possible.

Disabled: Parameters are processed as printable data.

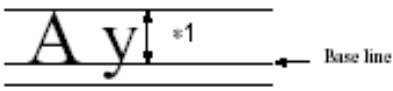
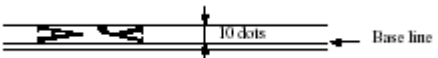
Ignored: All command codes including parameters are ignored and nothing is executed.

GS P function: codes i cui parametri sono interpretati tramite il valore definito nel command code GS P

## 4.5 Description of Commands

### 4.5.1 Explanation of Terms

The following table gives an explanation of the terms that you will encounter in the descriptions of the commands provided further on.

TERM	DESCRIPTION
Receive buffer	The receive buffer is a buffer that stores, as is, the data received from the host (the reception data). The reception data is stored in the receive buffer temporarily, and is then processed sequentially.
Print buffer	The print buffer is a buffer that stores the image data to be printed.
Print buffer full	This is the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the <b>LF</b> operation.
Start of line	The start of line state satisfies the following condition <ul style="list-style-type: none"> <li>• There is no print data (including spaces and portions of data skipped due to bit image data) currently in the print buffer.</li> <li>• There is no print data (including portions of data skipped due to <b>HT</b>)</li> <li>• The print position is not specified by the <b>ESC \$</b> or <b>ESC \</b> command.</li> </ul>
Printable area	The maximum range within which printing is possible under the printer specifications. The printable area for this printer is as follows: <ol style="list-style-type: none"> <li>1. The length of the horizontal direction in standard mode: approximately 72.2 mm {512/180"}</li> <li>2. The length of the horizontal direction in page mode: approximately 72.2 mm {512/180"}</li> <li>3. The length of the vertical direction in page mode: approximately 117.3 mm {1662/360"}</li> </ol>
Printing area	Printing range is set by the command. It must be printing area $\Upsilon \leftarrow$ printable area.
Ignore	The state in which all codes, including parameters, are read in and discarded, and nothing happens.
Inch	A unit of length. One inch is 25.4 mm.
MSB	Most Significant Bit
LSB	Least Significant Bit
Base line	Standard position when character data is stored in the print buffer. Normal character in standard mode and page mode: <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>*1. When font A (12·24 dots) is selected, this height is for 21 dots. When font B (9·17 dots) is selected, this height is for 16 dots.</p> </div> </div>
	Rotated character in standard mode (only when font A is selected): <div style="display: flex; align-items: center;">  </div>

## 4.5.2 Horizontal tab

### HT

Hexadecimal code: 09

Decimal code: 9

Function: Moves the print position to the next horizontal tab position.

- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
- Horizontal tab positions are set with **ESC D**.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8th character (9th, 17th, 25th, ... column).

**See also:**      **ESC D**

## 4.5.3 Print and line feed

### LF

Hexadecimal code: 0A

Decimal code: 10

Function: Prints the data in the print buffer and feeds one line based on the current line spacing.

**Note:**              This command sets the print position to the beginning of the line.

**See also:**      ESC 2, ESC 3

## 4.5.4 Print and return to standard mode in page mode

### FF

Hexadecimal code: 0C

Decimal code: 12

Function: Prints the data in the print buffer collectively and returns to standard mode.

- The buffer data is deleted after being printed.
- The print 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.

**See also:**      ESC FF, ESC L, ESC S

#### 4.5.5 Print and carriage return

##### CR

Hexadecimal code: 0D

Decimal code: 13

Function: When automatic line feed is enabled, this command functions the same as **LF**; when automatic line feed is disabled, this command is ignored.

- Sets the print starting position to the beginning of the line.
- The automatic line feed is ignored with a serial interface model.
- This command is set according to the SETUP setting with a parallel interface model.

**See also:** LF

#### 4.5.6 Cancels print data in page mode

##### CAN

Hexadecimal code: 18

Decimal code: 24

Function: In page mode, deletes all the print data in the current printable area.

- 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.

**See also:** ESC L, ESC W

#### 4.5.7 Real-time status transmission

##### DLE EOT n

Hexadecimal code: 10 04 n

Decimal code: 16 4 n

**Range:** n = 1-4

**Function:** Transmits the selected printer status specified by *n* in real-time, according to the following parameters:

n=1 Transmit printer status  
n=2 Transmit off-line status  
n=3 Transmit error status  
n=4 Transmit paper roll sensor status

- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command cannot be executed when the printer is busy.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT** command and the ASB status must be differentiated. (Refer to Appendix G, *TRANSMISSION STATUS IDENTIFICATION*)
- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.

**Notes:**

- The status is transmitted whenever the data sequence of <10>H<04>H<*n*> ( *n* = 1–4) is received.

Example:

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

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

Example:

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

n=1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer open/close signal is LOW (connector pin 3).
	On	04	4	Drawer open/close signal is HIGH (connector pin 3).
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On.
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n=2: Off-line status

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

Bit 5      Becomes on when the paper end sensor detects paper end and printing stops.

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	-	-	-	Undefined
3	Off	00	0	No autocutter error
	On	08	8	Autocutter error occurs
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurs.
6	Off	00	0	No autorecoverable error.
	On	40	64	Autorecoverable error occurs.
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 (n = 1-2). 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.

n=4: Continuous paper 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, 3	Off	00	0	Paper roll near-end sensor: paper adequate.
	On	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	On	10	16	Not used. Fixed to On.
5, 6	Off	00	0	Paper roll sensor: Paper present.
	On	20	32	Paper roll end detected by paper roll sensor.
7	Off	00	0	Not used. Fixed to Off.

**See also:** DLE ENQ, GS a, GS r

#### 4.5.8 Real-time request to printer

##### DLE ENQ n

Hexadecimal code: 10 05 n

Decimal code: 16 5 n

**Range:** n =1-2

**Function:** Responds to a request from the host computer. n specifies the requests as follows:

<b>n</b>	<b>Request</b>
----------	----------------

- |   |   |
|---|---|
| 1 | Recover from an error and restart printing from the line where the error occurred |
| 2 | Recover from an error aft clearing the receive and print buffers                  |

- When the printer is disabled with **ESC =** (Select peripheral device), this command is effective.
- This command is effective only when an autocutter error occurs.
- The printer starts processing data upon receiving this command.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command cannot be executed when the printer is busy.
- **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.

- Notes:**
- The status is transmitted whenever the data sequence of <10>H<05>H<n> (n=?1-4) is received.

Example:

In **ESC \* m nL nH d1...dk**, d1=<10>H, d2=<05>H, d3=<01>H

- This command should not be contained within another command that consists of 2 or more bytes.

Example:

If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **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.

**See also:** DLE EOT

#### 4.5.9 Generate pulse at real-time

##### DLE DC4 n m t

Hexadecimal code: 10 14 n m t

Decimal code: 16 20 n m t

**Range:** n = 1-2  
m = 0, 1  
t = 1-8

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

<b>m</b>	<b>Connector pin</b>
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

- 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 **DEL DC4** is executed while this command is processed, this command is ignored.
- The printer executes this command upon receiving it.
- With a serial interface model, this command is executed even when the printer is offline, the receive buffer is full, or there is an error status.
- With a parallel interface model, this command cannot be executed when the printer is busy.
- This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).

- Notes:**
- 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.

**See also:** ESC p

#### 4.5.10 Print data in page mode

##### ESC FF

Hexadecimal code: 1B 0C

Decimal code: 27 12

**Function:** In page mode, prints all buffered data in the printing area collectively.

- 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.

**See also:** FF, ESC L, ESC S

#### 4.5.11 Set right-side character spacing

##### ESC SP n

Hexadecimal code: 1B 20 n

Decimal code: 27 32 n

**Range:** n = 0-255

Function: Sets the character spacing for the right side of the character to [ $n \times$  horizontal or vertical motion units].

- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is  $n$  times normal value.
- This command does not affect the setting of Kanji characters.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit 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, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
  - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit ( $x$ ) is used.
  - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit ( $y$ ) is used.
- The maximum right-side spacing is 35.983 mm {255/180"}. Any setting exceeding the maximum is converted to the maximum automatically.

**Default:** n = 0

**See also:** GS P

#### 4.5.12 Select print mode(s)

##### ESC ! n

Hexadecimal code: 1B 21 n

Decimal code: 27 33 n

**Range:** n = 0-255

Function: Selects print modes using **n** as follows.

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (13 × 27).
	On	01	1	Character font B (10 × 20).
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized 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	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

- When both double-height and double-width modes are selected, quadruple size characters are printed.
- The printer can underline all characters, but can not underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC -**, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.
- Emphasized mode is effective for alphanumeric. All print modes except emphasized mode is effective only for alphanumeric.

**See also:** ESC -, ESC E, GS !

#### 4.5.13 Set absolute print position

##### ESC \$ nL nH

Hexadecimal code: 1B 24 nL nH

Decimal code: 27 36 nL nH

**Range:** nL = 0-255  
nH = 0-255

Function: Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.

- The distance from the beginning of the line to the print position is  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ .
- Settings outside the specified printable area are ignored.
- 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.
- In standard mode, the horizontal motion unit (x) is used.
- In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows:
  - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

**See also:** ESC \, GS \$, GS \, GS P

#### 4.5.14 Select/cancel user-defined character set

##### ESC % n

Hexadecimal code: 1B 25 n

Decimal code: 27 37 n

**Range:** n = 0-255

Function: Selects or cancels the user-defined character set.

- When the LSB of *n* is 0, the user-defined character set is canceled.
- When the LSB of *n* is 1, the user-defined character set is selected.
- When the user-defined character set is canceled, the internal character set is automatically selected.
- *n* is available only for the least significant bit.

**Default:** n = 0

**References:** ESC &, ESC ?

#### 4.5.15 Define user-defined characters

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

Hexadecimal code: 1B 26 y c1 c2 [x1 d1...d(y ´ x1)]...[xk d1 ... d(y ´ xk)]

Decimal code: 27 38 y c1 c2 [x1 d1...d(y ´ x1)]...[xk d1 ... d(y ´ xk)]

**Range:** y=3  
c1-c2=32-126  
x=0-12 (when font A (12 × 24) is selected)  
x=0-9 (when font B (9 × 17) is selected)  
d1...d(y × xk) =0-255

Function: Defines user-defined characters

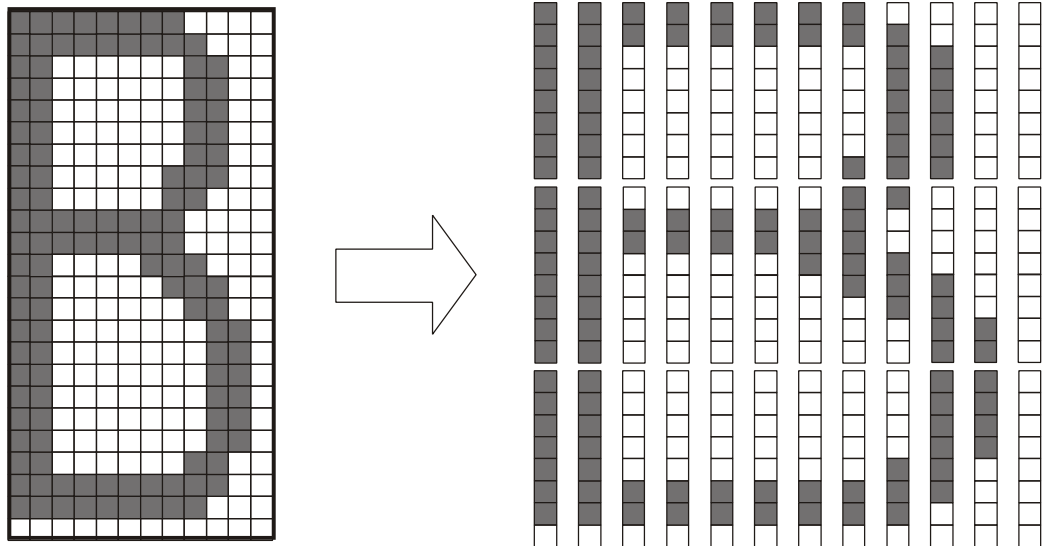
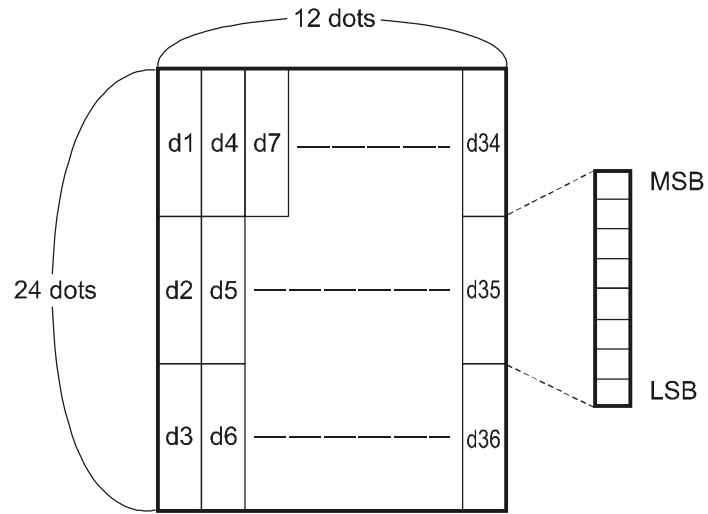
- y specifies the number of bytes in the vertical direction.
- c1 specifies the beginning character code for the definition, and c2 specifies the final code.
- x specifies the number of dots in the horizontal direction.
- The allowable character code range is from ASCII code <20>H to <7E>H (95 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- This command can define different user-defined character patterns by each fonts. To select a font, use **ESC !**
- A user-defined character and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definition is cleared when:
  - (1) **ESC @** is executed.
  - (2) **FS q** is executed.
  - (3) **GS \*** is executed.
  - (4) **ESC ?** is executed.
  - (5) The printer is reset or the power is turned off.
- When the user-defined characters are defined in font B (9 × 17), only the most significant bit of the 3rd byte of data in vertical direction is effective.

