

MODEL 814M

DIRECT THERMAL PRINTER

PROGRAMMING MANUAL

PART NUMBER 880048-0101

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1. General Information

1.1 Key Terms

Real-time commands – These commands are acted on immediately upon being received by the printer (regardless of the printer's busy or error status).

Page mode -- Under this mode, the printer possesses all data in specified memory and thinks of this as a virtual page. The page is printed when the printer receives a print command, either **FF** or **ESC FF**.

Standard mode – Standard mode is the default mode of printer uses to operate. Under this mode, the printer prints data and feeds paper upon print line buffer full (data is enough for one print line) or receiving print command like **LF**.

Marked paper mode– Configuration of printer is marked paper.

Presenter – Presenter is the front mechanism of the KIOSK printer. It is used to accommodate the printout during printing and retract the printout when the user does not take the printout. It is abbreviated as **PRST** in this programming manual.

HRI Characters – Human readable interpretation of the barcode.

NV – Non-volatile memory in which data stored is not lost when powered off.

RAM – Random Access Memory

Motion unit – The motion unit has vertical motion unit and horizontal motion unit, which specify the least space for vertical motion and horizontal motion.

ASB – Auto status back

DPI – Print dots per inch (one inch equals to 25.4mm). It is used to identify the resolution of a printer. For example, 203DPI means 203 print dots per inch.

Font 0 – A standard character, Font A size for 203 DPI model is 12 x 24; the size for 300 DPI is 18 x 34;

Font 1 – Compressed character, Font B size for 203 DPI model is 9 X 17; the size for 300 DPI is 13 X 24;

Asia Character Set – Double-byte code character used in Asia, the size for 203DPI is 24 x 24; the size for 300DPI is 36 x 36.

1.2 Command Explanation

[Name]	The name and function summary.
[Format]	The command format is expressed in ASCII, Hex and Decimal separately.
[Range]	The range of variation value is selected for a command.
[Description]	The detailed functions of command.
[Notes]	Lists items that will be given attention to. The main features of the command are given in this paragraph.
[Default]	The primary value used after initialization of the printer (power on).
[Reference]	Lists all other commands related or similar to the command.

2. Kiosk Command Set

HT

[Name]	Horizontal tab.	
[Format]	ASCII	HT
	Hex	09
	Decimal	9
[Description]	Moves the print position to the next horizontal tab position.	
[Notes]	▪ This command is ignored unless the next horizontal tab position has been set. ▪ If this command is received when the printing position is at the end of a line, the printer prints the current line and moves the print position to the beginning of the next line. ▪ Horizontal tab positions are set with ESC D. ▪ When the print buffer is full, the printer acts as follows, 1) Under standard mode, prints current line and moves the print position to the beginning of next line. 2) Under page mode, executes carriage return and moves the print position to the beginning of next line.	
[Default]	The default setting of the horizontal tab position for the paper roll is every 8th ASCII character. ESC D	
[Reference]		

LF

[Name]	Print and feeds one line.	
[Format]	ASCII	LF
	Hex	0A
	Decimal	10
[Description]	Under standard mode, prints the data in the print buffer and feeds one line. It only feeds one line when current buffer area is blank. Under page mode, executes carriage return and moves the print position to the beginning of the next line.	
[Notes]	▪ This command sets the print position to the beginning of the line.	
[Reference]	ESC 2, ESC 3	

FF

[Name]	Print and feed paper.	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
[Description]	Under page mode, prints the data in the print buffer collectively and returns to standard mode.	
[Notes]	▪ Under standard mode, this command functions the same as a LF command. ▪ The buffer data is deleted after being printed. ▪ This command sets the print position to the beginning of the line.	
[Reference]	ESC FF, ESC L, ESC S	

CR

[Name]	Print and carriage return		
[Format]	ASCII	CR	
	Hex	0D	
	Decimal	13	
[Description]	▪ When automatic line feed is enabled, this command functions the same as LF ;		
[Notes]	▪ This command is disabled according to the printer configuration.		
	▪ When automatic line feed is disabled, this command is ignored.		
[Reference]	LF		

DLE EOT n

[Name]	Real-time status transmission			
[Format]	ASCII	DLE	EOT	n
	Hex	10	04	n
	Decimal	16	4	n

[Range] $2 \leq n \leq 7, 9 \leq n \leq 11$

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

n = 2: Transmit peripheral equipment status

n = 3: Transmit error status.

n = 4: Transmit paper roll sensor status.

n = 5: Transmit printer status (Equal to first byte data of ASB).

n = 6: Transmit printer status (Equal to second byte data of ASB).

n = 7: Transmit printer status (Equal to third byte data of ASB).

n = 9: Transmit PRST status.

n = 10: Reset printer

n = 11: Clear printer errors.(function as the clear errors command)

[Notes] When n is out of range, the return value is invalid.

- The printer transmits specified status immediately upon receiving this command
- Even though the printer is not selected using ESC = (select peripheral device), this command is still effective.
- The printer transmits the status without confirming whether the host computer can receive data.
- This command is only valid for serial, USB and Ethernet interfaces.
- The reset command is used to clear the error status and the print buffer. Do not attempt to print while using this command.

n = 2, Transmits printer status defined as below:

Bit	Off/On	Hex.	Description
0	0	0	Fixed to 0
1	1	2	Fixed to 1
2	0/1	00/04	Top cover closed / Top cover open
3	0/1	00/08	No FEED button action / FEED button action
4	1	10	Fixed to 1
5	0/1	0/20	Paper adequate / Paper end
6	0/1	00/40	Normal / Error
7	0	00	Fixed to 0

n=3, Transmits error status defined as below:

Bit	Off/On	Hex.	Description
0	0	00	Fixed to 0
1	1	02	Fixed to 1
2	0	00	Fixed to 0
3	0/1	00/08	Cutter normal / Cutter error
4	1	10	Fixed to 1
5	0/1	00/20	Top cover closed / Top cover open
6	0/1	00/40	Print head temperature normal / Print head overheated
7	0	00	Fixed to 0

n=4, Transmits paper roll sensor status defined as below:

Bit	Off/On	Hex.	Description
0	0	00	Fixed to 0
1	1	02	Fixed to 1
2	0/1	00/04	Paper adequate / Paper near end
3	0/1	00/08	Paper adequate / Paper near end
4	1	10	Fixed to 1
5	0/1	00/20	Paper adequate / Paper end
6	0/1	00/40	Paper adequate / Paper end
7	0	00	Fixed to 0

n = 5, Transmits printer status defined as below:

Bit	Off/On	Hex.	Description
0	0/1	00/01	Paper adequate / Paper near end
1	1/1	00/02	Top cover closed / Top cover open
2	0/1	00/04	Paper adequate / Paper end
3	0/1	00/08	Print head normal / overheated

4	0/1	00/10	Cutter normal / Cutter error
5	0	00	Reserve
6	0	00	Reserve
7	0	00	Fixed to 0

n = 6, Transmits printer status defined as below:

Bit	Off/On	Hex.	Description
0	0/1	00/01	PRST without paper / PRST with paper
1	0/1	00/02	Normal / Paper jam at printing site
2	0/1	00/04	Normal / Paper jam on PRST
3	0/1	00/08	Normal / Black mark missing
4	0/1	00/10	Auto paper loading normal / error
5	0/1	00/20	Buffer not full / buffer full
6	0/1	0/40	System normal / system error
7	0	0	Fixed to 0

n = 7, Transmits printer course status:

Bit	Off/On	Hex.	Description	Error
0~4	00000/10000	00/10	Printer idle status Normal / Error	Top cover open, print head overheated, paper end
	00001/10001	01/11	Printing status Normal / Error	Top cover open, print head overheated, paper end, paper jam
	00010/10010	02/12	Cutting paper status Normal/ Error	Top cover open, print head overheated, paper end, cutter error, paper jam
	00011/10011	03/13	PRST feeding paper status Normal / Error	Top cover open, print head overheated, paper end, paper jam
	00100/10100	04/14	PRST waiting status Normal / Error	Top cover open, print head overheated, paper end
	00101/10101	05/15	PRST retraction status Normal / Error	Top cover open, print head overheated, paper end , paper jam
	00110/10110	06/16	PRST ejection status Error / Normal	Top cover open, print head overheated, paper end , paper jam
	00111/10111	07/17	Auto paper loading status Normal / Error	Top cover open, print head overheated, paper end
5	0/1	00/20	PrstIn with paper / PrstIn without paper	
6	0/1	00/40	No FEED button action / FEED button action	
7	0/1	00/80	Paper retract normally / user took the paper away in the process of retracting	

Notes:

- The seventh byte will be cleared after the next cut.
- PrstIn indicates the state of the PrstIn sensor before or after retraction, with paper means that the paper holder sensor detects paper.
- When the PrstIn sensor is in “with paper state” before retraction, the printer cannot judge whether the paper was taken away by user in the retraction process.

n = 9, Transmit PRST status:

Bit	Off/On	Hex.	Description
0	0/1	00/01	PRST without paper / PRST with paper
1-3	0	00	Fixed to 0
4	1	02	Fixed to 1
5-7	0	00	Fixed to 0

n = 10, reset printer

- Printer shall clear error information and buffer area and execute half-auto feeding.

n = 11, clear printer error

- When executing this command, the printer shall clear errors automatically according to error status. If the operation succeeds, it enters normal status, otherwise only via manual operation.

CAN

[Name] Cancel print data in page mode

[Format] ASCII CAN

Hex 18

Decimal 24

[Description] In page mode, deletes all print data in the print buffer.

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

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

ESC FF

[Name] Print data in page mode

[Format] ASCII ESC FF

Hex 1B 0C

Decimal 27 12

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

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

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

ESC SP n

[Name]	Set right-side character spacing			
[Format]	ASCII	ESC	SP	n
	Hex	1B	20	n
	Decimal	27	32	n
[Range]	$0 \leq n \leq 255$			
[Description]	Sets the character spacing for the right side of the character to [n × horizontal or vertical motion units] inches.			
[Notes]	▪ The horizontal and vertical motion units are specified by GS P. ▪ Without setting right-side character spacing, only changing the horizontal or vertical motion unit does not affect the current right-side spacing. ▪ The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is enlarged accordingly. ▪ 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 is specified 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. ▪ For 300DPI printers, the maximum right-side spacing is 288/305 inches. Any setting exceeding the maximum is converted to the maximum automatically. ▪ For 203DPI printers, the maximum right-side spacing is 288/203 inches. Any setting exceeding the maximum is converted to the maximum automatically. n = 0			
[Default]	GS P			
[Reference]				

ESC ! n

[Name] Select print mode

[Format] ASCII ESC ! n

Hex 1B 21 n

Decimal 27 33 n

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

[Description] Selects print mode(s) with n as follows:

Bit	1/0	Hex	Decimal	Function
0	0	00	0	Standard ASCII characters
	1	01	1	Compressed ASCII characters
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

- [Notes]
- 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 that selected by **ESC -**.
 - 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 last received command is effective.
 - **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
 - **GS !** can also select character size. However, the last received command is effective.

n = 0

ESC -, ESC E, GS !

[Default]

[Reference]

ESC \$ nL nH

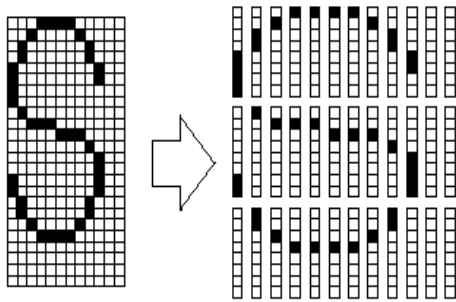
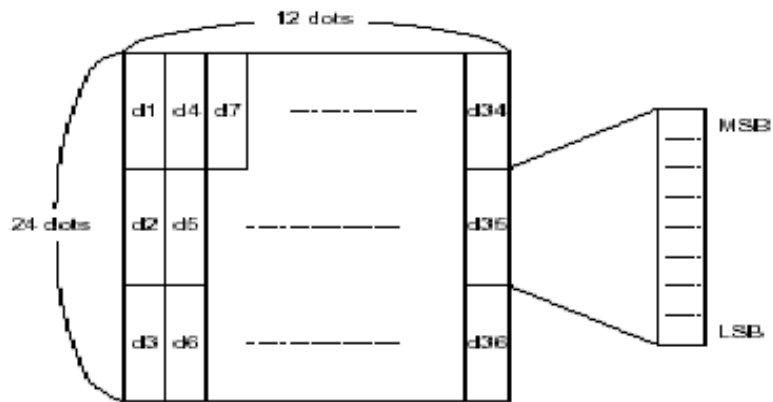
[Name]	Set absolute print position
[Format]	ASCII ESC \$ nL nH Hex 1B 24 nL nH Decimal 27 36 nL nH
[Range]	$0 \leq nL \leq 255$ $0 \leq nH \leq 255$
[Description]	Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed as below. ♦ $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ inches.
[Notes]	▪ Settings outside the specified printable area are ignored. ▪ The horizontal and vertical motion units are specified by GS P. ▪ In standard mode, the horizontal motion unit (x) is used. ▪ In page mode, horizontal or vertical motion unit is selected depending on the starting position of the printable area as follows: 1. When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (x) is used. 2. When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.
[Reference]	ESC \ , GS \$, GS \ , GS P

ESC % n

[Name]	Select/cancel user-defined character set
[Format]	ASCII ESC % n Hex 1B 25 n Decimal 27 37 n
[Range]	$0 \leq n \leq 255$
[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.
[Notes]	▪ When the user-defined character set is canceled, the internal character set is automatically selected. ▪ n is available only for the least significant bit.
[Default]	n = 0
[Reference]	▪ ESC & , ESC ?

