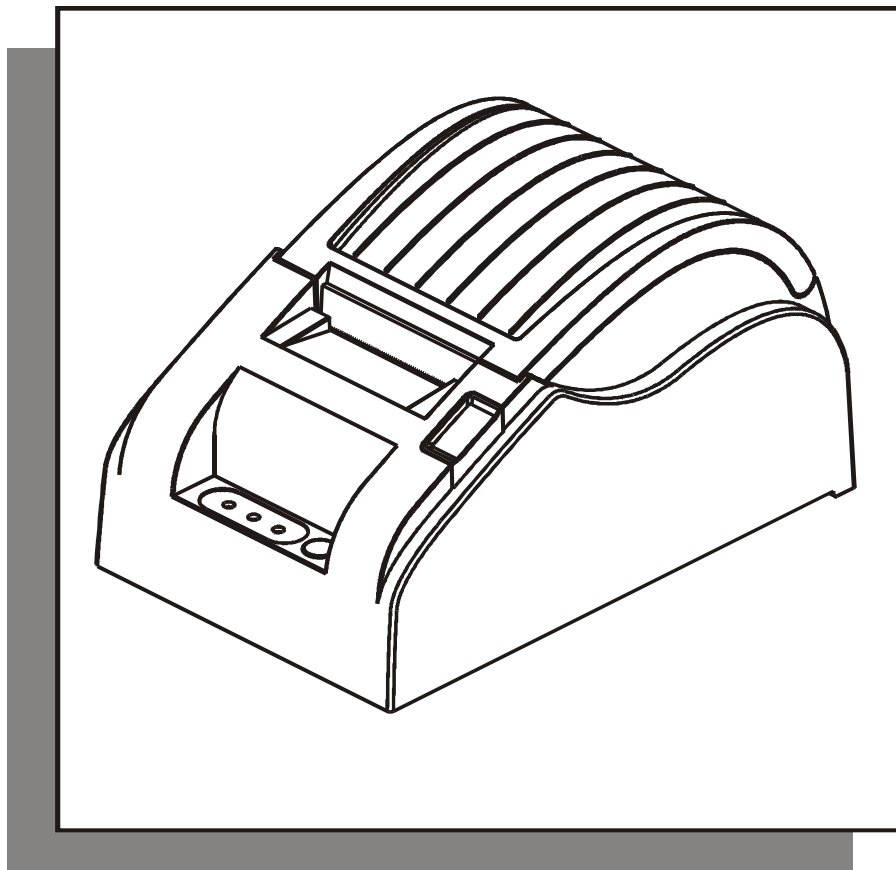


**CODE SOFT**

# **Programmer Manual**

**TP-290XIII**



## Manual Description

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### Command Notation

[Name]	Command in ASCII format and general description.
[Format]	The code sequence, including ASCII, HEX and DECIMAL.
[Range]	Gives the allowable ranges for the arguments.
[Description]	Describes the command's function.
[Details]	Describes the usage of the command in detail.
[Notes]	Provides important information on setting and using the printer command.
[Reference]	Lists related commands.
[Example]	Gives examples of how to use the command.

### 1、 HT Horizontal tab

---

[Format]	ASCII	HT
	Hex	09
	Decimal	9
[Description]	Moves the print position to the next horizontal tab position.	
[Details]	<p>§ This command is ignored unless the next horizontal tab position has been set.</p> <p>§ If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].</p> <p>§ Horizontal tab positions are set with <b>ESC D</b>.</p> <p>§ 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.</p> <p>§ The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8 character (column 9, 17, 25, ...).</p> <p>§ When the buffer is full on current line, the printer will do the following: In Standard Mode, print the current line and set the print position to next line. In Page Mode, printer enters new line and set the print position to next line.</p>	
[Reference]	<b>ESC D</b>	

### 2、 LF 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]	<b>ESC 2, ESC 3</b>	

### 3. ESC SP n Set right-side character spacing

---

[Format]	ASCII	ESC	SP	<i>n</i>
	Hex	1B	20	<i>n</i>
	Decimal	27	32	<i>n</i>
[Range]	$0 \leq n \leq 255$			
[Description]	Sets the character spacing for the right side of the character to inches [ <i>n</i> x horizontal motion units].			
[Details]	<p>§ When characters are enlarged <i>n</i> times, the right-side character spacing is <i>n</i> times normal value.</p> <p>§ The maximum right-side spacing is 255/203 inches. Any setting exceeding the maximum is converted to the maximum automatically.</p>			
[Default]	<i>n</i> = 0			
[Reference]	<b>GS P</b>			

### 4. ESC ! n Set print mode

---

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

Bit	1/0	HEX	DECIMAL	FUNCTION
0	0	00	0	Character font A (12 14) selected.
	1	01	1	Character font B (12 12) selected.
1,2		---	---	Undefined.
3	0	00	0	Emphasized mode not selected.
	1	08	8	Emphasized mode selected.
4	0	00	0	Double-height mode not selected.
	1	10	16	Double-height mode selected.
5	0	00	0	Double-width mode not selected.
	1	20	32	Double-width mode selected.
6		---	---	Undefined.
7	0	00	0	Underline mode not selected.
	1	80	128	Underline mode selected.

