

# COMMAND SET

(VER2.2)

SHANDONG NEW BEIYANG INFORMATION TECHNOLOGY CO.,LTD

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## Declaration

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## ● Technical Contact Information

## User Guide

This part explains to users how to use this programming manual. Please read it carefully before programming.

The command explanation in this manual includes the following parts.

- 1 [Name] the name and function summary. This is the first part of the command explanation in which the command is expressed in ASCII.
- 2 [Format] the command expressed in ASCII, Hex and Decimal separately. If not specified, the value in "range" part is decimal. For instance, in range "1 n 4", '1' is not an ASCII code but a decimal number.
- 3 [Range] the range of variation value.
- 4 [Description] the detailed explanation of command.
- 5 [Note] Lists items shall be given attention to. The command may function differently in different modes or while cooperating with other commands and the details are given in this paragraph.
- 6 [Reference] Lists all other commands related or similar to the command.

---> DLE EOT n

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

---> [Format]     ASCII             DLE     EOT     n  
                 Hex             10     04     n  
                 Decimal        16     4     n

---> [Range]     1 n 4

---> [Description] Transmits the printer status specified by 'n' in real-time.

---> [Note]     The printer will return relevant status immediately after receiving this command.

---> [Reference] None

## HT

[Name]     Horizontal        tab

[Format]    ASCII            HT  
             Hex            09  
             Decimal        9

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

[Notes]     • 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.

[Reference] **ESC D**

## LF

---

[Name] Print and line feed  
 [Format] ASCII LF  
 Hex 0A  
 Decimal 10  
 [Description] 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.  
 [Reference] **ESC 2, ESC 3**

## FF

---

[Name] Print and return to standard mode in page mode.  
 [Format] ASCII FF  
 Hex 0C  
 Decimal 12  
 [Description] Prints the data in the print buffer collectively and returns to standard mode in page mode, prints the data in the print buffer and feeds one line based on the current line spacing in standard mode.  
 [Notes]
 

- This command is valid only in page mode.
- The buffer data is deleted after being printed.
- The printer does not execute paper cutting.
- This command sets the print position to the beginning of the line.

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

## CR

---

[Name] Print and carriage return  
 [Format] ASCII CR  
 Hex 0D  
 Decimal 13  
 [Description] When automatic line feed is enabled, this command functions the same as **LF**; when automatic line feed is disabled, this command is ignored.  
 [Notes]
 

- Sets the print starting position to the beginning of the line.
- This command is set according to the printer configuration.

 [Reference] **LF**

## CAN

---

[Name] Cancel print data in page mode  
 [Format] ASCII CAN  
 Hex 18  
 Decimal 24  
 [Description] In page mode, deletes all the print data in the current area.  
 [Notes]
 

- This command is enabled only in page mode.
- If data that existed in the previously specified printing area also exists in the currently specified printing area, it is deleted.

[Reference] **ESC L, ESC W**

## DLE EOT *n*

[Name] Real-time status transmission

[Format] ASCII                      DLE        EOT        *n*  
Hex                              10        04        *n*  
Decimal                      16        4        *n*

[Range] 1   *n*   4

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

*n* = 1: Transmit printer status

*n* = 2: Transmit off-line status

*n* = 3: Transmit error status

*n* = 4: Transmit paper roll sensor status

[Notes] · The status is transmitted whenever the data sequence of <10>H<04>H< *n*> (1   *n*   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**.

· Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.

· The printer transmits the current status. Each status is represented by one-byte data.

· The printer transmits the status without confirming whether the host computer can receive data.

· The printer executes this command upon receiving it.

· This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.

· With a parallel interface model, this command is ignored.

· 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.

*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	00	Not used. Fixed to Off.

*n* = 2: Off-line status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off

1	On	02	2	Not used. Fixed to On
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open
3	Off	00	0	Paper is not being fed by using the FEED button
	On	08	8	Paper is being fed by the FEED button
4	On	10	16	Not used. Fixed to On
5	Off	00	0	No paper-end stop.
	On	20	32	Printing is being stopped.
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 auto-cutter error
	On	08	8	Auto-cutter error occurs.
4	On	10	16	Not used. Fixed to On
5	Off	00	0	No unrecoverable error
	On	20	32	Unrecoverable error occurs
6	Off	00	0	No auto-recoverable error.
	On	40	64	Auto recoverable 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 (1 ≤ n ≤ 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
4	On	10	16	Not used. Fixed to On.
5,6	Off	00	0	Paper roll sensor: Paper present
	On	60	96	Paper roll end detected by paper roll sensor.
7	Off	00	0	Not used. Fixed to Off

[Reference] DLE ENQ, GS a, GS r

## DLE ENQ n

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

[Range] 1 ≤ n ≤ 2

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

n	Request
---	---------

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

- [Notes]
- This command is effective only when an auto-cutter error occurs.
  - The printer starts processing data upon receiving this command.
  - This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.
  - With a parallel interface model, this command can not be executed when the printer is busy.
  - The status is also transmitted whenever the data sequence of <10>H<05>H<

n>

(1 n 2) is received.

**Example:**

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

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

**Example:**

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

- **DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.
- When the printer is disabled with **ESC =** (Select peripheral device), the error recovery functions (**DLE ENQ 1** and **DLE ENQ 2**) are enabled, and the other functions are disabled.

[Reference] **DLE EOT**

## DLE DC4 n m t

[Name] Generate pulse at real-time

[Format]

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

[Range] n = 1

m = 0, 1

1 t 6

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

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

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

- [Notes]
- 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 off-line, 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.
  - If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
  - This command should not be used within the data sequence of another



- command that consists of 2 or more bytes.
- This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).

[Reference] **ESC p**

## ESC FF

---

[Name] Print data in page mode  
 [Format] ASCII ESC FF  
 Hex 1B 0C  
 Decimal 27 12  
 [Description] In page mode, prints all buffered data in the printing area collectively.  
 [Notes]
 

- This command is enabled only in page mode.
- After printing, the printer does not clear the buffered data, setting values for **ESC T** and **ESC W**, and the position for buffering character data.

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

## ESC SP n

---

[Name] Set right-side character spacing  
 [Format] ASCII ESC SP n  
 Hex 1B 20 n  
 Decimal 27 32 n  
 [Range] 0 n 255  
 [Description] Sets the character spacing for the right side of the character to [ n × horizontal or vertical motion units].  
 [Notes]
 

- 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 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.
- 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:
  - 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.
  - 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 255/180 inches. Any setting exceeding the maximum is converted to the maximum automatically.

 [Default] n = 0  
 [Reference] **GS P**

## ESC ! n

---

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 × 24)
	On	01	1	Character font B (9 × 17)
1,2				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

- [Notes]
- 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.

[Default] n = 0

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

## **ESC \$ nL nH**

[Name] Set absolute print position

[Format] ASCII        ESC    \$    nL   nH  
Hex        1B        24   nL   nH  
Decimal 27        36   nL   nH

[Range] 0 nL 255  
0 nH 255

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

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

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

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

## ESC % n

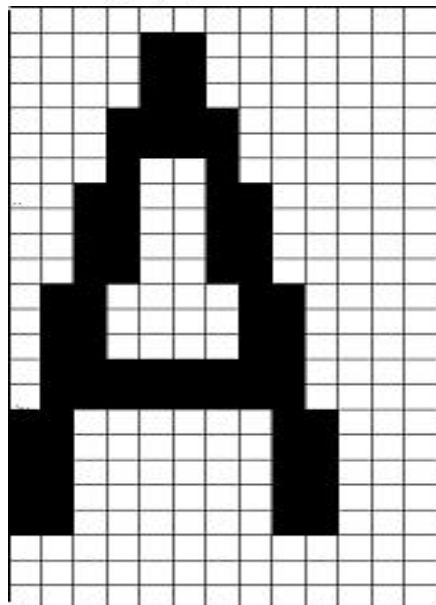
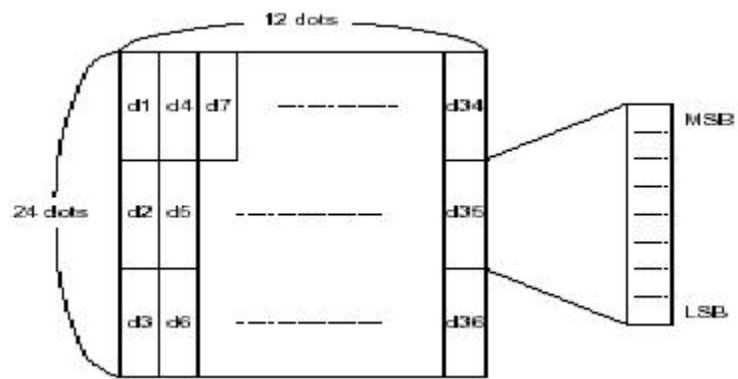
---

[Name]	Select/cancel user-defined character set
[Format]	ASCII           ESC    %    n Hex             1B     25   n Decimal 27       37    n
[Range]	0   n   255
[Description]	Selects or cancels the user-defined character set. <ul style="list-style-type: none"><li>· When the LSB of n is 0, the user-defined character set is canceled.</li><li>· When the LSB of n is 1, the user-defined character set is selected.</li></ul>
[Notes]	<ul style="list-style-type: none"><li>· When the user-defined character set is canceled, the internal character set is automatically selected.</li><li>· n is available only for the least significant bit.</li></ul>
[Default]	n = 0
[Reference]	<b>ESC &amp;</b> , <b>ESC ?</b>

