

POS-80-Series Printer

Programmer Manual

HT

[Name]	Horizontal tab	
[Format]	ASCII	HT
	Hex	09
	Decimal	9
[Description]	Moves the print position to the next horizontal tab position.	
[Details]	<ul style="list-style-type: none"> • This command is ignored unless the next horizontal tab position has been set. • If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1]. • Horizontal tab positions are set with ESC D. • If this command is received when the printing position is at [printing area width+ 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line. • The default setting of the horizontal tab position for the paper roll is font A(12 × 24) every 8th character (9th, 17th, 25th, ... column). 	
[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	

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.		
[Details]	<ul style="list-style-type: none"> • Sets the print starting position to the beginning of the line. • The automatic line feed is ignored with a serial interface model. • This command is set according to the DIP switch 1-1 setting with a parallel interface model. 		
[Reference]	LF		

DLE EOT n

[Name]	Real-time status transmission			
[Format]	ASCII	DLE	EOT	n
	Hex	10	04	n
	Decimal	16	4	n
[Range]	$1 \leq n \leq 4$			
[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			
[Details]	The status is transmitted whenever the data sequence of <10>H<04>H<n> ($1 \leq n \leq 4$) is received.			
	Example: In ESC _i .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 can not be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on with a parallel interface model.

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 pin3).
	ON	04	4	Drawer open/close signal is LOW (connector pin3).
3	---	---	---	Undefined.
4	ON	10	16	Not used. Fixed to On.

5. 6	--	--	--	Undefined.
7	OFF	00	0	Not used.Fixed to Off.

n = 2: Off-line status

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

n = 3: Error status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used Fixed to Off.
1	1	02	2	Not used Fixed to On.
2	-	-	-	Undefined.
3	0	00	0	No auto-cutter error.
	1	08	8	Auto-cutter error occurs.
4	1	10	16	Not used Fixed to On.
5	0	00	0	No unrecoverable error.
	1	20	32	Unrecoverable error occurs.
6	0	00	0	No auto-recoverable error.

	1	40	64	Auto recoverable error occurs.
7	0	00	0	Not used Fixed to Off.

n = 4: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used Fixed to Off.
1	1	02	2	Not used Fixed to On.
2,3	0	00	0	Paper roll near-end sensor, paper adequate.
	1	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	1	10	16	Not used Fixed to On.
5,6	0	00	0	Paper roll sensor Paper present.
	1	60	96	Paper roll end detected by paper roll sensor.
7	0	00	0	Not used Fixed to Off.

[Reference] **DLE ENQ, GS a, GS r**

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 ≤ 8

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

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

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

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

- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
- The printer executes this command upon receiving it.
- With a serial interface model, this command is executed even when the printer is 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. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on.
- 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 SP n

[Name] Set right-side character spacing

[Format]	ASCII	ESC	SP	n
	Hex	1B	20	n
	Decimal	27	32	n

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

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

[Details] • The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.

- This command does not affect the setting of kanji characters.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
 - 1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - 2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
- The maximum right-side spacing is 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	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

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

- Emphasized mode is effective for alphanumeric and Kanji. All print modes except emphasized mode is effective only for alphanumeric.

[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] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

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

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

[Details] • Settings outside the specified printable area are ignored.

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

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

- In standard mode, the horizontal motion unit (x) is used.
- In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows:1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

[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]	$0 \leq nL \leq 255$			
[Description]	Selects or cancels the user-defined character set. <ul style="list-style-type: none"> • When the LSB of n is 0, the user-defined character set is canceled. • When the LSB of n is 1, the user-defined character set is selected. 			
[Details]	<ul style="list-style-type: none"> • When the user-defined character set is canceled, the internal character set is automatically selected. • n is available only for the least significant bit. 			
[Default]	n = 0			
[Reference]	ESC &, ESC ?			

