

# Programming Manual

## Receipt Printer

### BTP-M300



Shandong New Beiyang Information Technology Co., Ltd.



## Revision history

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# Contents

1 Overview .....	- 1 -
1.1 Commands classification .....	- 1 -
1.2 Key terms.....	- 1 -
1.3 Command format .....	- 1 -
2 Command Description .....	- 3 -
2.1 Print command.....	- 3 -
LF .....	- 3 -
CR .....	- 3 -
ESC J n.....	- 3 -
ESC K n .....	- 3 -
ESC d n.....	- 4 -
ESC e n.....	- 4 -
2.2 Location command.....	- 5 -
HT .....	- 5 -
ESC D n1...nk NUL .....	- 5 -
ESC a n.....	- 6 -
GS ( F PL PH a m nL nH.....	- 7 -
GS FF.....	- 7 -
2.3 Character commands.....	- 8 -
ESC SP n.....	- 8 -
ESC ! n.....	- 8 -
ESC % n.....	- 9 -
ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] .....	- 10 -
ESC – n.....	- 11 -
ESC ? n.....	- 12 -
ESC E n .....	- 12 -
ESC G n.....	- 13 -
ESC M n.....	- 13 -
ESC R n .....	- 14 -

ESC t n..... - 14 -

ESC { n..... - 15 -

FS ! n..... - 15 -

FS &..... - 16 -

FS – n..... - 16 -

FS ..... - 17 -

FS 2 c1 c2 d1...dk ..... - 17 -

FS ? c1 c2 ..... - 18 -

FS C n..... - 18 -

FS S n1 n2 ..... - 19 -

FS W n ..... - 19 -

2.4 Bitmap command ..... - 19 -

ESC \* m nL nH d1... dk ..... - 19 -

FS p n m..... - 20 -

FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n..... - 20 -

2.5 Status command ..... - 22 -

DLE EOT n..... - 22 -

ESC u n..... - 24 -

ESC v ..... - 24 -

GS a n..... - 25 -

GS r n..... - 26 -

2.6 Other commands ..... - 27 -

DLE ENQ n ..... - 27 -

DLE DC4 fn m t ..... - 28 -

DLE BS SOH..... - 28 -

XON ..... - 28 -

XOFF..... - 29 -

ESC 2 ..... - 29 -

ESC 3 n..... - 29 -

ESC <..... - 29 -

ESC = n..... - 29 -

ESC @ ..... - 30 -

ESC U n ..... - 30 -

ESC c 3 n ..... - 30 -

ESC c 4 n ..... - 31 -

ESC c 5 n ..... - 31 -

ESC l ..... - 32 -

ESC m ..... - 32 -

ESC p m t1 t2 ..... - 32 -

ESC r n ..... - 32 -

GS ( A pL pH n m ..... - 33 -

GS ( C pL pH m fn b [c1 c2] [d1...dk] ..... - 33 -

GS ( D pL pH m [a1 b1]...[ak bk] ..... - 36 -

GS ( E pL pH fn [parameters] ..... - 37 -

GS ( H ACK NUL RS RS kc1 kc2 kc3 kc4 ..... - 41 -

①GS V m ②GS V m n ..... - 41 -

3 Programming Process Guide ..... - 43 -

Appendix A: character index table ..... - 44 -

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# 1 Overview

This manual classifies the printer commands into several kinds based on its functions, and also describes the applications of relative commands in detail depending on its sorts. We hope that it is helpful for programmers to get known of those commands.

## 1.1 Commands classification

This receipt printer commands are classified as below:

Print commands: used for printing and feeding paper;

Position commands: to control the print position;

Character commands: to set characters property;

Bitmap commands: to download and print bitmap, including NV bitmap;

Status commands: used for printer status query;

Other commands: used for periphery control, initialization, etc.;

For command instruction, please refer to the detailed function description of relevant commands.

## 1.2 Key terms

**Real-time commands** – These commands are acted on immediately upon being received by the printer.

**Print buffer** – used to store graphics data to be printed;

**Marked paper mode** – Printer works in the mode with marked paper;

**Line beginning** – The status after executing the commands like **LF**, **CR**, **ESC J**, **ESC K**, **ESC d**, **ESC e**; namely the position for starting the print is at the beginning of print buffer.

**Asian characters** – Multi-byte code character represented by simplified Chinese, traditional Chinese, Japanese and Korean characters of Asia. Some manufacturers call it Asian characters.

**NV memory**– Non-volatile memory in which data stored are not cleared after power down. NV: Non-volatile

**ASB** –Auto Status Back

**Font A** – 9 x 9 dot matrix ASCII characters.

**Font B** – 7 x 9 dot matrix ASCII characters.

## 1.3 Command format

**[Function]** The name and function summary of commands.

**[Format]** Describe command data format, such as ASCII, Hex and Decimal.

**[Range]** The value range of parameter in the command (The parameter is expressed in decimal system).

**[Note]** Explain the main features and application notices of commands.

**[Default]** The initial value used after the printer initialized.

**[Relative]** Other commands related to current command.

**[Demo]** Example used for current or relative commands.

All command data in programming Demo use HEX. All normal font/characters are data. There is no explanation for the data of command such as 42 43 which is data. The font/character underlined and emphasized is a command such as **1B 40**. All the data

inside parentheses after all commands in Demo is used to explain the meanings of this command. The parentheses and data inside it is not the command to be transmitted to the printer.

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## 2 Command Description

### 2.1 Print command

#### LF

**[Function]** Print the data in buffer and feed one line; when the print buffer is vacant, feed one line and the paper feed amount is the current line spacing.

**[Format]**

ASCII	LF
Hex	0A
Decimal	10

**[Relative]** **ESC 2, ESC 3**

#### CR

**[Function]** When the command is enabled, it equals to **LF**; it is used to print the data in the print buffer when disabled.

**[Format]**

ASCII	CR
Hex	0D
Decimal	13

**[Notes]** · Whether the command is enabled or not depends on the printer configuration.

**[Relative]** **LF**

#### ESC J n

**[Function]** Print the data in buffer and feed paper n dots (1 dot = 0.176mm)

**[Format]**

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

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

**[Notes]** · The paper feed amount set by this command is not affected by the values set by **ESC 2** or **ESC 3**.

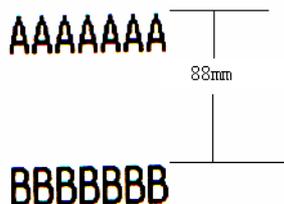
**[Demo]** **1B 40** (initialize printer)

41 41 41 41 41 41 41 41 (data to be printed)

**1B 4A 32** (print and feed  $50 \times 0.176 = 88\text{mm}$ )

42 42 42 42 42 42 42 **0A** (data to be printed)

Result:



#### ESC K n

**[Function]** Print the data in buffer and retract paper n dots (1 dot = 0.176mm)

<b>[Format]</b>	ASCII	ESC	K	n
	Hex	1B	4B	n
	Decimal	27	75	n
<b>[Range]</b>	0 ≤ n ≤ 48			
<b>[Notes]</b>	If n exceeds the paper retraction range, the data in the buffer will be printed but the printer will not retract paper.			
	Paper retraction may cause the issues below:			
	<ul style="list-style-type: none"> <li>• The paper feed amount is not correct;</li> <li>• Retraction noise is bigger than paper feed noise;</li> <li>• In paper retraction, the paper may be colored due to ribbon.</li> </ul>			

**ESC d n**

<b>[Function]</b>	Print the data in buffer and feed paper [ n x current line spacing]			
<b>[Format]</b>	ASCII	ESC	d	n
	Hex	1B	64	n
	Decimal	27	100	n
<b>[Range]</b>	0 ≤ n ≤ 255			
<b>[Notes]</b>	<ul style="list-style-type: none"> <li>• The current line spacing is set by <b>ESC 2</b> or <b>ESC 3</b>.</li> <li>• The maximum paper feed amount is 1016 mm. If the paper feed amount of more than 1016 mm is specified, the printer feeds paper only 1016 mm.</li> </ul>			
<b>[Relative]</b>	<b>ESC 2, ESC 3</b>			
<b>[Demo]</b>	<p><b>1B 40</b> (Initialize the printer)            41 41 41 41 41 41 41 41 (Data to be printed)</p> <p><b>1B 64 02</b> (Print and feed two character lines, 2/6 inch)            42 42 42 42 42 42 42 <b>0A</b> (Data to be printed)</p> <p>Result:</p> <div style="text-align: center;"> </div>			

**ESC e n**

<b>[Function]</b>	Print the data in the buffer and retract paper (n x current line spacing)			
<b>[Format]</b>	ASCII	ESC	e	n
	Hex	1B	65	n
	Decimal	27	101	n
<b>[Range]</b>	0 ≤ n ≤ 2			
<b>[Note]</b>	<ul style="list-style-type: none"> <li>• If paper retraction amount is more than 8.46mm, the printer prints the data and does not retract paper.</li> </ul> <p>The paper retraction may cause the issues below:</p> <ul style="list-style-type: none"> <li>• The paper feed amount is not correct.</li> <li>• Retraction noise is bigger than paper feed noise.</li> </ul>			



- [Notes]** Set horizontal tab positions.
- n specifies the column number for setting a horizontal tab position from the beginning of a line.
  - k indicates the total number of horizontal tab positions to be set.
  - **ESC D NUL** cancels all tab positions.
  - The horizontal tab position is stored as a value of [character width × n] measured from the beginning of a line. The character width includes the right-side character spacing, and double-width characters are set with twice the tap distance of normal characters.
  - This command cancels the previous tab position settings.
  - Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
  - 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 tap position settings;
  - The previously specified horizontal tab positions do not change, even if the character width changes.