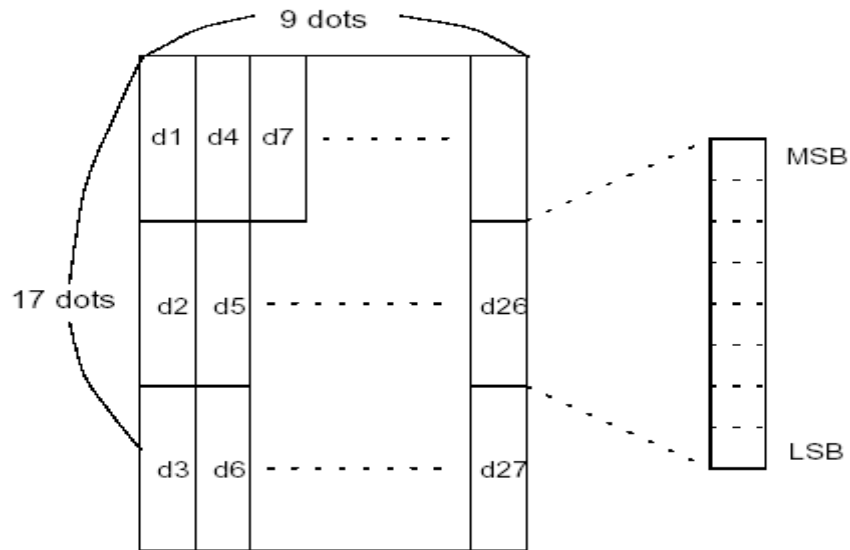
ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

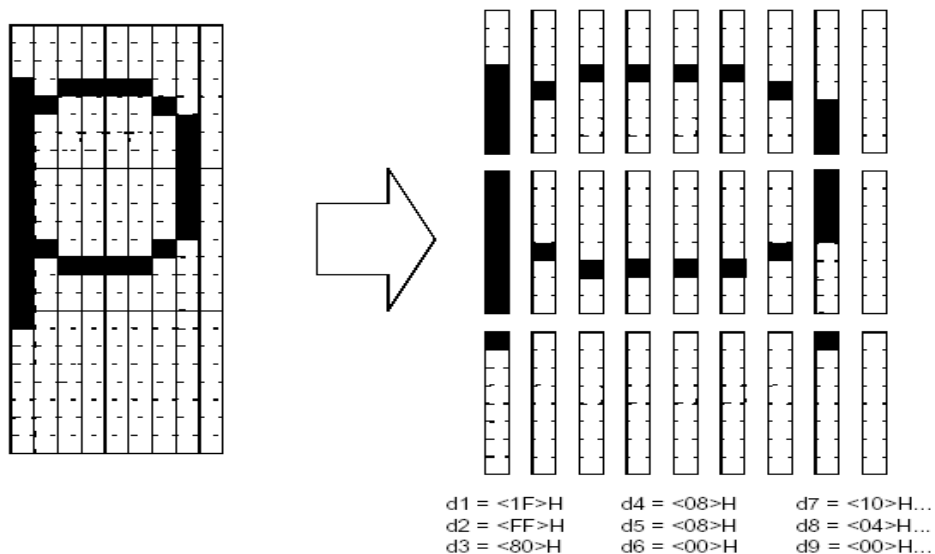
[Name]	Define user-defined characters
[Format]	ASCII ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)] Hex 1B 26 y c1 c2 [x1 d1...d(y × x1)]... [xk d1...d(y × xk)] Decimal 27 38 y c1 c2 [x1 d1...d(y × x1)]... [xk d1...d(y × xk)]
[Range]	203DPI model: $y = 3$ $32 \leq c1 \leq c2 \leq 127$ $0 \leq x \leq 12$ Standard ASCII font $0 \leq x \leq 9$ Compressed ASCII font 300DPI model: $0 < y < 6$ $32 \leq c1 \leq c2 \leq 127$ $0 \leq x \leq 18$ Standard ASCII font $0 \leq x \leq 12$ Compressed ASCII font $0 \leq d1 \dots d(y \times xk) \leq 255$
[Description]	Defines user-defined characters. ♦ y specifies the number of bytes in the vertical direction. ♦ c1 specifies the beginning character code for the definition, and c2 specifies the final code. ♦ x specifies the number of dots in the horizontal direction.
[Notes]	▪ The allowable character code range is from ASCII code <20>H to <7F>H (96 characters). ▪ It is possible to define multiple characters for consecutive character codes. If only one character is desired, use $c1 = c2$. ▪ d is the data for the downloaded characters. The dot pattern is in the horizontal direction from the left side. ▪ 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. ▪ The user-defined character definition is cleared when: –ESC ? is executed. –The power is turned off. ▪ All user-defined Characters defined with this command will be cleared when the GS * command is executed.
[Default]	ESC %, ESC ?
[Example]	203 DPI model When standard ASCII font (12 × 24) is selected.



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

When compressed ASCII font (9×17) is selected.





ESC * m nL nH d1... dk

[Name] Download and print bit-image

[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, 35

$0 \leq nL \leq 255$

$0 \leq nH \leq 3$

$0 \leq d \leq 255$

[Description] Selects a bit-image mode with m for the number of dots specified by nL and nH, d1...dk is data, of which number is decided by horizontal dots number and selected bit-image mode as follows:

203DPI

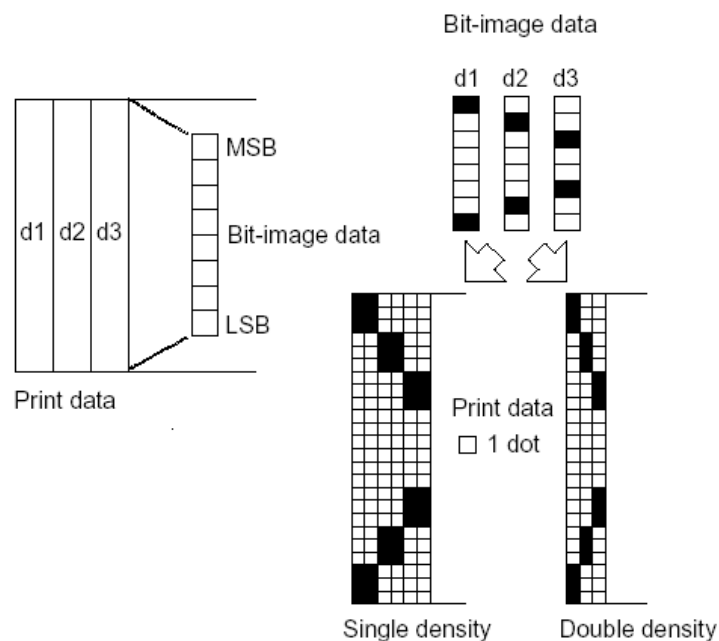
m	Bit-Image Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot density	Number of Data (K)
0	8-dot single-density	8	67 DPI	101 DPI	$nL + nH \times 256$
1	8-dot double-density	8	67 DPI	203 DPI	$nL + nH \times 256$
32	24-dot single-density	24	203 DPI	101 DPI	$(nL + nH \times 256) \times 3$
33,35	24-dot double-density	24	203 DP	203 DPI	$(nL + nH \times 256) \times 3$