**Default:** The internal character set

**See also:** ESC %, ESC ?

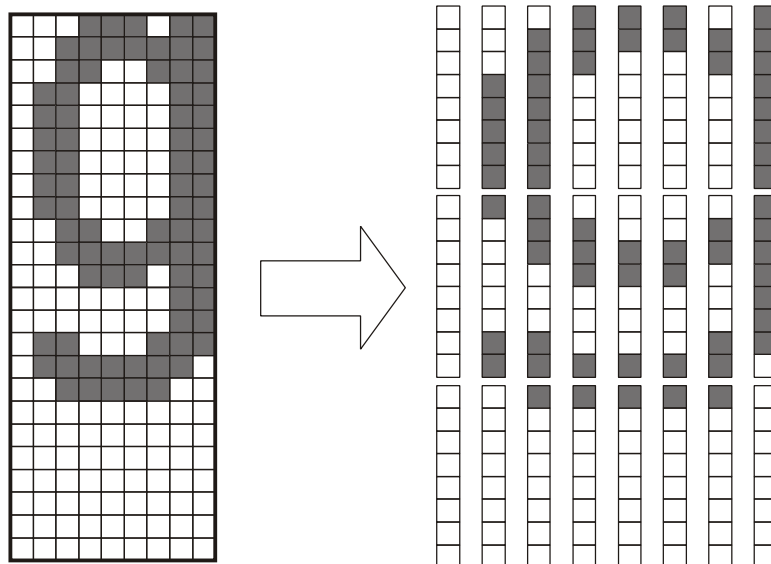
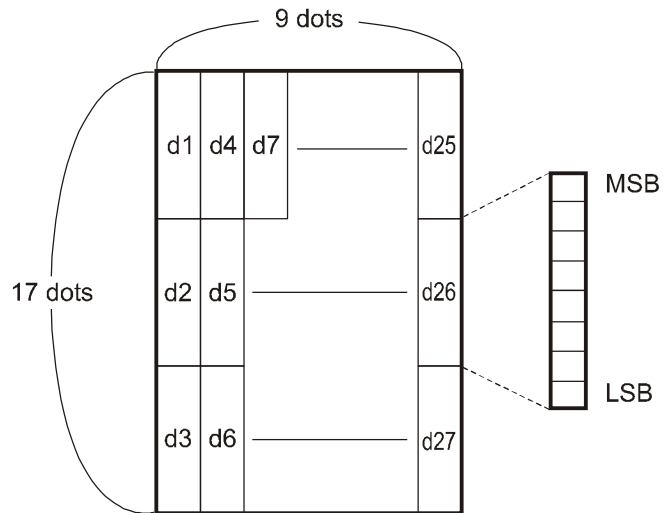
**Example:**

- When font A (12 × 24) is selected.



d1 = <FF>H	d4 = <FF>H	d7 = <C0>H . . . .
d2 = <FF>H	d5 = <FF>H	d8 = <60>H . . . .
d3 = <FE>H	d6 = <FE>H	d9 = <06>H . . . .

- When font B (9 × 17) is selected.



d1 = <00>H	d4 = <1F>H	d7 = <7F>H ...
d2 = <00>H	d5 = <83>H	d8 = <E3>H ...
d3 = <00>H	d6 = <00>H	d9 = <80>H ...

#### 4.5.16 Select bit-image mode

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

Hexadecimal code: 1B 2A *m nL nH d1...dk*

Decimal code: 27 42 *m nL nH d1...dk*

**Range:**        *m* = 0, 1, 32, 33  
                  *nL* = 0-255  
                  *nH* = 0-3  
                  *d* = 0-255

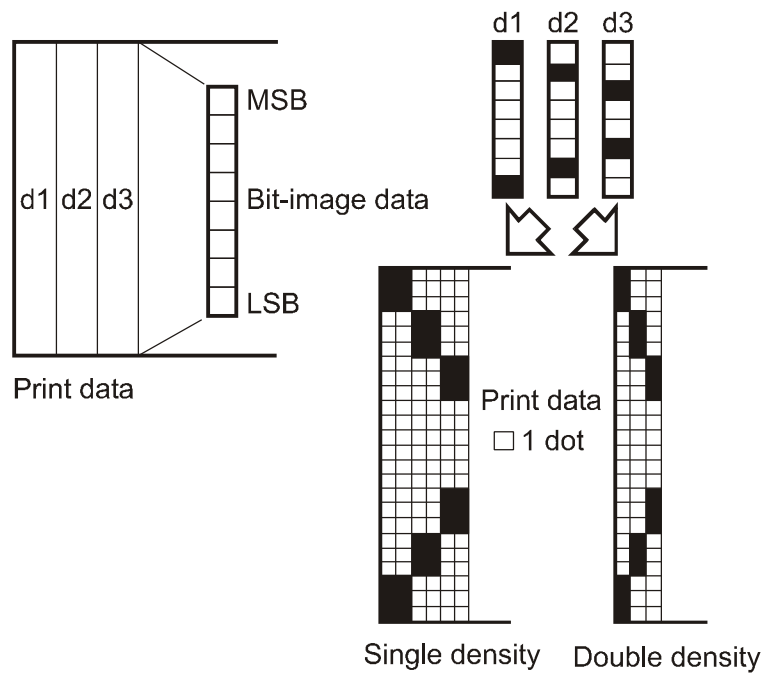
Function: Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

<b>m</b>	<b>Mode</b>	<b>Vertical Direction</b>		<b>Horizontal Direction</b>	
		<b>Number of Dots</b>	<b>Dot Density (dot/mm)</b>	<b>Dot Density (dot/mm)</b>	<b>Maximum Number of Dots</b>
0	8-dot single-density	8	2	4	$nL + nH \times 256$
1	8-dot double-density	8	2	8	$nL + nH \times 256$
32	24-dot single-density	24	8	4	$(nL + nH \times 256) \times 3$
33	24-dot single-density	24	8	8	$(nL + nH \times 256) \times 3$

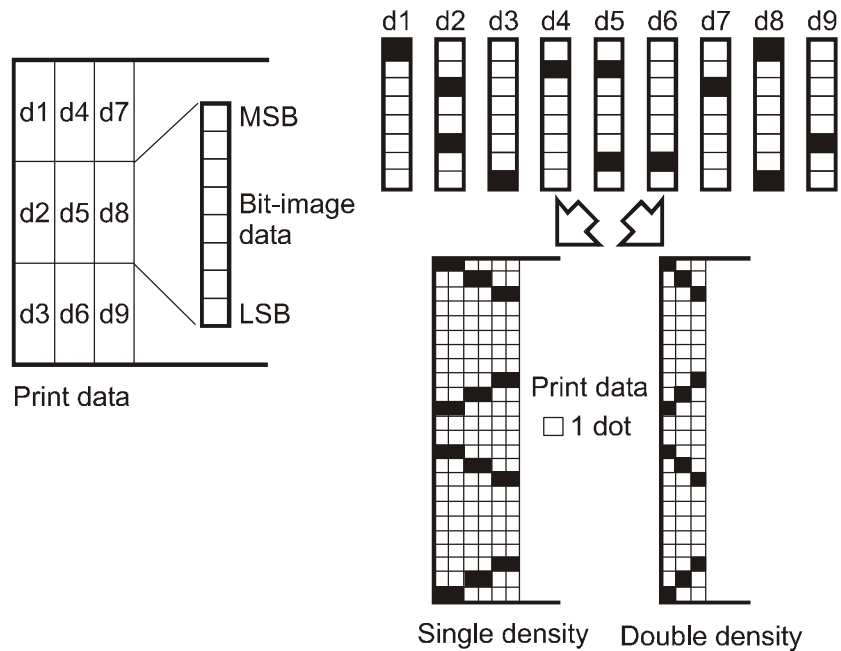
[dpi: dots per 25.4 mm (1")]

- If the value of *m* is out of the specified range, *nL* and data following are processed as normal data.
- The *nL* and *nH* indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by  $nL + nH \times 256$ .
- 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 a dot.
- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC \*** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
  - (1) The width of the printing area is extended to the right to accommodate the amount of data.
  - (2) If step (1) does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
- Refer to Figure 2 for the bit image development position in page mode.
- The relationship between the image data and the dots to be printed is as follows:

- When 8-dot bit image is selected:



- When 24-dot bit image is selected:



#### 4.5.17 Turn underline mode on/off

##### ESC - n

Hexadecimal code: 1B 2D n

Decimal code: 27 45 n

**Range:** n = 0-2, 48-50

Function: Turns underline mode on or off, based on the following values of n:

<b>n</b>	<b>Function</b>
0, 48	Turns off underline mode
1, 49	Turns on underline mode (1-dot thick)
2, 50	Turns on underline mode (2-dots thick)

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of *n* to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

**Default:** n = 0

**See also:** ESC !

#### 4.5.18 Select default line spacing

##### ESC 2

Hexadecimal code: 1B 32

Decimal code: 27 50

Function: Selects approximately 4.23 mm {1/6"} spacing.

- The line spacing can be set independently in standard mode and in page mode.

**See also:** ESC 3

#### 4.5.19 Set line spacing

##### ESC 3 n

Hexadecimal code: 1B 33 n

Decimal code: 27 51 n

**Range:** n = 0-255

Function: Sets the line spacing to [n × vertical or horizontal motion unit].

- The line spacing can be set independently in standard mode and in page mode.
- 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, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the vertical motion unit (y) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
  - (2) When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum paper feed amount is 1016 mm {40"}. Even if a paper feed amount of more than 1016 mm {40"} is set, the printer feeds the paper only 1016 mm {40"}.

**Default:** Line spacing equivalent to approximately 4.23mm {1/6"}.

**See also:** ESC 2, GS P

#### 4.5.20 Select peripheral device

##### ESC = n

Hexadecimal code: 1B 3D n

Decimal code: 27 61 n

**Range:** n = 1-255

Function: Selects device to which 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.
1-7	-	-	-	Undefined/Ignored.

- When the printer is disabled, it ignores all data except for error-recovery commands (**DLE EOT**, **DLE ENQ**, **DLE DC4**) until it is enabled by this command.

**Default:** n = 1

#### 4.5.21 Cancel user-defined characters

##### **ESC ? n**

Hexadecimal code: 1B 3F n

Decimal code: 27 63 *n*

**Range:** n = 32-126

Function: Cancels user-defined characters.

- This command cancels the pattern defined for the character code specified by *n*. After the user-defined character is canceled, the corresponding pattern for the internal character is printed.
- This command deletes the pattern defined for the specified code in the font selected by **ESC !**.
- If a user-defined character has not been defined for the specified character code, the printer ignores this command.

**See also:** ESC &, ESC %

#### 4.5.22 Initialize printer

##### **ESC @**

Hexadecimal code: 1B 40

Decimal code: 27 64

Function: Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

- The data in the receive buffer is not cleared.
- The macro definition is not cleared.
- The NV bit image data is not cleared.
- The data of the NV user memory is not cleared.

#### 4.5.23 Set horizontal tab position

##### ESC D n1 ... nk NUL

Hexadecimal code: 1B 44 n1 ... nk 00

Decimal code: 27 68 n1...nk 0

Function: Sets horizontal tab positions.

- $n$  specifies the column number for setting a horizontal tab position from the beginning of the line.
- $k$  indicates the total number of horizontal tab positions to be set.
- The horizontal tab position is stored as a value of  $[\text{character width} \times n]$  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 the previous horizontal 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.
- Transmit  $[n]k$  in ascending order and place a NUL code 0 at the end.
- When  $[n]k$  is less than or equal to the preceding value  $[n]k-1$ , tab setting is finished and the following data is processed as normal data.
- **ESC D NUL** cancels all horizontal tab positions.
- The previously specified horizontal tab positions do not change, even if the character width changes.
- The character width is memorized for each standard and page mode.

**Default:** The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for font A (12 x 24).

**See also:** HT

#### 4.5.24 Turn emphasized mode on/off

##### ESC E n

Hexadecimal code: 1B 45 n

Decimal code: 27 69 n

**Range:** n = 0-255

Function: Turns emphasized mode on or off.

When the LSB (least significant bit) of  $n$  is 1, emphasized mode is turned on.  
When it is 0, emphasized mode is turned off.

- Only the least significant bit of  $n$  is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

**Default:** n = 0

**See also:** ESC !

#### 4.5.25 Turn double-strike mode on/off

##### ESC G n

Hexadecimal code: 1B 47 n

Decimal code: 27 71 n

**Range:** n = 0-255

Function: Turns double-strike mode on or off.

- When the LSB (least significant bit) of n is 1, double-strike mode is turned on.
- When it is 0, double-strike mode is turned off.
- Only the lowest bit of n is enabled.
- Printer output is the same in double-strike mode and in emphasized mode.

