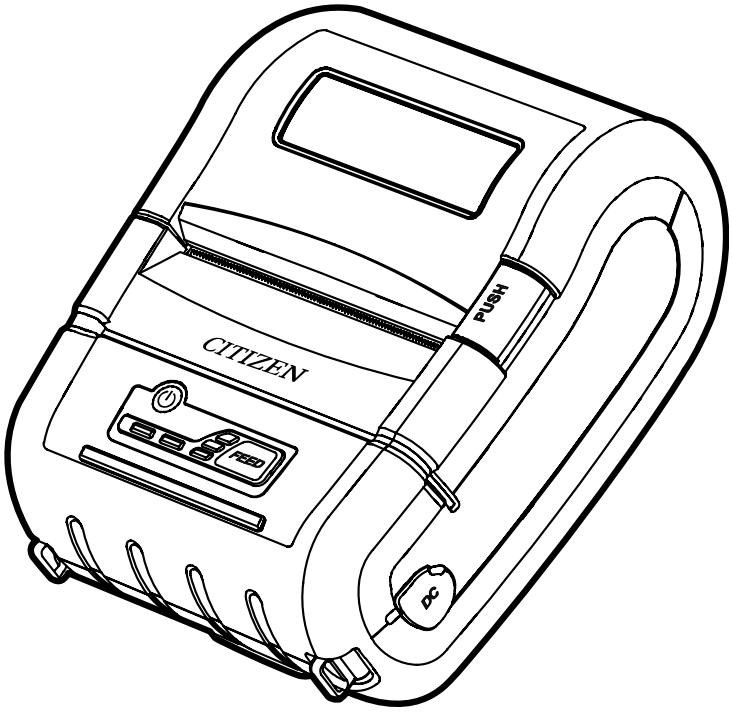
CITIZEN
Micro HumanTech

MOBILE THERMAL PRINTER

MODEL CMP-30 series

ESC Command Manual

Rev. 1.00



CITIZEN SYSTEMS JAPAN CO., LTD.

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1. Command Description

Command Notation

[Name] The name of the control command.

[Format] The code sequence.

In this description, < > H denotes hexadecimal numbers, < >denotes decimal numbers and < > B denotes binary numbers. [ ] k indicates the contents of the [ ] should be repeated k times.

[Range] The allowable range for the arguments.

[Description] Description of the command function.

[Details] If necessary provides important information on setting and using the printer command.

[Default] The default values for the commands.

☞ The numbers denoted by <>H is hexadecimal.

☞ The numbers denoted by <>B is binary.

2. Commands

HT

[Name] Horizontal tab

[Format]

ASCII	**HT**
Hex	**09**
Decimal	**9**

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

[Details]

- This command is ignored unless the next 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 using "**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 x 24) every 8th character (9th, 17th, 25th, … column).

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.

[Details] This command sets the print position to the beginning of the line.

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]
- Sets the print starting position to the beginning of the line.
- The automatic line feed is ignored.

FF

[Name] Print end position label to start printing

[Format] **ASCII FF**

Hex 0C

Decimal 12

[Description] Prints the data in the print buffer and returns to standard mode.

[Details]
- The buffer data is deleted after being printed.
- The printing area set by **ESC W** is reset to the default setting.
- The printer does not execute paper cutting.
- This command sets the print position to the beginning of the line.
- This command is enabled only in page mode.

CAN

[Name] Cancel print data in page mode

[Format] **ASCII CAN**

Hex 18

Decimal 24

[Description] In page mode, delete all the print data in the current printable area.

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

DLE EOT

[Name] Real-time status transmission

[Format]

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

[Range] $1 \le n \le 4$

[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

n=5 : MSR Status request

n=7 : Cancel card reader mode

[Details]

- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status.
- 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.

[Notes]

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	
	On	04	4	
3	Off	00	0	On-line
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2: Off-line status

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

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

n= 3: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off
1	On	02	2	Not used. Fixed to On
2	-	-	-	Undefined
3	Off	00	0	
	On	08	8	
4	On	10	16	Not used. Fixed to On
5	Off	00	0	No unrecoverable error
	On	20	32	Unrecoverable error occurs
6	Off	00	0	No auto-recoverable error
	On	40	64	Auto recoverable error occurs
7	Off	00	0	Not used. Fixed to Off

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

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open

during printing, bit 6 is On.

n = 4: Continuous paper sensor status

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

n = 5: MSR Status request

n = 5 the data from printe are as follows.

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off
1	Off	00	0	Not used. Fixed to On
2	Off	00	0	Not used. Fixed to Off
3	Off	00	0	Not used. Fixed to Off
4	Off	00	0	Not used. Fixed to Off
5	Off	00	0	Not used. Fixed to Off
6	Off	00	0	Normal mode
	On	40	64	Selected card reader mode, MS read mode
7	Off	00	0	Not used. Fixed to Off

n = 7: Continuous paper sensor status

n = 7: If printer is in MS read mode, it becomes normal mode and doesn't read MS .

DLE ENQ

[Name] Real-time status transmission

[Format]

ASCII	**DLE**	**ENQ**	***n***
Hex	**10**	**05**	***n***
Decimal	**16**	**5**	***n***

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

[Description] Responds to a request from the host computer.

n specifies the requests as follows:

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

[Details]

- This command is effective only when an auto-cutter error occurs.
- The printer starts processing data upon receiving this command.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- The status is also transmitted whenever the data sequence of <10>H<05>H<n> (1≤n≤2) is received.

3. ESC Commands

ESC FF

[Name] Print data in page mode

[Format]

ASCII	**ESC**	**FF**	
Hex	**1B**	**0C**	
Decimal	**27**	**12**	

[Description] In page mode, prints all buffered data in the printable area collectively.

[Details]

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

ESC SP

[Name] Set right-side character spacing

[Format]

ASCII	**ESC**	**SP**	***n***
Hex	**1B**	**20**	***n***
Decimal	**27**	**32**	***n***

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

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

[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 characters.
- This command sets values independently in each mode (standard and page modes).
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
  - ① When the starting position is set to the upper left or lower right of the printable area using **ESC T,** the horizontal motion unit (x) is used.
  - ② When the starting position is set to the upper right or lower left of the printable area using **ESC T,** the vertical motion unit (y) is used.
- The maximum right-side spacing is 35.983 mm {255/180”}. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] *n* = 0

ESC 2

[Name] Select default line spacing

[Format]

ASCII	**ESC**	**2**
Hex	**1B**	**32**
Decimal	**27**	**50**

[Description] Selects approximately 4.23 mm {1/6”} spacing.

[Details] The line spacing can be set independently in standard mode and in page mode.