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

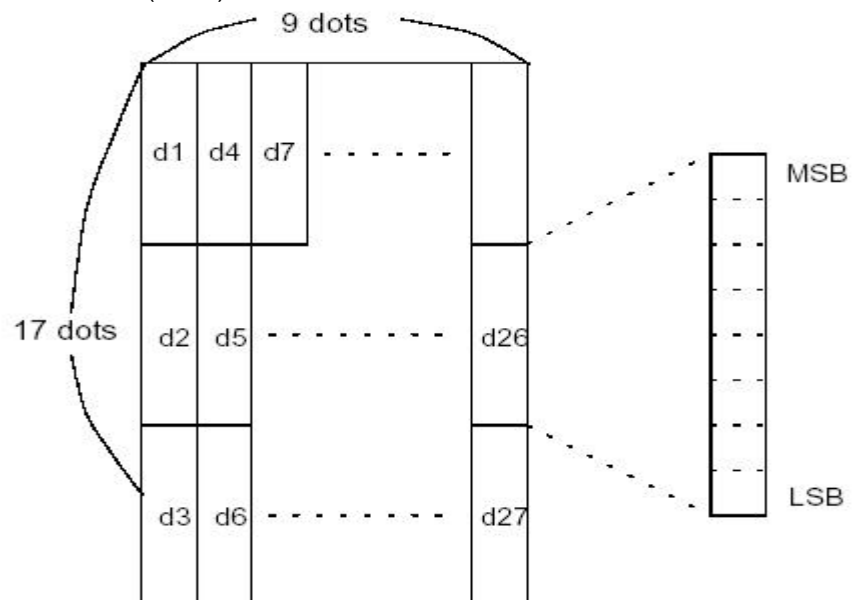
---

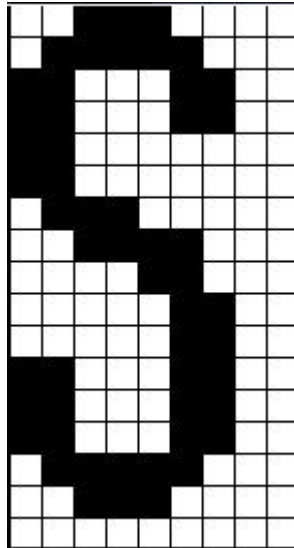
[Name]	Define user-defined characters
[Format]	ASCII           ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] Hex             1B 26 y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] Decimal 27 38 y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
[Range]	y = 3 32   c1   c2   127 0 < x   24 0   d1 ... d(y × xk)   255
[Description]	Defines user-defined characters. <ul style="list-style-type: none"><li>· y specifies the number of bytes in the vertical direction.</li><li>· c1 specifies the beginning character code for the definition, and c2 specifies the final code.</li><li>· x specifies the number of dots in the horizontal direction.</li></ul>
[Notes]	<ul style="list-style-type: none"><li>· The allowable character code range is from ASCII code &lt;20&gt;H to &lt;7F&gt;H (96 characters).</li><li>· It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.</li><li>· 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.</li><li>· The data to define a user-defined character is (y × x) bytes.</li><li>· Set a corresponding bit to 1 to print a dot or 0 to not print a dot.</li><li>· A user-defined character and a downloaded bit image can be defined simultaneously.</li><li>· The user-defined character definition is cleared when:<ul style="list-style-type: none"><li><b>ESC ?</b> is executed.</li><li>The the power is turned off.</li></ul></li><li>· 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.</li></ul>
[Default]	The internal character set
[Reference]	<b>ESC %</b> , <b>ESC ?</b>
[Example]	<ul style="list-style-type: none"><li>· When font A (12 × 24) is selected.</li></ul>



D1=00, D4=00, D7=01, .....  
D2=00, D5=1F, D8=FF, .....  
D3=F8, D6=F8, D9=00, .....

· When font B (9×17) is selected.





D1=3C, D4=7E, D7=C3, ...  
D2=1C, D5=1E, D8=03, ...  
D3=00, D6=00, D9=00, ...

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

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

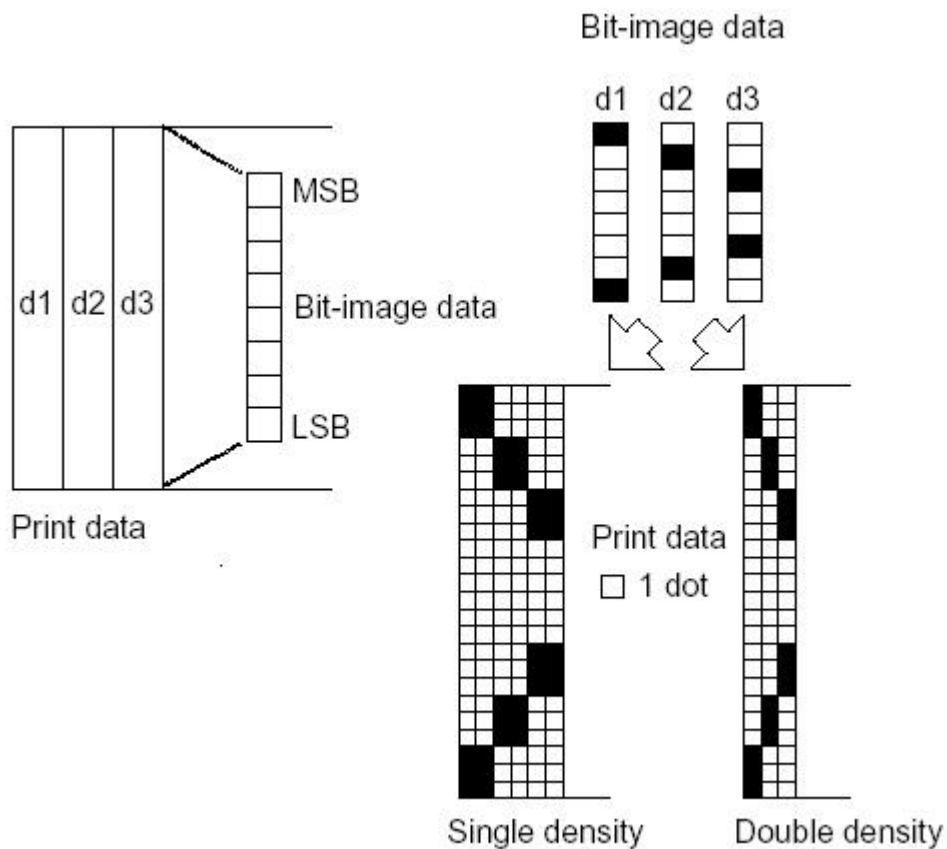
[Range] m = 0, 1, 32, 33  
0 nL 255  
0 nH 3  
0 d 255

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

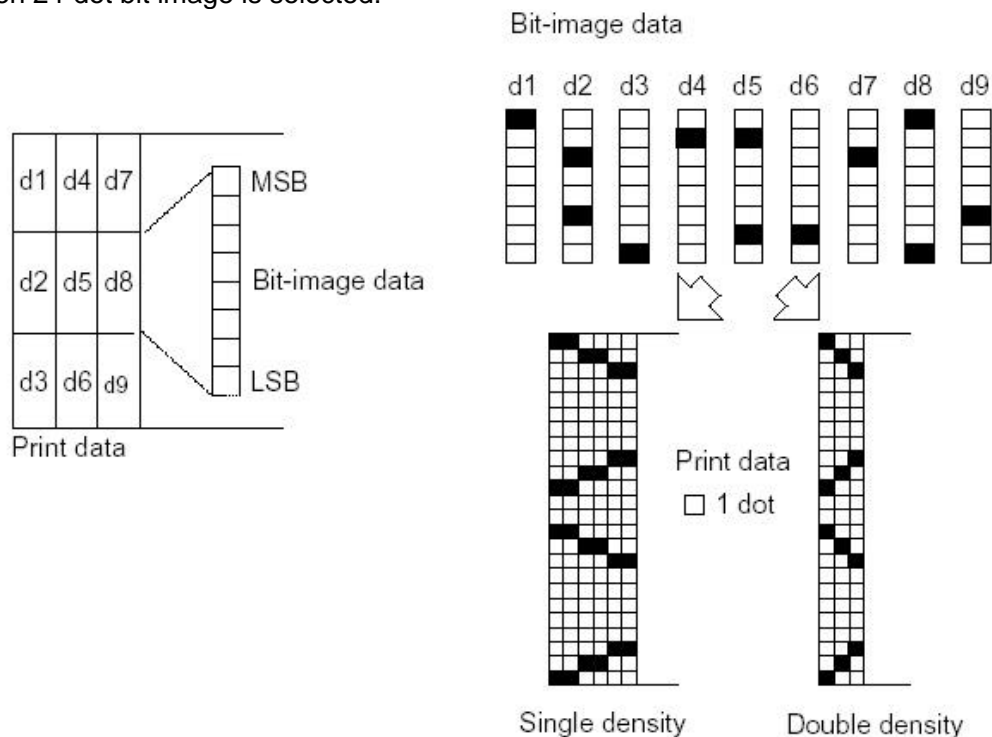
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot density	Number of Data (K)
0	8-dot single-density	8	60 DPI	101 DPI	$nL + nH \times 256$
1	8-dot double-density	8	60 DPI	203 DPI	$nL + nH \times 256$
32	24-dot single-density	24	180 DPI	101 DPI	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	180 DP	203 DPI	$(nL + nH \times 256) \times 3$

[Notes]

- If the values 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.
- 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.
- 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:



## ESC - n

[Name]	Turn underline mode on/off			
[Format]	ASCII	ESC	-	n
	Hex	1B	2D	n

Decimal 27 45 n

[Range] 0 n 2, 48 n 50

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

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

[Notes]

- 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

[Reference] **ESC !**

## ESC 2

---

[Name]	Select default line spacing		
[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal 27	50	
[Description]	Selects 1/6-inch line (approximately 4.23mm) spacing.		
[Notes]	· The line spacing can be set independently in standard mode and in page mode.		
[Reference]	<b>ESC 3</b>		

## ESC 3 n

---

[Name]	Set line spacing		
[Format]	ASCII	ESC	3 n
	Hex	1B	33 n
	Decimal 27	51	n
[Range]	0	n 255	
[Description]	Sets the line spacing to [ n × vertical or horizontal motion unit] inches.		
[Notes]	<ul style="list-style-type: none"> <li>· The line spacing can be set independently in standard mode and in page mode.</li> <li>· The horizontal and vertical motion unit are specified by <b>GS P</b>. Changing the horizontal or vertical motion unit does not affect the current line spacing.</li> <li>· In standard mode, the vertical motion unit (y) is used.</li> <li>· In page mode, this command functions as follows, depending on the starting position of the printable area: <ul style="list-style-type: none"> <li>When the starting position is set to the upper left or lower right of the printable area using <b>ESC T</b>, the vertical motion unit (y) is used.</li> <li>When the starting position is set to the upper right or lower left of the printable area using <b>ESC T</b>, the horizontal motion unit (x) is used.</li> </ul> </li> <li>· The maximum paper feed amount is 1016 mm (40 inches). Even if a paper feed amount of more than 1016 mm (40 inches) is set, the printer feeds the paper only 1016 mm (40 inches).</li> </ul>		
[Default]	Line spacing equivalent to approximately 4.23mm (1/6 inches).		
[Reference]	<b>ESC 2, GS P</b>		

## ESC = n

---

[Name] Set peripheral device

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

[Range] 0    n    1

[Description] 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

[Notes] · 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

## ESC ? n

---

[Name] Cancel user-defined characters

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

[Range] 32    n    127

[Description] Cancels user-defined characters.