**Default:** n = 0

**See also:** ESC E

#### 4.5.26 Print and feed paper

##### ESC J n

Hexadecimal code: 1B 4A n

Decimal code: 27 74 n

**Range:** n = 0-255

Function: Prints the data in the print buffer and feeds the paper [n × vertical or horizontal motion unit].

- After printing is 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 unit are specified by **GS P**.
- The **GS P** command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the printer uses the vertical motion unit (y).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
  - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum line spacing is 1016mm {40"}. When the setting value exceeds the maximum, it is converted to the maximum automatically.

**See also:** GS P

## 4.5.27 Select page mode

### ESC L

Hexadecimal code: 1B 4C

Decimal code: 27 76

Function: Switches from standard mode to page mode.

- 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 valve 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 {** Set left margin: **GS L**
  - (4) 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** Define NV bit image: **FS q**
  - (2) Write to NV user memory: **FS g 1**
  - (3) 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.

**See also:** FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS \$, GS \

#### 4.5.28 Select character font

##### ESC M n

Hexadecimal code: 1B 4D n

Decimal code: 27 77 n

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

Function: Selects character fonts.

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

- The **ESC !** command can also select the character fonts. However, the setting of the last received command is effective.

**See also:** ESC !

#### 4.5.29 Select an international character set

##### ESC R n

Hexadecimal code: 1B 52 n

Decimal code: 27 82 n

**Range:** n = 0-10

Function: Selects an international character set **n** from the following table:

n	Character set
0	U.S.A.
1	France
2	Germany
3	U. K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea

**Default:** n = 0

**See also:** International Character Set

#### 4.5.30 Select standard mode

##### ESC S

Hexadecimal code: 1B 53

Decimal code: 27 83

Function: Switches from page mode to standard mode.

- 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.

**See also:** FF, ESC FF, ESC L

#### 4.5.31 Select print direction in page mode

##### ESC T n

Hexadecimal code: 1B 54 n

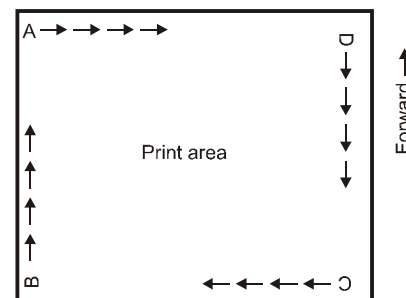
Decimal code: 27 84 n

**Range:** n = 0-3  
n = 48-51

Function: Selects 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 (A in the figure)
1, 49	Bottom to top	Lower left (B in the figure)
2, 50	Right to left	Lower right (C in the figure)
3, 51	Top to bottom	Upper right (D in the figure)



- 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

**See also:** ESC \$, ESC L, ESC W, ESC \, GS \$, GS P, GS \

#### 4.5.32 Turn 90° clockwise rotation mode on/off

##### ESC V n

Hexadecimal code: 1B 56 n

Decimal code: 27 86 n

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

Function: Turns 90° clockwise rotation mode on/off

n is used as follows:

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

- This command affects printing in standard mode. However, the setting is always effective.
- When underline mode is turned on, the printer does not underline 90° clockwise rotated.
- 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.

**Default:** n = 0

**See also:** ESC !, ESC -

#### 4.5.33 Set printing area in page mode

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

Hexadecimal code: 1B 57 xL xH yL yH dxL dxH dyL dyH

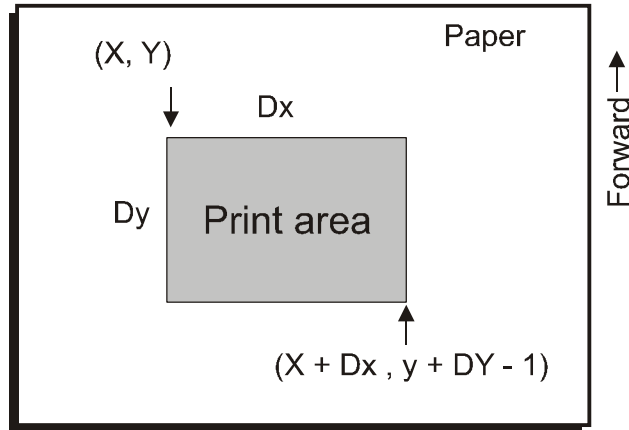
Decimal code: 27 87 xL xH yL yH dxL dxH dyL dyH

**Range:** xL xH yL yH dxL dxH dyL dyH = 0-255  
(except dxL=dxH=0 or dyL=dyH=0)

Function: Set printing area in page mode

- The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as  $x_0$ ,  $y_0$ ,  $dx$ ,  $dy$ , respectively.  
Each setting for the printing area is calculated as follows:  
 $x_0 = [(xL + xH \times 256) \times (\text{horizontal motion unit})]$   
 $y_0 = [(yL + yH \times 256) \times (\text{vertical motion unit})]$   
 $dx = [dxL + dxH \times 256] \times (\text{horizontal motion unit})]$   
 $dy = [dyL + dyH \times 256] \times (\text{vertical motion unit})]$   
The printing area is set as shown in the figure below.
- 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 as shown in the figure below.



- This printable area for this printer is approximately 72.2 mm {512/180"} in the horizontal direction and approximately 117.3 mm {1662/360"} in the vertical direction.

**Default:**  $xL = xH = yL = yH = 0$   
 $dxL = 0, dxH = 2, dyL = 126, dyH = 6$

**See also:** CAN, ESC L, ESC T, GS P

#### 4.5.34 Set relative print position

##### ESC \ nL nH

Hexadecimal code: 1B 5C nL nH

Decimal code: 27 92 nL nH

**Range:** nL = 0-255  
nH = 0-255

**Function:** Sets the print starting position based on the current position by using the horizontal or vertical motion unit.

- This command sets the distance from the current position to  $[(nL + nH \times 256) \times \text{horizontal or vertical motion unit}]$
- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right:  
 $nL + nH \times 256 = N$   
When pitch N is specified to the left (the negative direction), use the complement of 65536.  
When pitch N is specified to the left:  $nL + nH \times 256 = 65536 - N$
- The print starting position moves from the current position to  $[N \times \text{horizontal or vertical motion unit}]$
- 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.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
  - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

**See also:** ESC \$, GS P

#### 4.5.35 Select justification

##### ESC a n

Hexadecimal code: 1B 56 n

Decimal code: 27 97 n

**Range:** n = 0-2, 48-50

Function: Aligns all the data in one line to the specified position

n selects the justification as follows:

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

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command has no effect in page mode.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT**, **ESC \$** or **ESC \**.

**Default:** n = 0

**Example:** Left justification

ABC ABCD ABCDE
----------------------

Centering

ABC ABCD ABCDE
----------------------

Right justification

ABC ABCD ABCDE
----------------------

#### 4.5.36 Select paper sensor(s) to output paper end signal

##### ESC c 3 n

Hexadecimal code: 1B 63 33 n

Decimal code: 27 99 51 n

**Range:** n = 0-255

Function: Selects paper sensor(s) to output paper-end signals to a parallel interface.

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll near-end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll end sensor enabled
3	Off	00	0	Paper roll end sensor disabled
	On	08	8	Paper roll end sensor enabled
4-7	-	-	-	Undefined

- It is possible to select multiple sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal is output.
- The command is available only with a parallel interface and is ignored with a serial interface.
- Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.
- If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals
- If either bit 2 or bit 3 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

#### 4.5.37 Select paper sensor(s) to stop printing

##### ESC c 4 n

Hexadecimal code: 1B 63 34 n

Decimal code: 27 99 52 n

**Range:** n = 0-255

Function: Selects the paper sensor(s) used to stop printing when a paper-end is detected, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near end sensor disabled.
	On	01	1	Paper roll near end sensor enabled.
1	Off	00	0	Paper roll near end sensor disabled.
	On	02	2	Paper roll near end sensor enabled.
2-7	-	-	-	Undefined.

- When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.
- When a paper-end is detected by the paper roll sensor, the printer goes offline after printing stops.
- When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

**Default:** n = 0

#### 4.5.38 Enable/disable panel buttons

##### ESC c 5 n

Hexadecimal code: 1B 63 35 n

Decimal code: 27 99 53 n

**Range:** n = 0-255

Function: Enables or disables the panel buttons.

- When the LSB of *n* is 0, the panel buttons are enabled.
- When the LSB of *n* is 1, the panel buttons are disabled.
- Only the lowest bit of *n* is valid.
- When the panel buttons are disabled, none of them are usable when the printer cover is closed.
- In this printer, the panel buttons are the FEED button.
- In the macro ready mode, the FEED button are enabled regardless of the settings of this command; however, the paper cannot be fed by using these buttons.

**Default:** n = 0

#### 4.5.39 Print and feed n lines

##### ESC d n

Hexadecimal code: 1B 64 n

Decimal code: 27 100 n

**Range:** n = 0-255

Function: Prints the data in the print buffer and feeds n lines.

- This command sets the print starting position to 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 1016 mm {40"}. If the paper feed amount ( $n \cdot \text{line spacing}$ ) of more than 1016 mm {40"} is specified, the printer feeds the paper only 1016 mm {40"}.

**See also:** **ESC 2, ESC 3**

#### 4.5.40 Generate pulse

##### ESC p m t1 t2

Hexadecimal code: 1B 70 m t1 t2

Decimal code: 27 112 m t1 t2

**Range:** m = 0, 1, 48, 49  
t1 = 0-255  
t2 = 0-255

Function: 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.

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

**See also:** **DLE DC4**, Chapter 1 section 1.5.5 - *Drawer driver*

#### 4.5.41 Select character code table

##### ESC t n

Hexadecimal code: 1B 74 n

Decimal code: 27 116 n

**Range:**        n = 0-5  
                  n = 16-26  
                  n = 255

Function: Selects a page *n* from the character code table.

<i>n</i>	Page
0	PC437 [U.S.A., Standard Europe]
1	Ignored
2	PC850 [Multilingual]
3	PC860 [Portuguese]
4	PC863 [Canadian-French]
5	PC865 [Nordic]
16	WPC1252
17	PC866 [Cyrillic #2]
18	PC852 [Latin2]
19	PC858
20	Ignored
21	Ignored
22	Ignored
23	Ignored
24	Ignored
25	Ignored
26	Ignored
255	Space page

**Default:**        *n* = 0

**See also:**        5. *Character Set*

#### 4.5.42 Turn on/off upside-down printing mode

##### ESC { n

Hexadecimal code: 1B 7B n

Decimal code: 27 123 n

**Range:** n = 0-255

Function: Turns upside-down printing mode on or off.

- When the LSB of *n* is 0, upside-down printing mode is turned off.
- When the LSB of *n* is 1, upside-down printing mode is turned on.
- Only the lowest bit of *n* is valid.
- This command is enabled only when processed at the beginning of a line in standard mode.
- When this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

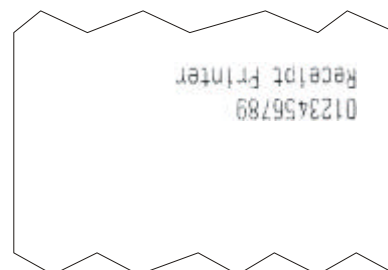
**Default:** n = 0

##### Example:

When upside-down printing  
mode is selected



When upside-down printing  
Mode is not selected



Paper feed direction

#### 4.5.43 Print NV bit image

##### **FS p *n m***

Hexadecimal code: 1C 70 *n m*

Decimal code: 28 112 *n m*

**Range:** *n* = 0-255

*m* = 0-3

*m* = 48-51

Function: Prints a NV bit image *n* using the mode specified by *m*.

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	8dots/mm	8dots/mm
1, 49	Double-width	8dots/mm	4dots/mm
2, 50	Double-height	4dots/mm	8dots/mm
3, 51	Quadruple	4dots/mm	4dots/mm

[dpi: dots per 25.4 mm {1"}]

- *n* is the number of the NV bit image (defined using the **FS q** command).
- *m* specifies the bit image mode.
- NV bit image means a bit image that 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.
- 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 processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (*m*=0, 48) and in double-height mode (*m*=2, 50), and it means 2 dots in double-width mode (*m*=1, 49) and in quadruple mode (*m*=3, 51).
  1. The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
  2. If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- This command feeds dots (for the height *n* of the NV bit-image) in normal and double-width modes, and (for the height *n* x 2 of the NV 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.

**See also:** **ESC \***, **FS q**, **GS /**, **GS v 0**

#### 4.5.44 Define NV bit image

**FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n**

Hexadecimal code: 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

Decimal code: 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

**Range:** n = 1-255  
xL = 0-255  
xH = 0-3 (when  $(xL + xH \times 256) = 1-1023$ )  
yL = 0-255  
yH = 0-1 (when  $(yL + yH \times 256) = 1-288$ )  
d = 0-255  
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$   
Total defined data area = 2M bits (256K bytes)

Function: Define the NV bit image specified by n .

- n specifies the number of the defined NV bit image.
- xL, xH specifies  $(xL + xH \times 256) \times 8$  dots in the horizontal direction for the NV bit image you are defining.
- yL, yH specifies  $(yL + yH \times 256) \times 8$  dots in the vertical direction for the NV bit image you are defining.
- This command cancels all NV bit images that have already been defined by this command. The printer cannot 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 FEED button, etc.) cannot be performed.
- During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit the data including the real-time commands during the execution of this command.
- NV bit image means a bit image that 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, and 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 NV 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.