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

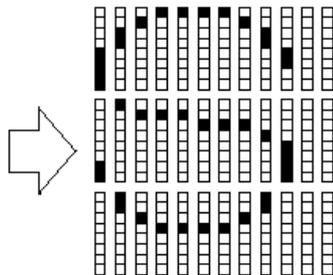
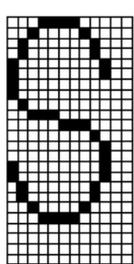
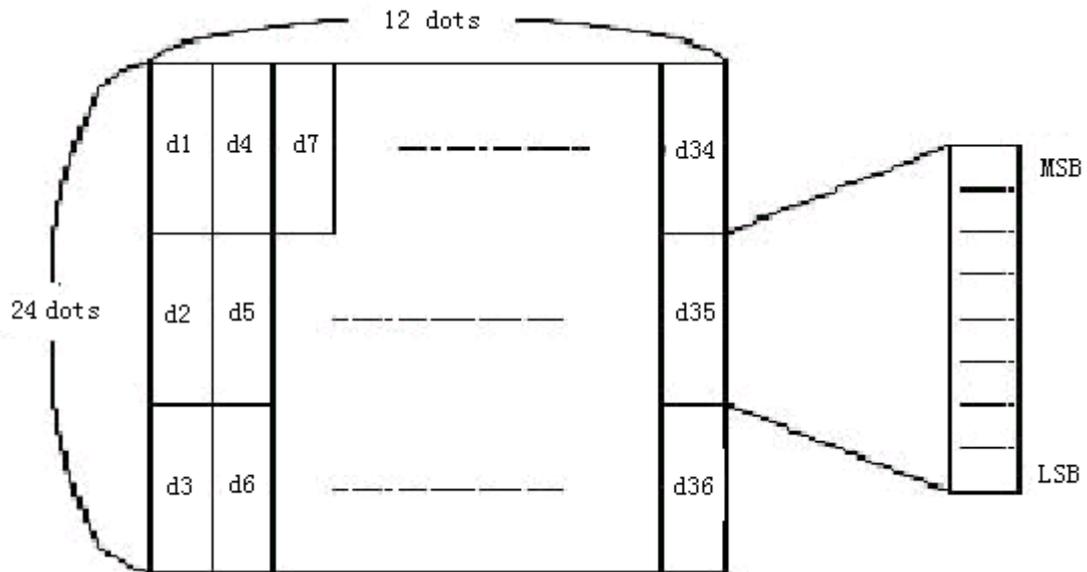
[Name]	Define user-defined characters			
[Format]	ASCII	ESC	&	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
	Hex	1B	26	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
	Decimal	27	38	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
[Range]	y = 3	$32 \leq c1 \leq c2 \leq 126$		$0 \leq x \leq 12$ Font A (12 × 24)
		$0 \leq x \leq 9$ Font B (9 × 17)		$0 \leq d1 \dots d(y \times xk) \leq 255$
[Description]	Defines user-defined characters. <ul style="list-style-type: none"> • y specifies the number of bytes in the vertical direction. • c1 specifies the beginning character code for the definition, and c2 specifies the final code. • x specifies the number of dots in the horizontal direction. 			

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

[Default] The internal character set

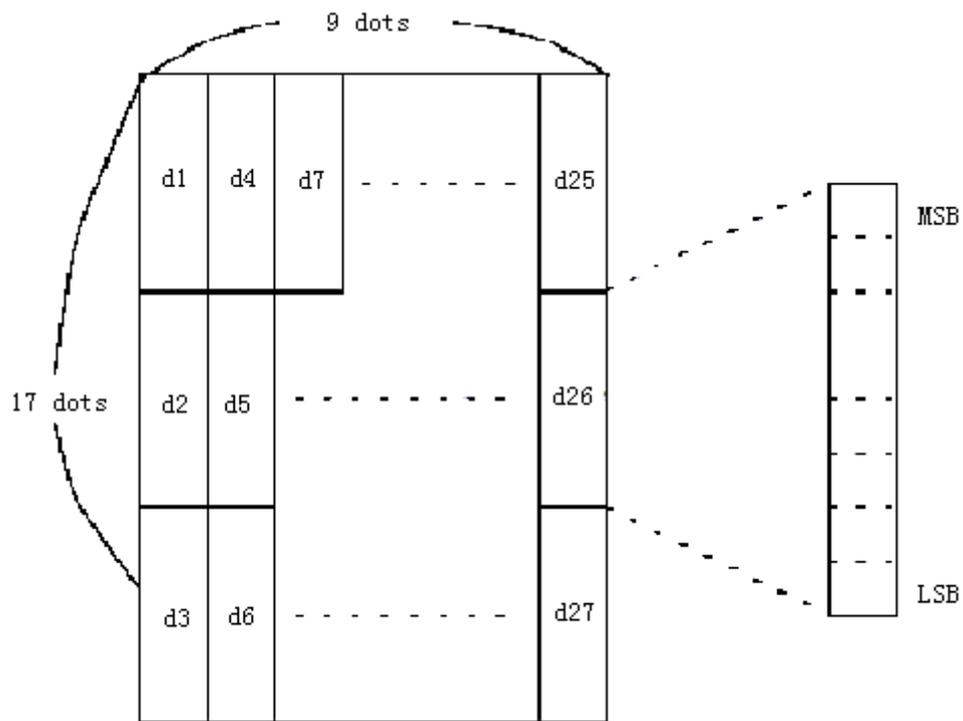
[Reference] **ESC %**, **ESC ?**

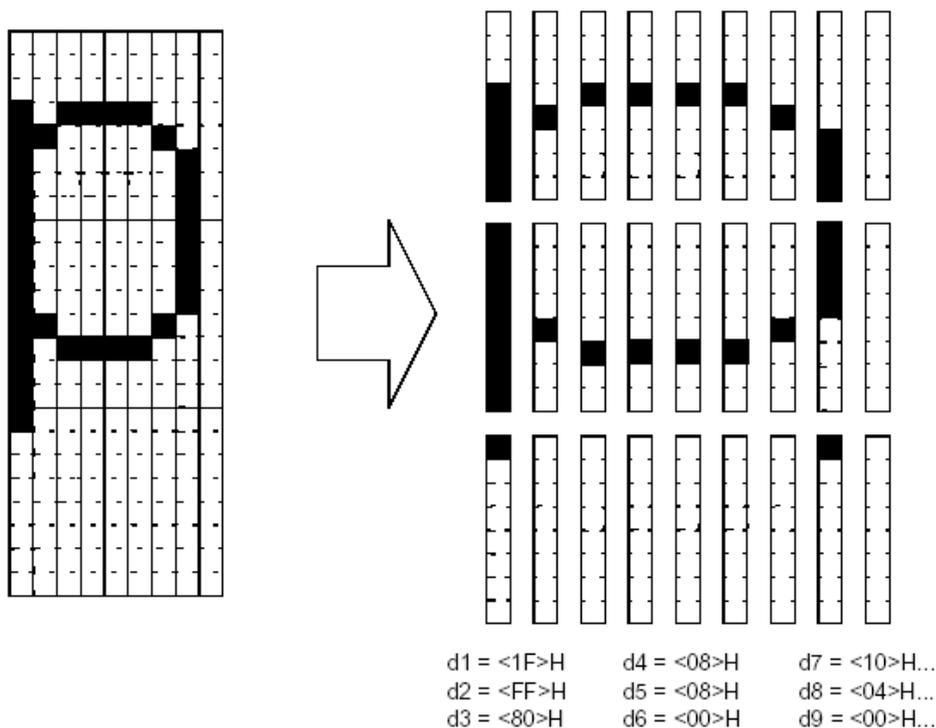
[Example] • When font A (12×24) is selected.