[Note]	<p>§ When both double-height and double-width modes are selected, quadruple size characters are printed.</p> <p>§ Underlining is added to the entire width of each character, including the space to the right of a character, but is not added to portions of lines that were skipped by means of an HT.</p>
[Default]	<i>n</i> = 0
[Reference]	<b>ESC - ESC E, GS !</b>

## 5、ESC \$ nL nH Set absolute print position

---

[Format]	ASCII	ESC \$	nL nH
	Hex	1B 24	nL nH
	Decimal	27 36	nL nH
[Range]	$0 \leq n \leq 255$		
[Description]	<p>§ Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.</p> <p>§ The distance from the beginning of the line to the print position is <math>[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]</math> inches.</p> <p>§ Settings outside the specified printable area are ignored.</p>		

## 6、ESC % n Select/cancel user-defined character set

---

[Format]	ASCII	ESC %	n
	Hex	1B 25	n
	Decimal	27 37	n
[Range]	$0 \leq nL \leq 255$		
[Description]	<p>Selects or cancels the user-defined character set.</p> <p>§ When the LSB of <math>n</math> is 0, the user-defined character set is canceled.</p> <p>§ When the LSB of <math>n</math> is 1, the user-defined character set is selected.</p>		
[Details]	<p>§ When the user-defined character set is canceled, the internal character set is automatically selected.</p> <p>§ <math>n</math> is available only for the least significant bit.</p>		
[Default]	$n = 0$		
[Reference]	<b>ESC &amp;, ESC ?</b>		

## 7、ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] 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]	$y = 3$ $32 \leq c1 \leq c2 \leq 127$ $0 \leq x \leq 12$ Font A (12 × 24) $0 \leq x \leq 9$ Font B (9 × 17) $0 \leq d1 \dots d(y \times xk) \leq 255$		
[Description]	<p>Defines user-defined characters.</p> <p>§ <math>y</math> specifies the number of bytes in the vertical direction.</p> <p>§ <math>c1</math> specifies the beginning character code for the definition, and <math>c2</math> specifies</p>		

the final code.

§ x specifies the number of dots in the horizontal direction.

[Note]

§ The available range of character is from ASCII <20>H to <7F>H (96 characters).

§ Consecutive character codes for multiple characters can be defined in one definition. When specifying only one character, specify c1 = c2.

§ d is definition data that indicates the pattern for " x" dots in the horizontal direction starting from the left edge.

§ The data to define a user-defined character is (y × x) bytes.

§ In the definition data, a "1" represents a dot that is to be printed, and a "0" represents a dot that is not to be printed.

§ The defined downloaded characters are cleared in the following circumstances:

- 1) When "ESC @" is executed
- 2) When deleted by "ESC ?"
- 3) When "FS q" is executed
- 4) When "GS \*" is executed
- 5) When the printer is reset or turned off

[Default]

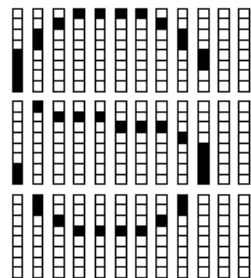
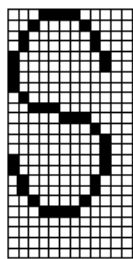
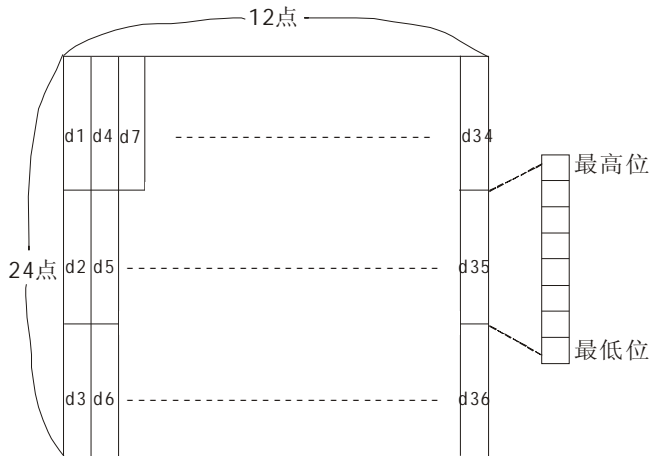
The internal character set

[Reference]

**ESC %, ESC ?**

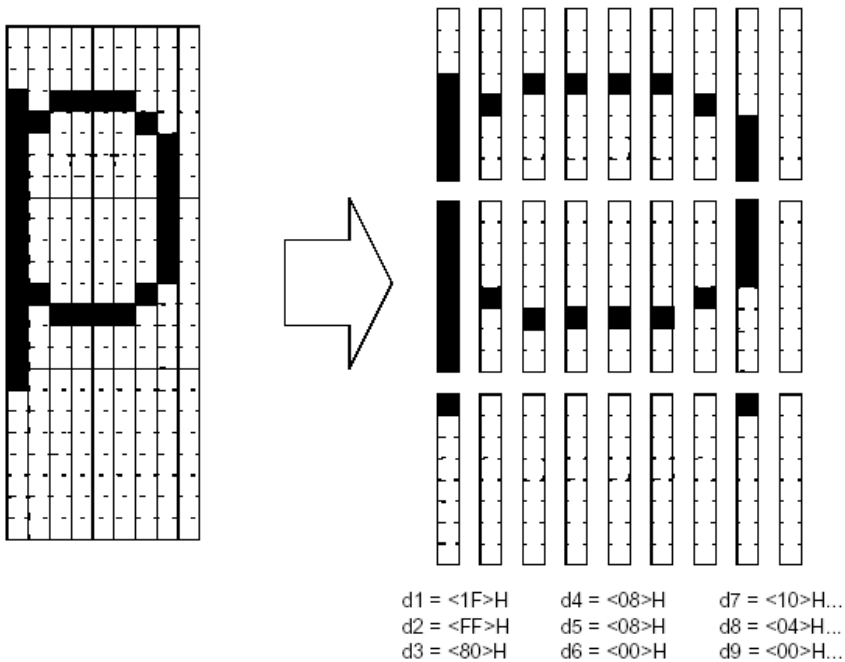
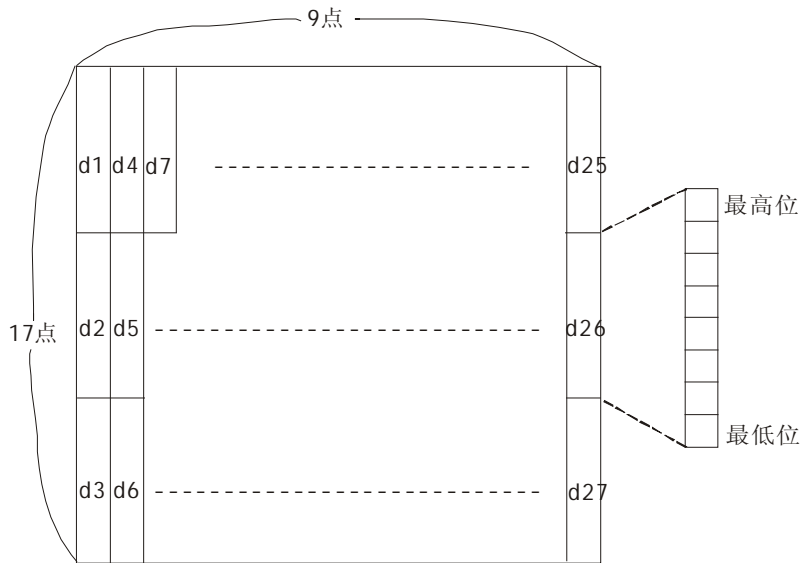
[Example]