[Notes] · This command cancels the pattern defined for the character code specified by n. After the user-defined characters 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.

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

## ESC @

---

[Name] Initialize printer

[Format] ASCII        ESC        @  
Hex            1B        40  
Decimal 27        64

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

[Notes] · The DIP switch settings are not checked again.  
· 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 user NV memory is not cleared.

## ESC D n1...nk NUL

---

[Name] Set horizontal tab positions



[Format]	ASCII	ESC	D	n1...nk	NUL
	Hex	1B	44	n1...nk	00
	Decimal	27	68	n1...nk	0
[Range]	1	n	255	1	k 32
[Description]	Sets horizontal tab positions. <ul style="list-style-type: none"> <li>· n specifies the column number for setting a horizontal tab position from the beginning of the line.</li> <li>· k indicates the total number of horizontal tab positions to be set.</li> </ul>				
[Notes]	<ul style="list-style-type: none"> <li>· The horizontal tab position is stored as a value of [character width × 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.</li> <li>· This command cancels the previous horizontal tab settings.</li> <li>· When setting n = 8, the print position is moved to column 9 by sending <b>HT</b>.</li> <li>· Up to 32 tab positions ( k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.</li> <li>· Transmit [ n] k in ascending order and place a NUL code 0 at the end.</li> <li>· 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.</li> <li>· <b>ESC D NUL</b> cancels all horizontal tab positions.</li> <li>· The previously specified horizontal tab positions do not change, even if the character width changes.</li> <li>· The character width is memorized for each standard and page mode.</li> </ul>				
[Default]	The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for				
	font A (12 × 24).				
[Reference]	<b>HT</b>				

## ESC E n

---

[Name]	Turn emphasized mode on/off				
[Format]	ASCII	ESC	E	n	
	Hex	1B	45	n	
	Decimal	27	69	n	
[Range]	0	n	255		
[Description]	Turns emphasized mode on or off When the LSB of n is 0, emphasized mode is turned off. When the LSB of n is 1, emphasized mode is turned on.				
[Notes]	<ul style="list-style-type: none"> <li>· Only the least significant bit of n is enabled.</li> <li>· This command and <b>ESC !</b> turn on and off emphasized mode in the same way.</li> <li>· Be careful when this command is used with <b>ESC !</b>.</li> </ul>				
[Default]	n = 0				
[Reference]	<b>ESC !</b>				

## ESC G n

---

[Name]	Turn on/off double-strike mode				
[Format]	ASCII	ESC	G	n	
	Hex	1B	47	n	
	Decimal	27	71	n	
[Range]	0	n	255		
[Description]	Turns double-strike mode on or off. <ul style="list-style-type: none"> <li>· When the LSB of n is 0, double-strike mode is turned off.</li> </ul>				

[Notes]	<ul style="list-style-type: none"> <li>· When the LSB of n is 1, double-strike mode is turned on.</li> <li>· Only the lowest bit of n is enabled.</li> <li>· Printer output is the same in double-strike mode and in emphasized mode.</li> </ul>
[Default]	n = 0
[Reference]	<b>ESC E</b>

## ESC J n

---

[Name]	Print and feed paper
[Format]	ASCII        ESC        J        n Hex         1B        4A       n Decimal 27        74        n
[Range]	0 n 255
[Description]	Prints the data in the print buffer and feeds the paper [ n × vertical or horizontal motion unit] inches.
[Notes]	<ul style="list-style-type: none"> <li>· After printing is completed, this command sets the print starting position to the beginning of the line.</li> <li>· The paper feed amount set by this command does not affect the values set by <b>ESC 2</b> or <b>ESC 3</b>.</li> <li>· The horizontal and vertical motion unit are specified by <b>GS P</b>.</li> <li>· In standard mode, the printer uses the vertical motion unit ( y ).</li> <li>· In page mode, this command functions as follows, depending on the starting position of the printable area:               <ul style="list-style-type: none"> <li>When the starting position is set to the upper left or lower right of the printable area using <b>ESC T</b>, the vertical motion unit ( y ) is used.</li> <li>When the starting position is set to the upper right or lower left of the printable area using <b>ESC T</b>, the horizontal motion unit ( x ) is used.</li> </ul> </li> <li>· The maximum line spacing is 1016mm (40 inches). When the setting value exceeds the maximum, it is converted to the maximum automatically.</li> </ul>
[Reference]	<b>GS P</b>

## ESC L

---

[Name]	Select page mode
[Format]	ASCII        ESC        L Hex         1B        4C Decimal 27        76
[Description]	Switches from standard mode to page mode.
[Notes]	<ul style="list-style-type: none"> <li>· This command is enabled only when processed at the beginning of a line in standard mode.</li> <li>· This command has no effect in page mode.</li> <li>· After printing by <b>FF</b> is completed or by using <b>ESC S</b>, the printer returns to standard mode.</li> <li>· This command sets the position where data is buffered to the position specified by <b>ESC T</b> within the printing area defined by <b>ESC W</b>.</li> <li>· 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:               <ul style="list-style-type: none"> <li>Set right-side character spacing: <b>ESC SP</b>, <b>FS S</b></li> <li>Select default line spacing: <b>ESC 2</b>, <b>ESC 3</b></li> </ul> </li> <li>· Only value settings is possible for the following commands in page mode; these commands are not executed.               <ul style="list-style-type: none"> <li>Turn 90° clockwise rotation mode on/off: <b>ESC V</b></li> <li>Select justification: <b>ESC a</b></li> </ul> </li> </ul>

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

Set left margin: **GS L**

Set printable area width: **GS W**

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

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

## ESC M n

---

[Name] Select character font

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

[Range] n = 0, 1, 2,3,48, 49,50,51

[Description] Selects character fonts.

n	Function
0,48	Character font A (12 × 24) selected
1,49	Character font B (9 × 17) selected
2,50	User defined character selected
3,51	Chinese font(24 × 24) selected

## ESC R n

---

[Name] Select an international character set

[Format] ASCII        ESC        R        n  
Hex        1B        52        n  
Decimal 27        82        n

[Range] 0    n    12

[Description] Selects an international character set n from the following table see

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

[Default] n = 0

## ESC S

---

[Name] Select standard mode

[Format] ASCII        ESC        S  
Hex        1B        53

Decimal 27      83

[Description] Switches from page mode to standard mode.

- [Notes]
- This command is effective only in page mode.
  - Data buffered in page mode are cleared.
  - This command sets the print position to the beginning of the line.
  - The printing area set by **ESC W** are initialized.
  - This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:
    - Set right-side character spacing: **ESC SP, FS S**
    - Select default line spacing: **ESC 2, ESC 3**
  - The following commands are enabled only to set in standard mode.
    - Set printing area in page mode: **ESC W**
    - Select print direction in page mode: **ESC T**
  - The following commands are ignored in standard mode.
    - Set absolute vertical print position in page mode: **GS \$**
    - Set relative vertical print position in page mode: **GS \**
  - Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

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

## ESC T n

[Name] Select print direction in page mode

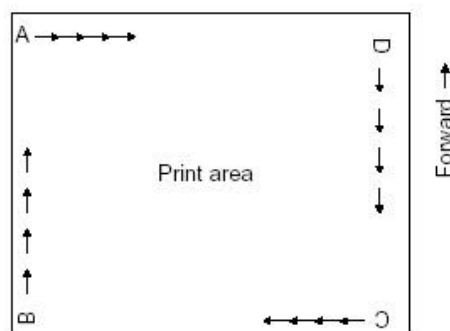
[Format]

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

[Range] 0 n 3  
48 n 51

[Description] 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)



- [Notes]
- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
  - This command sets the position where data is buffered within the printing area set by **ESC W**.
  - Parameters for horizontal or vertical motion units ( x or y) differ as follows, depending on the starting position of the printing area:
    - 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 \**
    - If the starting position is the upper right or lower left of the printing area, data

is buffered in the paper feed direction:

Commands using horizontal motion units: **ESC 3**, **ESC J**, **GS \$**, **GS \**

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

[Default] n = 0

[Reference] **ESC \$**, **ESC L**, **ESC W**, **ESC \**, **GS \$**, **GS P**, **GS \**

## ESC V n

[Name] Turn 90° clockwise rotation mode on/off

[Format] ASCII        ESC        V        n  
Hex            1B        56        n  
Decimal 27        86        n

[Range] 0 n 1, 48 n 49

[Description] 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

[Notes]

- 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

[Reference] **ESC !**, **ESC -**

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

[Name] Set printing area in page mode

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

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

[Description]

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

Each setting for the printing area is calculated as follows:

$x0 = [(xL + xH \times 256) \times (\text{horizontal motion unit})]$

$y0 = [(yL + yH \times 256) \times (\text{vertical motion unit})]$

$dx = [dxL + dxH \times 256] \times (\text{horizontal motion unit})$

$dy = [dyL + dyH \times 256] \times (\text{vertical motion unit})$

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

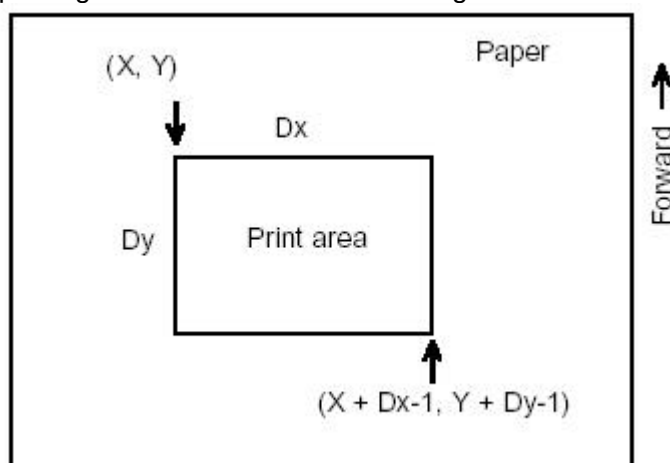
[Notes]

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

horizontal

starting position).

- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting position).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.
- 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.



[Default] xL = xH = yL = yH = 0

dxL, dxH, dyL, dyH is decided by printer configuration

[Reference] **CAN, ESC L, ESC T, GS P**

## **ESC \ nL nH**

[Name] Set relative print position

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

[Range] 0 nL 255  
0 nH 255

[Description] 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 × 256) × horizontal or vertical motion unit]

[Notes]

- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right: , nL+ nH × 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 × 256 = 65536 - N
- The print starting position moves from the current position to [ N × horizontal or vertical motion unit]
- The horizontal and vertical motion unit are specified by **GS P**.
- 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:  
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.  
 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.