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.





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

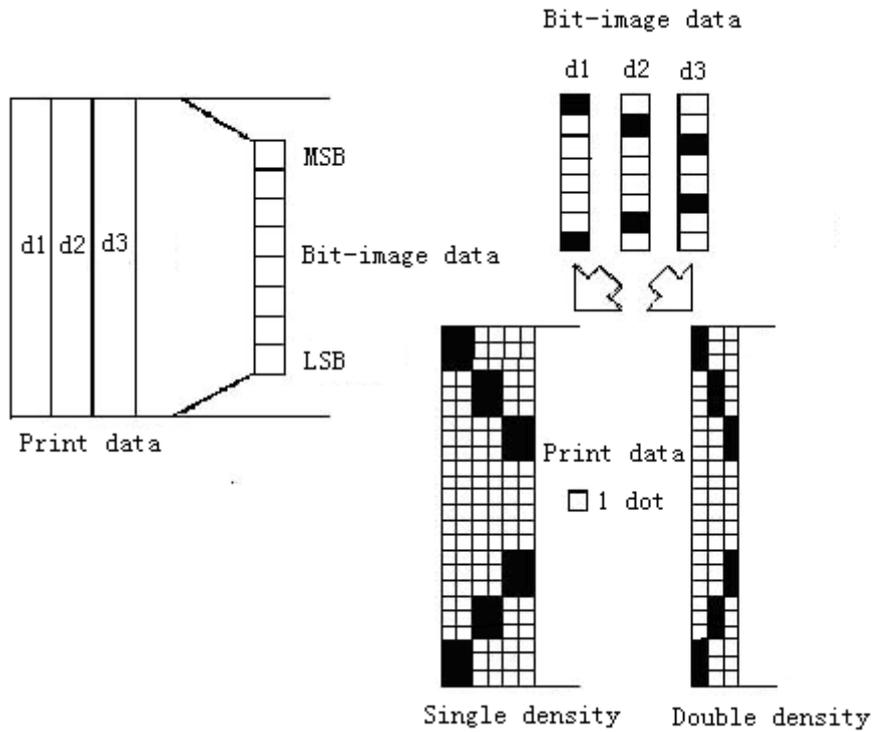
[Range] m = 0, 1, 32, 33 0 ≤ nL ≤ 255 0 ≤ nH ≤ 3 0 ≤ d ≤ 255

[Description] Selects a bit-image mode using m for the number of dots specified by nL

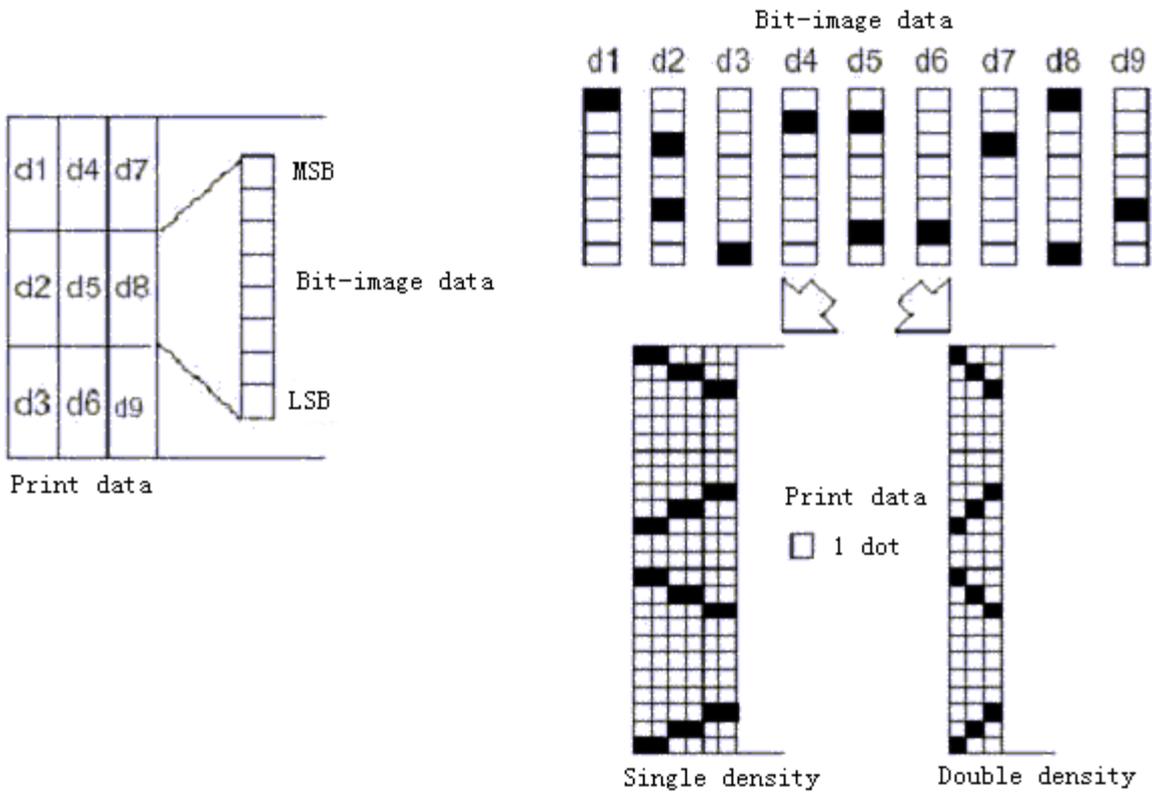
and nH, as follows:

m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data(K)
0	8-dot single-density	8	67 DPI	100 DPI	nL+nH×256
1	8-dot double-density	8	67 DP	200 DPI	nL+nH×256
32	24-dot single-density	24	200DPI	100 DPI	(nL+nH×256)×3
33	24-dot double-density	24	200 DPI	200DPI	(nL+nH×256)×3

- [Details]
- 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.
 - If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC *** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
 - ① The width of the printing area is extended to the right to accommodate the amount of data.
 - ② If step ① does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
 - After printing a bit image, the printer returns to normal data processing mode.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
 - 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] $0 \leq n \leq 2, 48 \leq n \leq 50$

[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)

[Details] • 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 white/black inverted characters.

• When underline mode id 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.

•This command does not affect the setting of Kanji characters.

[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.
- [Details] •The line spacing can be set independently in standard mode and in page mode.
- [Reference] **ESC 3**

ESC 3 n

- [Name] Set line spacing
- [Format]

ASCII	ESC	3	n
Hex	1B	33	n
Decimal	27	51	n
- [Range] $0 \leq n \leq 255$

[Description] Sets the line spacing to [n × vertical or horizontal motion unit] inches.

- [Details] • The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion unit are specified by **GS P**.

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

- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.

- In standard mode, the vertical motion unit (y) is used.

- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - ① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.

② When the

left of the print able area using **ESC T**, the horizontal motion unit (x) is used.

- The maximum paper feed amount is 1016 mm (40 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).

[Default] Line spacing equivalent to approximately 4.23mm (1/6 inches).

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

ESC = n

[Name] Set peripheral device

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

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

[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

[Details] 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] $32 \leq n \leq 126$

[Description] Cancels user-defined characters.

[Details] • 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.

- [Details]
- 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] $1 \leq n \leq 255$ $0 \leq k \leq 32$

[Description] Sets horizontal tab positions.

- n specifies the column number for setting a horizontal tab position from the beginning of the line.

- k indicates the total number of horizontal tab positions to be set.

[Details] • 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.

- This command cancels the previous horizontal tab settings.

- When setting n = 8, the print position is moved to column 9 by sending **HT**.

- Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.

- Transmit [n] k in ascending order and place a NUL code 0 at the end.

- When [n] k is less than or equal to the preceding value [n] k-1, tab setting is finished and the following data is processed as normal data.

- **ESC D NUL** cancels all horizontal tab positions.

- The previously specified horizontal tab positions do not change, even if the character width changes.

- The character width is memorized for each standard and page mode.

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

[Reference] **HT**

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.

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

[Default] n = 0

[Reference] **ESC !**

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.

- 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.

[Details] • Only the lowest bit of n is enabled.
 • Printer output is the same in double-strike mode and in emphasized mode.

[Default] n = 0

[Reference] **ESC E**

ESC J n

[Name] Print and feed paper

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

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

[Description] Prints the data in the print buffer and feeds the paper [$n \times$ vertical or horizontal motion unit] inches.

- [Details]
- After printing is completed, this command sets the print starting position to the beginning of the line.
 - The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
 - The horizontal and vertical motion unit are specified by **GS P**.
 - The **GS P** command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
 - In standard mode, the printer uses the vertical motion unit (y).
 - In page mode, this command functions as follows, depending on the starting position of the printable area: ① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used. ② When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.
 - The maximum line spacing is 1016mm (40 inches). When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Reference] **GS P**

ESC M n

[Name] Select character font

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

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

[Description] Selects character fonts.

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

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 used as follows:

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

[Details] 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 \ 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.				
	<ul style="list-style-type: none"> • This command sets the distance from the current position to [(nL + nH × 256) × 0.125mm] horizontal or vertical motion unit] 				
[Details]	<ul style="list-style-type: none"> • 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. • The GS P command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount. • In standard mode, the horizontal motion unit is used. • In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area: ①When 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. ②When 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

[Details] 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 **HT**, **ESC \$** or **ESC **.

[Default] n = 0

[Example]

Left justification	Centering	Right justification
ABC ABCD ABCDE	ABC ABCD ABCDE	ABC ABCD ABCDE

ESC c 3 n (*)

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

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

[Range] 0≤n≤255

[Description] Selects the paper sensor(s) to output paper end signals Each bit of

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 end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll near-end sensor enabled
3	Off	00	0	Paper roll end sensor disabled
	On	08	8	Paper roll near-end sensor enabled
4-7	-	-	-	Undefined

[Details] It is possible to select multiple sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal is output.