300DPI

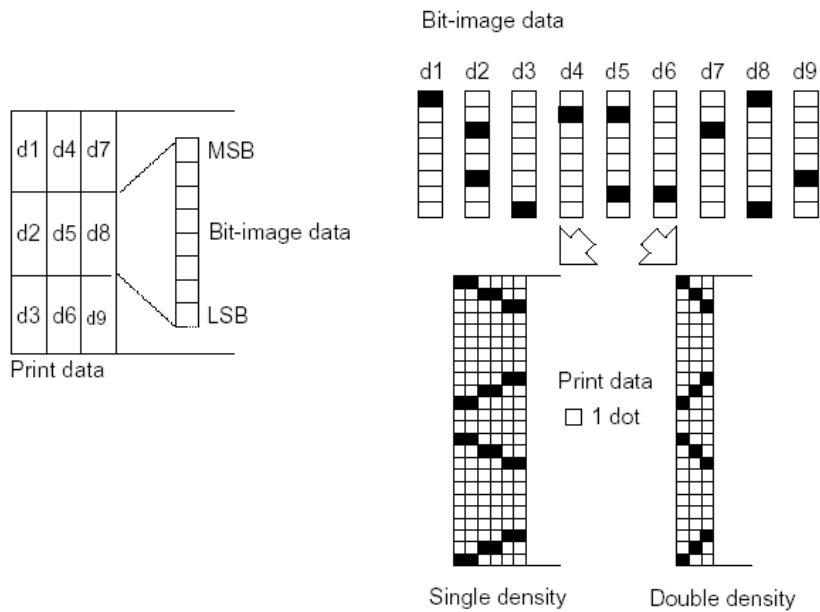
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot density	Number of Data (K)
0	8-dot single-density	8	100 DPI	150 DPI	$nL + nH \times 256$
1	8-dot double-density	8	100 DPI	300 DPI	$nL + nH \times 256$
32	24-dot single-density	24	300 DPI	150 DPI	$(nL + nH \times 256) \times 3$
33,35	24-dot double-density	24	300 DPI	300 DPI	$(nL + nH \times 256) \times 3$

[Notes]

- If the value of m is out of the specified range, nL and data following are processed as normal data.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- d indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
- The relationship between the image data and the dots to be printed is as follows:
- When 8-dot bit image is selected:



When 24-dot bit image is selected:



ESC - n

[Name] Turn underline mode on/off

[Format] ASCII ESC - n

Hex 1B 2D n

Decimal 27 45 n

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

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

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

- [Notes]
- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
 - The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
 - Changing the character size does not affect the current underline thickness.
 - Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

[Default] n = 0

[Reference] **HT, ESC !**

ESC 2

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

ESC 3 n

[Name]	Set line spacing		
[Format]	ASCII	ESC	3 n
	Hex	1B	33 n
	Decimal	27	51 n
[Range]	$0 \leq n \leq 255$		
[Description]	Sets the line spacing to [n × vertical or horizontal motion unit] inches.		
[Notes]	▪ The line spacing can be set independently in standard mode and in page mode.		
	▪ The horizontal and vertical motion units are specified by GS P . Changing the horizontal or vertical motion unit does not affect the current line spacing.		
	▪ In standard mode, the vertical motion unit (y) is used.		
	▪ In page mode, this command functions as follows, depending on the starting position and direction of the printable area:		
	- When the starting position is set to the upper left or lower right of the printable area with ESC T , the vertical motion unit (y) is used.		
	- When the starting position is set to the upper right or lower left of the printable area with ESC T , the horizontal motion unit (x) is used.		
	▪ The maximum paper feed amount is 600 mm (23.6 inches) for 300 DPI printer and 900mm (35.4 inches) for 203 DPI printer. If a paper feed amount of more than 600 mm (300DPI) or 900mm (203DPI) is set, the printer feeds the paper only 600mm (300DPI) or 900mm (203DPI).		
	Line spacing is equivalent to approximately 4.23mm (1/6 inches).		
[Default]	ESC 2, GS P		
[Reference]			

ESC = n

[Name]	Set peripheral device
[Format]	ASCII ESC = n Hex 1B 3D n Decimal 27 61 n
[Range]	$0 \leq n \leq 255$
[Description]	Disable or enable peripheral device to which host computer sends data.
[Notes]	• The lowest bit of n is effective; • When the LSB of n is 0, printer is disabled; • When the LSB of n is 1, printer is enabled' • When the printer is enabled when power on When the printer is disabled, it ignores all data except for real-time command (DLE EOT) until it is enabled by this command.
[Default]	N = 1

ESC ? n

[Name]	Cancel user-defined characters
[Format]	ASCII ESC ? n Hex 1B 3F n Decimal 27 63 n
[Range]	$32 \leq n \leq 127$
[Description]	Cancels user-defined characters.
[Notes]	▪ This command cancels the pattern defined for the character code specified by n. After the user-defined characters 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.
[Reference]	▪ ESC &, ESC %

ESC @

[Name]	Initialize printer		
[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64
[Description]	Clears the data in the print buffer and resets the printer mode to the default mode when the power was turned on.		
[Notes]	▪ The bit-image data or user-defined characters in RAM are cleared. ▪ The macro definition is not cleared. ▪ The NV bit image data is not cleared.		

ESC D n1...nk NUL

[Name]	Set horizontal tab positions			
[Format]	ASCII	ESC	D	n1...nk NUL
	Hex	1B	44	n1...nk 00
	Decimal	27	68	n1...nk 0
[Range]	$1 \leq n \leq 255$ $0 \leq k \leq 32$			
[Description]	Sets horizontal tab positions. ◆ n+1 specifies the column number for setting a horizontal tab position from the beginning of the line. ◆ k indicates the total number of horizontal tab positions to be set.			
[Notes]	▪ The horizontal tab position is stored as a value of [character width × 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. ▪ Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data. ▪ Transmit [n] k in ascending order and place a NUL code 0 at the end. ▪ When [n] k is less than or equal to the preceding value [n] k-1, tab setting is finished and the following data is processed as normal data. ▪ ESC D NUL cancels all horizontal tab positions. ▪ The previously specified horizontal tab positions do not change, even if the character width changes. ▪ The character width is independent for each standard and page mode.			
[Example]	When n = 8, printing position is at the ninth line			

[Default]	The default tab positions are at intervals of 8 standard ASCII characters (columns 9, 17, 25).
[Reference]	HT

ESC E n

[Name]	Turn emphasized mode on/off
[Format]	ASCII ESC E n
	Hex 1B 45 n
	Decimal 27 69 n
[Range]	$0 \leq n \leq 255$
[Description]	Turns emphasized mode on or off ◆ When the LSB of n is 0, emphasized mode is turned off. ◆ When the LSB of n is 1, emphasized mode is turned on.
[Notes]	▪ Only the least significant bit of n is effective. ▪ ESC ! turn on and off emphasized mode in the same way, the last received command is available. ▪ Printer output is the same in double-strike mode and in emphasized mode.
[Default]	n = 0
[Reference]	ESC !, ESC G

ESC G n

[Name]	Turn on/off double-strike mode
[Format]	ASCII ESC G n
	Hex 1B 47 n
	Decimal 27 71 n
[Range]	$0 \leq n \leq 255$
[Description]	Turns double-strike mode on or off. ◆ When the LSB of n is 0, double-strike mode is turned off. ◆ When the LSB of n is 1, double-strike mode is turned on.
[Notes]	▪ Only the least significant bit of n is enabled. ▪ Printer output is the same in double-strike mode and in emphasized mode. ▪ ESC ! can turn emphasized mode on/off, the last received command is effective.
[Default]	n = 0
[Reference]	ESC E, ESC !