ESC 3

[Name] Set line spacing

[Format]

ASCII	**ESC**	**3**	***n***
Hex	**1B**	**33**	***n***
Decimal	**27**	**51**	***n***

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

[Description] Sets the line spacing to [*n* x (vertical or horizontal motion unit)] inches.

[Details]

- The line spacing can be set independently in standard mode and in page mode.
- In standard mode, the vertical motion until (y) is used.
- In page mode, this command function 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 to the printable area using **ESC T**, the vertical motion unit *(y)* is used.
  - ② When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit *(x)* is used.
- The maximum paper feed amount is 1016 mm {40”}. Even if a paper feed amount of more than 1016 mm{40”}is set, the printer feeds the paper only 1016 mm{40”}

[Default] Line space is equivalent to approximately 4.23 mm {1/6”}.

ESC -

[Name] Turn underline mode on/off

[Format]

ASCII	**ESC**	**-**	***n***
Hex	**1B**	**2D**	***n***
Decimal	**27**	**45**	***n***

[Range] $0 \le n \le 2$,

$48 \le n \le 50$

[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 rotated characters and 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 printing.

[Default] *n* = 0

ESC !

[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 (12x24)
	On	01	1	Character font B (9x17)
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 cannot underline the space set by **HT** or 90° clockwise rotated characters.

· The thickness of the underline is 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 effective.

· **GS !** Can also select character size, however, the setting of the last received command is effective.

· Emphasized mode is effective for alphanumeric and. All print modes except

emphasized mode is effective only for alphanumeric.

[Default] *n* = 0

ESC $

[Name] Set absolute print position

[Format] **ASCII**

Hex

Decimal

[Range] 0 ≤ *nL* ≤ 255

0 ≤ *nH* ≤ 255

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

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

· Settings outside the specified printable area are ignored.

· In page mode, the 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.

ESC %

[Name] Select/cancel user-defined character set

[Format]

ASCII	**ESC**	**%**	***n***
Hex	**1B**	**25**	***n***
Decimal	**27**	**37**	***n***

[Range] 0 ≤ *n* ≤ 255

[Description] Selects or cancels the user-defined character set

· 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] · 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

ESC &

[Name] Define user-defined characters

[Format]

ASCII	**ESC**	**&**	**y**	**c1**	**c2[x1 d1…d(y x x1)]…[xk d1…d(y x xk)]**
Hex	**1B**	**26**	**y**	**c1**	**c2[x1 d1…d(y x x1)]…[xk d1…d(y x xk)]**
Decimal	**27**	**38**	**y**	**c1**	**c2[x1 d1…d(y x x1)]…[xk d1…d(y x xk)]**

[Range]

y = 3

32 ≤*c1* ≤ *c2* ≤ 126

0 ≤ x ≤ 12 Font A (when font A (12 x 24) is selected)

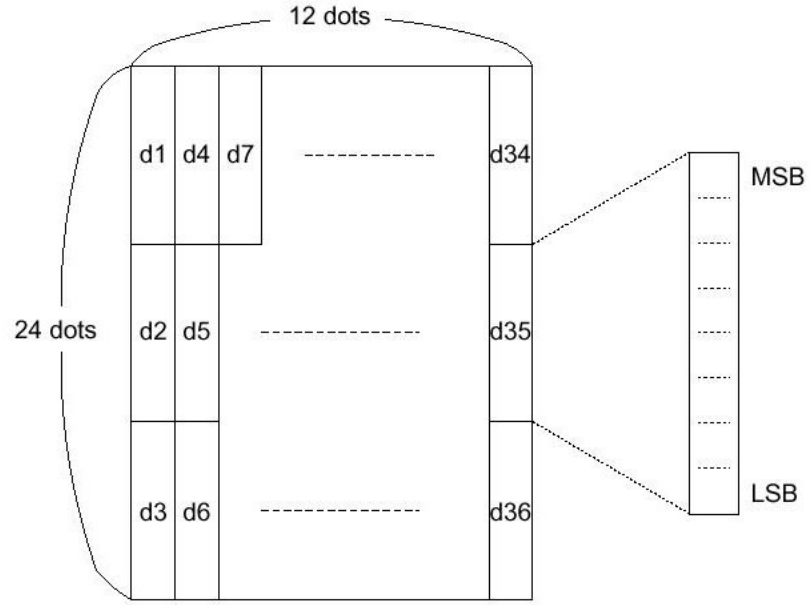
0 ≤ x ≤ 9 Font B (when font B (9 x 17) is selected)

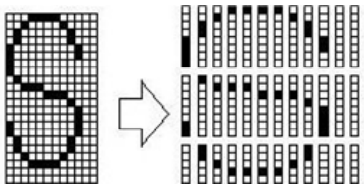
0 ≤ d1 ... d(*y* x *x*k) ≤ 255

[Description]

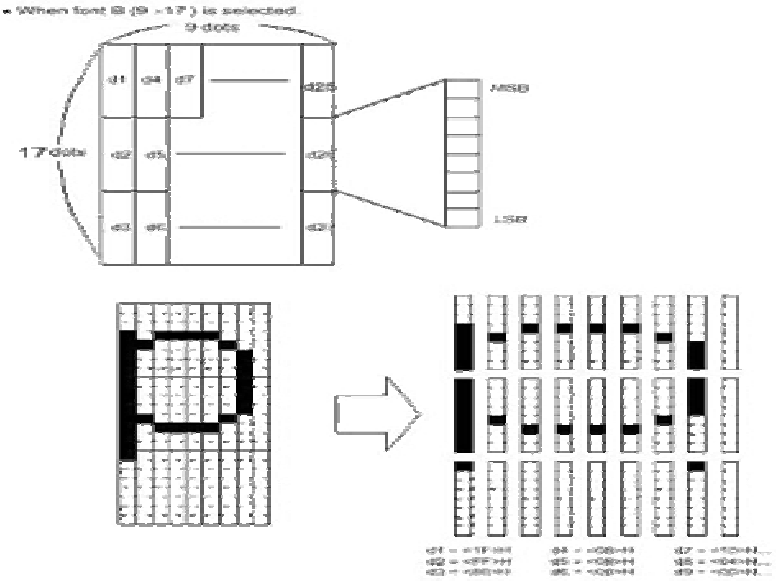
- The allowable character code range is from ASCII code <20>H to <7E> (95characters).
- It is possible to define multiple characters for consecutive character codes.
- If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- This command can define different user-defined character patterns by each font. 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 x 24), only the most significant bit of the 3rd byte of data in vertical direction is effective.

When font A(12 x 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 . . . .