The command is available only with a parallel interface and is ignored with a serial interface, Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.

If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals

If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.

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

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] $0 \leq n \leq 255$

[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 end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2-7	-	-	-	Undefined

[Details] When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.

When a paper-end is detected by the paper roll sensor, the printer goes offline after printing stops.

When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

[Default] n = 0

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] $0 \leq n \leq 255$

[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.

[Details]

- 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] $0 \leq n \leq 255$

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

[Details] • 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 (n line spacing) of more than 1016 mm (40 inches) is specified, the printer feeds the paper only 1016 mm (40 inches).

[Reference] **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 $0 \leq t1 \leq 255, 0 \leq t2 \leq 255$

[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.

- [Details]
- The pulse ON time is [$t_1 \times 2$ ms] and the OFF time is [$t_2 \times 2$ ms].
 - If $t_2 < t_1$, the OFF time is [$t_1 \times 2$ 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] $0 \leq n \leq 10$, $16 \leq n \leq 21$

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

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

19	PC858
20	IranII
21	Latvian

[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] $0 \leq n \leq 255$

[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.

[Details] Only the lowest bit of n is valid.

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

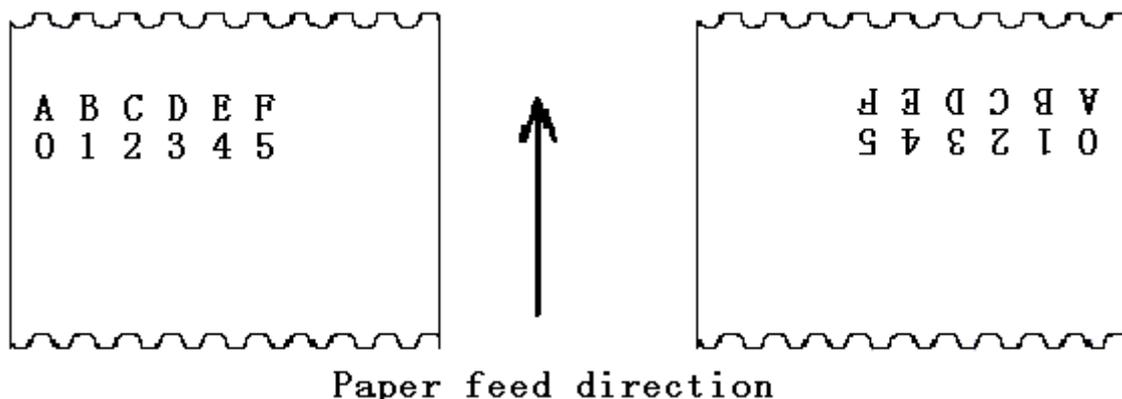
- When this command is input in page mode, the printer performs only internal flag operations.

- 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]



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] $0 \leq n \leq 255$ $0 \leq m \leq 3$ $48 \leq m \leq 51$

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

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

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

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

[Details] 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. In page mode, this command is not effective.

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

If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode ($m=0$, 48) and in double-height mode ($m=2$, 50), and it means 2 dots in double-width mode ($m=1$, 49) and in quadruple mode ($m=3$, 51).^①The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.^②If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.

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

This command feeds dots (for the height n of the NV bit-image) in normal and double-width modes, and (for the height $n \times 2$ 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] $0 \leq n \leq 255$ $0 \leq xL \leq 255$ $0 \leq xH \leq 3$ (when $1 \leq (xL + xH \times 256) \leq 1023$)

$$0 \leq y_L \leq 255 \quad 0 \leq y_H \leq 1 \text{ (when } 1 \leq (y_L + y_H \times 256) \leq 288) \quad 0 \leq d \leq 255$$

$$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256) \times 8$$

Total defined data area = 0.5M bits (64K bytes)

[Description] Define the NV bit image specified by n . n specifies the number of the defined NV bit image.

x_L , x_H specifies $(x_L + x_H \times 256) \times 8$ dots in the horizontal direction for the NV bit image you are defining.

y_L , y_H specifies $(y_L + y_H \times 256) \times 8$ dots in the vertical direction for the NV bit image you are defining.

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

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

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

NV bit image means a bit image 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.

When the amount of data exceeds the capacity left in the range defined by x_L , x_H , y_L , y_H , the printer processes x_L , x_H , y_L , y_H out of the defined range.

In the first group of NV bit images, when any of the parameters x_L , x_H , y_L , y_H is out of the definition range, this command is disabled.

□□ In groups of NV bit images later 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 $([data: (xL+xH \times 256) \times (yL+yH \times 256) \times 8] [header :4])$ bytes of NV memory.

The definition area in this printer is a maximum of 0.5M bits (64K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 0.5M bits (64K bytes).

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.