§ When Font A (12 × 24) is selected



d1 = <0F>H    d4 = <30>H    d7 = <40>H . . . .  
 d2 = <03>H    d5 = <80>H    d8 = <40>H . . . .  
 d3 = <00>H    d6 = <00>H    d9 = <20>H . . . .

§ When Font B (9 × 17) is selected



**8. ESC \* m nL nH d1... dk      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		

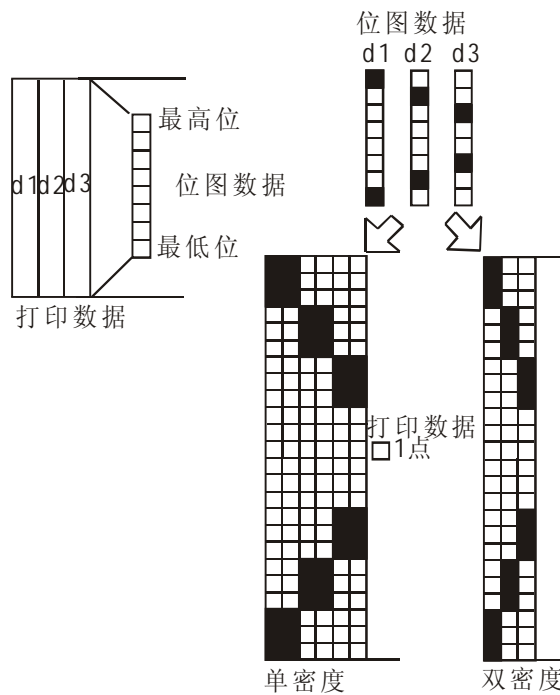
m	Mode	Vertical		Horizontal	
		Dot	Density	Density	Data (k)
0	8 dots Single Density	8	67 DPI	100 DPI	$nL + nH \times 256$
1	8 dots Double Density	8	67 DPI	200 DPI	$nL + nH \times 256$
32	24 dots Single Density	24	200 DPI	100 DPI	$(nL + nH \times 256) \times 3$
33	24 dots Double Density	24	200 DPI	200 DPI	$(nL + nH \times 256) \times 3$

[dpi: dot/25.4mm{1"}]

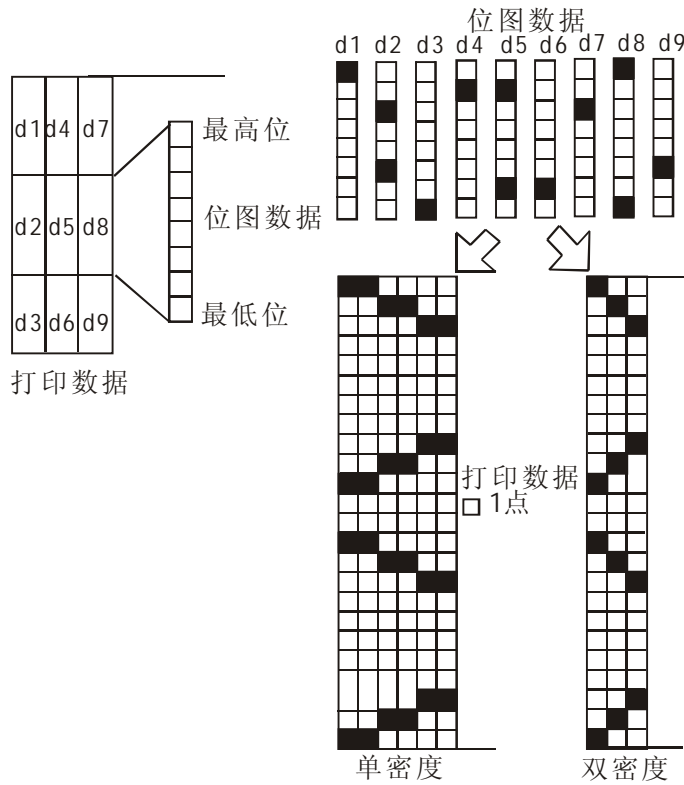
[Notes]

- § If the values of m and nH are out of the specified range, the following data is 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.
- § Except convert mode, this command doesn't affect other print mode, such as emphasized, double print, underline, character enlarged, contrary.
- § The relationship between the image data and the dots to be printed is as follows.