ESC J n

[Name]	Print and feed paper			
[Format]	ASCII	ESC	J	n
	Hex	1B	4A	n
	Decimal	27	74	n
[Range]	$0 \leq n \leq 255$			
[Description]	Prints the data in the print buffer and feeds the paper [n × vertical or horizontal motion unit] inches.			
[Notes]	▪ 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 settings of ESC 2 or ESC 3. ▪ The horizontal and vertical motion units are specified by GS P. ▪ 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 for selecting vertical motion unit(y) or horizontal motion unit(x): –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. –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 600mm (23.6 inches) for 300DPI printer and 900mm (35.4 inches) for 203DPI printer. When the setting value exceeds the maximum, it is converted to the maximum automatically.			

GS P

[Reference]

ESC L

[Name]	Select page mode		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	Switches from standard mode to page mode.		
[Notes]	▪ This command is enabled only when processed 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 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 switches the settings for the following commands to those for page mode:
 - Set right-side character spacing: **ESC SP**
 - Select line spacing: **ESC 2, ESC 3**
 - Only value settings is possible for the following commands in page mode; these commands are not executed until switch to standard mode.
 - Turn 90° clockwise rotation mode on/off: **ESC V**
 - Turn upside-down printing mode on/off: **ESC {**
 - Set left margin: **GS L**
 - Set printable area width: **GS W**
 - The printer returns to standard mode, after it is reset, or executes **ESC @**.
- [Reference] **FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS \$, GS **

ESC M n

[Name]	Select character font			
[Format]	ASCII	ESC	M	n
	Hex	1B	4D	n
	Decimal	27	77	n
[Range]	n = 0, 1, 2, 3, 48, 49, 50, 51			
[Description]	Selects character fonts.			
	N	Function		
	0,48	Select standard ASCII font		
	1,49	Select compressed ASCII font:		
	2,50	Select user defined character		
	3,51	Select Chinese font, include:		
		1) Simplified Chinese (GB2312) 2) Traditional Chinese (BIG5) 3) Japanese (JIS/SJIS/EUC) 4) Korean (KSC5601/EUC) The printer will print selected Chinese font [simplified Chinese, traditional Chinese, Japanese (EUC) or Korean (EUC)] according to its configuration		
[Notes]	• When Chinese font is selected, Chinese font and western font can be printed together. The font code in <20>H~<FE>H is identified as Western font automatically, and those in <A1>H~<FE> are Chinese font. • When Japanese is selected, the command switches western font to Japanese. • After Chinese font is selected, Font A is also enabled automatically.			

ESC R n

[Name] Select an international character set

[Format] ASCII ESC R n

Hex 1B 52 n

Decimal 27 82 n

[Range] $0 \leq n \leq 13$

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

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

[Notes]

- This command is only enabled for 203DPI printer.

[Default]

n = 0

ESC S

[Name] Select standard mode

[Format] ASCII ESC S

Hex 1B 53

Decimal 27 83

[Description] Switches from page mode to standard mode.

[Notes]

- This command is effective only in page mode.
- Data buffered in page mode are cleared.
- This command sets the print position to the beginning of the line.
- The page mode zone is initialized as default.
- This command switches the settings for the following commands to those for standard mode:

- .-Set right-side character spacing: **ESC SP**
- .-Select default line spacing: **ESC 2, ESC 3**
- The following commands are enabled only to set in standard mode.
 - .-Set printing area in page mode: **ESC W**
 - .-Select print direction in page mode: **ESC T**
- The following commands are ignored in standard mode.
 - .-Set absolute vertical print position in page mode: **GS \$**
 - .-Set relative vertical print position in page mode: **GS **
- Standard mode is selected automatically when the printer is reset, or command **ESC @** is used.

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

ESC T n

[Name] Select print direction in page mode

[Format]

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

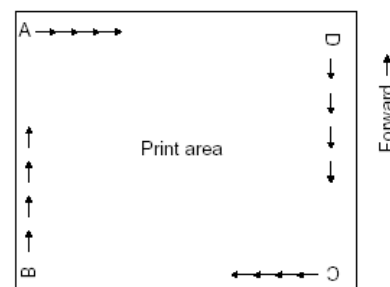
[Range]

$0 \leq n \leq 3$

$48 \leq n \leq 51$

[Description] Selects the print direction and starting position in page mode. n specifies the print direction and starting position as follows:

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



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

-If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction:

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

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

[Default] n = 0

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

ESC V n

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

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

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

[Description] Turns 90° clockwise rotation mode on/off. n is used as follows:

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

[Notes]

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

[Default] n = 0

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

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set printing area in page mode

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

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

[Description] The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as x0, y0, dx (inch), dy (inch), respectively. Each setting for the printing area is calculated as follows:

Horizontal starting position: $x0 = [(xL + xH \times 256) \times (\text{horizontal motion unit})] \text{ inches}$

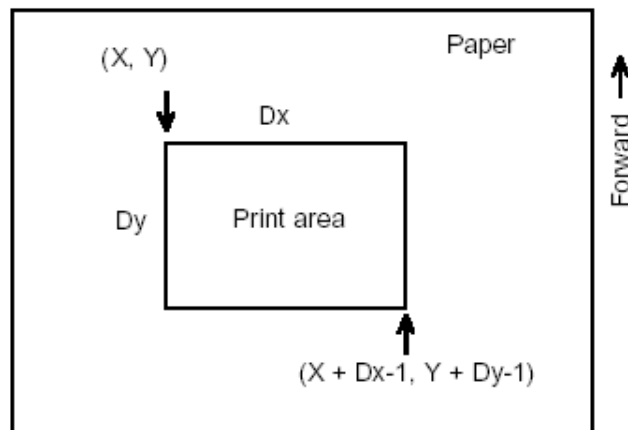
Vertical starting position: $y0 = [(yL + yH \times 256) \times (\text{vertical motion unit})] \text{ inches}$

Printing area width: $dx = [dxL + dxH \times 256] \times (\text{horizontal motion unit}) \text{ inches}$

Printing area height: $dy = [dyL + dyH \times 256] \times (\text{vertical motion unit}) \text{ inches}$

[Notes]

- If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area- horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area – vertical starting position).
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.
- Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width, and use the vertical motion unit (y) for setting the vertical starting position and printing area height.
- When the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as X, Y, Dx, and Dy respectively, the printing area is set as shown in the figure below.