ESC *

[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

$0 \le n_L \le 255$

$0 \le n_H \le 3$

$0 \le d \le 255$

[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**	
		NO. of Dots	**Dot Density**	**Dot Density**	**Number of (Data(K)**
0	8-dot single-density	8	60 DPI	90 DPI	*nL + nH* x *256*
1	8-dot double-density	8	60 DPI	180 DPI	*nL + nH* x *256*
32	24-dot single-density	24	180 DPI	90 DPI	*(nL + nH x 256)* x *3*
33	24-dot double-density	24	180 DPI	180 DPI	*(nL + nH x 256)* x *3*

- 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 x 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 of 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.

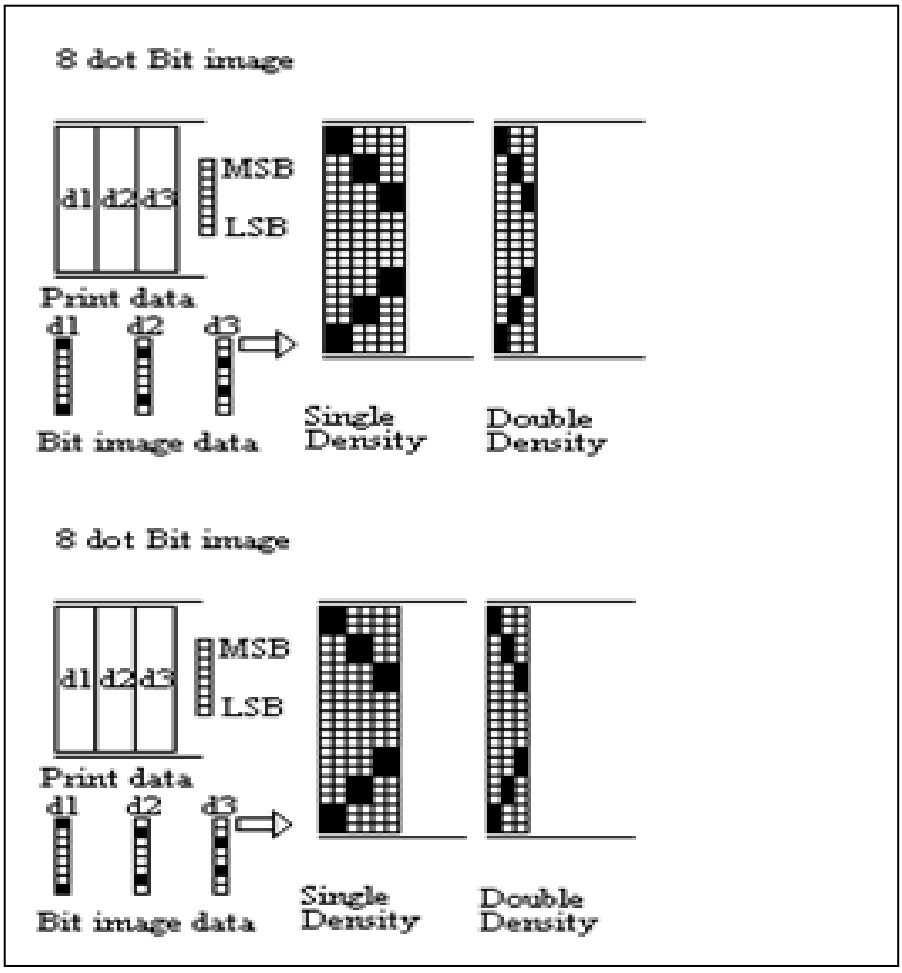
· After printing a bit image, the printer returns to normal data processing mode.

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

· Refer to Figure 3.12.3 for the bit image development position in page mode.

· The relationship between the image data and the dots to be printed is as follows:

· When 8-dot bit image is selected:



ESC ?

[Name] Cancel user-defined characters

[Format]

ASCII	**ESC**	**?**	***n***
Hex	**1B**	**3F**	***n***
Decimal	**27**	**63**	***n***

[Range] 32 ≤*n* ≤126

[Description] Cancels user-defined characters.

[Details]

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

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

ESC {

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

[Format]

ASCII	**ESC**	**{**
Hex	**1B**	**7B**
Decimal	**27**	**123**

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

[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

ESC \

[Name] Set relative print position

[Format]

ASCII	**ESC**	****	***nL***	**…**	***nH***
Hex	**1B**	**5C**	***nL***	**…**	***nH***
Decimal	**27**	**92**	***nL***	**…**	***nH***

[Range] $0 \le n_L \le 255$, $0 \le n_H \le 255$

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

This command sets the distance from the current position to [$(n_L + n_H \times 256) \times$ (horizontal or vertical unit)].

[Details]

- Any setting that exceeds the printable area is ignored.
- When pitch *N* is specified to the right :

  $n_L + n_H \times 256 = N$

  When pitch *n* is specified to the left (the negative direction), use the complement of 65536.

  When pitch *n* is specified to the left: $n_L + n_H \times 256 = 65536 - n$.
- The print starting position moves from the current position to [*n* x horizontal or vertical motion unit].
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area :
  - ① When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (*x*) is used.
  - ② When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (*y*) is used.

ESC a

[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 operation.

· This command has no effect in page mode.

· This command executes justification in the printing area.

· This command justifies the space area according to **HT, ESC $** or **ESC **

[Default] *n* = 0

ESC D

[Name] Set horizontal tab positions

[Format]

ASCII	**ESC**	**D**	***n1***	**…**	***nk***	***NUL***
Hex	**1B**	**44**	***n1***	**…**	***nk***	***00***
Decimal	**27**	**68**	***n1***	**…**	***nk***	***0***

[Range] 1 ≤ *n* ≤ 255

0 ≤ *k* ≤ 32

[Description]

· Set is 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 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 s 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 the font A (12 X 24).

ESC d

[Name] Print and feed paper *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.

[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**.

ESC E

[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

ESC J

[Name] Print and feed paper

[Format]

ASCII	**ESC**	**J**	***n***
Hex	**1B**	**4A**	***n***
Decimal	**27**	**74**	***n***

[Range] 0 ≤ *n* ≤255

[Description] Prints the data in the print buffer and feeds the paper [*n* x vertical or horizontal motion unit].

[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.**
- In standard mode, the printer uses the vertical motion unit(*y*).
- In page mode, this command functions as follows, depending on the starting position of the printable area.
  - ① When the starting position is set to the upper left or lower right of the printable area using **ESC T,** the vertical motion unit (y) is used.
  - ② When the starting position is set to the upper right or lower left of the printable area using **ESC T,** the horizontal motion unit (x) is used.
- The maximum line spacing is 1016 mm {40”}. When the setting value exceeds the maximum, it is converted to the maximum automatically.