8-dot density selected:



24-dot density selected:



## 9、ESC – n Turn underline mode on/off

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

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

[Description] Turns underline mode on or off,

n	Function
0, 48	underline mode is turned off.
1, 49	underline mode is turned on. (1dots)
2, 50	underline mode is turned on. (2 dots )

[Notes]

- § Underlines can be printed for all characters, but not for the space set by HT.
- § Underline is not enabled when 90° rotation or character contrary is set.
- § When underline mode is turned off, the following characters are without underline. The underline width is not changed. Default width is 1 dot width.
- § Underline mode is still enabled even character size is changed.
- § Underline mode can also be turned on or off by using ESC !.
- § This command does not affect the setting of Kanji characters.

[Default] n = 0

[Reference] **ESC !**



## 10、ESC 2      **Select default line spacing**

---

[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal	27	50
[Description]	Selects default (3.75mm, 1/6-inch) line spacing.		
[Notes]	§ Default line spacing is absolute in standard mode and page mode.		
[Reference]	<b>ESC 3</b>		

## 11、ESC 3 n      **Set line spacing**

---

[Format]	ASCII	ESC	3	n
	Hex	1B	33	n
	Decimal	27	51	n
[Range]	$0 \leq n \leq 255$			
[Description]	Sets the line spacing to [ n (1/192)] inches.			
[Notes]	§ Line spacing is absolute in standard mode and page mode.			
[Default]	n = 3.75mm			
[Reference]	<b>ESC 2, GS P</b>			

## 12、ESC ? n      **Cancel user-defined characters**

---

[Format]	ASCII	ESC	?	n
	Hex	1B	3F	n
	Decimal	27	63	n
[Range]	$32 \leq n \leq 127$			
[Description]	Cancel user-defined characters			
[Notes]	§ This command cancels the pattern defined for the character code specified by n. After the user-defined characters are canceled, the corresponding pattern of the internal character is printed.			
	§ If a user-defined character has not been defined for the specified character code, the printer ignores this command.			
[Reference]	<b>ESC &amp;, ESC %</b>			

## 13、ESC @      **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 is in effect when the power is turned on.		

[Notes]

- § The DIP switch settings are not checked again.
- § The data in the receive buffer is not cleared.
- § Macro defined is reserved.
- § NV bitmap data is not cleared.

#### 14、ESC D n1...nk NUL Set horizontal tab positions

---

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

[Range]         $1 \leq n \leq 255$   
                  $0 \leq k \leq 32$

[Description]   Set horizontal tab positions

- §  $n$  specifies the column number for setting a horizontal tab position from the beginning of the line.
- §  $k$  indicates the total number of horizontal tab positions to be set.

[Notes]

- § The horizontal tab position is stored as a value of [character width x  $n$ ] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- § This command cancels the previous horizontal tab settings.
- § When setting  $n = 8$ , the print position is moved to column 9 by sending **HT**.
- § Up to 32 tab positions ( $k = 32$ ) can be set. Data exceeding 32 tab positions is processed as normal data.
- § Transmit [ $n$ ]  $k$  in ascending order and place a NUL code 0 at the end. When [ $n$ ]  $k$  is less than or equal to the preceding value [ $n$ ]  $k-1$ , tab setting is finished and the following data is processed as normal data.
- § **ESC D NUL** cancels all horizontal tab positions.
- § The previously specified horizontal tab positions do not change, even if the character width changes.
- § Character width is absolute in standard mode and page mode.

[Default]        The default tab positions are at intervals of 8 characters (columns 9, 17, 25, ...) for the font B (12 14).

[Reference]      **HT**

#### 15、ESC E n Turn emphasized mode on/off

---

[Format]        ASCII        ESC     E   n  
                 Hex        1B     45   n  
                 Decimal    27     69   n

[Range]         $0 \leq n \leq 255$

[Description]   Turn emphasized mode on/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]

- § Only the lowest bit of n is enabled.
- § This command and ESC ! turn on and off emphasized mode in the same way.  
The last proceeded command becomes effective.

[Default] n = 0

[Reference] **ESC !**

## 16、ESC G n Turn double-strike mode on/off

---

[Format]      ASCII      ESC    G    n  
                  Hex        1B    47   n  
                  Decimal    27    71   n

[Range]        0 ≤ n ≤ 255

[Description] Turn double-strike mode on/off

- § When the LSB of n is 0, double-strike mode is turned off.
- § When the LSB of n is 1, double-strike mode is turned on.

[Notes]

- § Only the lowest bit of n is enabled.
- § Printer output is the same in double-strike and in emphasized (ESC E).

[Default] n = 0

[Reference] **ESC E**

## 17、ESC J n Print and feed paper

---

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

[Range]        0 ≤ n ≤ 255

[Description] Print the data in the print buffer and feeds the paper [n × 0.176mm (1/44inches)].

[Notes]

- § After printing is completed, this command sets the print starting position to the beginning of a line.
- § The paper feed amount set by this command does not affect the values set by ESC 2 or ESC 3.

[Reference] **GS P**

## 18、ESC M n Select font

---

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

[Range]        n = 0, 1, 48, 49

[Description] Selects Font A or Font B from the following table:

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

### 19、ESC R n Select an international character set

---

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

[Range]         $0 \leq n \leq 15$

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

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

[Default]        n = 0

### 20、ESC V n Select/Cancel 90-degree rotation

---

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

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

[Description] Select/Cancel 90-degree rotation

n	Function
0, 48	90-degree rotation is canceled
1, 49	90-degree rotation is selected

[Notes]

- § This command is only effected in standard mode.
- § When 90-degree rotation is selected, printer doesn't print the underline.
- § Twice-height and twice-width is opposited in 90-degree rotation mode.

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

## 21、ESC \ nL nH Set relative horizontal position

---

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

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

[Description] This command sets the print starting position to where that [( nL + nH × 256) × horizontal/vertical move unit] away.