Decided by printer configuration

[Default]

CAN, ESC L, ESC T, GS P

[Reference]

ESC \ nL nH

[Name]	Set horizontal relative print position				
[Format]	ASCII	ESC	\	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH
[Range]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
[Description]	◆ Sets the print starting position based on the current position by using the horizontal or vertical motion unit. ◆ This command sets the distance from the current position to [(nL + nH × 256) × horizontal or vertical motion unit] inches				
[Notes]	▪ Any setting that exceeds the printable area is ignored. ▪ When pitch N is specified to the right, $nL + nH \times 256 = N$. ▪ When pitch N is specified to the left (the negative direction): $nL + nH \times 256 = 65536 - N$. ▪ The print starting position moves from the current position to [N × horizontal or vertical motion unit] ▪ The horizontal and vertical motion units are specified by GS P. ▪ In standard mode, the horizontal motion unit is used. ▪ In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area: -When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (x) is used. -When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.				
[Reference]	ESC \$, GS P				

ESC a n

[Name] Select justification

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

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

[Description] Aligns all the data in one line to the specified position
n selects the justification as follows:

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

[Notes]

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.

[Default] n = 0

[Example]

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

ESC c 0 n

[Name] Select paper type to be used

[Format] ASCII ESC c 0 n
Hex 1B 63 30 n
Decimal 27 99 48 n

[Range] n = 0, 1, 2

[Description] Selects paper type specified by n as follows.

n	Paper type
0	Continuous paper
1, 2	Marked paper

[Notes]

[Default] n = 0

ESC c 1 nL nH

[Name]	Set cutting position				
[Format]	ASCII	ESC	c	1	nL nH
	Hex	1B	63	31	nL nH
	Decimal	27	99	49	nL nH
[Range]	$0 \leq nL \leq 255; 0 \leq nH \leq 255;$ $N = (nL + nH \times 256)$ (If $n < 19$, $n = 19$)				
[Description]	Sets the cutting position to a place when marked paper is selected.				
[Notes]	• Direction settings: feeding paper is front, reversing feed paper is back.				
	• The relationship between N and the cutting position is defined as below. If n increase, the cutting position move backward; If n decrease, the position move forward : $n/8$ (mm) for 203DPI, $n/12$ (mm) for 300DPI.				
	• When $nL = nH = 255$, the N saved to printer will not loss even when printer is turned off/on.				

ESC c 3 n

[Name]	Select paper-end signal of paper sensor				
[Format]	ASCII	ESC	c	3	n
	Hex	1B	63	33	n
	Decimal	27	99	51	n
[Range]	$0 \leq n \leq 255$				
[Description]	Select paper sensor to output paper-end signal				

- The definition of n bit is as follows:

Bit	0/1	Hex	Decimal	Function
0	0	00	0	undefined
1	0	00	0	Paper-near-end sensor is not available
	1	02	2	Paper-near-end sensor is available
2	0	00	0	undefined
3	0	00	0	Paper end sensor is not available
	1	08	8	Paper end sensor is available
4-7				undefined

[Notes]	• It is possible to select two sensors to output signals. Then, if any of the sensors detect a paper end, the paper end signal is output.
	• The command is available only with a parallel interface and is ignored with a serial interface.
[Default]	n = 0

ESC c 4 n

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

[Format] ASCII ESC c 4 n

Hex 1B 63 34 n

Decimal 27 99 52 n

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

[Description] Selects the paper sensor(s) used to stop printing when a paper-end is detected, using n as follows:

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

[Notes] • When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor. When the paper roll sensor detects a paper-end, the printer goes off-line after current printing stops.

[Default] n = 0

ESC c 5 n

[Name] Enable/disable panel buttons

[Format] ASCII ESC c 5 n

Hex 1B 63 35 n

Decimal 27 99 53 n

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

[Description] Enables or disables the panel buttons.

◆ When the LSB of n is 0, the panel buttons are enabled.

◆ When the LSB of n is 1, the panel buttons are disabled.

[Notes] ■ Only the LSB of n is valid.
■ When the panel buttons are disabled, none of them are usable.
■ In the macro ready mode, the panel buttons are always enabled.

[Default] n = 0

ESC c 8 n

[Name] Select PRST action mode

[Format] ASCII ESC c 8 n

Hex 1B 63 38 n

Decimal 27 99 56 n

[Range] $0 \leq n \leq 3$

[Description] Selects PRST action mode specified by n as follows.

N	PRST action mode
0	Retraction mode
1	Ejection mode(special model)
2	PRST holding waiting mode
3	PRST disabled mode

[Notes] Printer operates after receiving command, then if PRST is enabled, proceed as follows:

- During printing, the PRST starts and hold the paper head. The PRST will accommodate the printout and hold the end of paper after the printing is finished. After the waiting time, the PRST operates as follows:
 - 1) In retraction mode, retract the printout into a waste-bin, after reach a setting time. Its main purpose: user doesn't take it away in specified time, and avoid pollution and keep secrecy for customers.
 - 2) In ejection mode, discharge the printout after reach a setting time. Its main purpose: If user doesn't take paper away in specified time, it discharges for next printout.
 - 3) In waiting mode, wait until the user takes the printout away after a setting time.
- If the PRST is disabled, it takes no actions during printing and after printing. It is recommended to remove the PRST to prevent from paper jam if the PRST function is not desired.
- **ESC c 9** can set the waiting time before action of PRST.
- **ESC c 9**

[Reference]

ESC c 9 t

[Name]	Set PRST waiting time
[Format]	ASCII ESC c 9 t Hex 1B 63 39 t Decimal 27 99 57 t
[Range]	$0 \leq n \leq 240$
[Description]	Sets the time period (t in seconds) for PRST to wait before it takes any actions set by ESC c 8 .
[Notes]	▪ Actions here mean the PRST action modes specified in ESC c 8 command
[Reference]	▪ ESC c 8

ESC c @ n

[Name]	Enable/disable real-time commands
[Format]	ASCII ESC c @ n Hex 1B 63 40 n Decimal 27 99 64 n
[Range]	$0 \leq n \leq 255$
[Description]	Enables or disables the real-time commands. ♦ When the LSB of n is 0, the real-time commands are disabled. ♦ When the LSB of n is 1, the panel buttons are enabled.
[Notes]	▪ Only the LSB of n is valid. ▪ When the printer is turned on, the real-time commands are always enabled. ▪ When error occurs, the real-time commands are automatically enabled.
[Reference]	DLE EOT n

ESC c l

[Name]	PRESENTER retract immediately
[Format]	ASCII ESC c l Hex 1B 63 49 Decimal 27 99 73
[Description]	PRESENTER retract the paper immediately
[Notes]	This command does not change the waiting time of PRESENTER.
[Reference]	ESC c 8