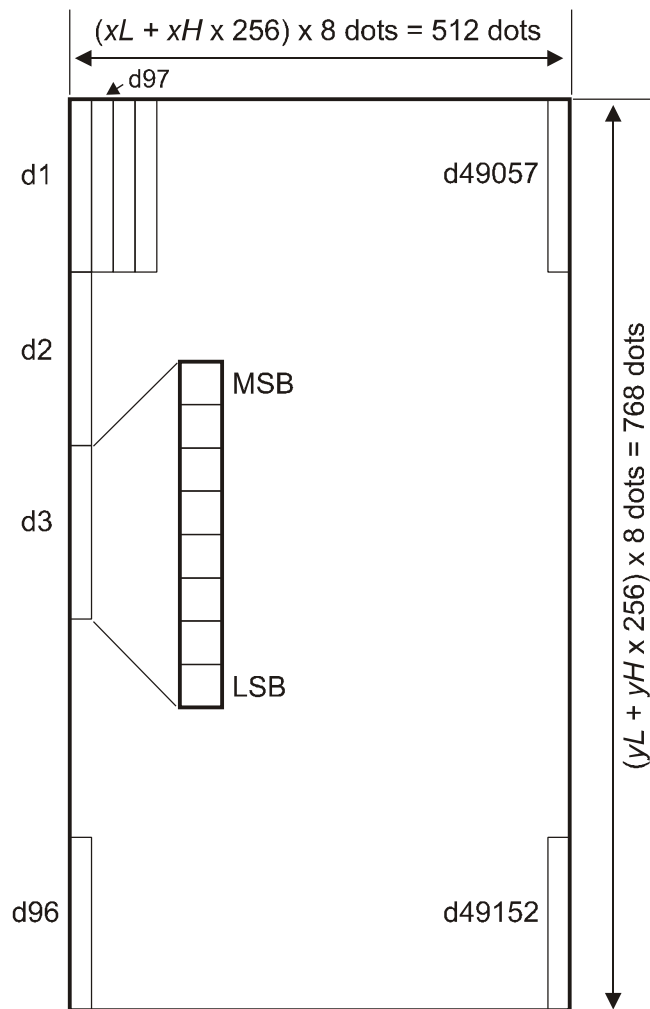
- This command defines  $n$  as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group  $[xL\ xH\ yL\ yH\ d1...dk]$  is NV bit image 01H, and the last data group  $[xL\ xH\ yL\ yH\ d1...dk]$  is NV bit image  $n$ . The total agrees with the number of NV bit images specified by command **FS p**.
- A definition data of a NV bit image consists of  $[xL\ xH\ yL\ yH\ d1...dk]$ . Therefore, 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  $((\text{data: } (xL + xH \times 256) \times (yL + yH \times 256) \times 8) + [\text{header :4}])$  bytes of NV memory.
- The definition area in this printer is a maximum of 2M bits (256K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 2M bytes (256K bytes).
- The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

**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 performs a hardware reset after the procedure to place the image into the NV 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. At this time, SETUP settings are checked again.

**See also:**     **Fs p**

**Example** When  $xL = 64$ ,  $xH = 0$ ,  $yL = 96$ ,  $yH = 0$



#### 4.5.45 Select character size

##### GS ! n

Hexadecimal code: 1D 21 *n*

Decimal code: 29 33 *n*

**Range:** *n* = 0-255

(vertical number of times = 1-8, 1 horizontal number of times = 1-8)

**Function:** Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0	Character height selection. See Table 2.			
1				
2				
3				
4	Character width selection. See Table 1.			
5				
6				
7				

Table 1 Character Width Selection

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

Table 2 Character Height Selection

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

- This command is all characters effective except for HRI characters.
- If *n* is outside of the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.
- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

**Default:** *n* = 0

**See also:** **ESC !**

#### 4.5.46 Set absolute vertical print position in page mode

##### **GS \$ nL nH**

Hexadecimal code: 1D 24 nL nH

Decimal code: 29 36 nL nH

**Range:** nL = 0-255  
nH = 0-255

Function:

- Sets the absolute vertical print starting position for buffer character data in page mode.
- This command sets the absolute print position to  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ .
- This command is effective only in page mode.
- If the  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  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.

**See also:** **ESC \$, ESC T, ESC W, ESC \, GS P, GS \, Appendix H**

#### 4.5.47 Define downloaded bit image

**GS \* x y d1...d(x × y × 8)**

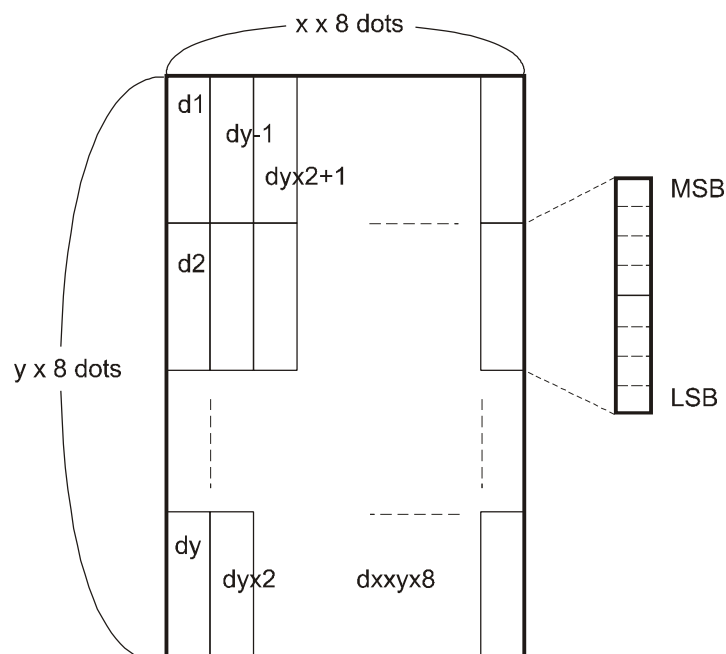
Hexadecimal code: 1D 2A x y d1...d(x × y × 8)

Decimal code: 29 42 x y d1...d(x × y × 8)

**Range:**        x = 1-255  
                  y = 1-48  
                  x × y = 1536  
                  d = 0-255

Function: 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 (divided by 8).
- y specifies the number of dots in the vertical direction (divided by 8).
- The number of dots in the horizontal direction is  $x \times 8$ , in the vertical direction it is  $y \times 8$ .
- If  $x \times y$  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. **SC &** is executed.
  3. **FS q** is executed.
  4. Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



**See also:**     **GS /**

#### 4.5.48 Execute test print

##### GS ( A pL pH n m

Hexadecimal code: 1D 28 41 pL pH n m

Decimal code: 29 40 65 pL pH n m

**Range:** (pL+(pH×256))=2 (pL=2, pH=0)

n = 0-2, n = 48-50

m = 1-3, m = 49-51

Function: Defines a downloaded bit image using the number of dots specified by x and y

- Executes a test print with a specified test pattern on a specified paper.
- pL and pH specifies the number of the parameter such as n, m to (pL + (pH × 256)) bytes.

n specifies the paper to be tested.

<i>n</i>	Paper
0, 48	Basic sheet (paper roll)
1, 49	Paper roll
2, 50	Paper roll

m specifies a test pattern.

<i>m</i>	Test pattern
1, 49	Hexadecimal dump
2, 50	Printer status print
3, 51	Rolling pattern print

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command.
- After the test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as an user-defined characters, downloaded bit image, and macro, becomes undefined, and the receive buffer and print buffer are cleared, and each setting returns to the default value. The printer also re-reads the SETUP settings .
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is executed.

#### 4.5.49 Print downloaded bit image

##### **GS / *m***

Hexadecimal code: 1D 2F *m*

Decimal code: 29 47 *m*

**Range:** *m* = 0-3

*m* = 48-51

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

*m* selects a mode from the table below:

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	18 dot/mm	8 dot/mm
1, 49	Double-width	8 dot/mm	4 dot/mm
2, 50	Double-height	4 dot/mm	8 dot/mm
3, 51	Quadruple	4 dot/mm	4 dot/mm

- 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, double-strike, 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.

**See also:** **GS \***

#### 4.5.50 Start/end macro definition

##### **GS :**

Hexadecimal code: 1D 3A

Decimal code: 29 58

Function: Starts or ends macro definition.

- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
- When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.
- Macro is not defined when the power is turned on.
- The defined contents of the macro are not cleared by **ESC @**. Therefore, **ESC @** can be included in the contents of the macro definition.
- If the printer receives **GS :** again immediately after previously receiving **GS :** the printer remains in the macro undefined state.
- The contents of the macro can be defined up to 2048 bytes. If the macro definition exceed 2048 bytes, excess data is not stored.

**See also:**     **GS ^**

#### 4.5.51 Turn white/black reverse printing mode

##### **GS B *n***

Hexadecimal code: 1D 42 *n*

Decimal code: 29 66 *n*

**Range:** *n* = 0-255

Function: Turns on or off white/black reverse printing mode.

- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of *n* is 1, white/black reverse mode is turned on.
- Only the lowest bit of *n* is valid.
- This command is available for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC SP**.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing skipped by **HT**, **ESC \$**, and **ESC \**.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

**Default:** *n* = 0

#### 4.5.52 Select printing position for HRI characters

##### **GS H *n***

Hexadecimal code: 1D 48 *n*

Decimal code: 29 72 *n*

**Range:** *n* = 0-3, *n* = 48-51

Function: Selects the printing position of HRI characters when printing a bar code.

*n* selects the printing position as follows:

<i>n</i>	Printing position
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code
3, 51	Both above and below the bar code

- HRI indicates Human Readable Interpretation.
- HRI characters are printed using the font specified by **GS f**.

**Default:** *n* = 0

**See also:** **GS f**, **GS k**

#### 4.5.53 Transmit printer ID

##### GS I *n*

Hexadecimal code: 1D 49 *n*

Decimal code: 29 73 *n*

**Range:** *n* = 1-3, *n* = 49-51, *n* = 65-68

Function: Transmits the printer ID specified by *n* as follows:

<i>n</i>	Printer ID	Specification	ID (hexadecimal)
1, 49	Printer model ID	TM-T88II series	20
2, 50	Type ID	See table below.	
3, 51	ROM version ID	Depends on ROM version.	
65	Firmware version	Depends on Firmware version.	
66	Manufacturer	OLIVETTI	
67	Printer name	TM-T88 III	
68	Serial number	Depends on serial number.	

*n* = 2, Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte character code not supported.
	On	01	1	Two-byte character code supported.
1	On	02	2	Autocutter equipped.
2	Off	00	0	Not used. Fixed to Off.
3	Off	00	0	Not used. Fixed to Off.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

- When DTR/DSR control is selected in the serial interface model, the printer transmits the printer ID after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.
- When XON/XOFF control is selected in the serial interface model, the printer transmits the printer ID without confirming the condition of the DSR signal.
- The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When the printer ID transmission is specified with (n = 1-3) or (n = 49-51), one byte code is transmitted.
- When Auto Status Back (ASB) is enabled using **GS a**, the printer ID transmitted by **GS I** and the ASB status must be differentiated using the table in Appendix G.
- After the data is ready to be transmitted, the printer executes the following process.
- When the printer ID transmission is specified with (n = 65-68), the following contents are transmitted: Header: Hexadecimal = 5FH / Decimal = 95 (1 byte) Data: Printer information NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)
  - 1) Executes READY to BUSY. If it is already BUSY, the printer executes nothing.
  - 2) Transmits [Header + Data + NUL].
  - 3) Executes BUSY to READY. If it is already BUSY from any other cause, the printer executes nothing.

**See also:**      Appendix G

#### 4.5.54 Set left margin

##### **GS L *nL nH***

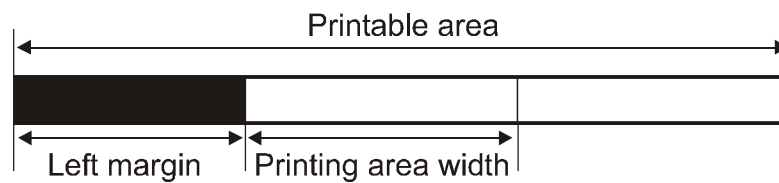
Hexadecimal code: 1D 4C *nL nH*

Decimal code: 29 76 *nL nH*

**Range:**        *nL* = 0-255  
                  *nH* = 0-255

Function: Sets the left margin using *nL* and *nH*.

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



- This command is effective only processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.
- The horizontal motion unit (*x*) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.

**Default:**        *nL* = 0, *nH* = 0

**See also:**       **GS P**, **GS W**

#### 4.5.55 Set horizontal and vertical motion units

##### **GS P x y**

Hexadecimal code: 1D 50 x y

Decimal code: 29 80 x y

**Range:**           x = 0-255  
                  y = 0-255

**Function:** Sets the horizontal and vertical motion units to approximately 25.4/x mm { 1/x inches} and approximately 25.4/y mm {1/y inches}, respectively.

When x and y are set to 0, the default setting of each value is used.

- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
- In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):
  1. Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**
  2. Commands using y: **ESC 3, ESC J, GS V**
- In page mode, the following command use x or y, depending on character orientation:
  1. When the print starting position is set to the upper left or lower right of the printing area using **ESC T** (data is buffered in the direction perpendicular to the paper feed direction):  
Commands using x : **ESC SP, ESC \$, ESC W, ESC \, FS S**  
Commands using y : **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**
  2. When the print starting position is set to the upper right or lower left of the printing area using **ESC T** (data is buffered in the paper feed direction):  
Commands using x : **ESC 3, ESC J, ESC W, GS \$, GS \**  
Commands using y : **ESC SP, ESC \$, ESC W, ESC \, FS S, GS V**
- The 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.