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

## **ESC a n**

[Name] Select justification

[Format] ASCII ESC a n  
 Hex 1B 61 n  
 Decimal 27 97 n

[Range] 0 n 2, 48 n 50

[Description] 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

[Notes]

- 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
  
```

## **ESC c 0 n**

[Name] Selects the paper type

[Format] ASCII ESC c 0 n  
 Hex 1B 63 30 n  
 Decimal 27 99 40 n

[Range] 0 n 2

[Description] Selects the paper type  
 n = 0, set paper type as normal paper roll.  
 n = 1, 2, set paper type as Marked paper.

[Notes] · Marked paper is the paper with black mark.

[Default] n = 0

[Reference] GS FF

## **ESC c 3 n**

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

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

[Range] 0 n 255

[Description] Selects the paper sensor(s) to output paper end signals  
· Each bit of n is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll 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

[Notes] · 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  
· When all the sensors are disabled, the paper end signal always outputs a paper present status.

[Default] n = 15

## ESC c 4 n

---

[Name] Select paper sensor(s) to stop printing

[Format] ASCII        ESC    c   4   n  
Hex        1B        63   34   n  
Decimal 27        99   52   n

[Range] 0   n   255

[Description] 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

[Notes] · 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 off-line 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

## ESC c 5 n

---

[Name] Enable/disable panel buttons

[Format] ASCII        ESC    c   5   n  
Hex        1B        63   35   n  
Decimal 27        99   53   n

[Range] 0   n   255

[Description] 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.

[Notes] · 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

## ESC d n

[Name] Print and feed n lines

[Format] ASCII ESC d n  
Hex 1B 64 n  
Decimal 27 100 n

[Range] 0 n 255

[Description] Prints the data in the print buffer and feeds n lines.

[Notes]

- 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 inches). If the paper feed amount ( nx line spacing) of more than 1016 mm (40 inches) is specified, the printer feeds the paper only 1016 mm (40 inches).

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

## ESC p m t1 t2

[Name] Generate pulse

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

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

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

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

[Notes]

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

[Reference] **DLE DC4**

## ESC t n

[Name] Select character code table

[Format] ASCII ESC t n  
Hex 1B 74 n  
Decimal 27 116 n

[Range] 0 n 7,

[Description] Selects a page n from the character code table.

n	Page
0	PC437 [U.S.A., Standard Europe]
1	Reserved
2	PC850 [Multilingual]
3	PC860 [Portuguese]
4	PC863 [Canadian-French]

5	PC865 [Nordic]
6	PC852
7	PC858

[Default] n = 0

## ESC { n

[Name] Turns on/off upside-down printing mode

[Format] ASCII ESC { n  
Hex 1B 7B n  
Decimal 27 123 n

[Range] 0 n 255

[Description] Turns upside-down printing mode on or off.

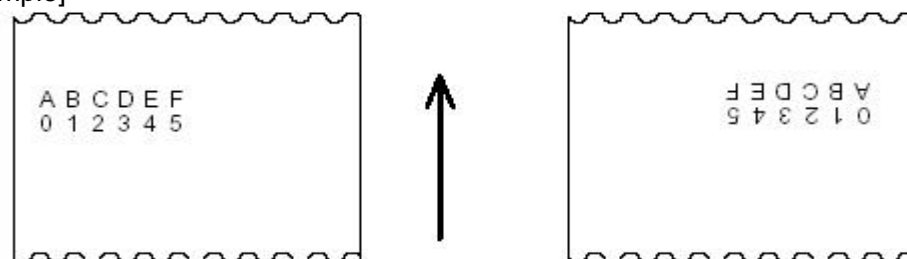
- When the LSB of n is 0, upside-down printing mode is turned off.
- When the LSB of n is 1, upside-down printing mode is turned on.

[Notes]

- 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]



Paper feed direction

## FS g 1 m a1 a2 a3 a4 nL nH d1...dk

[Name] Write to user NV memory

[Format] ASCII FS g 1 m a1 a2 a3 a4 nL nH d1...dk  
Hex 1C 67 31 m a1 a2 a3 a4 nL nH d1...dk  
Decimal 28 103 49 m a1 a2 a3 a4 nL nH d1...dk

[Range] m = 0  
0 ( a1+( a2×256)+( a3×65536)+( a4×16777216)) 1023  
1 ( nL+( nH×256)) 1024  
32 d 255  
k = ( nL+( nH×256))

[Description] Writes data to user NV memory.

- m is always set to 0.
- a1, a2, a3, and a4 specify the data stored starting address to ( a1+( a2×256) ×( a3×65536)+( a4×16777216)).
- nL, nH select the number of stored data bytes ( nL+( nH×256)).
- d specifies the stored data.

[Notes]

- Frequent write command execution by **FS g 1** may damage the NV memory.

- Therefore, it is recommended to write the NV memory 10 times or less a day.
- User NV memory means the memory area which is used for storing character font data in non-volatile memory.
  - This command is available only when processed at the beginning of a line in standard mode.
  - This command is ignored in page mode.
  - When this command is received during macro definition, the printer ends macro definition and begins executing this command.
  - If the values of the argument ( m ), the stored starting address ( a1, a2, a3, a4 ), and the number of the stored data ( nL, nH ) are out of the specified range, or if the stored starting address ( a1, a2, a3, a4 ) + the number of the stored data ( nL, nH ) 1024, this command is ignored and data following are processed as normal data.
  - If the value of the stored data d is out of range, the execution of this command is ended, and data following are processed as normal data. In this case, the data which are stored in the NV memory still remain.
  - Writing data to the NV memory overwrites previous data. Therefore, previous data is deleted.
  - Data which are stored in the user NV memory can be read by **FS g 2**.
  - Once data is stored in the user NV memory, it is not erased by executing **ESC @**, **FS q**, reset, or power off.

## **FS g 2 m a1 a2 a3 a4 nL nH**

---

[Name]	Read from user NV memory
[Format]	ASCII    FS g 2 m a1 a2 a3 a4 nL nH
	Hex       1C 67 32 m a1 a2 a3 a4 nL nH
	Decimal 28 103 50 m a1 a2 a3 a4 nL nH
[Range]	m = 0
	0    ( a1+( a2×256)+( a3×65536)+( a4×16777216))    1023
	1    ( nL+( nH×256))    80
[Description]	Transmits data from user NV memory.
	<ul style="list-style-type: none"> <li>• m is always set to 0.</li> <li>• a1, a2, a3, and a4 specify the data stored starting address to ( a1+( a2×256) ×( a3×65536)+( a4×16777216)).</li> <li>• nL, nH select the number of stored data bytes ( nL+( nH×256)).</li> </ul>
[Notes]	<ul style="list-style-type: none"> <li>• The printer transmits all data collectively without confirming whether the host is ready to receive data. To receive all data result correctly, (the capacity of the transmitted data + 2) bytes or more space is required in the receive buffer.</li> <li>• During data transmission, the printer ignores real-time commands . Also, the printer does not transmit ASB even when the ABS is enabled. Therefore, the user cannot confirm changes in the printer status during these periods.</li> <li>• User NV memory means the memory area which is used for storing character font data in non-volatile memory.</li> <li>• If the values of the argument ( m ), the stored starting address ( a1, a2, a3, a4 ) and the number of the stored data ( nL, nH ) are out of the specified range, or if the stored starting address ( a1, a2, a3, a4 ) + the number of the stored data ( nL, nH ) 1024, this command is ignored and data following are processed as normal data.</li> <li>• After the data is ready to be transmitted, the printer executes the following process: transmits [Header + Data + NUL].</li> <li>• The contents of [Header + Data + NUL] are as follows: <ul style="list-style-type: none"> <li>Header: Hexadecimal = 5FH / Decimal = 95 (1 byte)</li> <li>Data: Data stored in user NV memory (( nL+( nH×256)) bytes)</li> </ul> </li> </ul>

NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)

- the printer transmits all data consecutively without confirming whether the host computer is ready to receive data. The data transmission must be consecutive, except for the XOFF code.
- Data which is stored in the user NV memory can be written by **FS g 1**.

## FS p n m

[Name] Print NV bit image

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

[Range] 1 n 255  
0 m 3, 48 m 51

[Description] Prints a NV bit image n using the mode specified by m.

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0.48	Normal	180	203
1.49	Double-width	180	101
2.50	Double-height	90	203
3.51	Quadruple	90	101

- n is the number of the NV bit image (defined using the **FS q** command).

- m specifies the bit image mode.