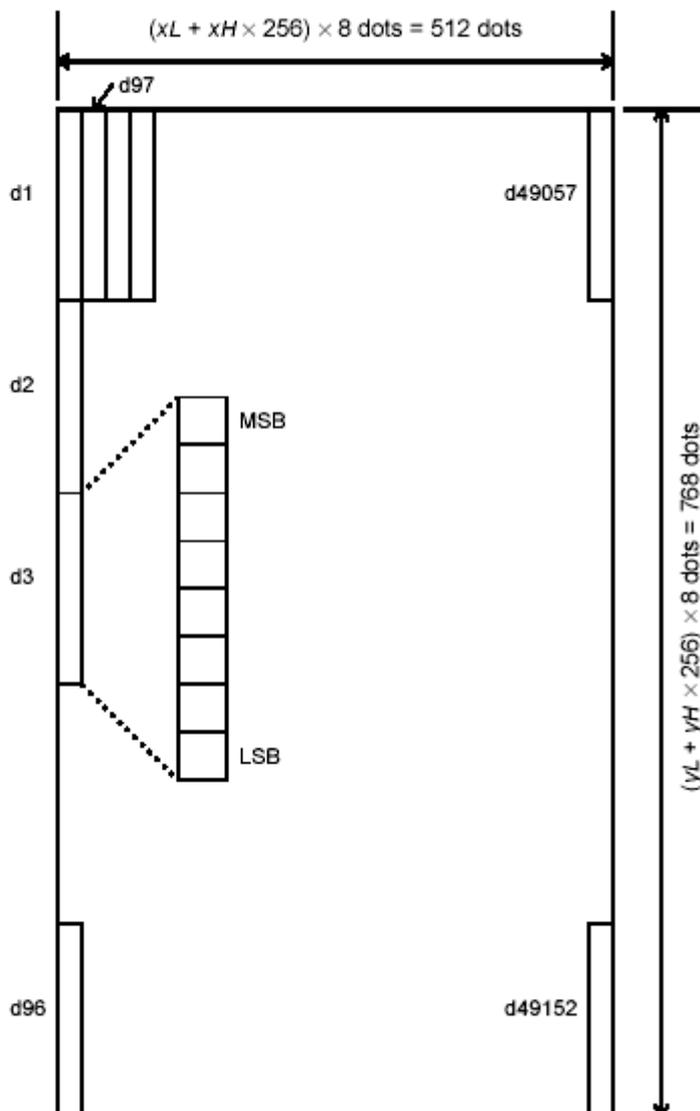
This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

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

The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, DIP switch settings are checked again.

[Reference] **FS p**

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



GS ! n

[Name] Select character size

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

[Range] $0 \leq n \leq 255$ ($1 \leq \text{vertical number of times} \leq 8$, $1 \leq \text{horizontal number of times} \leq 8$)

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

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

Table 1 Table 2 Table 1 Table 2

Character Width Selection

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

Character Height Selection

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

[Details] 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~~ 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] $0 \leq nL \leq 255, 0 \leq nH \leq 255$

[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.

[Details] • 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**:
 - ①When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.
 - ②When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

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

GS * x y d1...d(x×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] $1 \leq x \leq 255$ $1 \leq y \leq 48$ $x \leq y \leq 1536$ $0 \leq d \leq 255$

[Description] Defines a downloaded bit image using the number of dots specified by x and y

- x specifies the number of dots in the horizontal direction.
- y specifies the number of dots in the vertical direction.

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

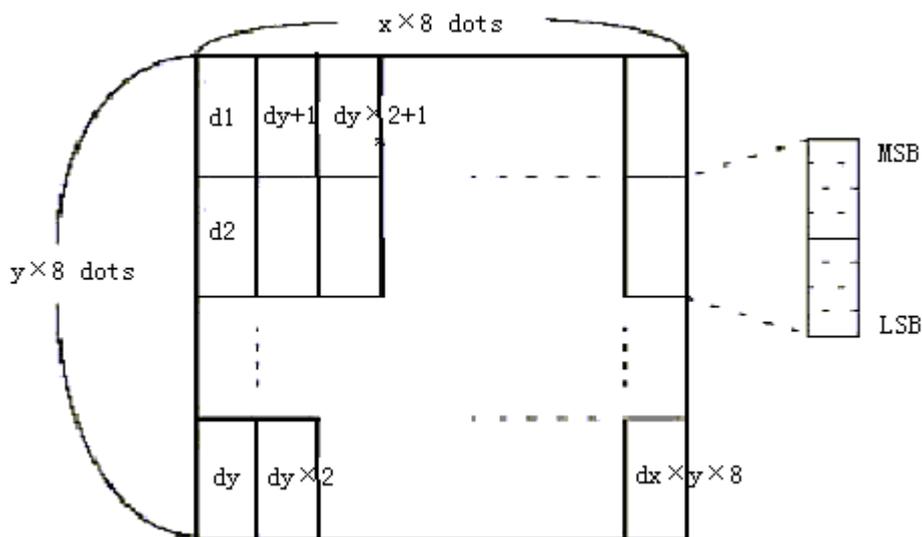
- If $x \times y$ is out of the specified range, this command is disabled.

- The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.

- The downloaded bit image definition is cleared when:

- ① **ESC @** is executed.
- ② **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 /**

GS / m

[Name] 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:

m	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

[Details]

- 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.
- Refer to Figure 3.12.3 for the downloaded bit image development position in page mode.
- If the printing area width set by **GS L** and **GS W** is less than one line in vertical,the following processing is performed only on the line in question:① The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.② If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.