**Default:**           x = 180, y = 360

**See also:**       **ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS \**

#### 4.5.56 Select cut mode and cut paper

##### (1) GS V *m* (2) GS V *m n*

Hexadecimal code: (1) 1D 56 *m*, (2) 1D 56 *m n*

Decimal code: (1) 29 86 *m*, (2) 29 86 *m n*

**Range:** (1) *m* = 1, 49, (2) *m* = 66, *n* = 0-255

**Function:** Selects a mode for cutting paper and executes paper cutting. The value of *m* selects the mode as follows:

<i>m</i>	Print mode
1, 49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [ <i>n</i> × (vertical motion unit)]), and cuts the paper partially (one point left uncut).
	partially (one point left uncut).

**(1) and (2):** • This command is effective only processed at the beginning of a line.

**(1):** • Only the partial cut is available; there is no full cut.

**(2):** • When *n* = 0, the printer feeds the paper to the cutting position and cuts it.  
• When *n* ≠ 0, the printer feeds the paper to (cutting position + [*n* × vertical motion unit]) and cuts it.  
• The horizontal and vertical motion unit are specified by **GS P**.  
• The paper feed amount is calculated using the vertical motion unit (*y*). 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.

#### 4.5.57 Set printing area width

##### **GS W *nL nH***

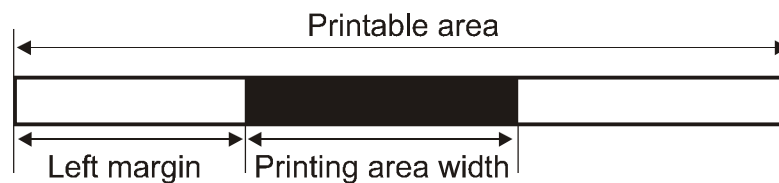
Hexadecimal code: 1D 57 *nL nH*

Decimal code: 29 87 *nL nH*

**Range:**        *nL* = 0-255  
                  *nH* = 0-255

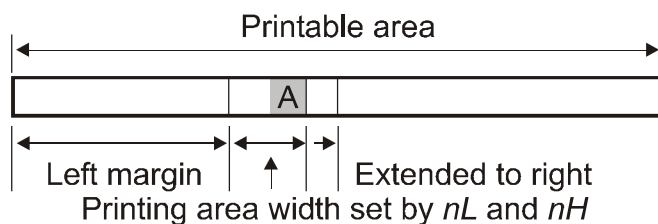
Function: Sets the printing area width to the area specified by *nL* and *nH*.

- The printing area width is set to  $[(nL + nH \times 256) \times \text{horizontal motion unit}]$ .



- This command is effective only processed at the beginning of the line.
- In page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin] is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.
- The horizontal motion unit (x) is used for calculating the printing area width. The calculated result is truncated to the minimum value of the mechanical pitch.

- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:
  1. The printing area width is extended to the right to accommodate one character.



2. If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one character.



3. If the printing area width cannot be extended sufficiently, the right space is reduced.
- If the width set for the printing area is less than one line in vertical, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:
    1. The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.
    2. If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one line in vertical.
  - The commands which set the printing area width for bit image printing and its minimum widths are as follows:
    - Bit image (**ESC \***):
      - Single density mode = 2 dots
      - Double density mode = 1 dot
    - Downloaded bit image (**GS I**):
      - Double width mode or Quadruple mode = 2 dots
      - Normal mode or Double-height mode = 1 dot
    - NV bit image (**FS p**):
      - Double width mode or Quadruple mode = 2 dots
      - Normal mode or Double-height mode = 1 dot
    - Raster bit image (**GS v 0**):
      - Double width mode or Quadruple mode = 2 dots
      - Normal mode or Double-height mode = 1 dot

**Default:**  $nL = 0$ ,  $nH = 2$

**See also:** **GS L**, **GS P**

#### 4.5.58 Set relative vertical print position in page mode

##### **GS \ nL nH**

Hexadecimal code: 1D 5C nL nH

Decimal code: 29 92 nL nH

**Range:** nL = 0-255  
nH = 0-255

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

- This command sets the distance from the current position to  $[(nL + nH \times 256) \times \text{vertical or horizontal motion unit}]$ .
- This command is ignored unless page mode is selected.
- When pitch  $N$  is specified to the movement downward:  
$$nL + nH \times 256 = N$$
- When pitch  $N$  is specified to the movement upward (the negative direction), use the complement of 65536.  
When pitch  $N$  is specified to the movement upward:  $nL + nH \times 256 = 65536 - N$
- 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.

**See also:** **ESC \$, ESC T, ESC W, ESC \, GS \$, GS P, Appendix H**

#### 4.5.59 Execute macro

##### **GS ^ $r$ $t$ $m$**

Hexadecimal code: 1D 5E  $r$   $t$   $m$

Decimal code: 29 94  $r$   $t$   $m$

**Range:**  $r = 0-255$

$t = 0-255$

$m = 0,1$

Function: Executes a macro.

- $r$  specifies the number of times to execute the macro.
- $t$  specifies the waiting time for executing the macro.
- $m$  specifies macro executing mode.

When the LSB of  $m = 0$ :

The macro executes  $r$  times continuously at the interval specified by  $t$ .

When the LSB of  $m = 1$ :

After waiting for the period specified by  $t$ , the PAPER OUT LED indicators blink 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.

- The waiting time is  $t \times 100$  ms for every macro execution.
- 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 ( $m = 1$ ), paper always cannot be fed by using the FEED button.

**See also:** **GS :**

#### 4.5.60 Enable/Disable Automatic Status Back (ASB)

##### GS a *n*

Hexadecimal code: 1D 61 *n*

Decimal code: 29 97 *n*

**Range:** *n* = 0-255

Function: 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	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-	-	-	Undefined.

- 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 EOT**, **GS I**, 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	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
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 autocutter error.
	On	08	8	Autocutter 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 end sensor: paper present.
	On	0C	12	Paper roll end 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.

**See also:** **DLE EOT**, **GS r**, Appendix G, *Transmission Status Identification*

#### 4.5.61 Turns smoothing mode on/off

##### **GS b *n***

Hexadecimal code: 1D 62 *n*

Decimal code: 29 98 *n*

**Range:** *n* = 0-255

Function: Turns smoothing mode on or off.

When the LSB of *n* is 0, smoothing mode is turned off.

When the LSB of *n* is 1, smoothing mode is turned on.

- Only the lowest bit of *n* is valid.
- Smoothing mode is available for built-in, user-defined characters.
- Even if smoothing mode is turned on, smoothing is not performed when either of character width or character height is the normal size.

**Default:** *n* = 0

**See also:** **GS : ESC !, GS !**

#### 4.5.62 Select font for Human Readable Interpretation (HRI) characters

##### **GS f *n***

Hexadecimal code: 1D 66 *n*

Decimal code: 29 102 *n*

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

Function: Selects a font for the HRI characters used when printing a bar code.

*n* selects a font from the following table:

<i>n</i>	Font
0, 48	Font A (12 × 24)
1, 49	Font B (9 × 17)

- HRI indicates Human Readable Interpretation.
- HRI characters are printed at the position specified by **GS H**.

**Default:** *n* = 0

**See also:** **GS H, GS k**

#### 4.5.63 Select bar code height

##### **GS h *n***

Hexadecimal code: 1D 68 *n*

Decimal code: 29 104 *n*

**Range:** *n* = 1-255

Function: Selects the height of the bar code.

*n* specifies the number of dots in the vertical direction.

**Default:** *n* = 162

**See also:** **GS k**

#### 4.5.64 Print bar code

##### (1) GS k m d1...dk NUL (2) GS k m n d1...dn

Hexadecimal code: (1) 1D 6B m d1...dk 00

(2) 1D 6B m n d1...dn

Decimal code: (1) 29 107 m d1...dk 0

(2) 29 107 m n d1...dn



**Range:**  $m = 0-6$  ( $k$  and  $d$  depends on the bar code system used)

$m = 65-73$  ( $n$  and  $d$  depends on the bar code system used)

Function: Selects a bar code system and prints the bar code.

$m$  selects a bar code system as follows:

$m$		Bar Code System	Number of Characters	Remarks
(1)	0	UPC-A	$k = 11-12$	$d = 48-57$
	1	UPC-E	$k = 11-12$	$d = 48-57$
	2	JAN13 (EAN13)	$k = 12-13$	$d = 48-57$
	3	JAN 8 (EAN8)	$k = 7-8$	$d = 48-57$
	4	CODE39	$K \leq 1$	$d = 48-57, d = 65-90, 32, 36, 37, 43, 45, 46, 47$
	5	ITF	$k = 1-(\text{even number})$	$d = 48-57$
	6	CODABAR	$K \leq 1$	$d = 48-57, d = 65-68, 36, 43, 45, 46, 47, 58$
(2)	65	UPC-A	$n = 11-12$	$d = 48-57$
	66	UPC-E	$n = 11-12$	$d = 48-57$
	67	JAN13 (EAN13)	$n = 12-13$	$d = 48-57$
	68	JAN 8 (EAN8)	$n = 7-8$	$d = 48-57$
	69	CODE39	$n = 1-255$	$d = 48-57, d = 65-90, 32, 36, 37, 43, 45, 46, 47$
	70	ITF	$n = 1-255$ (even number)	$d = 48-57$
	71	CODABAR	$n = 1-255$	$d = 48-57, d = 65-68, 36, 43, 45, 46, 47, 58$
	72	CODE93	$n = 1-255$	$d = 0-127$
	73	IGNORED		

- (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 12 bytes bar code data and processes the following data as normal data.
  - When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.
  - When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal 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.
- (2):
  - $n$  indicates the number of bar code data, and the printer processes  $n$  bytes from the next character data as bar code data.
  - If  $n$  is outside of the specified range, the printer stops command processing and processes the following data as normal data.
- Standard mode:**
  - If  $d$  is outside of the specified range, the printer only feeds paper and processes the following data as normal data.
  - If the horizontal size exceeds 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**.
  - This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following  $m$  as normal data.
  - After printing 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, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.
  - This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
  - If  $d$  is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.
  - If bar code width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.
  - The printer prints an HRI character  as start character at the beginning of the HRI character string.
  - The printer prints an HRI character  as a stop character at the end of the HRI character string.

- The printer prints HRI characters ( + an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

Control character				Control character			
ASCII	Hex	Decimal	HRI character	ASCII	Hex	Decimal	HRI character
NUL	00	0	■ U	DLE	10	16	■ P
SOH	01	1	■ A	DC1	11	17	■ Q
STX	02	2	■ B	DC2	12	18	■ R
ETX	03	3	■ C	DC3	13	19	■ S
EOT	04	4	■ D	DC4	14	20	■ T
ENQ	05	5	■ E	NAK	15	21	■ U
ACK	06	6	■ F	SYN	16	22	■ V
BEL	07	7	■ G	ETB	17	23	■ W
BS	08	8	■ H	CAN	18	24	■ X
HT	09	9	■ I	EM	19	25	■ Y
LF	0A	10	■ J	SUB	1A	26	■ Z
VT	0B	11	■ K	ESC	1B	27	■ A
FF	0C	12	■ L	FS	1C	28	■ B
CR	0D	13	■ M	GS	1D	29	■ C
SO	0E	14	■ N	RS	1E	30	■ D
SI	0F	15	■ O	US	1F	31	■ E
				DEL	7F	127	■ T

**Example:** Printing **GS k 72 07 67 111 100 101 32 51 57**



**See also:** **GS H, GS f, GS h, GS w**

#### 4.5.65 Transmit status

##### **GS r n**

Hexadecimal code: 1D 72 *n*

Decimal code: 29 114 *n*

**Range:** *n* = 1, 2, 49, 50

Function: Transmits the status specified by *n* as follows:

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

- When using a serial interface
- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.
- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated using the table in Appendix G.
- The status types to be transmitted are shown below:

Paper sensor status (*n* = 1, 49):

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 end sensor: paper adequate.
	On	(0C)	(12)	Paper roll end sensor: paper near end.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Bits 2 and 3: When the paper end sensor detects a paper end, the printer goes offline and does not execute this command. Therefore, bits 2 and 3 do not transmit the status of paper end.