ESC L

[Name] Select page mode

[Format]

ASCII	**ESC**	**L**
Hex	**1B**	**4C**
Decimal	**27**	**76**

[Description] Switches from standard mode to page mode.

[Details]

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

· This command has no effect in page mode.

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

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

· This command is switches the setting for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode.

① Set right-side character spacing : ESC SP, FS S

② Select default line spacing : ESC 2, ESC3

· Only valve settings is possible for the following commands in page

· Mode; these commands are not executed.

① Turn 90° clockwise rotation mode on/off: ESC V

② Select justification: **ESC a**

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

④ Set left margin: **GS L**

⑤ Set printable area width: **GS W**

· The following command is ignored in page mode:

① Execute test print: GS W

· The following command is not available in page mode:

① Print NV bit image : FS p

② Define NV bit image : FS q

③ Print raster bit image : GS v 0

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

ESC M

[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 X 24) Selected
1, 49	Character font B (9 X 24) Selected

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

ESC R

[Name] Select an international character set

[Format]

ASCII	**ESC**	**R**	***n***
Hex	**1B**	**52**	***n***
Decimal	**27**	**82**	***n***

[Range] 0≤*n* ≤13

[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 I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America

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

[Default] *n* = 0

ESC S

[Name] Select standard mode

[Format]

ASCII	**ESC**	**S**
Hex	**1B**	**53**
Decimal	**27**	**83**

[Range]

[Description] Switches from page mode to standard mode.

[Details]

· This command is effective only in page mode.

· Data buffered in page mode and the printable area developed in page mode is cleared.

· This command is switches the setting for the following command (in which the values can be set independently in standard mode and page mode) to those for standard mode:

① Set right-side character spacing: **ESC SP, FS S**

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

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

① Set printing area in page mode : ESC W

② Set print direction in page mode : ESC T

· The following commands are ignored in standard mode.

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

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

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

ESC T

[Name] Select print direction in page mode

[Format]

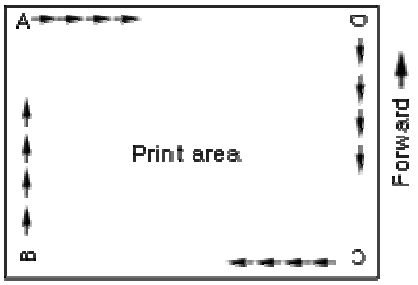
ASCII	**ESC**	**T**	***n***
Hex	**1B**	**54**	***n***
Decimal	**27**	**84**	***n***

[Range] 0 ≤ *n* ≤ 3, 48 ≤ *n* ≤51

[Description] Select the print direction and starting position in page mode.

n specifies the print direction and starting position as follows:

n	Print Direction	Starting Position
0, 48	Left to right	Upper left(A in the figure)
1, 49	Bottom to top	Lower left(B in the figure)
2, 50	Right to left	Lower right(C in the figure)
3, 51	Top to bottom	Upper right(D in the figure)



[Details]

- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing area set by ESC W.
- Parameters for horizontal or vertical motion units *(x or y)* differ as follows, depending on the starting position of the printing area:
  - ① If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction:
    Commands using horizontal motion units: ESC SP, ESC $, ESC
    Commands using vertical motion units: ESC 3, ESC J, GS $, GS
  - ② If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction:
    Commands using horizontal motion units : ESC 3, ESC J, GS &, GS
    Commands using vertical motion units : ESC SP, ESC $, ESC

[Default] *n* = 0

ESC t

[Name] Select character code table

[Format]

ASCII	**ESC**	**t**	***n***
Hex	**1B**	**74**	***n***
Decimal	**27**	**116**	***n***

[Range] 0 ≤ *n* ≤ 16

[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 [Nordic]
6	CP_1252
7	PC866 [Cyrillic #2]
8	CP_852
9	CP_858
10	CP_1253
11	CP_737
12	CP_857
13	ISO_8859_9
14	CP_864
15	CP_862
16	ISO_8859_2

ESC V

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

[Format]

ASCII	**ESC**	**V**	***n***
Hex	**1B**	**56**	***n***
Decimal	**27**	**86**	***n***

[Range] 0 ≤ *n* ≤ 1, 48 ≤ *n* ≤ 49

[Description] Turns 90° clockwise rotation mode on or off.

n is used as follows:

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

[Details]

- When underline mode is turned on, the printer does not underline 90° clockwise-rotated characters.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double height and double-width commands in normal mode.
- This command affects printing in standard mode. However, the setting is always effective.

[Default] *n* = 0

ESC W

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

[Format]

ASCII	**ESC**	**V**	***n***
Hex	**1B**	**56**	***n***
Decimal	**27**	**86**	***n***

[Range] 0 ≤ *n* ≤ 1, 48 ≤ *n* ≤ 49

[Description] Turns 90° clockwise rotation mode on or off.

n is used as follows:

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

[Details]

- When underline mode is turned on, the printer does not underline 90° clockwise-rotated characters.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double height and double-width commands in normal mode.
- This command affects printing in standard mode. However, the setting is always effective.

[Default] *n* = 0

4. GS Commands

GS FF

[Name] print and eject label

[Format]

ASCII	**GS**	**FF**
Hex	**1D**	**0C**
Decimal	**29**	**12**

[Description] To search Black mark, printer executes feeding. During the feeding action, the printer searchs the black mark through Black mark sensor. When it searched the black mark, the printer stops feeding there.

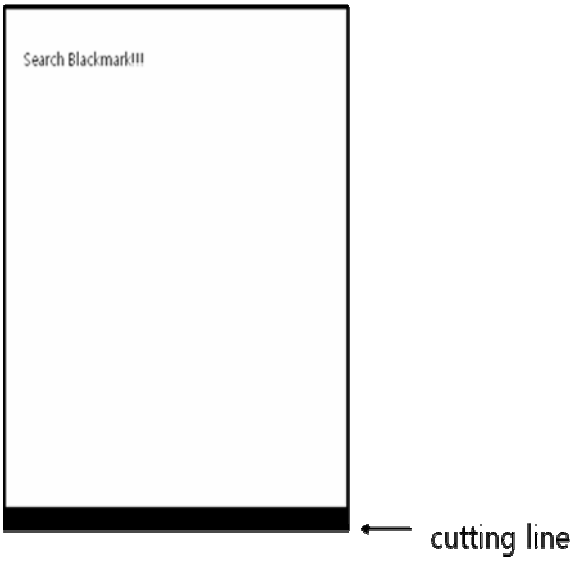
Then, based on the command data of " ESC p " or " GS (F ", printer start feeding additionally. The command " ESC p " or " GS (F " is the command to set the feeding value.