ESC d n

[Name]	Print and feed n lines			
[Format]	ASCII	ESC	d	n
	Hex	1B	64	n
	Decimal	27	100	n
[Range]	$0 \leq n \leq 255$			
[Description]	Prints the data in the print buffer and feeds n lines (character line).			
[Notes]	▪ This command sets the print starting position to the beginning of the line. ▪ This command does not affect the line spacing set by ESC 2 or ESC 3. ▪ The maximum paper feed amount is 600mm (23.6 inches) for 300DPI printer and is 900mm (35.4 inches) for 203DPI printers. If the paper feed amount (nx line spacing) of more than 600mm (300DPI) or 900mm (203DPI) is specified, the printer feeds the paper only 600mm (300DPI) or 900mm (203DPI).			
[Reference]	ESC 2, ESC 3			

ESC i

[Name]	Cut paper		
[Format]	ASCII	ESC	i
	Hex	1B	69
	Decimal	27	105
[Notes]	Cut paper		
[Description]	• If the paper feeding length (L1) is less than the minimum page length (L_m) specified when executing this command, the printer feeds paper (L_m-L1) long and cuts paper. Otherwise, the printer cuts paper directly. • In marked paper mode, cutting position is specified with marks and cuts paper.		

ESC l n X0l X0h Y0l Y0h X1l X1h Y1l Y1h

[Name]	Underline command						
[Forma]	ASCII	ESC	l	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h		
	Hex	1B	6C	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h		
	Decimal	27	108	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h		
[Range]	0 ≤ n ≤ 255						
[Description]	Set the position of start point and end point, then make a line in printing buffer area. n indicates the dots of thickness. X0l X0h Y0l Y0h set the start point (X0,Y0) ,X1l X1h Y1l Y1h set the end point (X1,Y1) . X0 = X0l + X0h×255,Y0 = Y0l + Y0h×255,X1 = X1l + X1h×255,						

$$Y1 = Y1l + Y1h \times 255.$$

- [Notes]
- This command is effective only in page mode.
 - This command can only make horizontal line and vertical line, so Y0 must equal to Y1 when X0 is unequal to X1, and X0 must equal to X1 when Y0 is unequal to Y1.
 - This command is not effective when the start point and end point exceeds the printing area.

ESC t n

- [Name] Select character code table
- [Format] ASCII ESC t n
 Hex 1B 74 n
 Decimal 27 116 n
- [Range] $0 \leq n \leq 5, 16 \leq n \leq 19,$
- [Description] Selects a page n from the character code table.

n	Page
0	PC437
1	Katakana
2	PC850
3	PC860
4	PC863
5	PC865
16	WPC1252
17	PC866
18	PC852
19	PC858

- [Notes]
- This command is enabled only for 203 DPI printers.
 - If the character set in printer is Chinese font, this command is not effective.
 - If printer font is Chinese character font, use **ESC M n** command to select English font first, then select page code with this command.
- [Default] ▪ Details see appendix 2 (Character code table)
 n = 0

ESC v

[Name] Transmit device status

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

[Description] Transmits the device status in one-byte data.

[Notes] • The command is non-real time
• Transmits the status via serial interface and/or USB interface. If printer has serial and USB interfaces, the data return to serial and USB interface at same time.

Define returned bytes as follows:

Bit	On/Off	Hex	Device Status
0	0/1	00/01	Paper adequate / Paper near end
1	0/1	00/02	Print head close / Print head open
2	0/1	00/04	Paper adequate / Paper end
3	0/1	00/08	Print head normal / overheat
4	0/1	00/10	Cutter normal / Cutter error

ESC { n

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

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

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

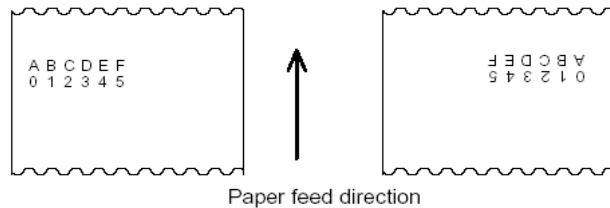
[Description] Turns upside-down printing mode on or off.

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

[Notes] ▪ Only the LSB 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.

[Default] n = 0

[Example]



FS p n m

[Name] Print NV bit image

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

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

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

203DPI:

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

300DPI:

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0.48	Normal	300	300
1.49	Double-width	300	150
2.50	Double-height	150	300
3.51	Quadruple	150	150

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

- [Notes]
- 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.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
 - If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.

ESC *, FS q, GS /, GS v 0

[Reference]

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

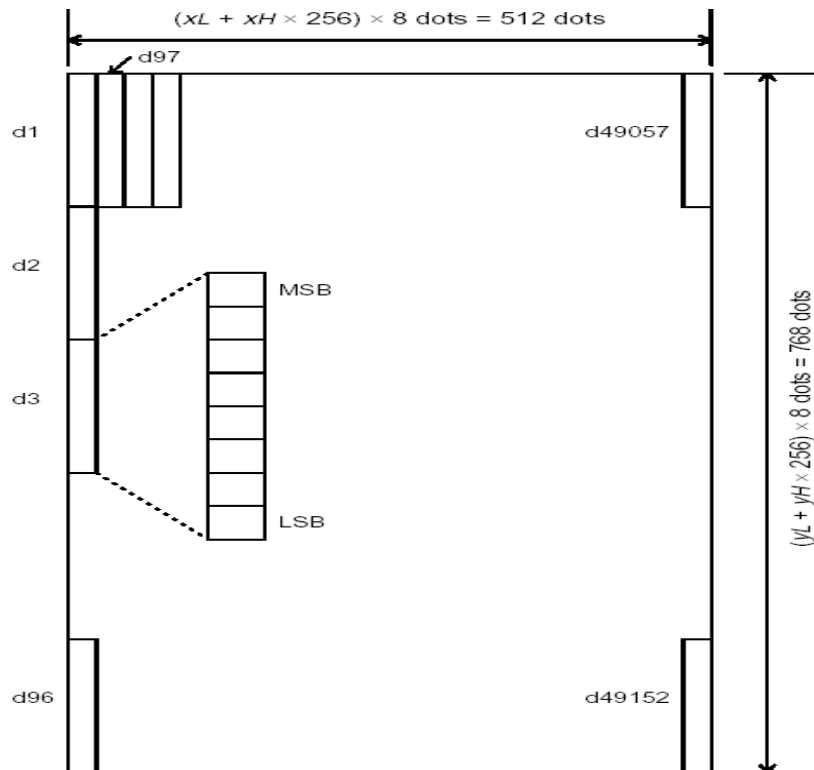
[Name]	Define NV bit image
[Format]	ASCII FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
[Range]	$1 \leq n \leq 255$ $0 \leq xL \leq 255$ $1 \leq (xL + xH \times 256) \leq 1023$ $1 \leq (yL + yH \times 256) \leq 8191$ $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$ Total defined data area(MAX) = 512K bits (64K bytes)
[Description]	Define the NV bit image specified by n. ◆ n specifies the number of the defined NV bit image. ◆ xL, xH specifies $(xL + xH \times 256) \times 8$ dots in the horizontal direction for the NV bit image you are defining. ◆ yL, yH specifies $(yL + yH \times 256) \times 8$ dots in the vertical direction for the NV bit image you are defining.
[Notes]	▪ Frequent write 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 bit images 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 busy to write data to NV memory and stops receiving any more commands. Therefore, before the ending of the processing of this command, do not send any other commands even real-time commands to the printer. ▪ NV bit image means a bit image which is defined in a non-volatile memory by FS q and printed by FS p. ▪ In standard mode, this command is effective only when processed at the beginning of the line. ▪ This command commences effective when 7 bytes <FS~yH> is processed as a normal value. ▪ When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes the defined range by xL, xH, yL, yH. ▪ In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled. ▪ In groups of NV bit images other than the first one, when the printer processes xL, xH,

yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.