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

**See also:** DLE EOT, GS a, Appendix G

#### 4.5.66 Print raster bit image

##### GS v 0 m xL xH yL yH d1....dk

Hexadecimal code: 1D 76 30 *m xL xH yL yH d1...dk*

Decimal code: 29 118 48 *m xL xH yL yH d1...dk*

**Range:**  $m = 0-3, m = 48-51$

$xL = 0-255$

$xH = 0-255$

$yL = 0-255$

$yH = 0-8$

$d = 0-255 \quad k = (xL + xH \times 256) \times (yL + yH \times 256) \quad (k \neq 0)$

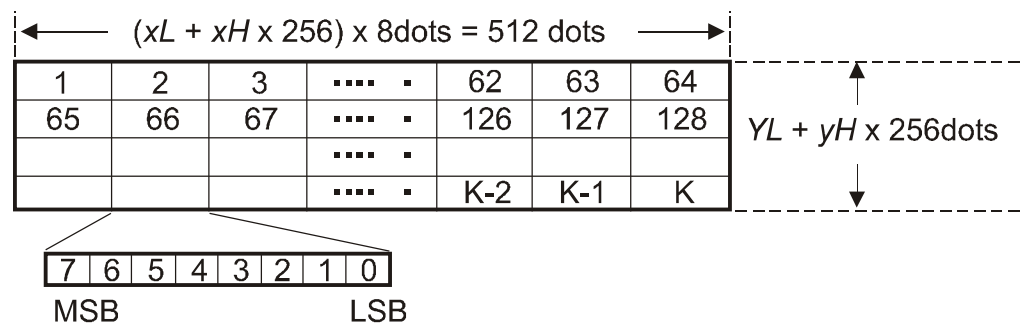
Function: Selects Raster bit-image mode. The value of *m* selects the mode, as follows:

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	8dots/mm	8dots/mm
1, 49	Double-width	8dots/mm	4dots/mm
2, 50	Double-height	4dots/mm	8dots/mm
3, 51	Quadruple	4dots/mm	4dots/mm

[dpi: dots per 25.4 mm {1"}]

- *xL*, *xH*, select the number of data bytes ( $xL+xH \times 256$ ) in the horizontal direction for the bit image.
- *yL*, *yH*, select the number of data bytes ( $yL+yH \times 256$ ) in the vertical direction for the bit image.

**Example:** When  $xL+xH \times 256=64$



#### 4.5.67 Set bar code width

##### **GS w *n***

Hexadecimal code: 1D 77 *n*

Decimal code: 29 119 *n*

**Range:** *n* = 2-6

Function: Set the horizontal size of the bar code.

*n* specifies the bar code width as follows:

<i>n</i>	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	2.000

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

**Default:** *n* = 3

**See also:** **GS k**

## 5 Character Sets

### 5.1 General

In the character set, the firmware assigns a specific printable character to each byte of data. A character set may contain up to 255 different characters. The first 128 characters (from code 0 to 127) are standardized and represent the USA ASCII character set, which excludes all the European national characters and semigraphic symbols as well.

The assignment of codes 128 to 255 varies from one country to another, from one type of hardware to another, from one operating system to another and often according to the application program used. Before selecting a character set, read the documentation provided with your operating system and application carefully.

The section "Printable character set tables" indicates the codes that correspond to the characters in the resident character sets.

## 5.2 Printable character sets

The printer recognizes and can print the following character sets, selected as follows:

Character sets	Selection
Code Page 437 (U.S.A., Standard Europe)	via setup (NATION: CP 437) or via software (see ESC t n)
Code Page 850 (Multilingual)	via setup (NATION: CP 850) or via software (see ESC t n)
Code Page 852 (Latin 2)	via setup (NATION: CP 852) or via software (see ESC t n)
Code Page 858	via setup (NATION: CP 858) or via software (see ESC t n)
Code Page 860 (Portuguese)	via setup (NATION: CP 860) or via software (see ESC t n)
Code Page 863 (Canadian-French)	via setup (NATION: CP 863) or via software (see ESC t n)
Code Page 865 (Nordic)	via setup (NATION: CP 865) or via software (see ESC t n)
Code Page 866 (Cyrillic #2)	via setup (NATION: CP 866) or via software (see ESC t n)
WPC1252	via setup (NATION: WPC1252) or via software (see ESC t n)
Code Page 255 (Space Page)	only via software (see ESC t n).
National variants	only via software (see ESC R n).

### 5.3.1 Code Page 437 (U.S.A., Standard Europe)

HEX	HEX BIN	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0000	NUL	DLE	SP	0	@	P	'	p	Ç	É	Á	⌘	⌘	⌘	α	
1	0001		XON	!	1	A	Q	a	q	ü	æ	í	⌘	⌘	⌘	β	±
2	0010			"	2	B	R	b	r	é	Æ	ó	⌘	⌘	⌘	Γ	≥
3	0011		XOFF	#	3	C	S	c	s	â	ô	ú	⌘	⌘	⌘	π	≤
4	0100	EOT	DC4	\$	4	D	T	d	t	ä	ö	ñ	⌘	⌘	⌘	Σ	↑
5	0101	ENQ		%	5	E	U	e	u	à	ò	ñ	⌘	⌘	⌘	σ	↓
6	0110			&	6	F	V	f	v	á	û	ä	⌘	⌘	⌘	μ	÷
7	0111			,	7	G	W	g	w	ç	ù	q	⌘	⌘	⌘	τ	≈
8	1000		CAN	(	8	H	X	h	x	ê	ÿ	ç	⌘	⌘	⌘	φ	°
9	1001	HT		)	9	I	Y	i	y	ë	ö	⌘	⌘	⌘	⌘	θ	•
A	1010	LF		*	:	J	Z	j	z	è	ú	⌘	⌘	⌘	⌘	Ω	·
B	1011		ESC	+	;	K	[	k	⌘	ï	φ	½	⌘	⌘	⌘	δ	
C	1100	FF		,	<	L	\	⌘	⌘	î	£	¾	⌘	⌘	⌘	∞	n
D	1101	CR	GS	-	=	M	]	m	⌘	ì	¥	⌘	⌘	⌘	⌘	∅	²
E	1110			.	>	N	`	n	~	À	⌘	«	⌘	⌘	⌘		■
F	1111			/	?	O	_	o	SP	Á	⌘	»	⌘	⌘	⌘		SP

### 5.3.2 Code Page 850 (Multilingual)

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

### 5.3.3 Code Page 852 (Latin 2)

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

### 5.3.4 Code Page 858 (Multilingual + Euro)

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

### 5.3.5 Code Page 860 (Portuguese)

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

### 5.3.6 Code Page 863 (Canadian-French)

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

### 5.3.7 Code Page 865 (Nordic)

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

### 5.3.8 Windows PC1252

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

### 5.3.9 Code Page 255 (Space Page)

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

### 5.3.10 National variants

COUNTRY	Hexadecimal codes
	23 24 40 5B 5C 5D 5E 60 7B 7C 7D 7E
0 U.S.A.	# \$ @ [ \ ] ^ ` {   } ~
1 France	# \$ à ° ç § ^ ` é ù è "
2 Germany	# \$ § Ä Ö Ü ^ ` ä ö ü ß
3 U. K.	£ \$ @ [ \ ] ^ ` {   } ~
4 Denmark I	# \$ @ Æ Ø Å ^ ` æ ø å ~
5 Sweden	# ¤ É Ä Ö Å Ü é ä ö å ü
6 Italy	# \$ @ ° \ é ^ ù à ò è ì
7 Spain	Pt \$ @ ¡ Ñ ¿ ^ ` " ñ } ~
8 Japan	# \$ @ [ ¥ ] ^ ` { ¡ } ~
9 Norway	# ¤ É Æ Ø Å Ü é æ ø å ü
10 Denmark II	# \$ É Æ Ø Å Ü é æ ø å ü

## Appendix A: General Information

### A.1 Printing and Paper Feeding

This line printer automatically feeds paper after printing the data. Therefore, when the line spacing for one line is set to a smaller value than the print data, paper may be fed more than the set amount just to print the data. For example, when the line spacing for one line is set to 10 dots (10/180 inches) and only paper feeding is executed, paper is fed for 10 dots; however, if bit-image characters are printed, paper is fed for 24 dots. (Refer to Table A.1.) When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1.

**Table A.1 Paper Feeding Amount**

		<b>Required Paper Feeding Amount (dots)</b>
Normal Characters	Font A	$27 \times \text{number of times enlarged in vertical}$
	Font B	$20 \times \text{number of times enlarged in vertical}$
Rotated Characters	Font A	$13 \times \text{number of times enlarged in vertical}$
	Font B	$10 \times \text{number of times enlarged in vertical}$
Bit image ( <b>ESC</b> *)		24

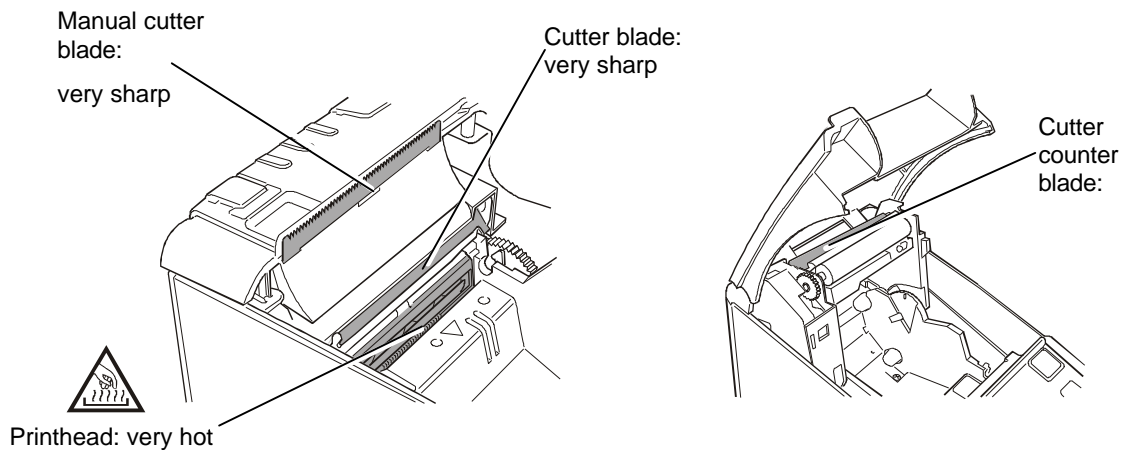
When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects bit-image printing.

Interval of autocutting operation in the receipt section. For driving the auto cutter of the receipt section, take the interval as a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the auto cutter).

## A.2 Safety Precautions And General Operating Norms

### READ THIS SECTION CAREFULLY BEFORE PROCEEDING TO USE THIS PRODUCT.

- ❑ Make sure that the electrical characteristics of the printer's external power supply unit (110/240 Vac, 50-60 Hz) correspond to those of the electrical socket to which it is connected.
- ❑ Connect the printer to an electrical system compliant with the latest standards.
- ❑ Do not locate the printer in direct sunlight, near water, near heat sources or in humid or very dusty environments.
- ❑ In case of smoke, bad odors or unusual noise coming from the printer, unplug the external power supply and contact the field engineering service.
- ❑ To avoid the risk of injury, **do not touch** the parts indicated in the following figures:

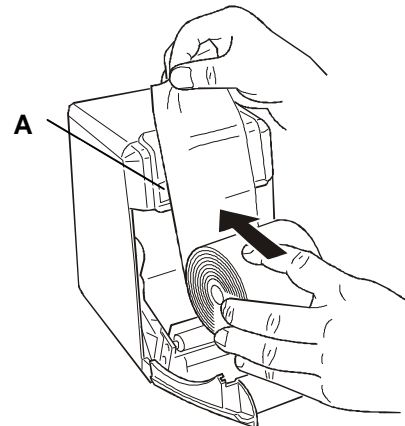
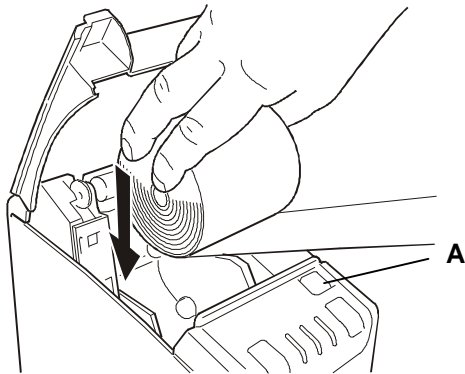


- ❑ Do not pull the receipt paper from its output slot when the printer cover is closed.
- ❑ Do not open the printer cover during a print job or when the incorporated cutter is cutting the receipt paper.
- ❑ Do not attempt to repair the printer except for following the troubleshooting procedures; contact the field engineering service.
- ❑ Do not disassemble or modify the printer.
- ❑ Do not insert foreign objects into the printer.
- ❑ Unplug the printer's external power supply unit from the electrical wall outlet if the printer is left unattended for long periods of time.
- ❑ If the printer is not used for long periods of time, it is suggested that you open its cover by pressing the OPEN button as far as it goes. This prevents feeble areas from appearing on initial printouts taken as soon as the printer is back into use

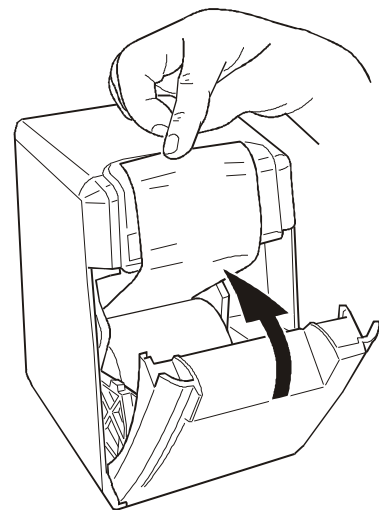
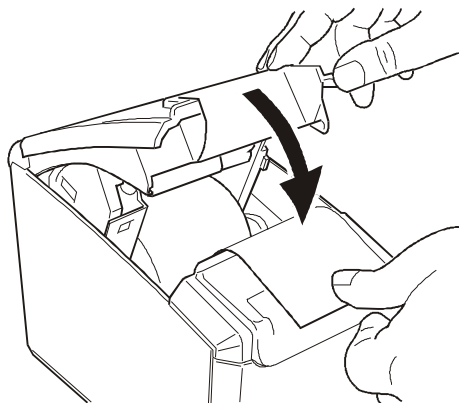
## Appendix B: Loading the Thermal Paper Roll

Proceed as follows to load the roll of thermal paper:

1. With the printer powered on, open the printer cover by pressing the Open button **(A)** on the operating console as far as it goes (until hearing a click sound indicating that the button is locked in a pressed position).
2. With the paper roll oriented as shown in the following figure, unroll about 20 cm of paper and then insert the roll into its compartment inside the printer while holding the unrolled portion of paper.