[Reference] **GS ***

GS B n

[Name] Turn white/black reverse printing mode

[Format] ASCII GS B n
 Hex 1D 42 n
 Decimal 29 66 n

- [Range] $0 \leq n \leq 255$
- [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.
- [Details] Only the lowest bit of n is valid.
- This command is available for built 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] $0 \leq n \leq 48, 48 \leq n \leq 51$
- [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.
- [Details] HRI characters are printed using the font specified by **GS f**.
- [Default] n = 0
- [Reference] **GS f**, **GS k**

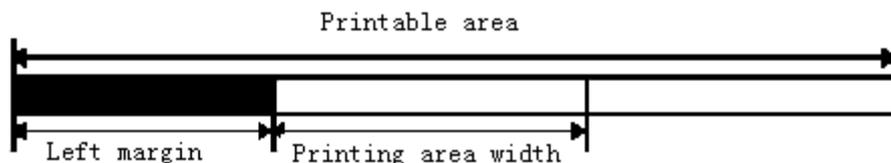
GS L nL nH

- [Name] Set left margin
- [Format]

ASCII	GS	L	nL	nH
Hex	1D	4C	nL	nH
Decimal	29	76	nL	nH
- [Range] $0 \leq nL \leq 255$ $0 \leq nH \leq 255$
- [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. Printable area Left margin Printing area width
- [Details] This command is effective only processed at the beginning of the line in standard mode.
 - If this command is input in page mode, the printer performs only internal flag operations.
 - This command does not affect printing in page mode.
 - If the setting exceeds the printable area, the maximum value of the printable area is used.
 - The horizontal and vertical motion units are specified by **GS P**.

Changing the horizontal and vertical motion unit does not affect the current left margin.

 - The horizontal motion unit (x) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.



[Default] nL = 0, nH = 0

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

① GS V m ② GS V m n

[Name] Select cut mode and cut paper

[Format] ① ASCII V m
 Hex 1D 56 m
 Decimal 29 86 m
 ② ASCII GS V m n
 Hex 1D 56 m n
 Decimal 29 86 m n

[Range] ① m = 1,49 ② 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, 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).

[Details for ① and ②] • This command is effective only processed at the beginning of a line.

[Details for ①] • Only the partial cut is available; there is no full cut.

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

(y). However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

GS W nL nH

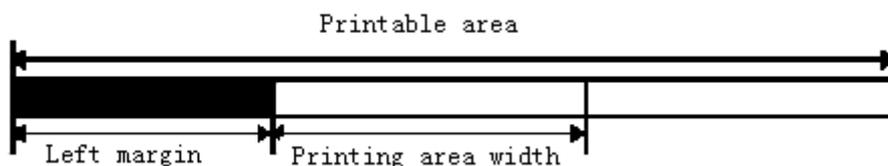
[Name] Set printing area width

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

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

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

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



[Details]

- This command is effective only processed at the beginning of the line.
- In page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin] is used.

- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.

- The horizontal motion unit (x) is used for calculating the printing area width.

The calculated result is truncated to the minimum value of the mechanical pitch.

- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:

- ① The printing area width is extended to the right to accommodate one character.

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

- ③ If the printing area width cannot be extended sufficiently, the right space is reduced.

- If the width set for the printing area is less than one line in vertical, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:

- ① The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.

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

- The commands which set the printing area width for bit image printing and its minimum widths are as follows:

- Bit image (**ESC ***): Single density mode = 2 dots Double density mode = 1 dot

- Downloaded bit image (**GS I**): Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot

- NV bit image (**FS p**): Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot

- Raster bit image (**GS r 0**): Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot

[Default] nL = 0, nH = 2 For 58mm paper width model; nL = 104, nH = 1

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

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)

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

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

[Default] n = 162

[Reference] **GS k**

①GS k m d1...dk NUL

②GS k m n d1..dn

[Name] Print bar code

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

[Range] ① $0 \leq m \leq 6$ (k and d depends on the bar code system used)
 ② □ $65 \leq m \leq 73$ (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
①	0	UPC-A	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	1	UPC-E	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	2	JAN13 (EAN13)	$12 \leq k \leq 13$	$48 \leq d \leq 57$
	3	JAN8 (EAN8)	$7 \leq k \leq 8$	$48 \leq d \leq 57$
	4	CODE39	$1 \leq k \leq 255$	$45 \leq d \leq 57$, $65 \leq d \leq 90$, d = 32, 36, 37, 43, 45, 46, 47 d = 42
	5	ITF	$1 \leq k \leq 255$ (even number)	$48 \leq d \leq 57$
	6	CODABAR	$1 \leq k \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, d = 36, 43, 45, 46, 47, 58
	65	UPC-A	$11 \leq n \leq 12$	$48 \leq d \leq 57$
	66	UPC-E	$11 \leq n \leq 12$	$48 \leq d \leq 57$

②	67	JAN13 (EAN13)	$12 \leq n \leq 13$	$48 \leq d \leq 57$
	68	JAN8 (EAN8)	$7 \leq n \leq 8$	$48 \leq d \leq 57$
	69	CODE39	$1 \leq n \leq 255$	$45 \leq d \leq 57$, $65 \leq d \leq 90$, $d = 32, 36, 37, 43, 45, 46, 47$ $d = 42$
	70	ITF	$1 \leq n \leq 255$ (even number)	$48 \leq d \leq 57$
	71	CODABAR	$1 \leq n \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, $d = 36, 43, 45, 46,$ $47, 58$
	72	CODE93	$1 \leq n \leq 255$	$0 \leq d \leq 127$
	73	CODE128	$2 \leq n \leq 255$	$0 \leq d \leq 127$

[Details for 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.