CMP-20 does not support

[Example]

0A 0A 53 65 61 72 63 68 20 42 6C 61 63 6B 6D 61 72 6B 21 21 21 0A 1D 28 46 30 30 30 30 A0 00 1D 0C	LF LF Search Blackmark!!! GS '(' 'F' '0' '0' '0' '0' "additional feeding lines" GS FF

Output



GS FF: start feeding to search BM mark.

Once BM is searched, GS (F will make decision how many feeding line before cut.

GS !

[Name] Select character size

[Format]

ASCII	**GS**	**!**	***n***
Hex	**1D**	**21**	***n***
Decimal	**29**	**33**	***n***

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

($1 \le$ vertical number of times ≤ 8, $1 \le$ horizontal number of times ≤ 8)

[Description] Selects the character height using bits 0 to 3 and selects the character width using bits 4 to 7,

as follows:

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

Table 1. Character Width Selection.

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

Table 2. Character Height Selection.

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

[Details]

· This command is effective for all characters (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

GS $

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

[Description]

- Sets the absolute vertical print starting position for buffer character data in page mode.
- This command sets the absolute print position to [($nL + nH \times 256$) × (vertical or horizontal motion unit)] inches.
- If the [($nL + nH \times 256$) × (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move.
- The reference starting position is that specified by **ESC T**.
- This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:
  - ① When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.
  - ② When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.

GS (

[Name] set adjustment value in black mark function

[Format]

ASCII	**GS**	**(**	**F**	***a1***	***a2***	***a3***	***a4***	***nL***	***nH***
Hex	**1D**	**28**	**46**	***a1***	***a2***	***a3***	***a4***	***nL***	***nH***
Decimal	**29**	**40**	**70**	***a1***	***a2***	***a3***	***a4***	***nL***	***nH***

[Range]

a1 = 30

a2 = 30

a3 = 30

a4 = 30

$0 \le nL \le 255$, $0 \le nH \le 255$

[Description] Set the number of the feeding line after BM is searched. 4byte date after 'F' has no meaning. The number of feeding will be set by using nL, and nH as follows.

The number of feeding = (m * 256) + n

For example, if feeding value is 280, nH = 1 and nL = 24.

CMP-20 do not support this command.

GS *

[Name] Define downloaded bit image

[Format]

ASCII	**GS**	*****	**x**	**y**	**d1**	**...**	**d(x × y × 8)**
Hex	**1D**		**x**	**y**	**d1**	**...**	**d(x × y × 8)**
Decimal	**29**		**x**	**y**	**d1**	**...**	**d(x × y × 8)**

[Range]

$1 \le x \le 255$

$1 \le y \le 48$

$x \times y \le 1536$

$0 \le d \le 255$

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

· *x* indicates the number of dots in the horizontal direction.

· *y* indicates the number of dots in the vertical direction.

[Details]

· The number of dots in the horizontal direction is *x* x 8, in the vertical direction it is *y* x 8.

· If *x* x *y* is out of the specified range, this command is disabled.

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

· The downloaded bit image definition is cleared when:

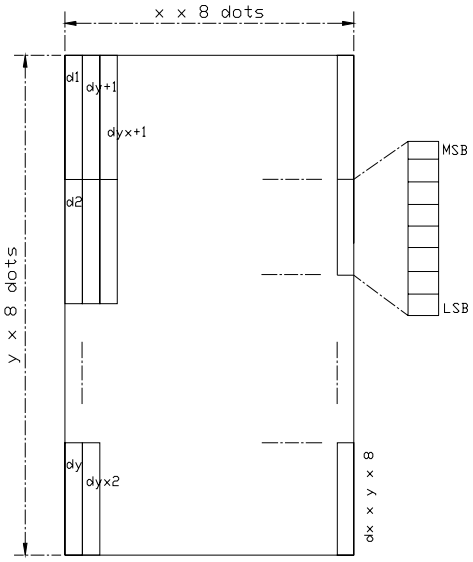
① ESC@ is executed.

② ESC & is executed.

③ FS q is executed.

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.



GS /

[Name] Print down-loaded bit image

[Format]

ASCII	**GS**	***/***	***m***
Hex	**1D**	**2F**	***m***
Decimal	**29**	**47**	***m***

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

[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**	**Horizontal Dot Density**
0, 48	Normal	180 DPI	180 DPI
1, 49	Double-width	180 DPI	90 DPI
2, 50	Double-height	90 DPI	180 DPI
3, 51	Quadruple	90DPI	90 DPI

[Details]

· This command is ignored if a downloaded bit image has not been defined.

· In standard mode, this command is effective only when the on data exists in the print buffer.

· This command is not affected by print modes (emphasized, double-strike, underline, or character size, white/black reverse printing), except for upside

down mode.

· If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.

· If the printing area width set by GS L and GS W is less than one line 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.

GS :

[Name] start/end macro definition

[Format]

ASCII	**GS**	**:**	
Hex	**1D**	**3A**	
Decimal	**29**	**58**	

[Description] Starts or ends macro definition.

[Details]

· Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.

· When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.

· Macro is not defined when the power is turned on.

· The defined contents of the macro are not cleared by **ESC** @. Therefore, **ESC** @ can be included in the contents of the macro definition.

· If the printer receives **GS :** again immediately after previously receiving **GS :** the printer remains in the macro undefined state.

· The contents of the macro can be defined up to 2048 bytes. If the macro definition exceeds 2048 bytes, excess data is not stored.

GS ^

[Name] Execute macro

[Format]

ASCII	**GS**	**^**	***r***	***t***	***m***
Hex	**1D**	**5E**	***r***	***t***	***m***
Decimal	**29**	**94**	***r***	***t***	***m***

[Range] $0 \le r \le 255$

$0 \le t \le 255$

$m = 0, 1$

[Description] Executes a macro.

· *r* specifies the number of times to execute the macro.

· *t* specifies the waiting time for executing the macro.

· *m* specifies macro executing mode.

When the LSB of *m* = 0:

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

When the LSB of *m* = 1:

After waiting for the period specified by *t*, the PAPER OUT LED indicators blink and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation *r* times.

[Details]

· The waiting time is *t* × 100 ms for every macro execution.

· If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.

· If the macro is not defined or if *r* is 0, nothing is executed.

· When the macro is executed (*m* = 1), paper always cannot be fed by using the FEED button.

GS \

[Name] Set relative vertical print position in page mode

[Format]

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

[Range] $0 \le n_L \le 255$

$0 \le n_H \le 255$

[Description] Sets the relative vertical print starting position from the current position in page mode.