**[Default]** The default tab positions are at intervals of 8 characters for Font B.

**[Relative]** HT

**ESC a n**

**[Function]** Select character justification mode

<b>[Format]</b>	ASCII	ESC	a	n
	Hex	1B	61	n
	Decimal	27	97	n

**[Range]** 0 ≤ n ≤ 2, 48 ≤ n ≤ 50

**[Notes]** Align all the data in some specified justification mode.  
n selects the justification as follows:

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

**[Default]** n = 0

- [Demo]** **0A** (Set the print position to the beginning of a line)  
**1B 40** (Initialize the printer)  
**1B 61 00** (Set the left alignment of characters)  
 41 42 43 **0A**  
 41 42 43 44 **0A**  
 41 42 43 44 45 **0A**  
**1B 61 01** (Set centering of characters)  
 41 42 43 **0A**  
 41 42 43 44 **0A**  
 41 42 43 44 45 **0A**

**1B 61 02** (Set the right alignment of characters)

41 42 43 **0A**

41 42 43 44 **0A**

41 42 43 44 45 **0A**

Result:

Left justification	Centering	Right justification
<div style="border: 1px solid black; padding: 5px;">                     ABC                      ABCD                      ABCDE                 </div>	<div style="border: 1px solid black; padding: 5px;">                     ABC                      ABCD                      ABCDE                 </div>	<div style="border: 1px solid black; padding: 5px;">                     ABC                      ABCD                      ABCDE                 </div>

**GS ( F PL PH a m nL nH**

**[Function]** Set location offset of black mark

**[Format]** ASCII GS ( F pL pH a m nL nH  
 Hex 1D 28 46 pL pH a m nL nH  
 Decimal 29 40 70 pL pH a m nL nH

**[Range]**  $(pL + (pH \times 256)) = 4 (pL = 4, pH = 0)$   
 $1 \leq a \leq 2$   
 $m = 0, 1, 48, 49$   
 $1 \leq (nL + nH \times 256) < 3000$

**[Notes]** • a is used to set the offset of the start print position or cutting/tear-off position.

a	Function
1	Set the offset of the start print position relative to black mark detection position
2	Set the offset of cutting/tear-off position relative to black mark detection position

• m is used to select the offset calculation method according to paper feed direction or retraction direction.

m	Function
0, 48	The selected offset is calculated according to paper feed direction
1, 49	The selected offset is calculated according to retraction direction

The offset set by nL, nH is corresponding to the actual distance of  $(nL+nH \times 256) \times 0.176\text{mm}$ .

- In executing **GS FF**, the offset settings of the start print position (a=1) is enabled.
- In executing **GS V m**, the offset settings of the start print position (a=2) is enabled.
- If you save the settings of this command into the printer, it shall not be lost after the printer is turned off or initialized.
- After this command sets the offset, the settings will be effective when printer powered on again.

**[Default]** nL= nH = 0, namely when mark sensor detects black mark, the position on current ticket corresponding to the print head is the start of print which is set. The position on current ticket corresponding to cutting/tear-off position is the set cutting/tear-off position.

**[Relative]** **GS FF, GS V**

**GS FF**

**[Function]** The printer feeds paper. Feed the next mark to the specified position.

[Format]	ASCII	GS	FF
	Hex	1D	0C
	Decimal	29	12

- [Notes]
- This Command is valid only when the paper type is set to marked paper;
  - Detect black mark and feed paper to the print start position set by **GS F (**;
  - When black mark is already at the print start position, the printer shall not feed paper if sending this command at this time;
  - Never use continuous paper when paper type is set to marked paper; otherwise this command will cause the printer to feed continuously.

[Relative] **GS F (**

### 2.3 Character commands

#### ESC SP n

[Function] Set right-side spacing of ASCII characters to ( n x 0.158mm)

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

[Range] 0 ≤ n ≤ 255

[Default] n = 0

[Demo] 1B 40

**1B 20 00** (Set right-side character spacing to 0)

41 41 41 41 41 **0A**

**1B 20 06** (Set character spacing to 6 \* 0.158 = 0.9mm )

42 42 42 42 42 **0A**

**1B 20 0C** (Set character spacing to 12 \* 0.158 = 1.9mm )

43 43 43 43 43 **0A**

Result:

A A A A A	← No character spacing
B B B B B	← Character spacing 0.9mm
C C C C C	← Character spacing 1.9mm

#### ESC ! n

[Function] Select character print mode

[Format]	ASCII	ESC	!	n
	Hex	1B	21	n
	Decimal	27	33	n

[Range] 0 ≤ n ≤ 255

[Notes] • Set character print mode using n as follows:

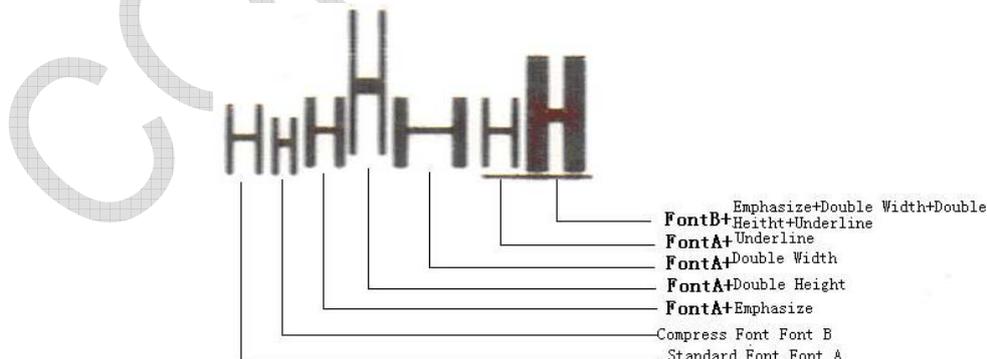
Bit	0/1	HEX	Decimal	Function
0	0	00	0	Select Font A (9 × 9)
	1	01	1	Select Font B (7 × 9)
1,2	--	--	--	Undefined
3	0	00	0	Emphasized mode not selected

	1	08	8	Emphasized mode selected
4	0	00	0	Double-height mode not selected
	1	10	16	Double-height mode selected
5	0	00	0	Double-width mode not selected
	1	20	32	Double-width mode selected
6	--	--	--	Undefined
7	0	00	0	Underline mode not selected
	1	80	128	Underline mode selected

- The command can underline ASCII characters and the right-side spacing, but can not underline the space set by HT.
- Double-height, double-width and underline modes set by this command are effective only for ASCII characters;

[Default]  
[Relative]  
[Demo]

n = 1  
 ESC -, ESC E  
**1B 40**(Initialization)  
**1B 21 00**(Select normal print mode)  
 48  
**1B 21 01**(Select FONT B)  
 48  
**1B 21 08**(Select emphasized mode)  
 48  
**1B 21 10**(Select double-height mode)  
 48  
**1B 21 20**(Select double-width mode)  
 48  
**1B 21 80**(Select underline mode)  
 48  
**1B 21 B9**(Select emphasized, double-width, double-height and underline mode for FONTB)  
 48 **0A**  
 Result:



**ESC % n**

[Function]	Select/cancel user-defined characters			
[Format]	ASCII	ESC	%	n
	Hex	1B	25	n
	Decimal	27	37	n

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

[Notes] Select or cancel the user-defined characters:  
 • When the LSB of n is 0, the user-defined characters are not used.  
 • When the LSB of n is 1, the user-defined characters are used.

[Default]  $n = 0$

[Relative] **ESC &, ESC ?**

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

[Function] Define user-defined characters

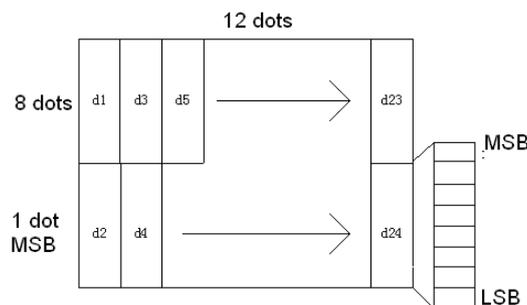
[Format] ASCII      ESC      &    y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]  
 Hex        1B        26    y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]  
 Decimal    27        38    y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

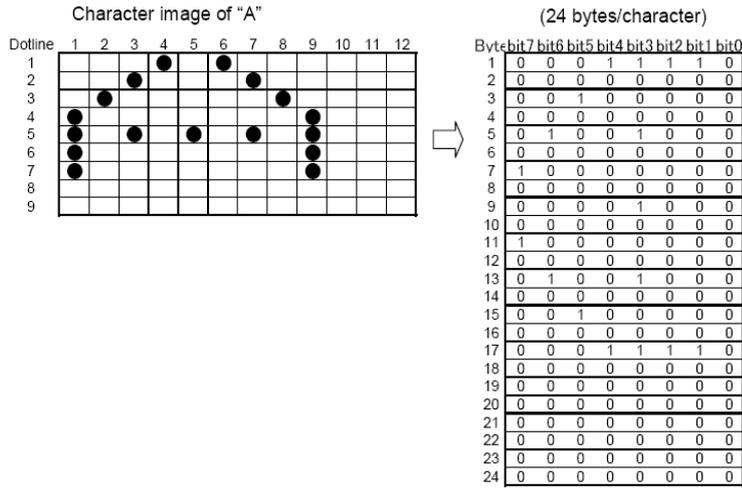
[Range]  $y = 2$   
 $32 \leq c1 \leq c2 \leq 126$   
 When Font A is selected:  $0 \leq x \leq 12$   
 When Font B is selected:  $0 \leq x \leq 10$   
 $0 \leq d1 \dots d(y \times xk) \leq 255$   
 $k = c2 - c1 + 1$

[Notes] Define the user-defined ASCII characters via this command:  
 • y specifies the number of bytes in the vertical direction, which is fixed to 2;  
 • c1 specifies the ASCII beginning character code, and c2 specifies the ASCII final character code;  
 • x specifies the number of dots in the horizontal direction.  
 • d is the data of the downloaded characters.  
 • The allowable character code range is from ASCII code <20>H to <7F>H (95 characters).  
 • Max. number of Font A and Font B which could be defined is 20 for each.  
 • It is possible to define multiple characters for consecutive character codes. If only one character is defined, use  $c1 = c2$ .  
 • The size of 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.  
 • The user-defined character definition is cleared when:  
     ① **ESC ?** or **ESC @** is executed.  
     ② The power is turned off.