[Notes]

- § The printer ignores the settings that out of the printable area.
- § When the print position is moving right,  $nL + nH \times 256 = N$
- § When the print position is moving left,  $nL + nH \times 256 = 65536 - N$
- § The beginning print position is moved from current position to [n × horizontal/vertical move unit]
- § Horizontal and Vertical move unit is set by command **GS P**.
- § In standard mode, horizontal move unit is used.
- § In page mode, print area direction and the beginning print position determine the use of horizontal move unit or vertical move unit, as follow,
  1. When the beginning print position is set by **ESC T** to top left corner or bottom right corner, horizontal move unit is used;
  2. When the beginning print position is set by **ESC T** to bottom left corner or top right corner, vertical move unit is used;

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

## 22、ESC a n Select justification

---

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

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

[Description] Aligns all data in one line to the specified position.

n selects the justification as follows:

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

[Notes]

- § The command is enabled only when processed at the beginning of a line.

§ This command justifies the space area of the data skipped by command **HT**, **ESC \$** and **ESC \**.

[Default] n = 0

[Example]



### 23、ESC c 5 n 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 least significant bit of "n" is valid.

§ When the panel buttons are disabled, no buttons on the panel are usable.

[Default]        n = 0

### 24、ESC d n 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.

§ The amount of paper fed per line is based on the value set using the line spacing command (ESC 2 or ESC 3)

§ The maximum paper feed distance is not more than 1016mm.

[Reference]     **ESC 2, ESC 3**

### 25、ESC p m t1 t2 Generate pulse

---

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

[Range] m = 0, 1, 48, 49  
 $0 \leq t_1 \leq 255, 0 \leq t_2 \leq 255$

[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  $[t_1 \times 2]$  ms and the OFF time is  $[t_2 \times 2]$  ms.  
 § When  $t_2 < t_1$ , the printer processes  $t_1 \times 2$  ms.

[Reference] **DLE DC4**

**26、ESC t n Select character code table**

---

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

[Range]  $0 \leq n \leq 10, 16 \leq n \leq 19$

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

n	Page
0	PC437 [U.S.A. & Europe Standard]
1	Katakana
2	PC850 [Multilingual]
3	PC860 [Portuguese]
4	PC863 [Canadian & French]
5	PC865 [Nordic]
6	West Europe
7	Greek
8	Hebrew
9	PC755: East Europe
10	Iran
16	WPC1252
17	PC866: Cyrillice#2
18	PC852: Latin2
19	PC858

[Default] n = 0

**27、ESC { n Turns on/off upside-down printing mode**

---

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

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

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

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

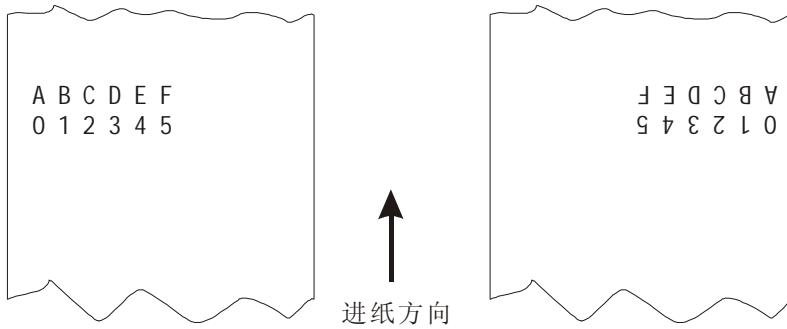
[Notes]

- § Only the lowest bit of n is effective.
- § This command is enabled only when input at the beginning of a line.
- § In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

[Default]

n = 0

[Example]



## 28、FS p n m Print NV bitmap 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]      m specifies the print mode:

m	Mode	Vertical Density (DPI)	Horizontal Density (DPI)
0, 48	Normal	200	200
1, 49	Double-width	200	100
2, 50	Double-height	100	200
3, 51	Quadruple	100	100

- § n is the number of the NV bitmap image (defined using the FS q command).
- § m specifies the bit image mode.

[Details]

- § NV bitmap image means a bitmap 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.
- § In page mode, this command is not effective.
- § This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated



characters, etc.), except upside-down printing mode.

- § If the 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.

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

## 29. **FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n** Define NV bitmap image

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

[Range]

$1 \leq n \leq 255$   
 $0 \leq xL \leq 255$   
 $1 \leq (xL + xH \times 256) \leq 1023$   
 $1 \leq (yL + yH \times 256) \leq 288$   
 $0 \leq d \leq 255$   
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$   
 Total defined data area = 8096 bytes

[Description]

Define the NV bit image specified by  $n$ .

- §  $n$  specifies the number of the defined NV bit image.
- §  $xL, xH$  specifies  $(xL, xH \times 256) \times 8$  dots in the horizontal direction for the NV bit image you are defining.
- §  $yL, yH$  specifies  $(yL, yH \times 256) \times 8$  dots in the vertical direction for the NV bit image you are defining.

[Notes]

- § It's not recommended to write flashrom frequently. No more than 10 times 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.
- § During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit the data including the real-time commands during the execution of this command.
- § NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- § In standard mode, this command is effective only when processed at the beginning of the line.