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

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

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

- 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 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  $n \times 2$  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.

[References] **ESC \***, **FS q**, **GS /**, **GS v 0**

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

[Name] Define NV bit image

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

[Range] 1 n 255  
0 xL 255  
0 xH 3 (when 1 (xL + xH × 256) 1023  
0 yL 1 (when 1 (yL + yH × 256) 288  
0 d 255  
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$

Total defined data area = 1M bits (128K bytes)

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

- n specifies the number of the defined NV bit image.
- xL, xH specifies ( xL + xH × 256) × 8 dots in the horizontal direction for the NV

bit

image you are defining.

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

[Notes]

- Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- This command cancels all NV bit images that have already been defined by this command. The printer can not redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- Before the ending of the processing of this command 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.
- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- In standard mode, this command is effective only when processed at the beginning of the line.
- This command is effective when 7 bytes <FS~yH> is processed as a normal value.
- When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.
- In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
- In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the 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 ([data: ( xL + xH × 256) × ( yL + yH × 256) × 8] + [header:4]) bytes of NV memory.
- The definition area in this printer is a maximum of 1M bits (128K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 1M bytes (128K bytes).
- The printer is busy immediately before writing into NV memory.
- 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.

[Reference] **FS p**

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



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

**Table 1**

Character Width Selection			Character Height Selection		
Hex	Decimal	Width	Hex	Decimal	Width
00	0	1 (normal)	00	0	1 (normal)
10	16	2(double-width)	01	1	2 (double-height)
20	32	3	02	2	3
30	48	4	03	3	4
40	64	5	04	4	5
50	80	6	05	5	6

- [Notes]
- This command is all characters (alphanumeric and Kanji) 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

[Reference] **ESC !**

## GS \$ nL nH

[Name] Set absolute vertical print position in page mode

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

[Range] 0 nL 255, 0 nH 255

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

- [Notes]
- 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**:  
When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.  
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**.

[Reference] **ESC \$, ESC T, ESC W, ESC \, GS P, GS \**, 3.12 Page Mode

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

- [Name] Execute test print  
[Format] ASCII GS ( A pL pH n m  
Hex 1D 28 41 pL pH n m  
Decimal 29 40 65 pL pH n m  
[Range] ( pL+( pH × 56))=2 (where pL=2, pH=0)  
0 n 2, 8 n 50  
1 m 3, 9 m 51  
[Description] · 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.

n	Paper
0, 48	Basic sheet (paper roll)
1, 49	Paper roll
2, 50	

m specifies a test pattern.

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

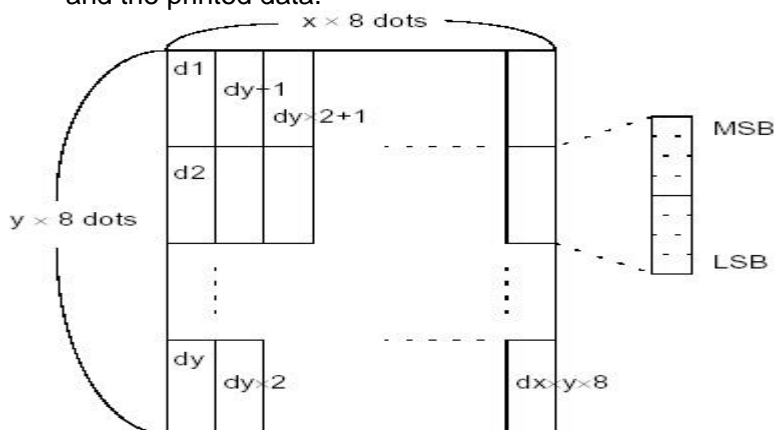
- [Description] · This command is enabled only when processed at the beginning of a line in standard mode.  
· This command is no effect in page mode.  
· When this command is received during macro definition, the printer ends macro definition and begins performing this command.  
· After the test print 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 DIP switch settings .  
· The printer cuts the paper at the end of the test print.  
· The printer goes BUSY while this command is executed.

## **GS \* x y d1...d(x × y × 8)**

- [Name] Define downloaded bit image  
[Format] ASCII GS \* x y d1...d(x × y × 8)  
Hex 1D 2A x y d1...d(x × y × 8)  
Decimal 29 42 x y d1...d(x × y × 8)  
[Range] 1 x 255, 1 y 255  
x × y 1024  
0 d 255  
[Description] Defines a downloaded bit image using the number of bytes specified by x and y  
· x specifies the number of dots in the horizontal direction.  
· y specifies the number of dots in the vertical direction.  
[Notes] · The number of dots in the horizontal direction is x × 8, in the vertical direction it is y × 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:  
Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **GS /**

## GS / m

[Name] Print downloaded bit image

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

[Range] 0 m 3, 48 m 51

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

$m$	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	180	203
1, 49	Double-width	180	101
2, 50	Double-height	90	203
3, 51	Quadruple	90	101

- [Notes]
- This command is ignored if a downloaded bit image has not been defined.
  - In standard mode, this command is effective only when there is no data in the print buffer.
  - This command has no effect in the print modes (emphasized, 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.

[Reference] **GS \***

## GS :

[Name] Start/end macro definition

[Format] ASCII GS :  
Hex 1D 3A  
Decimal 29 58

[Description] Starts or ends macro definition.

- [Notes]
- Macro definition starts when this command is received during normal operation.
  - 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.

[Reference] **GS ^**

## GS B n

[Name] Turn white/black reverse printing mode

[Format]

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

[Range] 0 n 255

[Description] 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.

[Notes]

- 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

## GS H n

[Name] Select printing position for HRI characters

[Format]

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

[Range] 0 n 3, 48 n 51

[Description] Selects the printing position of HRI characters when printing a bar code.

n selects the printing position as follows:

n	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.

[Notes]

- HRI characters are printed using the font specified by **GS f**.

[Default] n = 0

[Reference] **GS f**, **GS k**

## GS I n

[Name] Transmit printer ID

[Format] ASCII GS I n

Hex 1D 49 n

Decimal 29 73 n

[Range] 1 n 3, 49 n 51, 65 n 69

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

n	Printer ID	Specification	ID (hexadecimal)
1,49	Printer model ID	BTP2002 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	BEIYANG	
67	Printer name	BTP2002CP	
68	Serial number	Depends on serial number.	
69	Supporting Kanji type	Japan model: KANJI JAPANESE China model: CHINA GB2312 Taiwan model: TAIWAN BIG-5 Thai model: THAI 3 PASS	

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	Auto-cutter equipped.
2	OFF	00	0	No direct connection with customer display
3	OFF	00	0	No MICR reader.
4	OFF	00	0	Not used. Fixed to Off.
5	—	—	—	Undefined.
6	—	—	—	Undefined.
7	OFF	00	0	Not used. Fixed to Off.

- [Notes]
- 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 (1 n 3) or (49 n 51), one byte code is transmitted.
  - When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS I** and the ASB status must be differentiated.
  - When the printer ID transmission is specified with (65 n 69), the following contents are transmitted:  
Header: Hexadecimal = 5FH / Decimal = 95 (1 byte)  
Data: Printer information  
NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)

## GS L nL nH

[Name] Set left margin

[Format] ASCII GS L nL nH

Hex 1D 4C nL nH

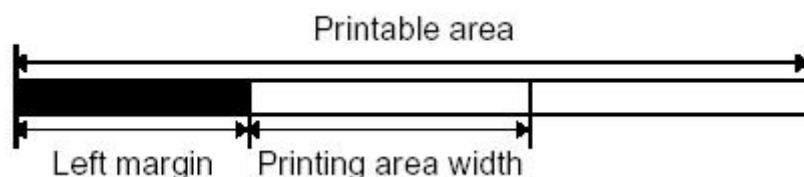
Decimal 29 76 nL nH

[Range] 0 nL 255

0 nH 255

[Description] Sets the left margin using nL and nH.

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



- [Notes]
- 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.

[Default] nL = 0, nH = 0

[Reference] **GS P**, **GS W**

## GS P x y

[Name] Set horizontal and vertical motion units

[Format]