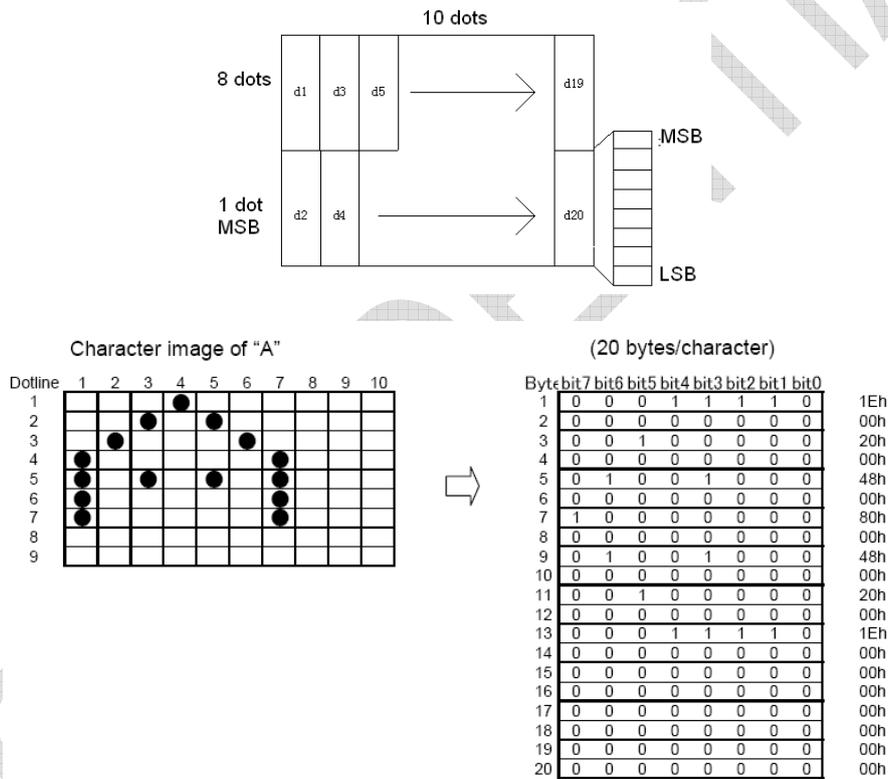
[Relative] **ESC &, ESC ?, ESC @**

[Demo] • When Font A is selected:





• When Font B is selected:



**ESC – n**

**[Function]** Turn underline mode on/off

**[Format]** ASCII      ESC    -    n

Hex            1B    2D   n

Decimal      27    45   n

**[Range]**      0 ≤ n ≤ 2, 48 ≤ n ≤ 50

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

n	Function
0, 48	Turn off underline mode
1, 49	Turn on underline mode
2, 50	

- The command can underline ASCII characters, but cannot underline the space set by HT.
- Underline mode can also be turned on or off by using **ESC !**. The last executed command is effective.

[Default] n = 0

[Relative] **ESC !**

[Demo] **1B 40**

**1B 2D 01** (underline)

42 42 42 42 42 42 **0A**

**1B 2D 00** (Without underline)

43 43 43 43 43 43 **0A**

Result:

**BBBBBB** → 1-dot thick underline  
**CCCCCC** → Cancel underline

**ESC ? n**

[Function] Cancel user-defined characters

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

[Range] 32 ≤ n ≤ 126

- [Notes]
- This command cancels the pattern defined for the character code specified by n. After the user-defined characters are canceled, the corresponding pattern for the internal character is printed.
  - If a user-defined character has not been defined for the specified character code, the printer ignores this command.

[Relative] **ESC &, ESC %**

**ESC E n**

[Function] Turn emphasized mode on/off

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

[Range] 0 ≤ n ≤ 255

- [Notes]
- When the LSB of n is 0, emphasized mode is turned off.
  - When the LSB of n is 1, emphasized mode is turned on.
  - Only the least significant bit of n is enabled.
  - Emphasized mode is slower than normal print mode.
  - The printout effect made by this command and double-strike is the same.
  - Emphasized mode and double-strike mode cannot be canceled by each other.
  - **ESC !** can turn on and off emphasized mode in the same way, and the last command received is effective.

[Default] n = 0

[Relative] **ESC !, ESC G**

[Demo] **1B 40**

**1B 45 00** (Emphasized mode is not selected)

41 41 41 42 42 42 **0A**

**1B 45 01** (Emphasized mode is selected)

41 41 41 42 42 42 **0A**

Result:

AAABBB ← Turn off emphasized mode  
**AAABBB** ← Turn on emphasized mode

**ESC G n**

**[Function]** Turn on/off double-strike mode

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

**[Range]** 0 ≤ n ≤ 255

- [Notes]**
- 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.
  - Only the lowest bit of n is enabled .
  - Double-strike is slower than normal print.
  - Double-strike and emphases mode can not be canceled by each other.
  - Printer output is the same in double-strike mode and in emphasized mode.

**[Default]** n = 0

**[Relative]** **ESC G**

**[Demo]** See **ESC E**

**ESC M n**

**[Function]** Select character font.

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

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

**[Notes]** Select font according to the value of n.

n	Function
0,48	Select Font A (9 × 9 )
1,49	Select Font B (7 × 9)
2,50	User-defined Font A

**[Default]** n = 1

**[Relative]** **ESC !**

**[Demo]** **1B 40**

**1B 4D 01** (Font B selected)

41 41 41 42 42 42 30 30 30 31 31 31 **0A**

**1B 4D 00** (Font A selected)

41 41 41 42 42 42 30 30 30 31 31 31 **0A**

Result:

AAABBB000111 → FontB  
 AAABBB000111 → FontA

**ESC R n**

**[Function]** Select an international character set

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

**[Range]**  $0 \leq n \leq 15$

**[Notes]** Selects an international character set:

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

**[Default]** n = 0 (Western words)  
 n = 15 (Simplified Chinese)

**ESC t n**

**[Function]** Select code page

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

**[Range]**  $0 \leq n \leq 5, 16 \leq n \leq 19, n = 255$   
 $0 \leq n \leq 5, 16 \leq n \leq 21, 26, n = 255^*$

**[Notes]** Select character code page specified by n:

n	Character code page
0	Page 0 [PC437 (USA:Standard Europe)]
1	Page 1 [Katakana]
2	Page 2 [PC850 (Multilingual)]
3	Page 3 [PC860 (Portuguese)]
4	Page 4 [PC863 (Canadian-French)]
5	Page 5 [PC865 (Nordic)]
12	Page 12[PC857]**
16	Page 16 [WPC1252]
17	Page 17 [PC866 (Cyrillic #2)]
18	Page 18 [PC852 (Latin 2)]
19	Page 19 [PC858 (Euro)]

20	Page 20 [Thai character code 42]*
21	Page 21 [Thai character code 11]*
26	Page 26 [Thai character code 18]*
34	Page 34[PC1251]**
38	Page 38[PC1257]**
255	Page 255 [User-defined page]

\*Printers that have been installed with Thai code page;

\*\* Printers that have been installed with English or GB2312 fonts.

[Default] n = 0

**ESC { n**

[Function] Turn on/off upside-down print mode

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

[Range] 0 ≤ n ≤ 255

- [Notes]
- When the LSB of n is 0, upside-down print mode is turned off;
  - When the LSB of n is 1, upside-down print mode is turned on;
  - Only the lowest bit of n is valid;
  - This command is enabled only when processed at the beginning of a line;
  - In upside-down print mode, the printer rotates the line to be printed by 180° and then prints it.

[Default] n = 0

[Demo] **1B 40**

**1B 7B 00** (Turn off upside-down print mode)

41 42 43 44 45 46 **0A**

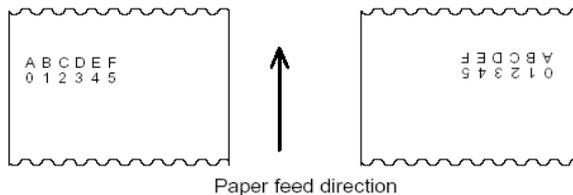
30 31 32 33 34 35 **0A**

**1B 7B 01** (Turn on upside-down print mode)

41 42 43 44 45 46 **0A**

30 31 32 33 34 35 **0A**

Result:



**FS ! n**

[Function] Set Asian character mode

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

[Range] 0 ≤ n ≤ 255

[Notes] Set the print mode for Asian characters, using n as follows:

Bit	0/1	Hex	Decimal	Function
0,1	--	--	--	Undefined
2	0	00	0	Double-width mode OFF
	1	04	4	Double-width mode ON
3	0	00	0	Double-height mode OFF
	1	08	8	Double-height mode ON
4~6	--	--	--	Undefined
7	0	00	0	Underline mode OFF
	1	80	128	Underline mode ON

- 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**.
- When the characters in a line are not of the same height, all the characters on the line are aligned at the baseline.
- It is possible to magnify the Asian characters using **FS W** or **FS !**, with the settings of the last received command effective.
- It is possible to turn underline mode on or off using **FS -** or **FS !**, with the settings of the last received command effective.