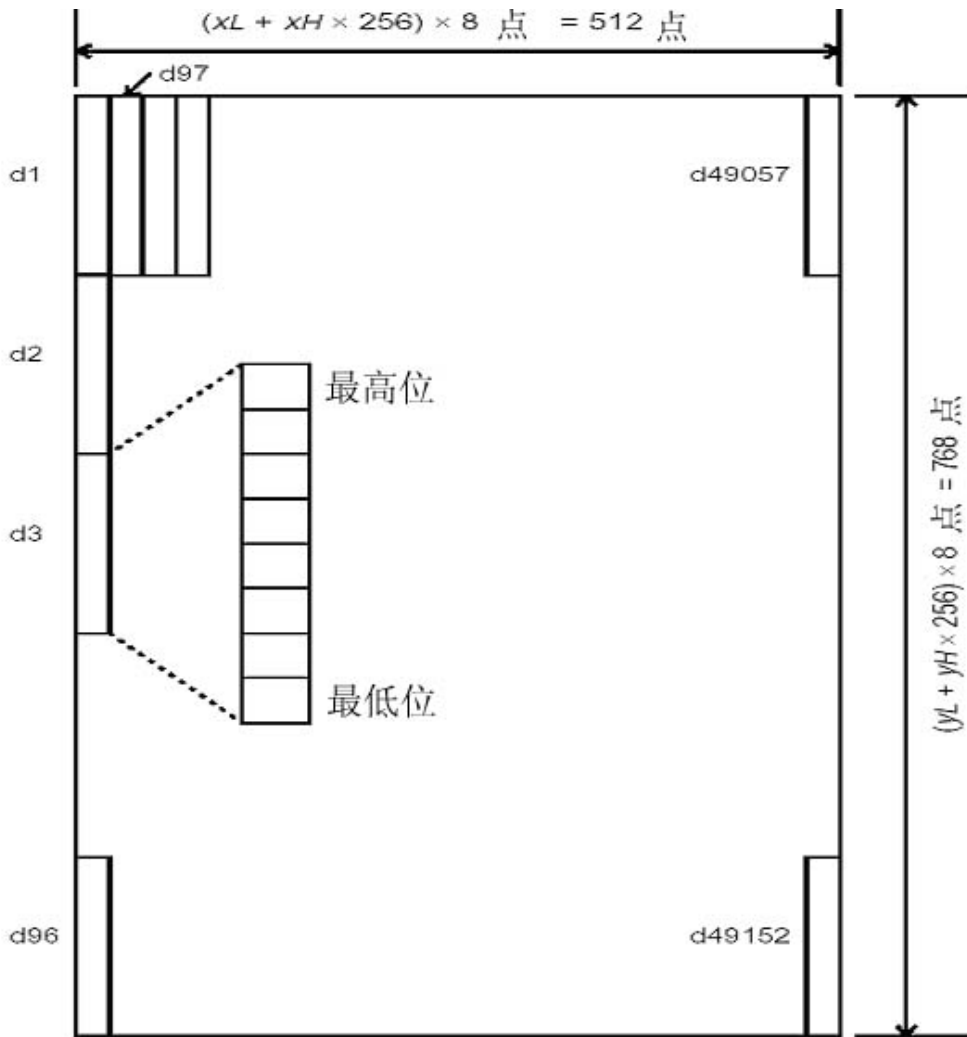
- § In page mode, this command is not effective.
- § This command is effective when 7 bytes <FS yH> is processed as a normal value.
- § When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.
- § In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
- § In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the 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  $(xL \times xH \times 256) \times (yL \times yH \times 256) \times 8$  [header :4] bytes of NV memory.
- § The definition area in this printer is a maximum of 64K bits (8K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data header] exceeds 64K bits.
- § The printer is busy immediately before writing into NV memory.
- § The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
- § When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- § Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- § This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

[Reference]

**FS p**

[Example]

When xL = 64, xH = 0, yL = 96, yH = 0



### 30、GS ! n Select character size

[Format]	ASCII	GS	!	n
	Hex	1D	21	n
	Decimal	29	33	n

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

( $1 \leq \text{vertical number of times} \leq 8$ ,  $1 \leq \text{horizontal number of times} \leq 8$ )

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

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

Table 1

Table 2

Character height			Character height		
Hex	Decimal	Horizontal	Hex	Decimal	Vertical
00	0	1 (Normal)	00	0	1 (Normal)
10	16	2 (Double width)	01	1	2 (Double width)

20	32	3	02	2	3
30	48	4	03	3	4
40	64	5	04	4	5
50	80	6	05	5	6
60	96	7	06	6	7
70	112	8	07	7	8

[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 !**

### 31、GS \* x y d1...d(x × y × 8) 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]         $1 \leq x \leq 255, 1 \leq y \leq 48$   
 $x \times y \leq 912$   
 $0 \leq d \leq 255$

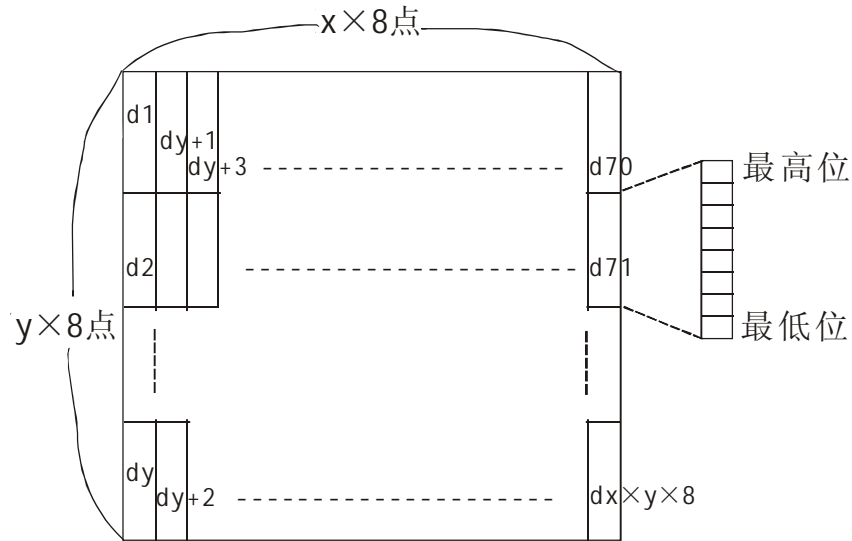
[Description]    Defines a downloaded bit image using the number of dots specified by  $x$  and  $y$ .  
 §  $x$  specifies the number of dots in the horizontal direction.  
 §  $y$  specifies the number of dots in the vertical direction.