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

[Range] 0 x 255  
0 y 255

[Description] 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.

- [Notes]
- 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):
    - Commands using x: **ESC SP**, **ESC \$**, **ESC \**, **FS S**, **GS L**, **GS W**
    - Commands using y: **ESC 3**, **ESC J**, **GS V**
  - In page mode, the following command use x or y, depending on character orientation:

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**

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.

[Default] x = 203, y = 180

[Reference] **ESC SP**, **ESC \$**, **ESC 3**, **ESC J**, **ESC W**, **ESC \**, **GS \$**, **GS L**, **GS V**, **GS W**, **GS \**

## GS V m GS V m n

[Name] Select cut mode and cut paper

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

[Range]    m = 1, 49  
               m = 66, 0    n = 255

[Description] Selects a mode for cutting paper and executes paper cutting. The value of m selects the mode as follows:

m	Print mode
0,48	Full cut
1,49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [ n × (vertical motion unit)]), and cuts the paper partially (one point left uncut).

[Notes for and ]

- This command is effective only processed at the beginning of a line.

[Note for ]

- When n = 0, the printer feeds the paper to the cutting position and cuts it.
- Normally, 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**.

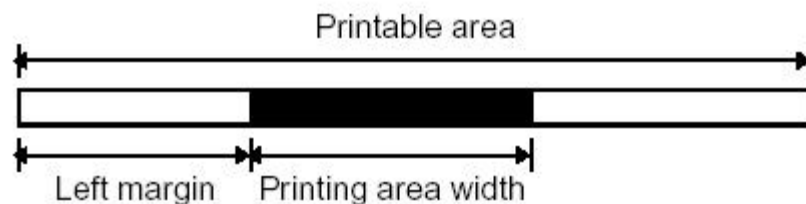
## GS W nL nH

[Name] Set printing area width

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

[Range] 0    nL = 255  
               0    nH = 255

[Description] Sets the printing area width to the area specified by nL and nH.  
 · The printing area width is set to [( nL + nH × 256) × horizontal motion unit] inches.



[Notes]

- 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.

[Default]    nL = 80, nH = 2

[Reference] **GS L**, **GS P**

## GS \ nL nH

---

[Name]	Set relative vertical print position in page mode				
[Format]	ASCII	GS	\	nL	nH
	Hex	1D	5C	nL	nH
	Decimal	29	92	nL	nH
[Range]	0	nL	255		
		0	nH	255	
[Description]	<p>Sets the relative vertical print starting position from the current position in page mode.</p> <ul style="list-style-type: none"><li>· This command sets the distance from the current position to [( nL + nH × 256) × vertical or horizontal motion unit] inches.</li></ul>				
[Notes]	<ul style="list-style-type: none"><li>· This command is ignored unless page mode is selected.</li></ul>				
	<ul style="list-style-type: none"><li>· When pitch N is specified to the movement downward: <math>nL + nH \times 256 = N</math></li></ul>				
	<p>When pitch N is specified to the movement upward (the negative direction), use the complement of 65536.</p>				
	<p>When pitch N is specified to the movement upward:</p> $nL + nH \times 256 = 65536 - N$				
	<ul style="list-style-type: none"><li>· Any setting that exceeds the specified printing area is ignored.</li></ul>				
	<ul style="list-style-type: none"><li>· This command function as follows, depending on the print starting position set by <b>ESC T</b>:<ul style="list-style-type: none"><li>When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (y) is used.</li><li>When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (x) is used.</li></ul></li></ul>				
[Reference]	<b>ESC \$</b> , <b>ESC T</b> , <b>ESC W</b> , <b>ESC \</b> , <b>GS \$</b> , <b>GS P</b> , 3.12 Page Mode				

## GS ^ r t m

---

[Name]	Execute macro					
[Format]	ASCII	GS	^	r	t	m
	Hex	1D	5E	r	t	m
	Decimal	29	94	r	t	m
[Range]	0	r	255			
	0	t	255			
	m = 0, 1					
[Description]	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.					
	[Notes]	· 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						

[Reference] FEED button.  
**GS :**

## GS a n

[Name] Enable/Disable Automatic Status Back (ASB)

[Format] ASCII GS a n

Hex 1D 61 n

Decimal 29 97 n

[Range] 0 n 255

[Description] Enables or disables ASB and specifies the status items to include, using n as follows:

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

- [Notes]
- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
  - If all status items are disabled, the ASB function is also disabled.
  - 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.
  - The status to be transmitted are as follows:

First byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off.
1	Off	00	0	Not used. Fixed to Off.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	On-line.

	On	08	8	Off-line.
<b>4</b>	On	10	16	Not used. Fixed to On.
<b>5</b>	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
<b>6</b>	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.
<b>7</b>	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.
<b>3</b>	Off	00	0	No auto cutter error.
	On	08	8	Auto cutter error occurred.
<b>4</b>	Off	00	0	Not used. Fixed to Off.
<b>5</b>	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
<b>6</b>	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
<b>7</b>	Off	00	0	Not used. Fixed to Off.

Bit 5: 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 ≤ n ≤ 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.



## GS f n

[Name] Select font for Human Readable Interpretation (HRI) characters

[Format] ASCII GS f n  
Hex 1D 66 n  
Decimal 29 102 n

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

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

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

[Notes] · HRI indicates Human Readable Interpretation.  
· HRI characters are printed at the position specified by **GS H**.

[Default] n = 0

[Reference] **GS H**, **GS k**

## GS h n

[Name] Select bar code height

[Format] ASCII GS h n  
Hex 1D 68 n  
Decimal 29 104 n

[Range] 1 n 255

[Description] Selects the height of the bar code.  
n specifies the number of dots in the vertical direction.

[Default] n = 162

[Reference] **GS k**

## GS k m d1...dk NUL GS k m n d1...dn

[Name] Print bar code

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

[Range] 0 m 6 (k and d depends on the bar code system used)  
65 m 73 (n and d depends on the bar code system used)

[Description] 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
0	UPC-A	11 k 12	48 d 57
1	UPC-E	11 k 12	48 d 57
2	JAN13 (EAN13)	12 k 13	48 d 57
3	JAN 8 (EAN8)	7 k 8	48 d 57
4	CODE39	1 k 255	45 d 57, 65 d 90, 32, 36, 37,43
5	ITF	1 k 255	48 d 57

6	CODABAR	1 k 255	48 d 57, 65 d 68, 36, 43, 45, 46, 47, 58
65	UPC-A	11 n 12	48 d 57
66	UPC-E	11 n 12	48 d 57
67	JAN13 (EAN13)	12 n 13	48 d 57
68	JAN 8 (EAN8)	7 n 8	48 d 57
69	CODE39	1 n 255	45 d 57, 65 d 90, 32, 36, 37, 43 d1 = dk = 42 (1)
70	ITF	1 n 255	48 d 57
71	CODABAR	1 n 255	48 d 57 65 d 68, 36, 43, 45, 46, 47, 58
72	CODE93	1 n 255	0 d 127
73	CODE128	2 n 255	0 d 127

[Notes for ]

- This command ends with a NUL code.
- The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

[Notes for ]

- 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.

[Notes in 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 command is ignored.
- 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.

[Notes in page 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

When CODE128 ( m = 73) is used:

- Refer to Appendix A for the information of the CODE 128 bar code and its code table.
- When using the CODE 128 in this printer, take the following points into account for data transmission:  
The top of the bar code data string must be code set selection character (any of CODE A, CODE B or CODE C) which selects  
Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

Specific character	Transmit data
--------------------	---------------

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

[Example] Example data for printing "No. 123456"  
In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

**GS k** 73 10 123 66 78 111 46 123 67 12 34 56



- If the top of the bar code data is not the code set selection character, the printer stops command processing and ignore the following data.
- If combination of "{" and the following character does not apply any special character, the printer stops command processing and ignore the following data.
- If the printer receives characters that cannot be used in the special code set, the printer stops command processing and ignore the following data.