[Details for 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

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

[Name] Print raster bit image

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

[Range] $0 \leq m \leq 3, 48 \leq m \leq 51$ $0 \leq xL \leq 255$ $0 \leq xH \leq 255$
 $0 \leq yL \leq 255$ $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256)$ ($k > 0$)

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

m	Mode	Vertical Dot	Horizontal Dot
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 ($xL + xH \times 256$) in the horizontal direction for the bit image.

yL, yH, select the number of data bits ($yL + yH \times 256$) in the vertical direction for the bit image.

[Details] 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.

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

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

basis.

The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC \$** (Set absolute print position), **ESC ** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is not a 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 time a bit to 1 prints a dot and setting it to 0 does not print a dot.

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 codes	
		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 = 3

[Reference] **GS k**

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

[Details]

- 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 underline 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.
 [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] $0 \leq n \leq 2, 48 \leq n \leq 50$
 [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)

[Details] • 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.

[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. The range of values for c1 and c2 differ depending on the character code system used.

Model type	c1	c2
Japanese Kanji supporting model (JIS code system)	c1 = 77H	21H ≤ c2 ≤ 7EH
Japanese Kanji supporting model (SHIFT-JIS code system)	c1 = ECH	40H ≤ c2 ≤ 7EH 80H ≤ c2 ≤ 9EH
Chinese Kanji supporting model	c1 = FEH	A1H ≤ c2 ≤ FEH
Taiwanese Kanji supporting model	c1 = FEH	A1H ≤ c2 ≤ FEH

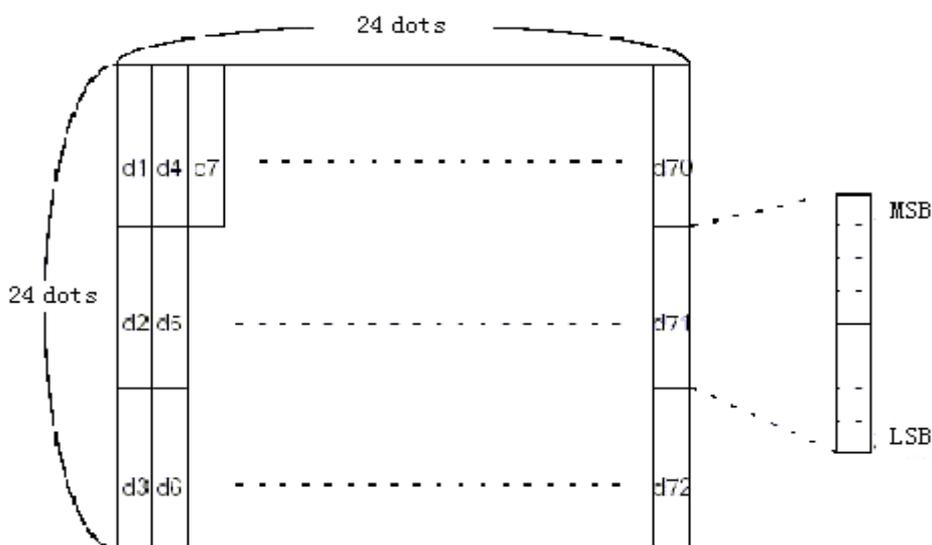
0 ≤ d ≤ 255 k = 72

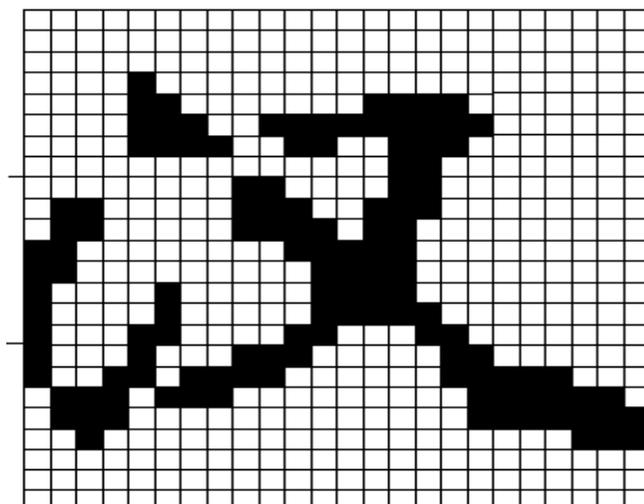
[Description] Defines user-defined Kanji characters for the character codes specified by c1 and c2.

[Details] • 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**





D1=00H, D4=00H, D7=00H, D10=00H.
 D2=1FH, D5=78H, D8=60H, D11=00H.
 D3=C0H, D6=30H, D9=38H, D12=70H.

FS S n1 n2

[Name] Set left- and right-side Kanji character spacing

[Format]	ASCII	FS	S	n 1	n2
	Hex	1C	53	n 1	n2
	Decimal	28	83	n 1	n2

[Range] $0 \leq n1 \leq 255$ $0 \leq n2 \leq 255$

[Description] Sets left- and right-side Kanji character spacing n1 and n2, respectively.

- When the printer model used supports **GS 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].

[Details] • 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**.

- The value cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.

- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:

① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.

② When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

③ The maximum right-side spacing is 255/180 inches for the paper roll and is approximately 35.983 mm {255/150 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] $0 \leq n \leq 255$

[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.

[Details]

- 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 !**