[Notes]        The number of dots in the horizontal direction is  $x \times 8$ , and in the vertical direction it is  $y \times 8$ .

- § If  $x \times y$  is out of the specified range, this command is disabled.
- § The  $d$  indicates bit-image data. Data ( $d$ ) specifies a bit printed to 1 and not printed to 0.
- § The downloaded bit image definition is cleared when:
  - ① **ESC @** is executed.
  - ② **ESC &** is executed.
  - ③ **FS q** is executed.

④ Printer is reset or the power is turned off.

§ The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **GS /**

### 32. **GS / m** Print downloaded bit image

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

[Range]         $0 \leq m \leq 3, 48 \leq m \leq 51$

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

<i>m</i>	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	200	200
1, 49	Double-width	200	100
2, 50	Double-height	100	200
3, 51	Quadruple	100	100

[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 up side down printing mode.
- § If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.

[Reference] **GS \* , GS \***

### 33、GS B n 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 <b>ESC SP</b> .			
	§ This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing skipped by <b>HT</b> , <b>ESC \$</b> , and <b>ESC \</b> .			
	§ 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			

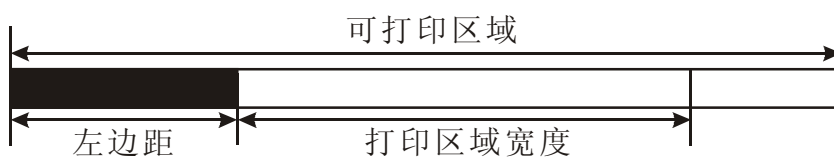
### 34、GS H n Select printing position for HRI characters

---

[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:													
	<table border="1"> <thead> <tr> <th>n</th> <th>Printing Position</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Not printed</td> </tr> <tr> <td>1, 49</td> <td>Above the bar code</td> </tr> <tr> <td>2, 50</td> <td>Below the bar code</td> </tr> <tr> <td>3, 51</td> <td>Both above and below the bar code</td> </tr> </tbody> </table>				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
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 <b>GS f</b> .													
[Default]	n = 0													
[Reference]	<b>GS f</b> , <b>GS k</b>													

### 35、GS L nL nH 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 <b>GS P</b> . Changing the horizontal and vertical motion unit does not affect the current left margin.
	§ The horizontal motion unit (x) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.

[Default] nL = 0, nH = 0

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

### 36、GS P x y 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):
  - ① Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**
  - ② Commands using y: **ESC 3, ESC J, GS V**
- § In page mode, the following command use x or y, depending on character orientation:
  - ① When the print starting position is set to the upper left or lower right of the printing area using **ESC T** (data is buffered in the direction perpendicular to the paper feed direction):
    - Commands using x: **ESC SP, ESC \$, ESC W, ESC \, FS S**
    - Commands using y: **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**
  - ② When the print starting position is set to the upper right or lower left of the printing area using **ESC T** (data is buffered in the paper feed direction):
    - Commands using x: **ESC 3, ESC J, ESC W, GS \$, GS \**
    - Commands using y: **ESC SP, ESC \$, ESC W, ESC \, FS S, GS V**
- § The command does not affect the previously specified values.
- § The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

[Default] x = 200, y = 200

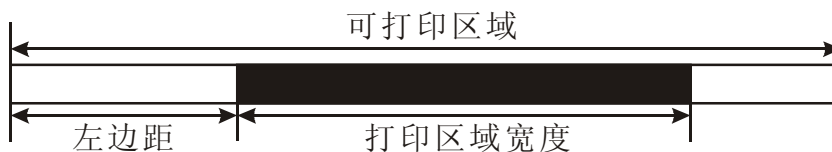
[Reference] **ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS \**

### 37、GS W nL nH 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 = 76, nH = 2

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

### 38、ESC v Transmit printer status (only for Serial and Ethernet interface)

[Format] ASCII ESC v  
Hex 1B 76  
Decimal 27 118

[Description] Transmit printer status.

For Serial interface:

§ When n=0, paper present.

§ When n=4, no paper present.

For Ethernet interface, the printer status is transmitted automatically.

First byte (printer info):

Bit	On/Off	Hex	Decimal	ASB Status
0,1	Off	00	0	Not used. Fixed to 0.
2	On	04	4	Not used. Fixed to 1.
3	Off	00	0	Not used. Fixed to 0.
4	On	10	16	Not used. Fixed to 1.
5	Off	00	0	Not used. Fixed to 0.
6	Off	00	0	Paper is not being fed by the paper feed button.
	On	40	64	Paper is eing fed by the paper feed button.
7	Off	00	0	Not used. Fixed to 0.

Second byte (printer info):

Bit	Off/On	Hex	Decimal	ASB Status
0-4	Off	00	0	Not used. Fixed to 0.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error.
6	Off	00	0	No unrecoverable error.
	On	40	64	Unrecoverable error.
7	Off	00	0	Not used. Fixed to 0.

Third byte (paper sensor info):

Bit	Off/On	Hex	Decimal	ASB Status
0,1	Off	03	3	Not used. Fixed to 1.
2,3	Off	00	0	Paper end sensor: paper present.
	On	0C	12	Paper end sensor: no paper present.
4-7	Off	00	0	Not used. Fixed to 0.