3. While holding the unrolled portion of paper, close the printer cover by pressing simultaneously on the right-hand and left-hand sides of the paper output slot. Make sure that the cover is properly closed on both sides.

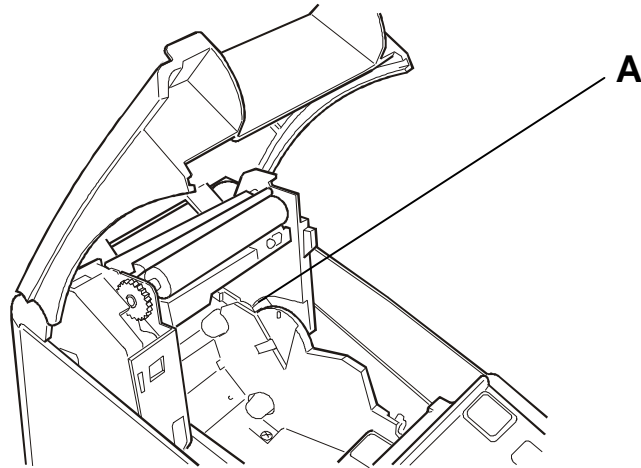


## Appendix C: Adjusting the Near Paper End Sensor

The near paper end detection sensor is adjusted at the factory so that it is functionally compatible with the most widespread paper rolls. This sensor can be adjusted accordingly, when either too much or not enough paper is still remaining when the condition is signaled.

The adjustment of this sensor depends upon the diameter of the core of the paper roll used. When moving the adjustment lever forward the near paper end condition is signaled when more paper is present, while moving the lever backward less paper will be present when the condition is signaled. Proceed as follows to adjust the near paper end sensor:

1. Open the printer cover by pressing the Open button on the operating console as far as it goes (until hearing a click sound indicating that the button is locked in a pressed position).
2. Move the green adjustment lever **(A)** towards the front of the printer if you wish to have a more anticipated indication (in the case of cores with a larger diameter), or towards the rear of the printer if you wish to have a more delayed indication (in the case of cores with a smaller diameter).



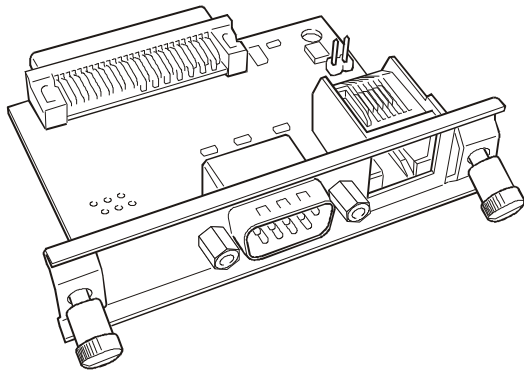
3. Load the roll of thermal paper.

## Appendix D: Installing the interface card

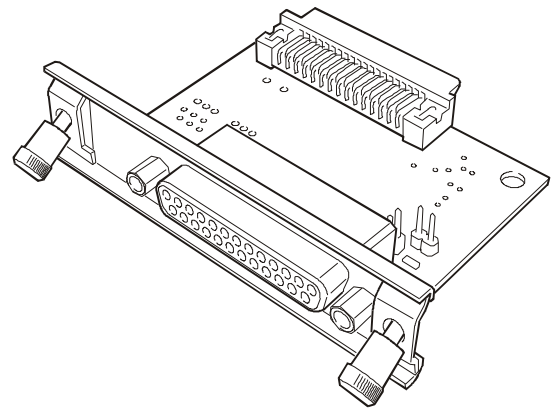
**WARNING:** Before proceeding with any type of operation, unplug the power cord of the external power supply unit from the electrical power outlet and bear in mind the information provided in the chapter entitled **Safety Precautions and General Operating Norms**.

The following slot pluggable interface cards can be installed on the printer:

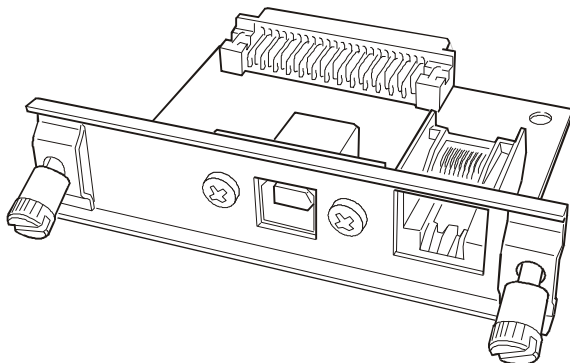
1. Serial (9 pin)
2. Serial (25 pin)
3. USB
4. Bi-directional parallel



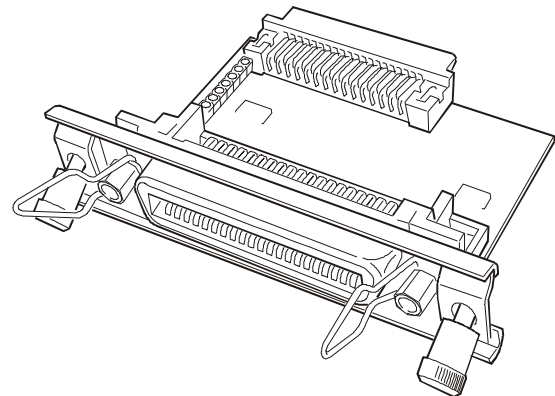
9 pin Serial



25 pin Serial



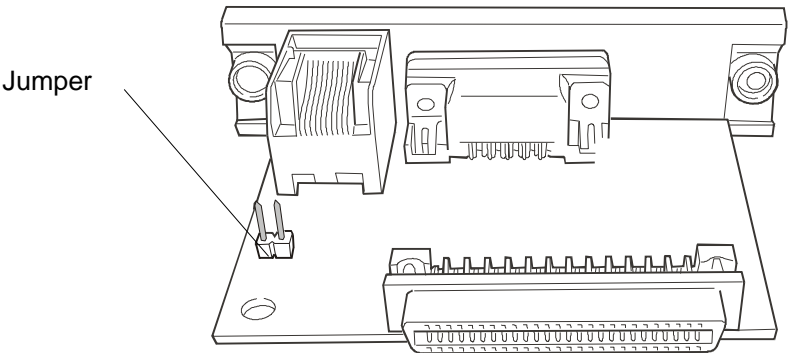
USB



Parallel

D.1 Serial intrface card configuration

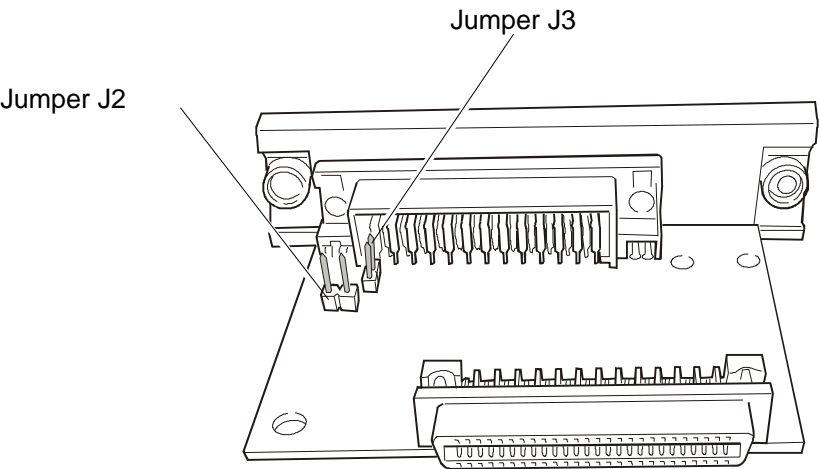
Before installing the interface card its jumpers need to be configured accordingly.



9 pin Serial

ON	I/F pin 6 used as reset signal
OFF	I/F pin 6 used as DSR signal

When ON: The printer is reset when the signal remains MARK for 1 ms or more.



25 pin Serial

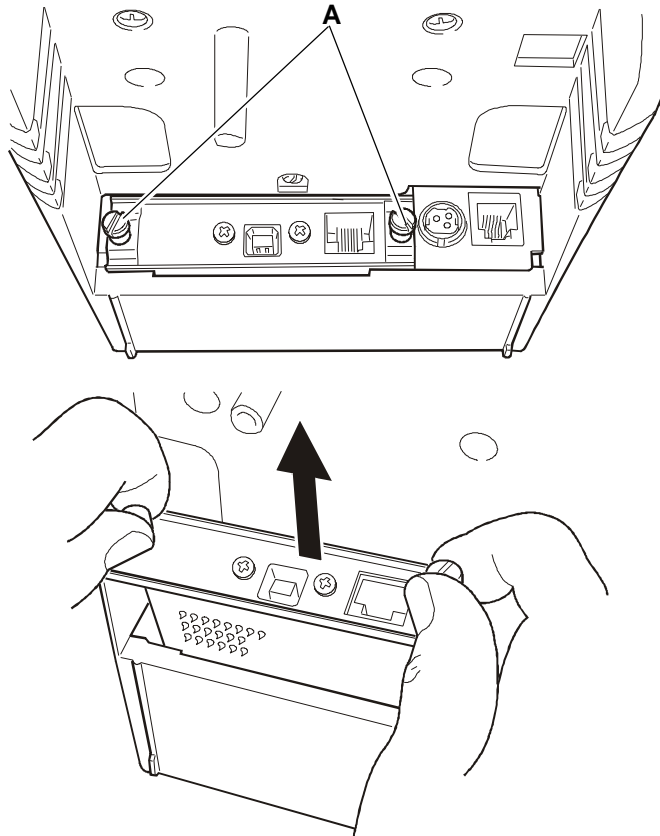
Jumper J2	When ON	I/F pin 6 used as reset signal
	When OFF	I/F pin 6 used as DSR signal
Jumper J3	When ON	I/F pin 25 used as reset signal
	When OFF	Not Used (INIT)

When J3 is ON: The printer is reset when the signal remains SPACE for 1 ms on more.

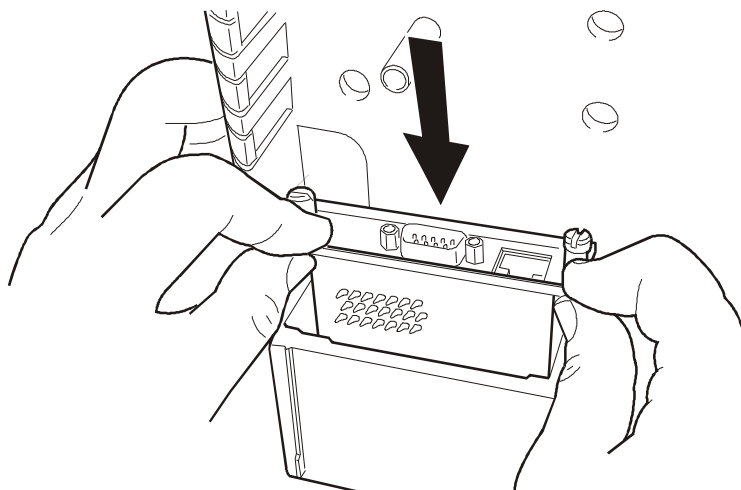
## D.2 Installing the interface card

The procedure described below is valid for each interface card.

- Unscrew the two securing screws **A** and remove the interface card that is present.



- Insert the new card into the slot, pressing it all the way to make sure that it correctly plugs into the related connector on the main board. Secure the card in place by tightening the two securing screws **A**.



## Appendix E: Cleaning the Printer

**WARNING:** Before proceeding with any type of operation, unplug the power cord of the external power supply unit from the electrical power outlet and bear in mind the information provided in the chapter entitled Safety Precautions and General Operating Norms.

### CLEANING THE PAPER ROLL COMPARTMENT

1. Open the printer cover, remove the paper roll from the paper roll compartment and clean the compartment with a soft cloth being very careful to avoid touching the printhead and cutter blades.
2. Load the paper roll.

### CLEANING THE PRINTER CASE

1. Clean the printer's external case using a soft cloth. Do not use solvents or hydrocarbon-based products.

### CLEANING THE PRINTHEAD

**WARNING:** The printhead could be easily damaged so it is suggested that you clean it with extreme care, without scratching it.

1. Open the printer cover.
2. Gently pass a cotton swab dampened with isopropyl alcohol (IPA) over the surface of the thermal printhead.
3. Unroll about 20 cm of paper and, while holding the unrolled portion of paper; close the printer cover by pressing on the right-hand and left-hand sides of the paper output slot. Make sure that the cover is properly closed on both sides.

## Appendix F: Problem Solving

### CLEARING A PAPER JAM

1. Power off the printer and open its cover.
2. Remove the paper roll and check what caused the paper jam. When the paper roll compartment is clear of any paper residue, power on the printer and load the paper roll.

### TROUBLESHOOTING

Before contacting the field engineering service, consult the table below so as to attempt to correct the malfunction by following the information provided.