[Default] n = 0

[Relative] **FS-**, **FS W**

**FS &**

[Function] Select Asian character mode

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

[Notes] Select Asian character mode.

[Relative] **FS .**, **FS C**

**FS - n**

[Function] Turn underline mode on/off for Asian characters

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

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

[Notes] Turn underline mode for Asian characters on or off, based on the following values of n.

n	Function
0, 48	Turn off underline mode for Asian characters
1, 49	Turn on underline mode for Asian characters

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

**[Relative]** **FS !**

**FS .**

**[Function]** Cancel Asian character mode

**[Format]**

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

**[Notes]** When Asian character mode is turned off, all the characters will be processed as ASCII characters.

**[Relative]** **FS &, FS C**

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

**[Function]** Define user-defined characters.

**[Format]**

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

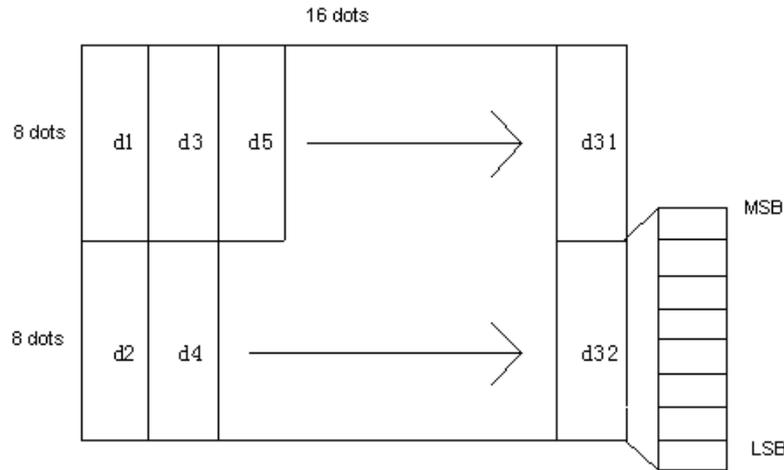
**[Range]** The value range of c1, c2 is related to different character type:

Character type	c1	c2
Japanese(JIS code)	c1 = 77H	21H ≤ c2 ≤ 7EH
Japanese(SHIFT code)	c1 = ECH	40H ≤ c2 ≤ 7EH 80H ≤ c2 ≤ 9EH
Simplified Chinese Traditional Chinese Korean	c1 = FEH	A1H ≤ c2 ≤ FEH

0 ≤ d ≤ 255

k = 32

- [Notes]**
- Define the double-byte character specified by c1 and c2.
  - c1 and c2 indicate character codes for the user-defined characters. c1 specifies the first byte, and c2 for the second byte.
  - d represents character dot-matrix data (column array)
  - The defined double-byte character up to five characters can be redefined.
  - Data format is shown as below:



**[Relative]** FS ?, FS C

**FS ? c1 c2**

**[Function]** Cancel the user-defined characters

**[Format]** ASCII FS ? c1 c2  
 Hex 1C 3F c1 c2  
 Decimal 28 63 c1 c2

**[Range]** The value range of c1, c2 is related to different Asian character type:

Character type	c1	c2
Japanese(JIS code)	c1 = 77H	21H ≤ c2 ≤ 7EH
Japanese (SHIFT code)	c1 = ECH	40H ≤ c2 ≤ 7EH 80H ≤ c2 ≤ 9EH
Simplified Chinese Traditional Chinese Korean	c1 = FEH	A1H ≤ c2 ≤ FEH

**[Notes]** Cancel the user-defined double-byte character specified.  
 c1 indicates the first byte of character code and c2 is for the second byte of character code.

**[Relative]** FS 2, FS C

**FS C n**

**[Function]** Select character code system

**[Format]** ASCII FS C n  
 Hex 1C 43 n  
 Decimal 28 67 n

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

**[Notes]** This command selects Japanese character code system for Japanese models.

n	Japanese character code system
0, 48	JIS code
1, 49	SHIFT JIS code

**[Default]** n = 0

**FS S n1 n2**

**[Function]** Set left-side and right-side character spacing

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

**[Range]**  $0 \leq n1 \leq 32$   
 $0 \leq n2 \leq 32$

**[Notes]** The left-side character spacing of Asian characters is  $[n1 \times 0.158]$ mm, and the right-side character spacing is  $[n2 \times 0.158]$ mm.

**[Default]**  $n1 = 0, n2 = 2$

**FS W n**

**[Function]** Turn quadruple-size mode on/off

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

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

**[Notes]** Turn quadruple-size mode on or off for multi-byte characters.

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

**[Default]**  $n = 0$

**[Relative]** FS !

**2.4 Bitmap command**

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

**[Function]** Select bitmap 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]**  $m = 0, 1, 2, 3$   
 $1 \leq (nL + nH \times 256) \leq 1023$  ( $0 \leq nL \leq 255, 0 \leq nH \leq 3$ )  
 $0 \leq d \leq 255$   
 $K = nL + nH \times 256$

**[Notes]** • m specifies bitmap mode. The number of dots is  $nL + nH \times 256$ .  
 • d specifies bitmap data. The data bit of 1 means to print this dot and 0 means not to print this dot.

m	Mode	Vertical enlargement times	Horizontal enlargement times	Max. print dots defined
0	8-dot single-density	1	2	200 dots
1	8-dot double-density	1	1	400 dots

2	Encrypted 8-dot single-density	1	2	200 dots
3	Encrypted 8-dot double-density	1	1	400 dots

- [Notes]**
- If the bitmap data input exceeds the number of dots to be printed on a line, the excess data is ignored.
  - If the value of m is out of the specified range, nL and the data that follows are processed as normal data.
  - The figure below is the data filling mode for printing single-density and double-density image.
  - This command is not affected by print modes (emphasized, double-strike, underline or character enlargement), except upside-down print mode.
  - When m=2 or 3, the bitmap data adopts encryption mode.

**[Relative]** LF, CR

**FS p n m**

**[Function]** Print NV bitmap

**[Format]**

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

**[Range]** 1 ≤ n ≤ 255  
m = 0, 1, 48, 49

**[Notes]** Print a NV bitmap n using the mode specified by m:

m	Mode	Vertical enlargement	Horizontal enlargement
0, 48	Normal	1	1
1, 49	Double-width	1	2

n is the number of the NV bitmap (defined using the **FS q** command).

- [Note]**
- This command is enabled at the beginning of a line.
  - NV bitmap is a bitmap 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 bitmap has not been defined.
  - This command is not affected by print modes (such as double-height, double-width, underline, character enlargement), except upside-down print mode.
  - If the downloaded bitmap to be printed exceeds the current print area, the excess data is not printed.

**[References]** FS q

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

**[Function]** Define NV bitmap

**[Format]**

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

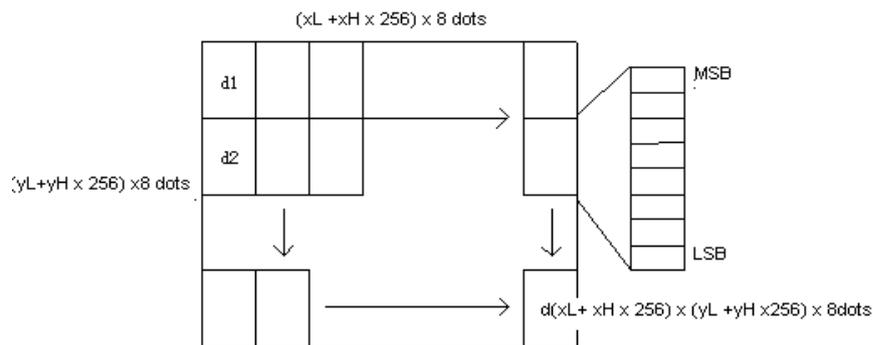
**[Range]**  $1 \leq n \leq 255$   
 $1 \leq (xL + xH \times 256) \leq 1023$  ( $0 \leq xL \leq 255, 0 \leq xH \leq 3$ )  
 $1 \leq (yL + yH \times 256) \leq 288$  ( $0 \leq yL \leq 255, yH = 0,1$ )  
 $0 \leq d \leq 255$   
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$

Total defined data area = 128K bytes

**[Notes]**

- n specifies the number of the defined NV bitmap.
- xL, xH specifies (xL + xH × 256) in the horizontal direction for the NV bitmap.
- yL, yH specifies (yL + yH × 256) in the vertical direction for the NV bitmap.
- d is bitmap data to be defined. Set the corresponding bit to 1 to print this dot or 0 to not print this dot.
- Frequent command execution may cause damage to the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- This command cancels all NV bitmaps 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.
- During the processing of this command, the printer is in busy status; because the data now is being inputted into NV memory at that moment, the printer stops receiving other commands. Hence during this command operation, other commands (including real-time command) are not allowed to be sent to the printer.
- This command is effective only when processed at the beginning of a line.
- This command defines n as the number of NV bitmaps. The serial number of every bitmap rises in order from 1. Therefore, the first data group [xL xH yL yH d1...dk] is the data of NV bitmap 1, and the last data group [xL xH yL yH d1...dk] is the data of NV bitmap n.
- Seven-byte data from FS to yH is processed as command data, but not as a part of graphics data.
- When the number of bitmap data bytes exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer only processes the data range specified by xL, xH, yL, yH.
- In the first group of NV bitmaps, when any of the parameters xL, xH, yL, yH is out of the defined range, this command is disabled.
- When many bitmaps are downloaded, if xL, xH, yL or yH exceeds the defined range, the printer will stop executing this command; the bitmap definition after that is ineffective and the bitmap definition before that is effective.
- The d indicates the defined bitmap data. The data bit of 1 specifies a dot to be printed and 0 specifies a dot not to be printed.
- This command defines n pieces of NV bitmap. The serial number of every bitmap rises in order from 1. Therefore the first data group [xL xH yL yH d1...dk] is the data of NV bitmap 1, and the last data group [xL xH yL yH d1...dk] is the data of NV bitmap n. The bitmap printed by FS p is also the same.