Fourth byte (paper sensor info):

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

### 39、GS f n      Select HRI font

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

[Range]      n = 0, 1, 48, 49

[Description]      When printing barcode, to select HRI font.  
n selects the font as follows:

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

[Notes]      §      HRI character is Notes character in barcode.  
§      HRI print position is set by command **GS H**

[Default]      n = 0

[Reference]      **GS H, GS k**

### 40、GS h n      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 dots)

[Default]      n = 162

[Reference]      **GS k**

### 41、①GS k m d1...dk NUL②GS k m n d1...dn      Barcode printing

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

②ASCII      GS      k      m      n      d1... dn  
Hex      1D      6B      m      n      d1... dn  
Decimal      29      107      m      n      d1... dn

[Range]      ①0 ≤ m ≤ 6 (k and d depends on the barcode type used)  
②65 ≤ m ≤ 73 (k and d depends on the barcode type used)

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

m	Barcode Type	Number of Characters	Characters	Remarks	
①	0	UPC-A	$11 \leq k \leq 12$	0~9 $48 \leq d \leq 57$	
	1	UPC-E	$11 \leq k \leq 12$	0~9 $48 \leq d \leq 57$	
	2	JAN13 (EAN13)	$12 \leq k \leq 13$	0~9 $48 \leq d \leq 57$	
	3	JAN8 (EAN8)	$7 \leq k \leq 8$	0~9 $48 \leq d \leq 57$	
	4	CODE39	$1 \leq k \leq 255$	0~9, A~Z, SP, \$, %, +, -, ., / * (Start/End character)	$45 \leq d \leq 57$ , $65 \leq d \leq 90$ , $d = 32, 36, 37, 43,$ $45, 46, 47$ $d = 42$ (Start/End character)
	5	ITF	$1 \leq k \leq 255$ (even number)	0~9 $48 \leq d \leq 57$	
②	6	CODABAR	$1 \leq k \leq 255$	0~9, A~D \$, +, -, ., /, ;	$48 \leq d \leq 57$ , $65 \leq d \leq 68$ , $d = 36, 43, 45, 46,$ $47, 58$
	65	UPC-A	$11 \leq n \leq 12$	0~9 $48 \leq d \leq 57$	
	66	UPC-E	$11 \leq n \leq 12$	0~9 $48 \leq d \leq 57$	
	67	JAN13 (EAN13)	$12 \leq n \leq 13$	0~9 $48 \leq d \leq 57$	
	68	JAN8 (EAN8)	$7 \leq n \leq 8$	0~9 $48 \leq d \leq 57$	
	69	CODE39	$1 \leq n \leq 255$	0~9, A~Z, SP, \$, %, +, -, . , / * (Start/End character)	$45 \leq d \leq 57$ , $65 \leq d \leq 90$ , $d = 32, 36, 37, 43, 45,$ $46, 47$ $d = 42$ (Start/End character)
	70	ITF	$1 \leq n \leq 255$ (even number)	0~9 $48 \leq d \leq 57$	
	71	CODABAR	$1 \leq n \leq 255$	0~9, A~D \$, +, -, ., /, ;	$48 \leq d \leq 57$ , $65 \leq d \leq 68$ , $d = 36, 43, 45, 46,$ $47, 58$
72	CODE93	$1 \leq n \leq 255$	NUL~SP(7FH)	$0 \leq d \leq 127$	
73	CODE128	$2 \leq n \leq 255$	NUL~SP(7FH)	$0 \leq d \leq 127$	

[Notes ①]

- § This command ends with a NUL code.
- § When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes bar code data and processes the following data as normal data.
- § When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.
- § When the bar code system used is JAN8 (EAN8), the printer prints the bar

code after receiving 8 bytes bar code data and processes the following data as normal data.

- § The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

[Notes ②]

- §  $n$  indicates the number of bar code data, and the printer processes  $n$  bytes from the next character data as bar code data.
- § If  $n$  is outside of the specified range, the printer stops command processing and processes the following data as normal data.

[Notes (standard mode)]

- § If  $d$  is outside of the specified range, the printer only feeds paper and processes the following data as normal data.
- § If the horizontal size exceeds printing area, the printer only feeds the paper.
- § This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- § This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following  $m$  as normal data.
- § After printing bar code, this command sets the print position to the beginning of the line.
- § This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[Notes (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 barcode.
- § 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 barcode width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.

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

#### 42、**GS v 0 m xL xH yL yH d1...dk** **Print bitmap image**

---

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

[Range]

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

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$

$0 \leq yL \leq 255$

$$0 \leq d \leq 255$$

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

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

m	MODE	Vertical Dot Density	Horizontal Dot density
0, 48	Normal	200 DPI	200 DPI
1, 49	Double-width	200 DPI	100 DPI
2, 50	Double-height	100 DPI	200 DPI
3, 51	Quadruple	100 DPI	100 DPI

§ xL, xH, select the number of data bits ( xL+ xH × 256) in the horizontal direction for the bitmap image.

§ yL, yH, select the number of data bits ( yL+ yH × 256) in the vertical direction for the bitmap 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.

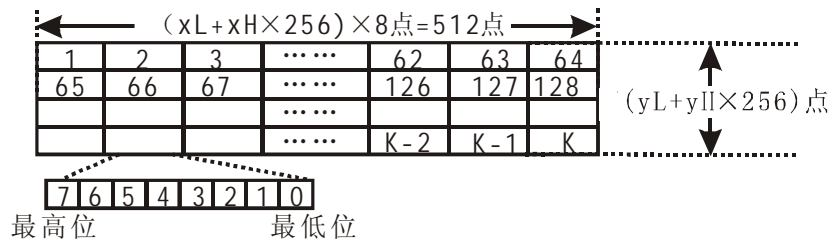
§ The part of bitmap image that exceeds the printable area will not be printed.

§ **ESC a** is available for bitmap image.

§ In Macro process, this command is executed and Macro is stopped. This command is not a part of Marco.

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

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



### 43. GS w n Set barcode width

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

[Range]       $2 \leq n \leq 6$

[Description]      Set the width of barcode

n specifies the bar code width as follows:

n	Module Width (mm) for Single-level Barcode	Binary-level barcodes	
		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

§ Single-level barcodes:


UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128

§ Binary-level barcodes:

CODE39, ITF, CODABAR

[Default] n = 3

[Reference] **GS k**

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