· This command sets the distance from the current position to [($n_L + n_H \times 256$) × vertical or horizontal motion unit].

[Details]

· This command is ignored unless page mode is selected.

· When pitch *N* is specified to the movement downward:

$n_L + n_H \times 256 = N$

When pitch *N* is specified to the movement upward (the negative direction), use the complement of 65536.

When pitch *N* is specified to the movement upward:

$n_L + n_H \times 256 = 65536 - N$

· Any setting that exceeds the specified printing area is ignored.

· This command function as follows, depending on the print starting position set by **ESC T**:

① When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (*y*) is used.

② When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (*x*) is used.

· The horizontal and vertical motion units 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.

GS a

[Name] enable/disable automatic status back

[Format]

ASCII	**GS**	**a**	***n***
Hex	**1D**	**61**	***n***
Decimal	**29**	**97**	***n***

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

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

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

[Details]

- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
- If all status items are disabled, the ASB function is also disabled.
- If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission is possible at the first time from when the printer is turned on.
- The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
- Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
- When using **DLE EOT**, **GS I**, or **GS r**, the status transmitted by these commands and ASB status must be differentiated.

· The status to be transmitted are as follows:

First byte (printer information)

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

Second byte (printer information)

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

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

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open

during printing, bit 6 is On.

Third byte (paper sensor information)

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

Fourth byte (paper sensor information)

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

[Default] n = 0

GS B

[Name] Turn white/black reverse printing mode

[Format]

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

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

[Description] Turns on or off white/black reverse printing mode.

When the LSB of *n* is 0, white/black reverse printing mode is turned off.

When the LSB of *n* is 1, white/black reverse printing mode is turned on.

[Details]

- Only the LSB of *n* is effective.
- This command is available for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC SP**.
- This command does not affect bit image, user-defined bit image, barcode, HRI characters, and spacing skipped by **H**T, **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 f

[Name] 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 the font from the following table:

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

[Details]

· HRI means Human Readable Interpretation.

· HRI characters are printed of the position specified by **GS H**.

[Default] *n* = 0

GS H

[Name] select printing position of HRI characters

[Format]

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

[Range] $0 \le n \le 3$, $48 \le n \le 51$

[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

[Details]

· HRI means Human Readable Interpretation.

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

GS h

[Name] Set bar code height

[Format]

ASCII	**GS**	**h**	***n***
Hex	**1D**	**6B**	***n***
Decimal	**29**	**104**	***n***

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

[Description] Select the height of the bar code.

n specifies the number of dots in the vertical direction.

[Details] *n* = 162

GS k

[Name] Print bar code

[Format] ①

ASCII	**GS**	**k**	***m***	***d1***	***...***	***dk***	***NUL***
Hex	**1D**	**6B**	***m***	***d1***	***...***	***dk***	***NUL***
Decimal	**29**	**107**	***m***	***d1***	***...***	***dk***	***NUL***

②

ASCII	**GS**	**k**	***m***	***n***	***d1***	***...***	***dk***
Hex	**1D**	**6B**	***m***	***n***	***d1***	***...***	***dk***
Decimal	**29**	**107**	***m***	***n***	***d1***	***...***	***dk***

[Range] ① $0 \le m \le 6$(k and d depends on the code system used)

② $65 \le m \le 73$ *n* and d depends on the 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 Character**	**Remarks**
①	0	UPC – A	$11 \le k \le 12$	$48 \le d \le 57$
	1	UPC – E	$11 \le k \le 12$	$48 \le d \le 57$
	2	EAN13	$12 \le k \le 13$	$48 \le d \le 57$
	3	EAN8	$7 \le k \le 8$	$48 \le d \le 57$
	4	CODE39	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 90$, 32,36,37,43,45,46,47
	5	ITF	$1 \le k$ (even number)	$48 \le d \le 57$
	6	CODABAR	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 68$, 36,43,45,46,47,58
②	65	UPC – A	$11 \le n \le 12$	$48 \le d \le 57$
	66	UPC – E	$11 \le n \le 12$	$48 \le d \le 57$

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

[Details] 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 JAN 13, the printer prints the bar code after receiving 13 bytes bar code data and processes the following date as normal data.
- When the bar code system used is JAN 8, 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] 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.

[Details in page mode]

- This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
- If *d* is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.
- If bar code width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.
- Refer to Figure 3.12.3 for bar code data buffer position.

When CODE93 (*m* = 72) is used:

- The printer prints an HRI character ( ) as start character at the beginning of the HRI character

string.

· The printer prints an HRI character ( ) as a stop character at the end of the HRI character string.

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

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

[Example] Printing **GS k** 72 7 67 111 100 101 13 57 51

When CODE 128 (m = 73) is used:

· Refer to Appendix J for the information of the CODE 128 bar code and is code table.

· When using the CODE 128 in this printer, take the following points into account for data transmission:

① The top of the bar code data string must be code set selection character (any of CODE A, CODE B or CODE C) which selects the first code set.

② Special characters are defined by combining two characters "{" and one character.

The ASCII character “{“ is defined by transmitting “{“ twice consecutively.

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

[Example] Example data for printing “No. 123456”

In this example, the printer first prints “No.” using CODE B, then prints the following numbers using CODE C.

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

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

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

GS L

[Name] Set left margin

[Format]

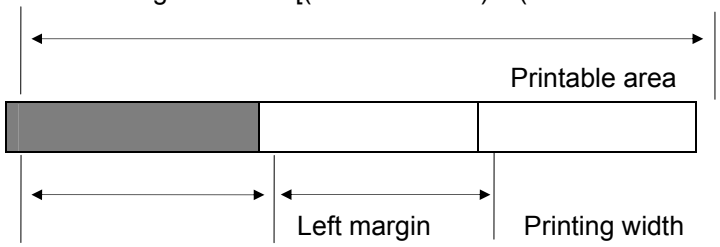
ASCII	**GS**	**L**	***nL***	***nH***
Hex	**1D**	**4C**	***nL***	***nH***
Decimal	**29**	**76**	***nL***	***nH***

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

$0 \le nH \le 255$

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

·The left margin is set to [(*nL* + *nH* × 256) × (horizontal motion unit)] inches.



[Details]

· This command is effective only of the beginning of a line.

· If this command is input in page made, the printer performs only internal flag operations.

· This command does not affect printing in page made.

· If the setting exceeds the printable area, the maximum value of the printable area is used.

· 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

GS P

[Name] Set horizontal and vertical motion units

[Format]

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

[Range] $0 \le x \le 255$, $0 \le y \le 255$

[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.

[Details]

· 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):

・In page mode, the following command use *x* or *y*, depending on character orientation:

When the print starting position is set to the upper left or lower right of the printing area using ESC T (data is buffered in the direction perpendicular to the paper feed direction):

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):

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.