- A definition data of a NV bitmap consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bitmap is defined, n=1. The printer uses ((number of bitmap data bytes: ( xL + xH × 256) × ( yL + yH× 256) × 8] + [header:4]) bytes of NV memory.
- During the processing of this command, the printer does not transmit status or execute status inquiry.
- Once a NV bitmap is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bitmap and does not perform printing. Printing of the NV bitmap is performed by the **FS p** command.
- Define the relation between bitmap and bitmap data as below:



[Relative] **FS p**  
**2.5 Status command**

**DLE EOT n**

[Function] Real-time status transmission

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

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

[Notes] Transmit the printer status specified by 'n' at real time.

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

The printer returns the corresponding status upon receiving the command.

- n = 1: Printer status

Bit	0/1	HEX	Decimal	Function
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1
2	0	00	0	Cash drawer on
	1	04	4	Cash drawer off
3	0	00	0	Printer on-line

	1	08	8	Printer off-line
4	1	10	16	Fixed to 1
5,6	0	00	0	Reserved
7	0	00	00	Fixed to 0

• n = 2: off-line status

Bit	0/1	HEX	Decimal	Function
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1
2	0	00	0	Top cover closed
	1	04	4	Top cover open
3	0	00	0	FEED button not pressed
	1	08	8	FEED button pressed down
4	1	10	16	Fixed to 1
5	0	00	0	Printer with paper
	1	20	32	Printer paper end
6	0	00	0	Printer normal
	1	40	64	Printer error
7	0	00	0	Fixed to 0

Bit 6 Printer error: Here error refers to cutter error, overheating error, HP error and input voltage error.

• n = 3: Error status

Bit	0/1	HEX	Decimal	Function
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1
2	0	00	0	No carriage error
	1	04	4	Carriage error
3	0	00	0	No cutter error
	1	08	8	Cutter error
4	1	10	16	Fixed to 1
5	0	00	0	No unrecoverable error
	1	20	32	Unrecoverable error occurs
6	0	00	0	No auto-recovery error
	1	40	64	Auto-recovery error occurs
7	0	00	0	Fixed to 0

Bit 5: Unrecoverable error: input voltage abnormal.

Bit 6: Auto-recovery error: it refers to print head overheating error. When print head overheating error occurs, wait for a while until the print head cools down. This error can recover automatically.

• n = 4: Paper sensor status

Bit	0/1	HEX	Decimal	Function
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1

2, 3	0	00	0	Paper present
	1	0C	12	Paper near end
4	1	10	16	Fixed to 1
5, 6	0	00	0	Paper present
	1	60	96	Paper end
7	0	00	0	Fixed to 0

- If print data contains the same character strings as this command, those data shall be executed as this command. Users must consider this case.
- When print head overheating error occurs, wait for a while until the print head temperature drops sufficiently, and the error recovers automatically.
- This command should not be insert into 2 or more other command sequence.
- Transmit the printer current status, and one byte represents one type of status.
- Printer transmission status value does not mean the host can really receive it.
- The command can be executed as soon as the printer receives it.
- This command can be forbidden by **GS ( D**.
- This command is valid for printers with serial, parallel or USB interface.

[Relative] **DLE ENQ, GS a, GS r , GS ( D**

**ESC u n**

[Function] Peripheral status transmission

[Format] ASCII      ESC    u    n  
 Hex        1B    75    n  
 Decimal    27    117   n

[Range] n = 0, 48

[Notes] Transmit peripheral status, and the returned status information is defined as below:

Bit	0/1	Hex	Decimal	Status
0	0	00	0	Cash drawer is open.
	1	01	1	Cash drawer is closed.
1~7	0	00	0	Reserved

**ESC v**

[Function] Paper status transmission

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

[Notes] Transmit paper sensor status, and the returned status information is defined as below:

Bit	0/1	Hex	Decimal	Status
0, 1	0	00	0	Paper near end sensor: adequate paper
	1	03	3	Paper near end sensor: paper near end
2, 3	0	00	0	Paper end sensor: adequate paper
	1	0c	12	Paper end sensor: paper end
4~7	0	00	0	Reserved

**GS a n**

**[Function]** Enable/disable Automatic Status Back (ASB)

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

**[Range]** 0 ≤ n ≤ 255

**[Notes]** Determine the content of ASB, and the meaning of parameter n is as below:

Bit	0/1	Hex	Decimal	Status for ASB
0	0	00	0	Cash drawer kick-out status disabled
	1	01	1	Cash drawer kick-out status enabled
1	0	00	0	On-line/off-line status disabled
	1	02	2	On-line/off-line status enabled
2	0	00	0	Error status disabled
	1	04	4	Error status enabled
3	0	00	0	Paper status disabled
	1	08	8	Paper status enabled
4~7	--	--	--	Undefined

- [Notes]**
- This command is enabled for printers with serial, parallel or USB interface.
  - If any of the status items in the table above is enabled, the printer returns automatically four-byte printer status when the status changes.
  - If all status items are disabled, the ASB function is also disabled.
  - The status bytes are transmitted by the printer without confirming whether the host is ready to receive data.
  - Since this command is executed with other commands in sequence, there is a time lag from sending this command to ASB settings becoming effective.
  - The status to be transmitted is as follows:

First byte (printer information):

Bit	0/1	Hex	Decimal	Printer status
0, 1	0	00	0	Not used. Fixed to 0
2	0	00	0	Cash drawer open
	1	04	4	Cash drawer closed
3	0	00	0	On-line
	1	08	8	Off-line
4	1	10	16	Not used. Fixed to 1
5	0	00	0	Top cover closed
	1	20	32	Top cover open
6	0	00	0	FEED button not pressed
	1	40	64	FEED button pressed down
7	0	00	0	Not used. Fixed to 0

Second byte (printer information)

Bit	0/1	Hex	Decimal	Printer status
0	0	00	0	Reserved
1	0	00	0	Reserved
2	0	00	0	No carriage error
	1	04	4	Carriage error occurs
3	0	00	0	No cutter error
	1	08	8	Cutter error
4	0	00	0	Reserved
5	0	00	0	No unrecoverable error
	1	20	32	Unrecoverable error occurs
6	0	00	0	No auto-recovery error
	1	40	64	Auto-recovery error occurs
7	0	00	0	Reserved

Bit 5: Unrecoverable error means that input voltage is abnormal.

Bit 6: Auto-recovery error refers to print head overheating error, which can recover automatically after waiting for a while.

Third byte (paper sensor information):

Bit	0/1	Hex	Decimal	Printer status
0, 1	0	00	0	Paper adequate
	1	03	3	Paper near end
2, 3	0	00	0	Paper adequate
	1	0C	12	Paper end
4	0	00	0	Reserved
5, 6	0	00	0	Reserved
7	0	00	0	Reserved

Fourth byte (paper sensor information)

Bit	0/1	Hex	Decimal	Printer status
0~3	1	0F	15	Reserved
4	0	00	0	Reserved
5, 6	0	00	0	Reserved
7	0	00	0	Reserved

[Relative] DLE EOT, GS r

GS r n

[Function] Return status

[Format] ASCII GS r n

Hex 1D 72 n

Decimal 29 114 n

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

**[Notes]** Return the status specified by n as follows:

n	Function
1, 49	Return paper sensor status
2, 50	Return cash drawer status

- [Notes]**
- This command is valid for serial, parallel and USB interface printers.
  - This command is executed after the data before the command in the receive buffer is processed. Therefore, there may be a time lag between sending this command and receiving the returned status.
  - The command returns one-byte data, and the relationship between bits is shown below:  
Paper sensor status (n = 1, 49):

Bit	0/1	Hex	Decimal	Status for ASB
0, 1	0	00	0	Paper near end sensor: paper adequate
	1	03	3	Paper near end sensor: paper near end
2, 3	0	00	0	Paper end sensor: paper adequate
	1	0c	12	Paper end sensor: paper end
4	0	00	0	Reserved
5, 6	0	00	0	Reserved
7	0	00	0	Reserved

Cash drawer status (n = 2, 50):

Bit	0/1	Hex	Decimal	Status
0	0	00	0	Cash drawer open
	1	01	1	Cash drawer closed
1~7	0	00	0	Reserved

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

## 2.6 Other commands

### DLE ENQ n

**[Function]** Real-time request to printer

**[Format]**

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

**[Range]** n = 2

**[Notes]** Respond to a request from the host computer. n specifies the requests as follows:

n	Function
2	Recover from error status and clear the command receive buffer and print buffer

- Only when carriage error or cutter error occurs, this command can be executed. In other cases, this command is not responded.
- If print data contains the same character strings as this command, those data shall be executed as this command. Users need to consider this case.

**[Relative]** DLE EOT

**DLE DC4 fn m t**

**[Function]** Generate cash drawer opening pulse at real time.

**[Format]** ASCII DLE DC4 fn m t  
 Hex 10 14 fn m t  
 Decimal 16 20 fn m t

**[Range]** fn = 1  
 m = 0, 1  
 1 ≤ t ≤ 8

**[Notes]** Generate the opening pulse in the specified cash drawer connector pin, with pins specified by m:

m	Connector pin
0	Cash drawer kick-out connector pin 2
1	Cash drawer kick-out connector pin 5

The cash drawer opening time is [ t × 100 ms] and the closing time is [ t × 100ms].