1.	<b>PROBLEM</b>	The printer does not power on.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Make sure that the power cord of the external power supply unit is properly connected to the electrical outlet.</li><li>❑ Make sure that the power cord of the external power supply unit is properly connected to the printer.</li><li>❑ Make sure there are no blackouts.</li></ul>
2.	<b>PROBLEM</b>	The paper is jammed.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Remove the paper roll, make sure that the paper compartment is clear of paper dust or residue and then reload the paper roll.</li></ul>
3.	<b>PROBLEM</b>	The paper is not cut (cutter locked)
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Reset the cutter by opening and closing the printer cover.</li><li>❑ Open the printer cover and remove the wrinkled portion of paper then load paper roll again.</li><li>❑ Open the printer cover and then remove and reload the paper roll.</li></ul>
4.	<b>PROBLEM</b>	The yellow out/almost out of paper LED (ROLL) is on or flashing.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Load a new paper roll.</li></ul>
5.	<b>PROBLEM</b>	The red ERROR LED (ERR) is on.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ If the paper is jammed, clear the paper jam by following the instructions of step 2.</li><li>❑ If the cutter is locked, unlock the cutter by following the instructions of step 3.</li><li>❑ In the case of a printer failure, contact the field engineering service.</li></ul>
6.	<b>PROBLEM</b>	The power LED (ON/OFF) is flashing.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Wait for the LED to stop flashing.</li></ul>
7.	<b>PROBLEM</b>	The paper is not fed.
	<b>SOLUTION</b>	<ul style="list-style-type: none"><li>❑ Open the printer cover and then close it again by pressing on the right-hand and left-hand sides of the cover's paper output slot.</li></ul>

## Appendix G: Transmission Status Identification

Because the specified status bits transmitted from this printer are fixed, the user can confirm the command to which the status belongs, as shown in the following table. When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB. Otherwise, the status transmitted by using the **GS r** and the status of the second and following bytes of the ASB cannot be differentiated.

**Table F.1      Transmission Status Identification**

<b>Command &amp; Function</b>	<b>Status Reply</b>
<b>GS I</b>	<0**0****>B
<b>GS r</b>	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
<b>DLE EOT</b>	<0**1**10>B
ASB (1st byte)	<0**1**00>B
ASB (2nd to 4th bytes)	<0**0****>B

## Appendix H: Page Mode

### H.1 Introduction

The printer operates in two print modes: standard mode and page mode. In standard mode, the printer prints and feeds paper each time it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are processed in the specified memory, and the printer executes no operations. All the data in the memory is then printed when an **ESC FF** or **FF** command is received.

The **ESC L** command puts the printer into page mode, and all commands received thereafter are processed in page mode. Executing an **ESC FF** command prints the received data collectively, and executing an **FF** command restores the printer to standard mode after the received data is printed collectively. Executing an **ESC S** command restores the printer to standard mode without printing the received data in page mode; the received data is cleared from memory instead.

### H.2 Setting Values in Standard and Page Modes

The available commands and parameters are the same for both standard and page modes. However, these values can be set independently in each mode for the **ESC SP**, **ESC 2**, **ESC 3**, and **FS S** commands. For these commands, different settings can be stored for each mode.

Although the maximum number of printable dots for a bit image when the paper roll is selected as the print sheet is 512 in standard mode, 831 bit-image dots can be printed in the y direction (paper feed direction) in page mode. This is possible only when the **ESC W** command has specified 831 printable-area dots in the y direction and the printing direction value of *n* in the **ESC T** command is 1 or 3.

### H.3 Formatting of Print Data in the Printable Area

The printable area is set using **ESC W**. If all printing and feeding are complete before the printer receives the **ESC W** command, the left side (as you face the printer) is taken as the origin (x0, y0) of the printable area. The printable rectangular area is defined by the length (dx dots) extending from and including the origin (x0, y0) in the x direction (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction). If the **ESC W** command is not used, the printable area remains the default value.

When the printer receives print data after **ESC W** sets the printable area and **ESC T** sets the printing direction, the print data is formatted within the printable area so that point A in Figure 1 is at the beginning of the printable area as a default value. (When a character is printed, point A is the baseline.)

Print data containing downloaded bit images or bar codes is formatted so that the bottom point of the left side of the image data (point B in Figure 1) is aligned with the baseline. However, any Human Readable Interpretation (HRI) characters are printed under the baseline. At the points labeled Point B, if characters (such as double-height characters) higher than normal size characters or downloaded bit image characters are received, any part of the character higher than the normal-size character is not printed.

If the print data (including the space to the right of a character) exceeds the printable area before the printer receives a command (e.g., **LF** or **ESC J**) that includes line feeding, a line feed is executed automatically within the printable area. The print position, therefore, moves to the beginning of the next line. The line feed amount depends on the values set by commands (such as **ESC 2** and **ESC 3**).

The default value of the line spacing is set to 4.23 mm (1/6") and corresponds to 30 dots in the vertical direction. If print data for the next line contains extended characters that are higher than double-height characters, bit images taking up two or more lines, or bar codes higher than normal characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line. To avoid this, increase the amount of line spacing. The line spacing in Figure 3 requires 27 dots or more.

## Example

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula: {number of vertical dots ( $8 \times 6$ ) - number of dots for feeding at the beginning of the printable area (21)}  $\times$  vertical motion unit conversions ( $360/180$ ) = 54 Therefore, 27 dots (54 pitch) are required for feeding. Use the following commands:

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

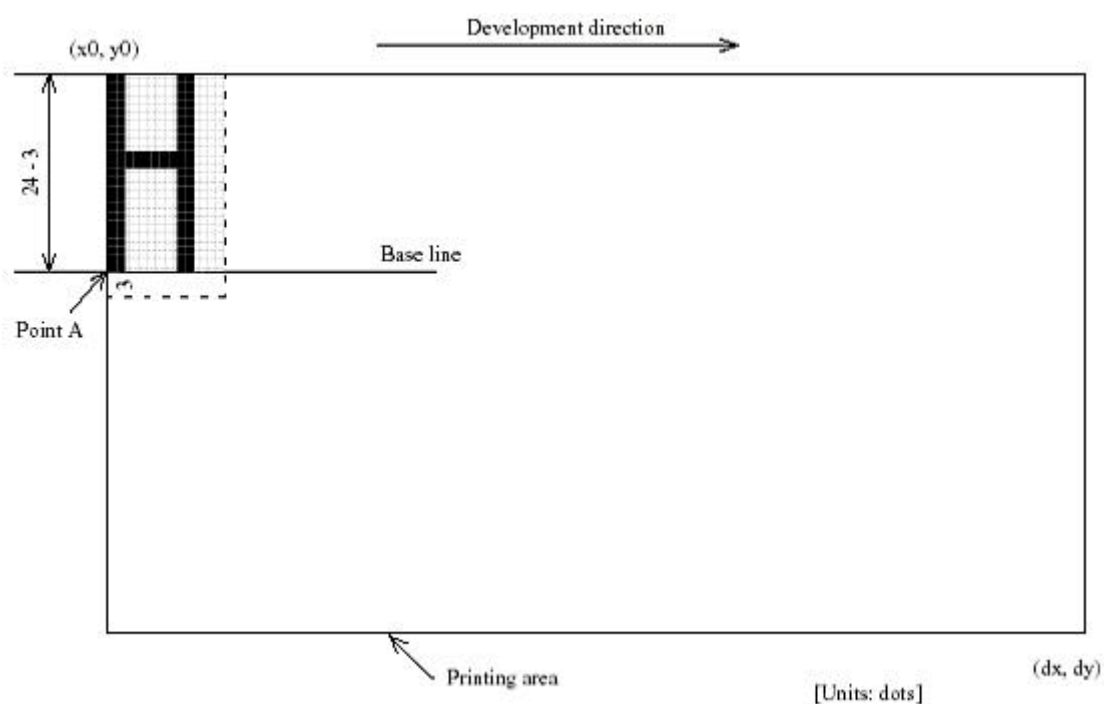
**ESC T** *n*

**ESC 3 54**  $\leftarrow$  Set line spacing to be added.

**LF GS / 1**

**ESC 2**  $\leftarrow$  Reset the line spacing to 4.23 mm {1/6"}.

NOTE: Vertical and horizontal motion units are 1/360 in the vertical direction and 1/180 in the horizontal direction; therefore, the position you specify varies depending on the printing direction. Setting the vertical motion unit to 1/180 using the **GS P** command does not change the current print position.



**Figure 1 Character Data Developing Position**

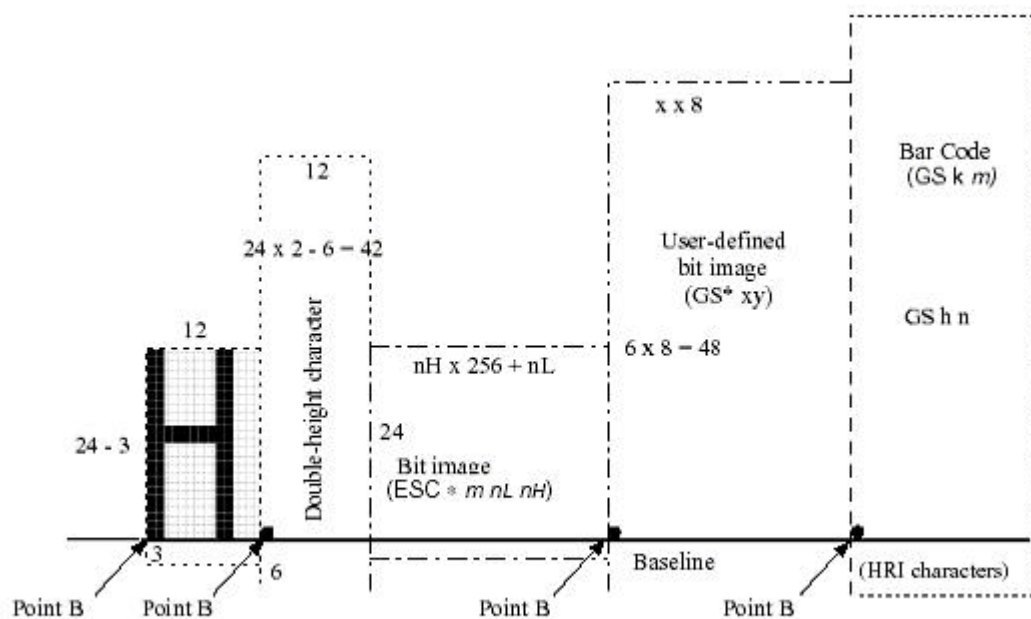


Figure 2 Print Data Developing Position

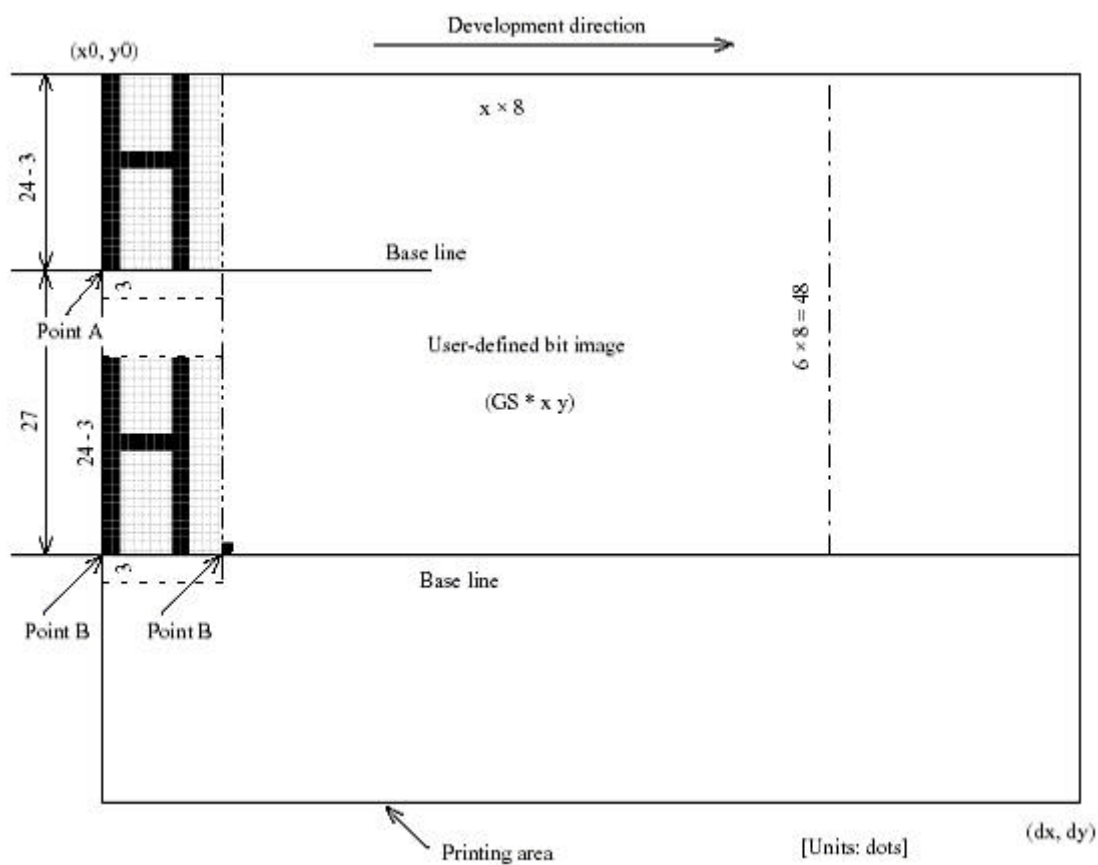


Figure 3 Downloaded Bit Image Developing Position