- The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
- HRI character for the function character is space.
- HRI characters for the control character (<00>H to <1F>H and <7F>H) are not printed.

<Others> Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

[Reference] **GS H**, **GS f**, **GS h**, **GS w**.

## GS r n

[Name] Transmit status

[Format] ASCII GS r n  
Hex 1D 72 n  
Decimal 29 114 n

[Range] n = 1, 2, 49, 50

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

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

- [Notes]
- This command is valid for serial model only, 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.
  - 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 off-line 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	Status for ASB
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.

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

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

[Name] Print raster bit image

[Format] ASCII GS v 0 m xL xH yL yH d1...dk

Hex 1D 76 30 m xL xH yL yH d1...dk

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

[Range] 0 m 3, 48 m 51

0 xL 255

0 xH 255

0 yL 255

0 d 255

$k = (xL + xH \times 256) \times (yL + yH \times 256) (k \geq 0)$

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

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	180 DPI	203 DPI
1, 49	Double-width	180 DPI	101 DPI
2, 50	Double-height	90 DPI	203 DPI
3, 51	Quadruple	90 DPI	101 DPI

· xL, xH, select the number of data bytes ( xL+ xH × 256) in the horizontal direction for the bit image.

· yL, yH, select the number of data bytes ( yL+ yH × 256) in the vertical direction for the bit image.

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

· This command has no effect in all print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.

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

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

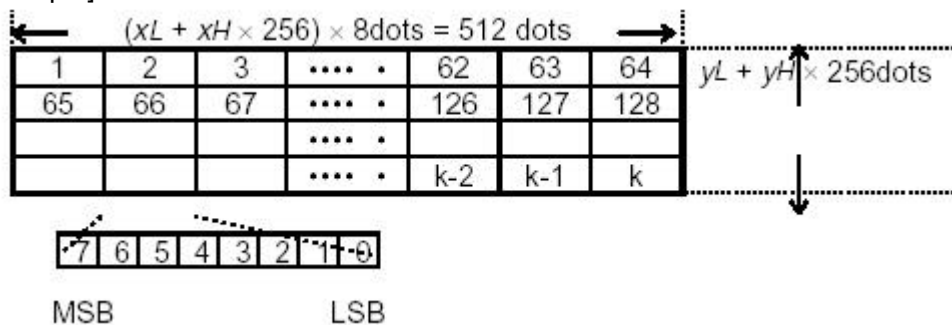
· The **ESC a** (Select justification) setting is also effective on raster bit images.

· When this command is received during macro definition, the printer ends macro

definition, and begins performing this command. The definition of this command should be cleared.

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

[Example] When  $xL + xH \times 256 = 64$



## GS w n

[Name] Set bar code width

[Format] ASCII GS w n  
Hex 1D 77 n  
Decimal 29 119 n

[Range] 2 n 6

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

n	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	1.0
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	1.875

· 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 = 2

[Reference] **GS k**

## Kanji Control Commands

### FS ! n

[Name] Set print mode(s) for Kanji characters

[Format] ASCII FS ! n  
Hex 1C 21 n  
Decimal 28 33 n

[Range] 0 n 255

[Description] Sets the print mode for Kanji characters, using n as follows:

Bit	Off/On	Hex	Decimal	Status for ASB
0, 1				Undefined

2	Off	00	0	Double-width mode is OFF
	On	04	4	Double-width mode is ON
3	Off	00	0	Double-height mode is OFF.
	On	08	8	Double-height mode is ON
4-6				Undefined
7	Off	00	0	Underline mode is OFF
	On	80	128	Underline mode is ON

- [Notes]
- When both double-width and double-height modes are set (including right- and left-side character spacing), quadruple-size characters are printed.
  - The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
  - The thickness of the underline is that specified by **FS** -, regardless of the character size.
  - When some of the characters in a line are double or more height, all the characters on the line are aligned at the baseline.
  - It is possible to emphasize the Kanji character using **FS W** or **GS !**, the setting of the last received command is effective.
  - It is possible to turn under line mode on or off using **FS** -, and the setting of the last received command is effective.

[Default] n = 0

[Reference] **FS** -, **FS W**, **GS !**

## FS &

[Name] Select Kanji character mode

[Format] ASCII FS &  
Hex 1C 26  
Decimal 28 38

[Description] Selects Kanji character mode.

- [Notes]
- When the kanji character mode is selected, the printer checks whether the code is for Kanji or not, then processed the first byte and the second byte if the code is for Kanji.
  - Kanji codes are processed in the order of the first byte and second byte.
  - Kanji character mode is not selected when the power is turned on.

[Reference] **FS** ., **FS C**

## FS - n

[Name] Turn underline mode on/off for Kanji characters

[Format] ASCII FS - n  
Hex 1C 2D n  
Decimal 28 45 n

[Range] 0 n 2, 48 n 50

[Description] Turns underline mode for Kanji characters on or off, based on the following values

of n.

n	Function
0, 48	Turns off underline mode for Kanji characters
1, 49	Turns on underline mode for Kanji characters (1-dot thick)
2, 50	Turns on underline mode for Kanji characters (2-dot thick)

- [Notes]
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.

- After the underline mode for Kanji characters is turned off by setting n to 0, underline printing is no longer performed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.
- The specified line thickness does not change even when the character size changes.
- It is possible to turn underline mode on or off using **FS !**, and the last received command is effective.

[Default] n = 0

[Reference] **FS !**

## **FS .**

---

[Name] Cancel Kanji character mode

[Format] ASCII FS .  
Hex 1C 2E  
Decimal 28 46

[Description] Cancels Kanji character mode.

[Notes] For Chinese Kanji model:

- When the Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.
- Kanji character mode is selected when the power is turned on.

[Reference] **FS &**, **FS C**

## **FS 2 c1 c2 d1...dk**

---

[Name] Define user-defined Kanji characters

[Format] ASCII FS 2 c1 c2 d1...dk  
Hex 1C 32 c1 c2 d1...dk  
Decimal 28 50 c1 c2 d1...dk

[Range] c1 and c2 indicate character codes for the defined characters.

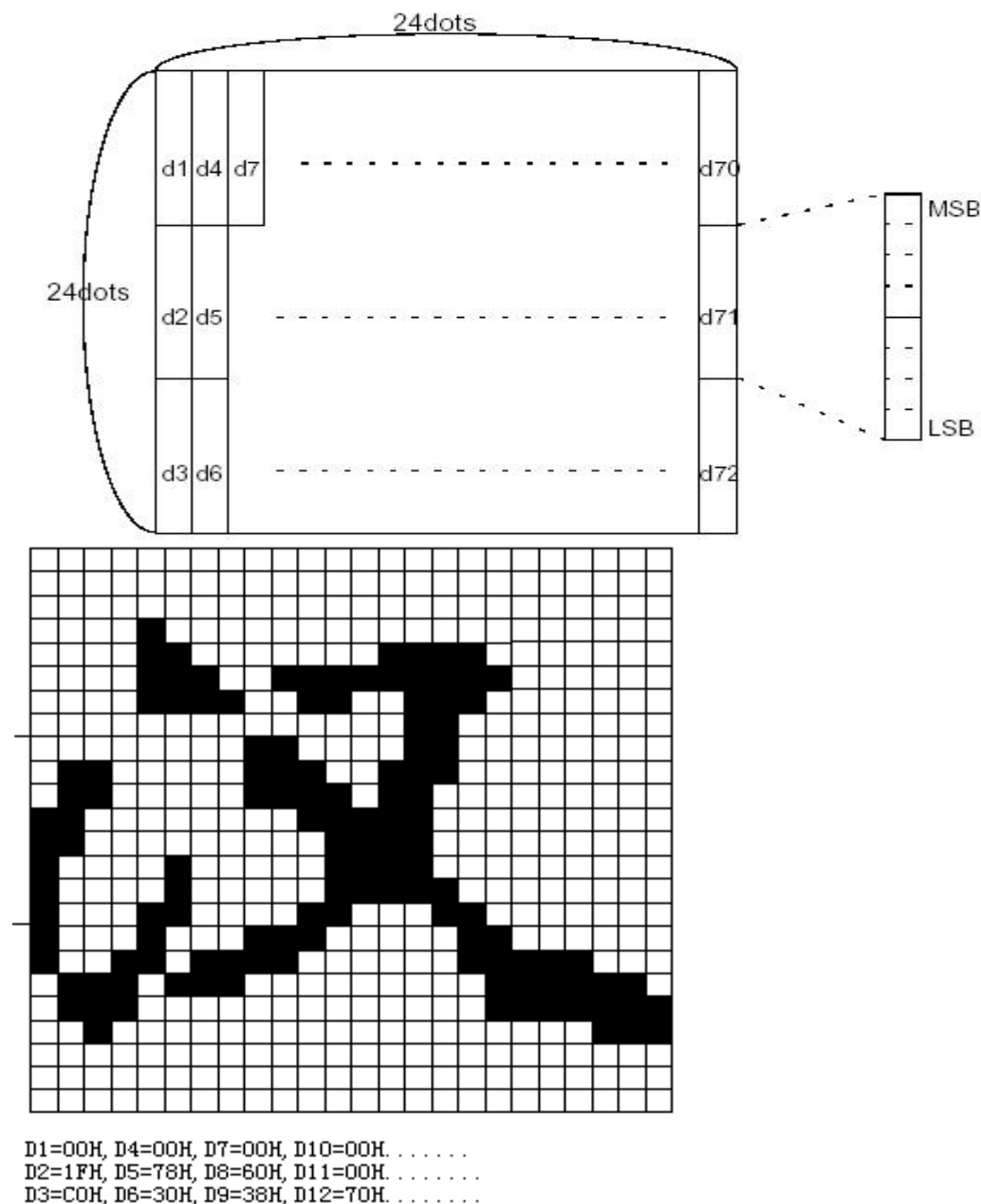
c1 = FEH, A1H c2 FEH  
0 d 255  
k = 72

[Description] Defines user-defined Kanji characters for the character codes specified by c1 and c2.

[Notes] · c1 and c2 indicate character codes for the defined characters. c1 specifies for the first byte, and c2 for the second byte.  
· d indicates the dot data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

[Default] All spaces.

[Reference] **FS C**



## FS S n1 n2

[Name]	Set left- and right-side Kanji character spacing				
[Format]	ASCII	FS	S	n1	n2
	Hex	1C	53	n1	n2
	Decimal	28	83	n1	n2
[Range]	0	n1	255	0	n2 255
[Description]	Sets left-side and right-side Kanji character spacing n1 and n2, respectively.				
	· When the printer model used supports <b>GS</b> P, the left-side character spacing is [ n1 × horizontal or vertical motion units], and the right-side character spacing is [ n2 × horizontal or vertical motion units].				
[Notes]	· When double-width mode is set, the left- and right-side character spacing is twice the normal value.				



- The horizontal and vertical motion units are set by **GS P**. The previously specified character spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.
- 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:
  - 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.
  - 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 288/203 inches for the paper roll and is approximately 36 mm {288/203 inches}. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0, n2 = 0

[Reference] **GS P**

## FS W n

---

[Name] Turn quadruple-size mode on/off for Kanji characters

[Format] ASCII FS W n  
 Hex 1C 57 n  
 Decimal 28 87 n

[Range] 0 n 255

[Description] Turns quadruple-size mode on or off for Kanji characters.

- When the LSB of n is 0, quadruple-size mode for Kanji characters is turned off.
- When the LSB of n is 1, quadruple-size mode for Kanji characters is turned on.

[Notes]

- Only the lowest bit of n is valid.
- In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.
- When quadruple-size mode is turned off using this command, the following characters are printed in normal size.
- When some of the characters on a line are different in height, all the characters on the line are aligned at the baseline.