- When the printer is executing the cash drawer opening command (**ESC p** or **DEL DC4**), this command is ignored.
- If print data includes the same character strings as this command, these data are executed as this command by the printer. Users need to consider this.
- This command should not be used within the data sequence of another command.

**[Relative]** **ESC p**

**DLE BS SOH**

**[Function]** Real-time command used to query buffer remaining space

**[Format]** ASCII DLE BS SOH  
 Hex 10 08 01  
 Decimal 16 8 1

**[Notes]** This command queries the remaining size of receive buffer at real time and returns two-byte data, low bit preceding high bit. The returned data represents the remaining buffer space in bytes.

Used when the receive buffer is set to 8K.

**XON**

**[Function]** Data return is enabled.

**[Format]** ASCII XON  
 Hex 11  
 Decimal 17

**[Notes]**

- This command is effective when the interface is serial and flow control is software handshake.
- Allow printer to return data.
- Data return is allowed when the printer is powered on by default.

**XOFF**

---

- [Function]** Data return is disabled.
- [Format]** ASCII XOFF  
 Hex 13  
 Decimal 19
- [Notes]**
- This command is effective when the interface is serial and flow control is software handshake.
  - Data return is forbidden.
  - This command disables printer to return data. At prohibitive stage, the data to be returned are thrown away.

**ESC 2**

---

- [Function]** Select 1/6 inch (about 4.23mm) as line spacing.
- [Format]** ASCII ESC 2  
 Hex 1B 32  
 Decimal 27 50

**[Relative]** ESC 3

**ESC 3 n**

---

- [Function]** Set line spacing to  $n \times 0.176$  mm
- [Format]** ASCII ESC 3 n  
 Hex 1B 33 n  
 Decimal 27 51 n

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

**[Default]** n=24

**[Relative]** ESC 2

**ESC <**

---

- [Function]** Move the print head to the original position
- [Format]** ASCII ESC <  
 Hex 1B 3C  
 Decimal 27 60

**[Notes]** Move the print head to the original position.

**ESC = n**

---

- [Function]** Select printer
- [Format]** ASCII ESC = n  
 Hex 1B 3D n  
 Decimal 27 61 n

**[Range]**  $1 \leq n \leq 3$

**[Default]** n = 1

**[Notes]** Select printer to receive the data sent by the host computer, using n as follows:

n	Function
1,3	Printer on-line
2	Printer off-line

**[Notes]** • When the printer is disabled, it ignores all other commands except for this command and real-time commands (**DLE EOT, DLE ENQ, DLE DC4**).

**[Relative]** **DLE EOT, DLE ENQ, DLE DC4**

**ESC @**

**[Function]** Initialize the printer

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

**[Notes]** Clear the data in the print buffer and set the work mode of printer to the work mode when the power was turned on.

- The NV bitmap data is not cleared.
- The self-defined characters already defined are cleared.
- The memory switch settings are not checked.
- The DIP switch settings are not checked.

**ESC U n**

**[Function]** Select /cancel unidirectional print mode

**[Format]** ASCII    ESC    U    n  
 Hex        1B     55    n  
 Decimal    27     85    n

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

**[Notes]** Select / cancel unidirectional print mode

- When the LSB of n is 0, unidirectional print mode is turned off.
- When the LSB of n is 1, unidirectional print mode is turned on.
- Only the lowest bit of n is enabled.
- In bi-directional print mode, the print speed is twice the print speed of unidirectional printing. But upside may not be aligned with downside due to the printer structure design, which is normal.

**[Default]** n = 0

**ESC c 3 n**

**[Function]** Select paper sensor to output paper end signal

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

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

**[Notes]** Select the paper sensor to output paper end signal. Each bit of n is defined as follows:

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

• The command is valid only when the interface is a parallel interface.

**[Default]** n = 15

**ESC c 4 n**

**[Function]** Select paper sensor to stop printing

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

**[Range]** 0 ≤ n ≤ 255

**[Notes]** Select paper sensor to stop printing when paper end is detected.

Each bit of n is defined as follows:

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

• When bit 0 or bit 1 of n is 1, paper near end sensor is valid. When paper near end is detected, the printer will stop printing after completing the printing of the current line.

• When the printer is not installed with paper near end sensor, this command is disabled.

**[Default]** n = 0

**ESC c 5 n**

**[Function]** Enable/disable button.

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

**[Range]** 0 ≤ n ≤ 255

**[Notes]** Enable or disable the panel buttons.

- When the LSB of n is 0, the button is enabled.
- When the LSB of n is 1, the button is disabled.

**[Notes]** • When paper sensor of printer detects paper end, the button is disabled.

[Default] n = 0

**ESC I**

[Function] Partial cut

[Format] ASCII ESC i  
 Hex 1B 69  
 Decimal 27 105

[Notes] • Printer doesn't feed paper and cut paper directly.  
 • Partial cut refers to the cutting operation with several dots in the middle left uncut.

**ESC m**

[Function] Partial cut

[Format] ASCII ESC m  
 Hex 1B 6D  
 Decimal 27 109

[Notes] • Printer doesn't feed paper and cut paper directly.

**ESC p m t1 t2**

[Function] Generate cash drawer control 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  
 $0 \leq t1 \leq 255, 0 \leq t2 \leq 255$

[Notes] Output the cash drawer opening pulse specified by t1 and t2 to the connector pin specified by m as follows:

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

- The cash drawer opening time is [ t1 × 2 ms] and the closing time is [ t2 × 2 ms].
- If t2 < t1, the closing time is [ t1 × 2 ms].
- If t2 < 50, t2 = 50.

[Relative] **DLE DC4**

**ESC r n**

[Function] Choose print color

[Format] ASCII ESC r n  
 Hex 1B 72 n  
 Decimal 27 114 n

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

[Notes] Choose print color.

n	Print color
0, 48	Black
1, 49	Red

This command is enabled at the beginning of a line.

[Default] n=0

**GS ( A pL pH n m**

[Function] Execute test print.

[Format] ASCII GS ( A pL pH n m  
 Hex 1D 28 41 pL pH n m  
 Decimal 29 40 65 pL pH n m

[Range]  $(pL + (pH \times 256)) = 2$  ( pL = 2 , pH = 0)  
 $0 \leq n \leq 2, 48 \leq n \leq 50$   
 $1 \leq m \leq 3, 49 \leq m \leq 51$

[Notes] • Execute test print with print method specified by n, m.  
 n specifies the test paper type:

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

m specifies print content:

m	Print content
1, 49	Hexadecimal dump
2, 50	Printer internal configuration information print
3, 51	Cyclic character print

[Note] • This command is enabled only when processed at the beginning of a line.  
 • The printer cuts paper when this command is finished.  
 • After this command is executed, the printer is initialized automatically.  
 • Hexadecimal dump print cannot exit automatically. Please operate according to print prompt information.

**GS ( C pL pH m fn b [c1 c2] [d1...dk]**

[Function] Edit user data in NV memory

[Notes] • Edit data in NV memory.  
 • pL and pH specify the byte number of (m fn b [c1 c2] [d1...dk]) after pH.  
 • fn can specify the function of this command.  
 • c1 and c2 are index code of user data.  
 • [d1...dk] is the user data.

fn	Command format	S/N	Functions
0, 48	<b>GS ( C pL pH m fn b c1 c2</b>	0	Delete data record specified by c1 and c2
1, 49	<b>GS ( C pL pH m fn b c1 c2 [d1...dk]</b>	1	Store data in the specified record
2, 50	<b>GS ( C pL pH m fn b c1 c2</b>	2	Query the specified data record
3, 51	<b>GS ( C pL pH m fn b</b>	3	Query the used user data space
4, 52	<b>GS ( C pL pH m fn b</b>	4	Query the remaining user data space
5, 53	<b>GS ( C pL pH m fn b</b>	5	Query data record list
6, 54	<b>GS ( C pL pH m fn b d1 d2 d3</b>	6	Delete stored data of all users

- Frequent command execution may cause damage to NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- During the processing of this command, the printer is in busy status. Because the data now is being inputted into NV memory at that moment, the printer stops receiving other commands. Hence during this command operation, other commands (including real-time commands) are not allowed to be sent to the printer.
- When function 2, 3, 4, 5 is executed, data cannot be transmitted until the returned status is received.

**(Function 0)GS ( C pL pH m fn b c1 c2 (fn = 0, 48)**

**[Function]** Delete data record specified by c1 and c2.

**[Format]** ASCII GS ( C pL pH m fn b c1 c2  
Hex 1D 28 43 pL pH m fn b c1 c2  
Decimal 29 40 67 pL pH m fn b c1 c2

**[Range]**  $(pL + pH \times 256) = 5$  (pL = 5, pH = 0)  
m = 0  
fn = 0, 48  
b = 0  
 $32 \leq c1 \leq 126$   
 $32 \leq c2 \leq 126$

**(Function 1)GS ( C pL pH m fn b c1 c2 d1...dk (fn = 1, 49)**

**[Function]** Store the user-defined data.

**[Format]** ASCII GS ( C pL pH m fn b c1 c2 d1...dk  
Hex 1D 28 43 pL pH m fn b c1 c2 d1...dk  
Decimal 29 40 67 pL pH m fn b c1 c2 d1...dk

**[Range]**  $6 \leq (pL + pH \times 256) \leq 65535$  ( $0 \leq pL \leq 255, 0 \leq pH \leq 255$ )  
m = 0  
fn = 1, 49  
b = 0  
 $32 \leq c1 \leq 126$   
 $32 \leq c2 \leq 126$

$$32 \leq d \leq 254$$

$$k = (\rho L + \rho H \times 256) - 5$$

Total capacity = 8KB

- [Notes]**
- Data (d1.....dk), as the record data of key code (c1, c2), is stored in user NV memory. [d1...dk] specifies the stored data (record content).
  - If the number of data  $((\rho L + \rho H \times 256) - 5)$  exceeds the reserved capacity of user NV memory, this command will be ineffective.