CMP-20 do not support

[Default] X = 203, y = 203

GS r

[Name] Transmit status

[Format]

ASCII	**GS**	**r**	***n***
Hex	**1D**	**72**	***n***
Decimal	**29**	**114**	***n***

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

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

n	Function
1,49	Transmits paper sensor status
2,50	

[Details]

・When using a serial interface

・When DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.

・When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.

・This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.

・When Auto Status Back (ASB) is enabled using **GS** a, the status transmitted by **GS r** and the ASB status must be differentiated using the table in Appendix G.

· The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

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

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

GS S C

[Name] Change serial communication option

[Format]

ASCII	**GS**	**S**	**C**	***n0***	***n1***	***n2***	***n3***	***n4***	***n5***
Hex	**1D**	**53**	**43**	***n0***	***n1***	***n2***	***n3***	***n4***	***n5***
Decimal	**29**	**83**	**67**	***n0***	***n1***	***n2***	***n3***	***n4***	***n5***

[Range]

n0 = 1; reserved

48 ≤ *n1* ≤ 52; Baud rate

48 ≤ *n2* ≤ 49; Data Length

48 ≤ *n3* ≤ 50; Parity Bits

n4 = 49, *n4* = 51; Stop Bits

48 ≤ *n5* ≤ 50; Flow Control

[Description] Set the serial option of the printer. You can set " Baud-rate, Data Length, Parity Bit, Stop Bit, Flow Control etc ".

However, if you use 7bit data, you need to use parity bit. If you set the Parity bit as " none ", it will not work correctly.

n1: Baud-rate

9600	'0' 48
19200	'1' 49
38400	'2' 50
57600	'3' 51
115200	'4' 52

n2: Data Length

7bit	'0' 48**(* You much select parity bit)**
8bit	'1' 49

n3: Parity Bit

none	'0' 48
odd	'1' 49
even	'2' 50

n4: Stop Bit

1 stop bit	'1' 49
2 stop bit	'3' 51

n5: Flow Control

DTR/DSR	'1' 49
XON/XOFF	'2' 50

[Default] Baud-rate: 19200

Data Length: 8bit

Parity Bit: none

Stop Bit: 1 stop bit

Flow Control: DTR/DSR

GS S P

[Name] Enable/Disable Power off(save) mode

[Format]

ASCII	**GS**	**S**	**P**	***m***	***n***
Hex	**1D**	**53**	**50**	***m***	***n***
Decimal	**29**	**83**	**80**	***m***	***n***

[Range] $0 \le m \le 2$; mode

$0 \le n \le 60$; Time

[Description] If there is no action for data input or any key processing during the setting time by user, the printer will go into save mode or power off to protect the printer from power consumption.

m: mode

m	mode
0	Disable Power off/save
1	Enable Power off
2	Enable Power save

Power off: If there is no action for data input during the setting time, printer will off the power.

Power save: If there is no action for data input or any key processing, printer will go into power save mode. To return to the normal mode from power

save mode, you need to press the power button or need to send any dummy data.

However, when the USB cable is connected with the Host, the printer does not go into power save mode or does not turn into power off mode.

In case the printer is under Power save mode, you need to send dummy data to return the printer for normal mode. For the dummy data sending, usually, send " NULL(0) ". After send the dummy data, host should wait for around 200ms for processing. After that, host can send the data for printing. This waiting time is required to protect the printer during the change from power save mode to wake up the printer.

n: Time, Input time is minute, Input value is available from 1 ~ 60min.

GS v 0

[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]

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

$0 \le xL \le 255$

$0 \le xH \le 255$

$0 \le yL \le 255$

$0 \le yH \le 8$

$0 \le d \le 255$

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

[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	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

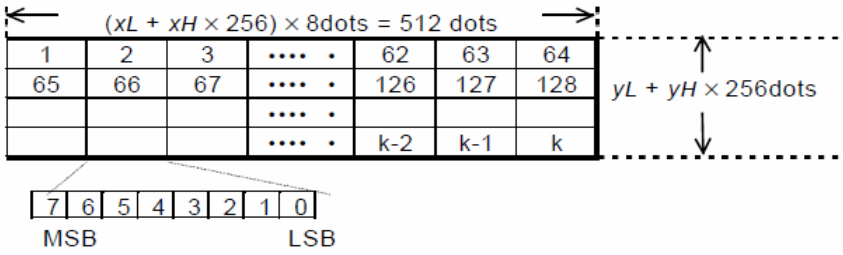
- xL, xH, selects the number of data bytes (xL + xH×256) in the horizontal direction for the bit image.
- yL, yH, select the number of data bytes (xL + xH×256) in the vertical direction for the bit image.

[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), 2dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.
- Data outside the printing area is ready 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** (Ste 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 image.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of the 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

[Name] Set printing area width

[Format]

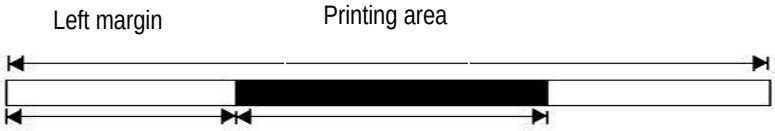
ASCII	**GS**	**W**	***nL***	***nH***
Hex	**1D**	**57**	***nL***	***nH***
Decimal	**29**	**87**	***nL***	***nH***

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

$0 \le nH \le 255$

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

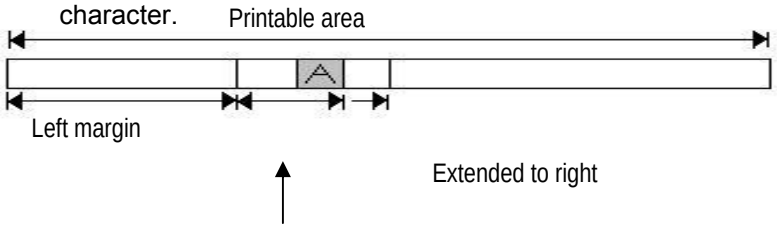
The printing area width is set to [(*nL* + *nH* x 256) x horizontal motion unit]].