- **FS !** or **GS !** can also select and cancel quadruple-size mode by selecting double-height and double-width modes, and the setting of the last received command is effective.

[Default] n = 0

[Reference] **FS !**, **GS !**

## **APPENDIX A: CODE128 BAR CODE**

### **A.1 Description of the CODE128 Bar Code**

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to

99)

The following special characters are also available in CODE128:

- SHIFT characters

In code set A, the character just after SHIFT is processed as a character for code set B.

In code set B, the character just after SHIFT is processed as a character for code set A.

SHIFT characters cannot be used in code set C.

- Code set selection character (CODE A, CODE B, CODE C).

This character switches the following code set to code set A, B, or C.

- Function character (FNC1, FNC2, FNC3, FNC4)

The usage of function characters depends on the application software. In code set C, only FNC1 is available.

## A.2 Code Tables

Printable characters in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NULL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
\$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Printable characters in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal

SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
\$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84		7C	124
-	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,65
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	—	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Printable characters in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal

0	00	0	40	28	40	80	50	80
1	01	1	41	29	41	81	51	81
2	02	2	42	2A	42	82	52	82
3	03	3	43	2B	43	83	53	83
4	04	4	44	2C	44	84	54	84
5	05	5	45	2D	45	85	55	85
6	06	6	46	2E	46	86	56	86
7	07	7	47	2F	47	87	57	87
8	08	8	48	30	48	88	58	88
9	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1 CODEA CODEB	7B,31	123,49
21	15	21	61	3D	61		7B,41	123,65
22	16	22	62	3E	62		7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			

## APPENDIX B: Page Mode-----

### B.1 General Description

The printer operates in two print modes only when the paper roll is selected as the print sheet: standard mode and page mode. In standard mode, the printer prints and feeds paper each time

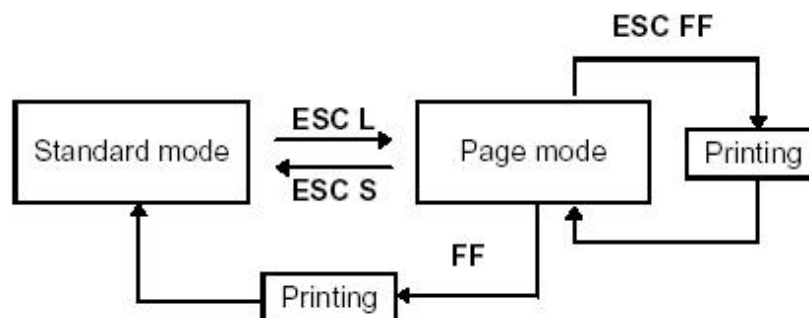
it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are processed in the specified memory, and the printer executes no operations. All the data in the memory is then printed when an **ESC FF** or **FF** command is received.

For example, when the printer receives the data "ABCDEF" <LF> in standard mode, it prints "ABCDEF" and feeds the paper by one line. In page mode, "ABCDEF" is written to the specified

printing area in memory, and the position in memory for the next print data is shifted by one line.

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.



**Figure B.1 Shifting Between Standard Mode and Page Mode**

## **B.2 Setting Values in Standard and Page Modes**

1) 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.

## **B.3 Formatting of Print Data in the Printable Area**

Formatting of print data in the printable area is performed as follows:

1) 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.)

2) 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 B.2 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 B.3) 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.

3) 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**).

4) The default value of the line spacing is set to 1/6 inch and corresponds to 31 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.

### **Example**

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula:

{number of vertical dots (8×6) - number of dots for feeding at the beginning of the printable area (24)} × vertical motion unit conversions (180/180) = 24

Therefore, 24 dots are required for feeding.

Use the following commands:

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

**ESC T n**

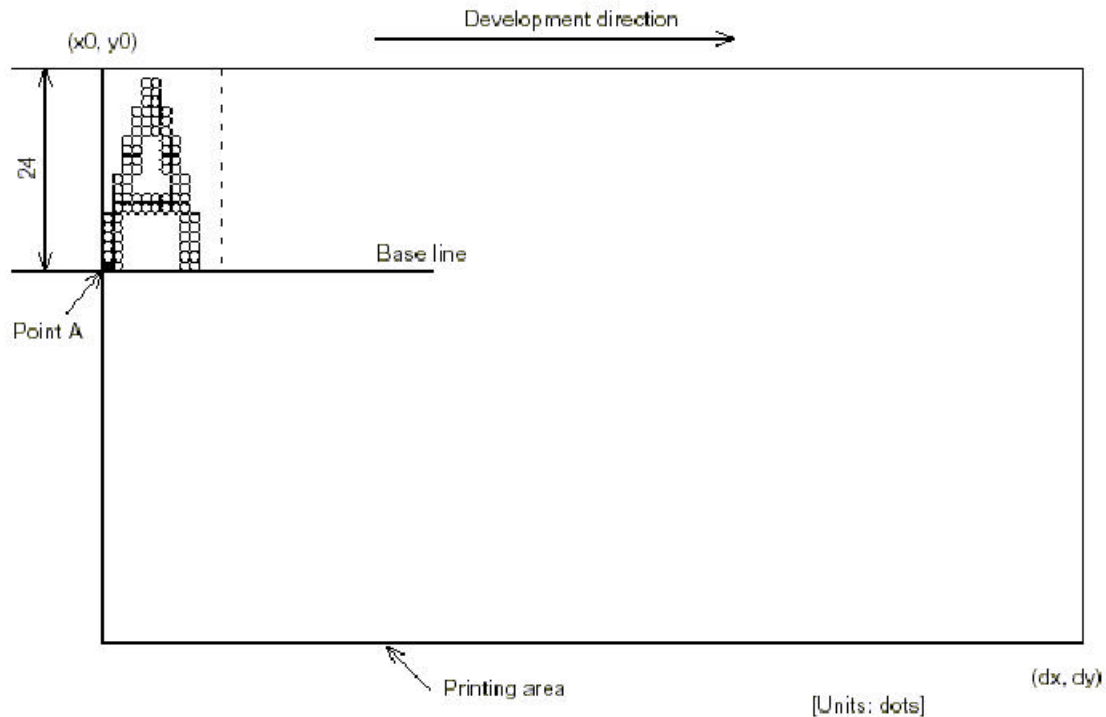
**ESC 3 24** → Set line spacing to be added.

**LF**

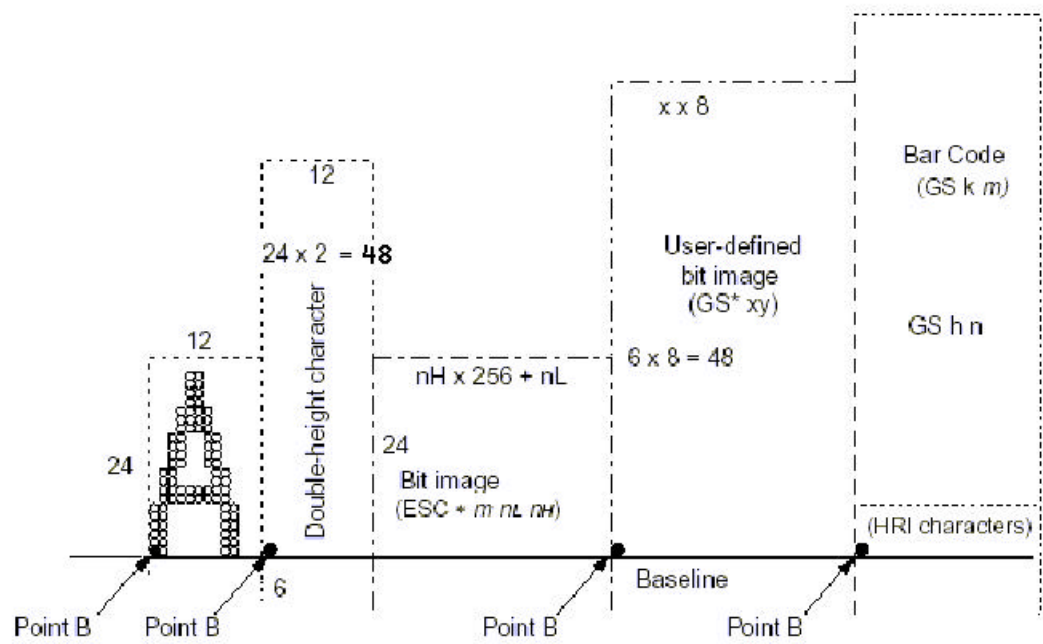
**GS / 1**

**ESC 2** → Reset the line spacing to 1/6 inch.

**NOTE:** Vertical and horizontal motion units are 1/180 in the vertical direction and 1/203 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.

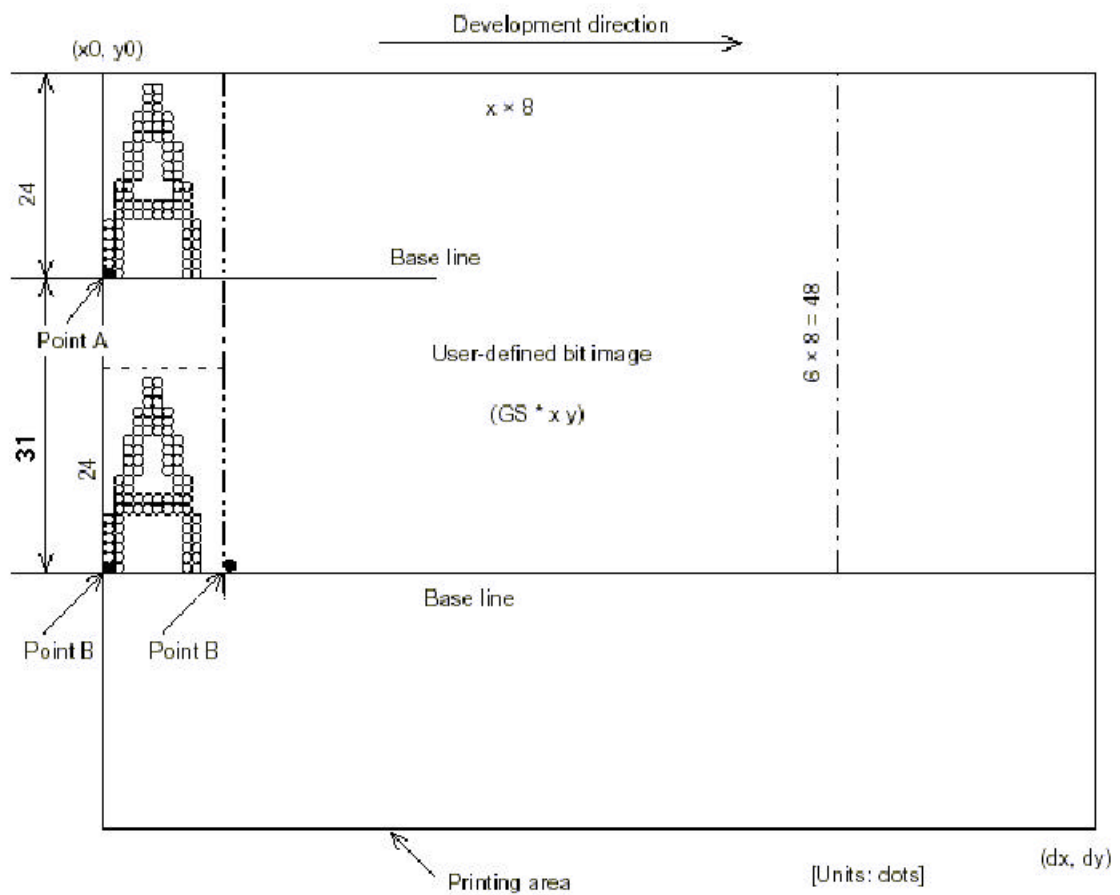


**Figure B.2 Character Data Developing Position**



**Figure B.3 Print Data Developing Position**





**Figure B.4 Downloaded Bit Image Developing Position**

## APPENDIX C: Character Code Tables

C.1 Page 0 (PC437: USA, Standard Europe) (International Character Set: U.S.A.)



	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	177	± 193	Đ 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	178	Ƨ 194	Ê 210	Ô 226	— 242
3	0011	â 131	ô 147	ú 163	179	† 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	† 180	— 196	È 212	Õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	÷ 197	ı 213	Ö 229	§ 245
6	0110	å 134	û 150	ä 166	Â 182	ä 198	í 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	À 183	Ã 199	Î 215	þ 231	ˆ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	Ł 200	Ï 216	ƒ 232	° 248
9	1001	ë 137	ÿ 153	® 169	ƒ 185	ŕ 201	Ƶ 217	Ú 233	ˆ 249
A	1010	è 138	Û 154	ˆ 170	ı 186	Ł 202	ŕ 218	Û 234	ˆ 250
B	1011	ï 139	ø 155	½ 171	¶ 187	Ƨ 203	■ 219	Ü 235	¹ 251
C	1100	î 140	£ 156	¼ 172	Œ 188	† 204	■ 220	Ý 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	İ 222	— 238	■ 254
F	1111	Å 143	f 159	» 175	Ƨ 191	¤ 207	■ 223	’ 239	SP 255

# C.3 Page 2 (PC860: Portuguese)

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

# C.4 Page 3 (PC863: Canadian-French)

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

# C.5 Page 4 (PC865: Nordic)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	Ł 192	⌚ 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	⌘ 179	⌚ 195	⌚ 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	⌘ 180	⌚ 196	⌚ 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	⌘ 181	⌚ 197	⌚ 213	σ 229	Ƶ 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	¿ 168	⌘ 184	⌚ 200	⌚ 216	Φ 232	° 248
9	1001	ë 137	Ö 153	ƒ 169	⌘ 185	⌚ 201	⌚ 217	Θ 233	• 249
A	1010	è 138	Û 154	ƒ 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	n 252
D	1101	ì 141	Ø 157	ı 173	⌘ 189	⌚ 205	⌚ 221	ø 237	² 253
E	1110	Ä 142	Ɔ 158	« 174	⌘ 190	⌚ 206	⌚ 222	€ 238	■ 254
F	1111	Å 143	ƒ 159	⌘ 175	⌘ 191	⌚ 207	⌚ 223	∩ 239	SP 255



# C.6 Page 5 ( PC852 )

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0	@	P	`	p	Ç	É	Á	⋮	Ł	đ	Ó	–
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	33	1	A	Q	a	q	ü	Í	í	⋮	⊥	Đ	ß	”
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	34	2	B	R	b	r	é	Í	ó	⋮	⊥	Đ	Ô	‘
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	35	3	C	S	c	s	â	ô	ú	⋮	⊥	Ě	Ň	ˇ
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	36	4	D	T	d	t	ä	ö	À	⋮	⊥	ď	ň	ˆ
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	37	5	E	U	e	u	ű	Ĺ	ą	Á	⋮	Ń	ń	§
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	38	6	F	V	f	v	ć	İ	Ž	Â	⋮	İ	Š	÷
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	39	7	G	W	g	w	ç	Ś	ž	Ě	⋮	ă	î	š
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	40	8	H	X	h	x	ı	ś	Ę	Ş	⋮	ě	Ř	°
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	41	9	I	Y	i	y	ë	Ö	ę	⋮	⋮	Ú	„	
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	42	10	J	Z	j	z	Õ	Ü		⋮	⋮	Ú	ř	•
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	43	11	K	[	k	{	ó	Ť	ž	⋮	⋮	■	Ú	ú
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	44	12	L	\	l		î	ť	Č	⋮	⋮	■	ý	Ř
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	45	13	M	]	m	}	Ž	Ł	ş	Ž	=	Ť	Ý	ř
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	46	14	N	^	n	~	Ä	×	«	ž	⋮	Ů	ť	■
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	47	15	O	_	o	△	Ć	č	»	⋮	⋮	■	’	

# C.7 Page 6 (PC858)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255



## C.8 International Character Set

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A	#	\$	@	[	\	]	^	`	{		}	~
France	#	\$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	\$	@	[	\	]	^	`	{		}	~
Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	\$	@	ı	Ñ	ı	^	`	¨	ñ	}	~
Japan	#	\$	@	[	¥	]	^	`	{		}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	\$	á	ı	Ñ	ı	é	`	í	ñ	ó	ú
Latin America	#	\$	á	ı	Ñ	ı	é	ü	í	ñ	ó	ú
Korea	#	\$	@	[	₩	]	^	`	{		}	~