---

### (Function 2)GS ( C $\rho L$ $\rho H$ m fn b c1 c2 (fn = 2, 50)

---

**[Function]** Query the data record specified by key code (c1,c2).

**[Format]**

ASCII	GS (	C	$\rho L$	$\rho H$	m	fn	b	c1	c2
Hex	1D 28 43	$\rho L$	$\rho H$	m	fn	b	c1	c2	
Decimal	29 40 67	$\rho L$	$\rho H$	m	fn	b	c1	c2	

**[Range]**

$(\rho L + \rho H \times 256) = 5$  ( $\rho L = 5, \rho H = 0$ )

m = 0

fn = 2, 50

b = 0

$32 \leq c1 \leq 126$

$32 \leq c2 \leq 126$

- [Notes]**
- Return data not more than 64 bytes; Ethernet interface does not return data.

---

### (Function 3)GS ( C $\rho L$ $\rho H$ m fn b (fn = 3, 51)

---

**[Function]** Query the user data space that has been used.

**[Format]**

ASCII	GS (	C	$\rho L$	$\rho H$	m	fn	b
Hex	1D 28 43	$\rho L$	$\rho H$	m	fn	b	
Decimal	29 40 67	$\rho L$	$\rho H$	m	fn	b	

**[Range]**

$(\rho L + \rho H \times 256) = 3$  ( $\rho L = 3, \rho H = 0$ )

m = 0

fn = 3, 51

b = 0

- [Notes]**
- This command is valid for serial, parallel, and USB interface printer.

---

### (Function 4)GS ( C $\rho L$ $\rho H$ m fn b (fn = 4, 52)

---

**[Function]** Query the remaining user data space.

**[Format]**

ASCII	GS (	C	$\rho L$	$\rho H$	m	fn	b
Hex	1D 28 43	$\rho L$	$\rho H$	m	fn	b	
Decimal	29 40 67	$\rho L$	$\rho H$	m	fn	b	

**[Range]**

$(\rho L + \rho H \times 256) = 3$  ( $\rho L = 3, \rho H = 0$ )

m = 0

fn = 4, 52

b = 0

- [Notes]**
- This command is valid for serial, parallel, and USB interface printer.

**(Function 5)GS ( C pL pH m fn b (fn = 5, 53)**

**[Function]** Query data record list.

**[Format]** ASCII GS ( C pL pH m fn b  
 Hex 1D 28 43 pL pH m fn b  
 Decimal 29 40 67 pL pH m fn b

**[Range]**  $(pL + pH \times 256) = 3$  (pL = 3, pH = 0)  
 m = 0  
 fn = 5, 53  
 b = 0

**[Notes]** • This command is valid for serial, parallel, and USB interface printer.

**(Function 6)GS ( C pL pH m fn b d1 d2 d3 (fn = 6, 54)**

**[Function]** Delete stored data of all users.

**[Format]** ASCII GS ( C pL pH m fn b d1 d2 d3  
 Hex 1D 28 43 pL pH m fn b d1 d2 d3  
 Decimal 29 40 67 pL pH m fn b d1 d2 d3

**[range]**  $(pL + pH \times 256) = 6$  (pL = 6, pH = 0)  
 m = 0  
 fn = 6, 54  
 b = 0  
 d1 = 67  
 d2 = 76  
 d3 = 82

**GS ( D pL pH m [a1 b1]...[ak bk]**

**[Function]** Turn on/off real-time command

**[Format]** ASCII GS ( D pL pH m [ a1 b1 ]...[ ak bk ]  
 Hex 1D 28 44 pL pH m [ a1 b1 ]...[ ak bk ]  
 Decimal 29 40 68 pL pH m [ a1 b1 ]...[ ak bk ]

**[Range]**  $(pL + pH \times 256) = 3, 5$  (pL = 3,5, pH = 0)  
 m = 20  
 a = 1~3  
 b = 0, 1, 48, 49

**[Notes]** • Turn on/off real-time command.  
 • pL, pH is the byte number of(m [a1 b2]... [ak bk]) after pH.  
 • a is the real-time command type specified.  
 • b means to turn on/off real-time command.

a	b	Function
1	0, 48	DLE DC4 fn m t is disabled.
	1, 49	DLE DC4 fn m t is enabled.
2	0, 48	DLE EOT n is disabled.
	1, 49	DLE EOT n is enabled.

3	0, 48	DLE DC4 fn m t and DLE EOT n are disabled.
	1, 49	DLE DC4 fn m t and DLE EOT n are enabled.

[Default] a = 1, b = 1

**GS ( E pL pH fn [parameters]**

[Function] User setting command

- [Notes]
- User sets printer parameters.
  - pL, pH is the byte number of (fn [parameters])after pH.
  - fn specifies this command functions.
  - [parameters] specifies the setting data of every function.

fn	Format	S/N	Function
1	GS ( E pL pH fn d1 d2	1	Enter user setting mode
2	GS ( E pL pH fn d1 d2 d3	2	Exit user setting mode
3	GS ( E pL pH fn [a1 b18...b11] ... ak bk8....bk1]	3	Change memory switch
4	GS ( E pL pH fn a	4	Query the status of memory switch
5	GS ( E pL pH fn [a1 n1L n1H] ... [ak nkL nkH]	5	Set user self-defined settings
6	GS ( E pL pH fn a	6	Query the status of user self-defined values
11	GS ( E pL pH fn a d1...dk	11	Set serial communication parameter.
12	GS ( E pL pH fn a	12	Query serial communication parameter.

- [Notes]
- Frequent command execution may cause damage to NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
  - During the processing of this command, the printer is in busy status. Because the data now is being inputted into NV memory at that moment, the printer stops receiving other commands. Hence during this command operation, other commands including real-time command are not allowed to be sent to the printer.
  - When function 1, 4, 6, 12 is executed, the data cannot be transmitted until the returned status is received.

**(Function 1)GS ( E pL pH fn d1 d2 (fn = 1)**

[Function] Enter user setting mode, and change the current work mode.

[Format]

ASCII GS ( E pL pH fn d1 d2

Hex 1D 28 45 pL pH fn d1 d2

Decimal 29 40 69 pL pH fn d1 d2

[Range] (pL + pH × 256) = 3 (pL = 3 , pH = 0)

fn = 1

d1 = 73

d2 = 78

**(Function 2)GS ( E pL pH fn d1 d2 d3 (fn = 2)**

[Function] Exit user setting mode and perform soft reset.

[Format]

ASCII GS ( E pL pH fn d1 d2 d3

Hex 1D 28 45 pL pH fn d1 d2 d3

Decimal 29 40 69 pL pH fn d1 d2 d3

**[Range]** (pL + pH × 256) = 4 (pL = 4 , pH = 0)  
 fn = 2  
 d1 = 79  
 d2 = 85  
 d3 = 84

**[Notes]**

- Clear receive buffer and print buffer.
- Printer executes initialization operation.

**(Function 3)GS ( E pL pH fn [a1 b18...b11]...[ak bk8...bk1] (fn = 3)**

**[Function]** Change the settings of memory switch through the value of b.

**[Format]** ASCII GS ( E pL pH fn [a1 b18 ... b11] ... [ak bk8 ... bk1]  
 Hex 1D 28 45 pL pH fn [a1 b18 ... b11] ... [ak bk8 ... bk1]  
 Decimal 29 40 69 pL pH fn [a1 b18 ... b11] ... [ak bk8 ... bk1]

**[Range]**  $10 \leq (pL + pH \times 256) \leq 65530$  ( $0 \leq pL \leq 255, 0 \leq pH \leq 255$ )  
 fn = 3  
 a = 2,8  
 b = 48, 49, 50

**[Default]** All switches are set to off (b = 48)

**[Notes]**

- Change the settings of memory switch through the value of b.
- b = 48, the corresponding bit is off.
- b = 49, the corresponding bit is on.
- b = 50, the corresponding bit does not change.
- a = 2 (Memory switch 2)

Status byte	Function	Value
2-1,2-2	Undefined	50
2-3	Simplified Chinese character set mode: GB18030	48
	Simplified Chinese character set mode:GB2312	49
2-4 ~ 2-8	Undefined	50

• a = 8 (Memory switch 8)

Status byte	Function	Value
8-1 ~ 8-4	Undefined	50
8-5	When top cover is open, printer returns paper end error.	48
	When top cover is open, printer returns cover open error.	49
8-6,8-7	Undefined	48
8-8	The error of opening top cover is auto-recovery error.	48
	The error of opening top cover is unrecoverable error.	49

**(Function 4)GS ( E pL pH fn a (fn = 4)**

**[Function]** Query the status of memory switch via a.

**[Format]** ASCII GS ( E pL pH fn a  
 Hex 1D 28 45 pL pH fn a  
 Decimal 29 40 69 pL pH fn a

**[Range]**  $(pL + pH \times 256) = 2$  ( $pL = 2, pH = 0$ )  
 $fn = 4$   
 $a = 2, 8$

**[Note]** • This command is valid for serial, parallel, and USB interface printer.

**(Function 5)GS ( E pL pH fn [a1 n1L n1H] ... [ak nkL nkH] (fn = 5)**

**[Function]** Set paper width.

**[Format]** ASCII GS ( E pL pH fn [a1 n1L n1H] ... [ak nkL nkH]  
 Hex 1D 28 45 pL pH fn [a1 n1L n1H] ... [ak nkL nkH]  
 Decimal 29 40 69 pL pH fn [a1 n1L n1H] ... [ak nkL nkH]