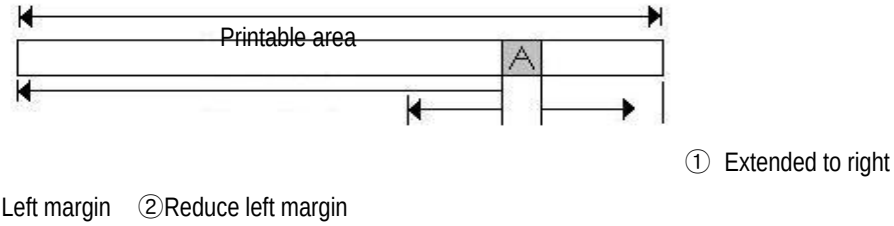
[Details]

- 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 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 f 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** /):

Double width mode or Quadruple mode = 2 dots

Normal mode or Double-height mode = 1 dot

・NV bit image (**FS p**) :

Double width mode or Quadruple mode = 2 dots

Normal mode or Double-height mode = 1 dot

・Raster bit image (**GS v 0**) :

Double width mode or Quadruple mode = 2 dots

Normal mode or Double-height mode = 1 dot

GS w

[Name] Set bar code width

[Format]

ASCII	**GS**	**w**	***n***
Hex	**1D**	**77**	***n***
Decimal	**29**	**119**	***n***

[Range] $2 \leq n \leq 6$

[Description] Set the horizontal size of the bar code.

n specifies the bar code width as follows:

n	Module width (mm) for Multi-level Bar code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.282	0.282	0.706
3	0.423	0.423	1.129
4	0.564	0.564	1.411
5	0.706	0.706	1.834
6	0.847	0.847	2.258

·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

[Details] *n* = 3

5. FS Commands

FS E P

[Name] Define code page

[Format]

ASCII	**FS**	**E**	**P**	***m***
Hex	**1C**	**45**	**50**	***m***
Decimal	**28**	**69**	**80**	***m***

[Range] 0 ≤ *m* ≤ 16

[Description] Selects a page *m* 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 [Nordic]
6	CP_1252
7	PC866 [Cyrillic #2]
8	CP_852
9	CP_858
10	CP_1253
11	CP_737
12	CP_857
13	ISO_8859_9
14	CP_864
15	CP_862
16	ISO_8859_2

When you select the code page, it will be saved in NV memory. This is saved although you power off the printer. Accordingly, if you power on the printer, the saved code page has been applied.

FS e

[Name] Erase NV bit image

[Format]

ASCII	**FS**	**e**	***n***
Hex	**1C**	**65**	***n***
Decimal	**28**	**101**	***n***

[Description] Delete the image stored in NV memory

n is the number of the image

FS p

[Name] Print NV bit image

[Format]

ASCII	**FS**	**p**	***n***	***m***
Hex	**1C**	**70**	***n***	***m***
Decimal	**28**	**112**	***n***	***m***

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

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

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

[Details]

- *n* is the number of the NV bit image (defined using the **FS q** command).
- *m* specifies the bit image mode.
- *NV* bit image means a bit image 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, the command is not effective.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (m=0, 48) and in double-height mode (m=2, 50), and it means 2 dots in double-width mode (m=1, 49) and in quadruple mode (m=3, 51).
  - ① The printing area width is extended to the right in NV bit image mode
  - ② If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.

・This command feeds dots (for the height n of the NV bit-image) in normal and double-width modes, and (for the height *n* x 2 of the NV bit-image) in double-height and quadruple modes, regardless of the line spacing specified by **ESC 2** or **ESC 3**.

・After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

FS q

[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***	
Decimal	**28**	**113**	***n***	

[Range]

$1 \le n \le 255$

$0 \le xL \le 255$

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

$0 \le yL \le 255$

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

$0 \le d \le 255$

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

Total defined data area = 2M bits (256K bytes)

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

[Details]

・*n* specifies the number of the defined NV bit image.

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

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

・This command cancels all NV bit image that have already been defined by this command. The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.

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

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

・NV bit image means a bit image 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 the 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 image, when any of the parameters xL, xH, yL, yH, is out of the definition range, the command is disabled.
- In groups of NV bit image other than the first one, when the printer processes xL, xH yL, yH out of the defined range, it stops processing this command and stars writing into the NV images. At this time, NV bit image 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 image. Number 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 vL vH 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 2M bits (256K bytes). This command can define several NV bit image, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 2M bytes (256K bytes).
- The printer does not transmit ASB status and perform status detection during processing of the 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 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 q** command.

[Notes]

- Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- In the case of CMP-20 printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit image, and macros should be defined only after completing this command. The printer clears the received and print buffers and resets the mode to the mode that was in effect at power on. CMP-30 printer do not perform hardware reset after the procedure to place the image into the NV memory
- n is the number of the NV bit

FS -

[Name] Underline mode on/off

[Format]

ASCII	**FS**	**_**	**n**
Hex	**1C**	**2D**	**n**
Decimal	**28**	**45**	**n**

[Range] 0 ≤ *n* ≤ 2, 48 ≤ *n* ≤ 50

[Description] Turns underline mode for characters on or off, based on the following values of *n*.

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

[Notes]

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

FS !

[Name] Set double width/height

[Format]

ASCII	**FS**	**!**	***n***
Hex	**1C**	**21**	***n***
Decimal	**28**	**33**	***n***

[Range] 0 ≤ *n* ≤ 255

[Description] Sets the print mode for 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	0	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.

[Notes]

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

[Default] *n* = 0

FS M

[Name] Select MS Track

[Format]

ASCII	**FS**	**M**	***n***
Hex	**1C**	**4D**	***n***
Decimal	**28**	**77**	***n***

[Range] 49 ≤ *n* ≤ 52, n = 36

[Description] Select card reader mode.

n : read track data

n	MSR Track
0x31	Track 1
0x32	Track 2
0x33	Track 1,2
0x34	Track 3
0x36	Track 2,3

[Details] Magnetic card read out put format

STX	FS	Track Ⅰ Data	FS	Track Ⅱ Data	FS	Track Ⅲ Data	ETX	
		0~76 Byte		0~37 Byte		0~106Byte		
0x02	0x1C	Alphanumeric	0x1C	Numeric	0x1C	Numeric	0x03	0x0D,0x0A,0x00

Track I Data length = 76Byte

Track II Data length = 37 Byte

Track III Data length = 106 Byte

FS S

[Name] set left-side/right-side character spacing

[Format]

ASCII	**FS**	**S**	***n1***	***n2***
Hex	**1C**	**53**	***n1***	***n2***
Decimal	**28**	**83**	***n1***	***n2***

[Range] 0 ≤ *n1* ≤ 255

0 ≤ *n2* ≤ 255

[Description] Sets left- and right-side 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].

[Notes]

- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- The horizontal and vertical motion units are set by **GS P**. The previously specified character
- Spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.
- 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

FS W

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

[Format]

ASCII	**FS**	**W**	***n***
Hex	**1C**	**57**	***n***
Decimal	**28**	**87**	***n***

[Range] 0 ≤ *n* ≤ 255

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

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

[Default] *n* = 0