**[Range]**  $4 \leq (pL + pH \times 256) \leq 65533$  ( $0 \leq pL \leq 255, 0 \leq pH \leq 255$ )  
 $fn = 5$   
 $a = 3$

$(nL + nH \times 256) = 2,4,5$  ( $nL = 2, 4, 5, nH = 0$ )

**[Notes]** • Make user-defined settings via the value of  $(nL + nH \times 256)$

a	Self-defined value
3	Paper width

• Paper width settings

$(nL + nH \times 256)$	Paper width
2	57.5 mm{2.26"}
4	69.5 mm{2.74"}
5	76 mm{2.99"}

**[Default]**  $(nL + nH \times 256) = 5$  ( $nL = 5, nH = 0$ )

**(Function 6)GS ( E pL pH fn a (fn = 6)**

**[Function]** Query paper width.

**[Format]** ASCII GS ( E pL pH fn a  
 Hex 1D 28 45 pL pH fn a  
 Decimal 29 40 69 pL pH fn a

**[Range]**  $(pL + pH \times 256) = 2$  ( $pL = 2, pH = 0$ )  
 $fn = 6$   
 $a = 3$

**[Notes]** Query user self-defined value:

a	Self-defined value
3	Paper width

• Data return format: head information + data + NUL, with details as below:

Head information: 0x37 0x27 0x33 0x1F (4 byte)

Data: Paper width information

NUL: 0x00 (1 byte)

• This command is valid for serial, parallel, and USB interface printer.

**(Function 11)GS ( E pL pH fn a d1 ... dk (fn = 11)**

**[Function]** Set serial communication parameters.

**[Format]** ASCII GS ( E pL pH fn a d1 ... dk  
 Hex 1D 28 45 pL pH fn a d1 ... dk  
 Decimal 29 40 69 pL pH fn a d1 ... dk

**[Range]**  $3 \leq (pL + pH \times 256) \leq 8$  ( $3 \leq pL \leq 8, pH = 0$ )  
 fn = 11  
 $1 \leq a \leq 4$   
 $48 \leq d \leq 57$

**[Notes]** • Set serial communication parameters via d.

a	Parameter	d value explanation
1	Transmission speed	K bytes of (d1 ... dk)
2	Parity	1 byte of (d1)
3	Flow control	1 byte of (d1)
4	Data bit	1 byte of (d1)

• Transmission speed settings (a = 1)

Transmission speed(bps)	d1	d2	d3	d4	d5
1200	49	50	48	48	--
2400	50	52	48	48	--
4800	52	56	48	48	--
9600	57	54	48	48	--
19200	49	57	50	48	48

• Parity settings (a = 2)

d1	Parity
48	None
49	Odd
50	Even

• Flow control settings (a = 3)

d1	Flow control
48	DTR/DSR
49	XON/XOFF

• Data bit length settings (a = 4)

d1	Data bit length
55	7 bits
56	8 bits

• The communication parameters set by this function can be enabled via executing <Function 2> or powering on the printer again. The host must be set so that the printer can be communicated with the host normally.

• This command is enabled to serial interface printer.

**[Default]** 9600 bps, without parity, DTR/DSR, 8 bits  
 d1 ... dk = "9600" (a = 1)

d1 = 48 (a = 2)  
 d1 = 48 (a = 3)  
 d1 = 56 (a = 4)

**(Function 12)GS ( E pL pH fn a (fn = 12)**

**[Function]** Query serial communication parameters.

**[Format]** ASCII GS ( E pL pH fn a  
 Hex 1D 28 45 pL pH fn a  
 Decimal 29 40 69 pL pH fn a

**[Range]** (pL + pH × 256) = 2 (pL = 2, pH = 0)  
 fn = 12  
 1 ≤ a ≤ 4

**[Notes]** • The status of serial communication parameter is queried by the value of a.

a	Communication parameter
1	Communication speed
2	Parity
3	Flow control
4	Data bit length

• This command is effective to serial interface printer.

**GS ( H ACK NUL RS RS kc1 kc2 kc3 kc4**

**[Function]** Inquire serial communication parameters.

**[Format]** ASCII GS ( H ACK NUL RS RS kc1 kc2 kc3 kc4  
 Hex 1D 28 48 06 00 30 30 kc1 kc2 kc3 kc4  
 Decimal 29 40 72 6 0 48 48 kc1 kc2 kc3 kc4

**[Range]** 32 ≤ kc1, kc2, kc3, kc4 ≤ 126

**[Notes]** This command is used to determine whether the current print task is completed or not.  
 The returned data format: 37 22 kc1 kc2 kc3 kc4 00  
 If sending this command after print command, the command will wait for the carriage task and return the 4-bit data from the command after the carriage task is completed.

**①GS V m ②GS V m n**

**[Function]** Select cutting mode and cut paper.

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

**[Range]** ① m = 0, 1, 48, 49  
 ② m = 65, 66, 0 ≤ n ≤ 255

**[Notes]** Choose cutting mode and cut paper.  
 Choose cutting mode according to the value of m as follows:

m	Cutting mode
0, 48	Full cut
1, 49	Partial cut
65, 66	Cut paper after feeding (the distance from print position to cutter +[n ×0.176]mm)

- [Note ①, ②]**
- This command is effective at the beginning of a line.
  - Under marked paper mode, the cutting distance set by n is ineffective. The printer locates the mark first, and then cuts paper.

- [Note ①]**
- Printer cuts paper directly when m=0, 48, 1, 49.
  - Printer cuts paper after feeding [the distance from print position to cutter +n ×0.176mm] when m = 65 or 66.

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### 3 Programming Process Guide

Because the different printing status and error can be returned by Auto Status Back (ASB) command, it is recommended that you can use ASB command to inquire status. ASB command is effective when powering on the printer and can be directly sent to inquire the status.

The recommended command programming process is shown as below:

1) Inquire the printer status

Make sure that the printer status is normal before sending data to print.

2) Initialize the printer

Make sure that the previous setting does not affect the current printing.

3) Set the print content

Set character property/bitmap property/barcode property, etc. of the print content so as to get the desired print effect.

4) Send the data to be printed (including the setting command before printing)

If the data to be printed is bitmap data, please do not send the status inquiry command when sending printing data.

5) Inquire the printer status after printing

If ASB is enabled, the printer will return the printer status automatically.

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## Appendix A: character index table

<b>—C—</b>		ESC u n Peripheral status transmission	24
CR Print and carriage return	3	ESC U n Select /cancel unidirectional print mode	30
<b>—D—</b>		ESC v Paper status transmission	24
DLE DC4 fn m t Generate cash drawer opening pulse at real time	28	<b>—F—</b>	
DLE ENQ n Real-time request to printer	27	FS – n Turn underline mode on/off for Asian characters	16
DLE EOT n Real-time status transmission	22	FS ! n Set Asian character mode	15
DLE BS SOH Query receive buffer remaining space	28	FS & Select Asian character mode	16
<b>—E—</b>		FS . Cancel Asian character mode	17
ESC – n Turn underline mode on/off	11	FS ? c1 c2 Cancel the user-defined characters	18
ESC ! n Select character print mode	8	FS 2 c1 c2 d1...dk Define user-defined characters	17
ESC % n Select/cancel user-defined characters	9	FS C n Select character code system	18
ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] Define user-defined ASCII characters	10	FS p n m Print NV bitmap	20
ESC * m nL nH d1... dk Select bitmap mode	19	FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n Define NV bitmap	20
ESC ? n Cancel user-defined characters	12	FS S n1 n2 Set left-side and right-side character spacing	19
ESC @ Initialize the printer	30	FS W n Turn quadruple-size mode on/off	19
ESC { n Turn on/off upside-down print mode	15	<b>—G—</b>	
ESC < Move the print head to the original position	29	GS ( A pL pH n m Execute test print	33
ESC = n Select printer	29	GS ( C pL pH m fn b [c1 c2] [d1...dk] Edit user data in NV memory	33
ESC 2 Set default line spacing	29	GS ( D pL pH m [a1 b1]...[ak bk] Turn on/off real-time command	36
ESC 3 n Set line spacing	29	GS ( E pL pH fn [parameters] User setting command	37
ESC a n Select character justification mode	6	GS ( F PL PH a m nL nH Set location offset of black mark	7
ESC c 3 n Select paper sensor to output paper end signal	30	GS a n Enable/disable Automatic Status Back (ASB)	25
ESC c 4 n Select paper sensor to stop printing	31	GS FF Marked paper location	7
ESC c 5 n Enable/disable button	31	GS r n Return status	26
ESC d n Print and feed n lines	4	①GS V m ②GS V m n Select cutting mode and cut paper	41
ESC D n1...nk NUL Set horizontal tab positions	5	<b>—H—</b>	
ESC e n Print and retract n lines	4	HT Horizontal tab	5
ESC E n Turn emphasized mode on/off	12	<b>—L—</b>	
ESC G n Turn on/off double-strike mode	13	LF Print and feed one line	3
ESC I Partial cut	32	<b>—X—</b>	
ESC J n Print and feed paper	3	XOFF Data return is disabled	29
ESC K n Print and retract paper	3	XON Data return is enabled	28
ESC M n Select character font	13		
ESC m Partial cut	32		
ESC p m t1 t2 Generate cash drawer control pulse	32		
ESC R n Select an international character set	14		
ESC r n Choose print color	32		
ESC SP n Set right-side spacing	8		
ESC t n Select code page	14		