- The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
- This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command **FS p**.
- A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses $[(\text{data: } (xL + xH \times 256) \times (yL + yH \times 256) \times 8) + [\text{header:4}]]$ bytes of NV memory.
- The definition area in this printer is a maximum of 512K bits (64K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 512K bytes (64K bytes).
(Different printer download different space, please refer to printer configuration)
- During the processing of this command, the printer does not transmit status and does not respond to status inquiry as well.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

[Reference] **FS p**

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



GS FF

[Name] Feed paper until the next black mark reaches print position

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

[Description] Feed paper until the next black mark reaches print position

GS ! n

[Name] n select character size

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

[Range] $0 \leq n \leq 255$
($1 \leq \text{vertical number of times} \leq 6$, $1 \leq \text{horizontal number of times} \leq 6$)

[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
0-3	Character height selection. See Table 2.			
4-7	Character width selection. See Table 1.			

Table 1

Table 2

Character Width Selection			Character Height Selection		
Hex	Decimal	Width	Hex	Decimal	Width
00	0	1 (normal)	00	0	1 (normal)
10	16	2	01	1	2
20	32	3	02	2	3
30	48	4	03	3	4
40	64	5	04	4	5
50	80	6	05	5	6
60	96	6	06	6	6
70	112	6	07	7	6

[Notes]

- This command is effective for all characters (alphanumeric and Kanji) except for HRI characters.
- If n is outside of the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.
- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default]

n = 0

[Reference]

ESC !

GS # n

[Name]

Specify a number for the bit-image to be downloaded.

[Format]

ASCII GS # n
Hex 1D 23 n
Decimal 29 35 n

[Range]

$0 \leq n \leq 7$

[Description]

Specifies a number for the bit-image to be downloaded. This number is to be used when downloading and printing this bit-image.

[Notes]

- The command is only enabled for bit-images in RAM and the settings are erased when the printer is turned off.

GS \$ nL nH

[Name]	Set absolute vertical print position in page mode			
[Format]	ASCII	GS	\$	nL nH
	Hex	1D	24	nL nH
	Decimal	29	36	nL nH
[Range]	$0 \leq nL \leq 255, 0 \leq nH \leq 255$			
[Description]	◆ Sets the absolute vertical print starting position for buffer character data in page mode.			
	◆ This command sets the absolute print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ inches.			
[Notes]	▪ This command is effective only in page mode.			
	▪ If the $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ exceeds the specified printing area, this command is ignored.			
	▪ The horizontal starting buffer position does not move after enabling the command.			
	▪ The reference starting position is specified by ESC T .			
	▪ This command operates as follows, depending on the starting position of the printing area specified by ESC T :			
	-When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.			
[Reference]	-When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.			
	▪ The horizontal and vertical motion units are specified by GS P .			
	ESC \$, ESC T, ESC W, ESC \, GS P, GS \,			

GS (A pL pH n m

[Name]	Execute test printing				
[Format]	ASCII	GS	(	A	pL pH n m
	Hex	1D	28	41	pL pH n m
[Range]	$(pL + (pH \times 256)) = 2$ ($pL=2, pH=0$)				
	$0 \leq n \leq 2, 48 \leq n \leq 50$				
	$1 \leq m \leq 3, 49 \leq m \leq 51$				
[Description]	• Execute the test printing in the mode decided by n, m				
	m specifies a test pattern.				

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

- [Notes] • This command is enabled only when processed at the beginning of a line in standard mode.
- This command is not effective in page mode.
 - When this command is received during macro definition, the printer ends macro definition and begins performing this command.
 - The printer cuts the paper at the end of the test print.

GS (E pL pH m [parameter]

[Name] User-defined commands

[Description] The user-defined commands control the values which are stored in the user NV memory.

The functions selected by m as below.

m	Format	Function
1	GS (E pL pH m d1 d2	Enter user-defined mode
2	GS (E pL pH m d1 d2 d3	End user-defined mode
3	GS (E pL pH m [a1 b18 ...b11]...[ak bk8...bk1]	Sets the customized data of memory switch
4	GS (E pL pH m a	Transmits the customized data in the memory switch

- The number of bytes is specified by pL, pH is (pL + (pH $\square$ 256)).
- m specifies the function
 - d1, d2, d3 specifies the parameters to select the mode.
 - a specifies the type of the stored data.
 - bk8...bk1 specifies the value to be set to the stored data which is specified by a .
- In the Function 2, the printer performs the software reset. Therefore, the printer clears the receive and print buffers, and resets all settings (user-defined characters, downloaded bit images, macros, and the character style) to the mode that was in effect at power on.

[Notes] Frequent write command executions by a NV memory write command may damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.

GS (E pL pH m d1 d2 (m = 1) <Function 1>

[Format] ASCII GS (E pL pH m d1 d2

Hex 1D 28 45 pL pH 01 d1 d2

Decimal 29 40 69 pL pH 1 d1 d2

[Range] pL = 3, pH = 0

m = 1

d1 = 73

d2 = 78

[Description] • Enters to the user-defined mode and transmits the following data.

Header: Hexadecimal = 37H /Decimal = 55 (1 byte)

Flage: Hexadecimal = 20H /Decimal = 32 (1 byte)

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

- In the user-defined mode, only the following commands can be executed:

Function 2, Function 3 and Function 4 of this command and **GS I**:

GS (E pL pH m d1 d2 d3 (m = 2) <Function 2>

[Format] ASCII GS (E pL pH m d1 d2 d3
 Hex 1D 28 45 pL pH 02 d1 d2 d3
 Decimal 29 40 69 pL pH 2 d1 d2 d3

[Range] pL = 4, pH = 0
 m = 2
 d1 = 79
 d2 = 85
 d3 = 84

[Description] • Ends the user-defined mode and performs the software reset. Therefore, the printer clears the receive and print buffers, and resets all settings (user-defined characters, downloaded bit images, macros, and the character style) to the mode that was in effect at power on.

- The function with m = 2 of this command is only effective on the user-defined mode.

GS (E pL pH m [a1 b18...b11]...[ak bk8...bk1] (m = 3) <Function 3>

[Format] ASCII GS (E pL pH m [a1 b18...b11]...[ak bk8...bk1]
 Hex 1D 28 45 pL pH 03 [a1 b18...b11]...[ak bk8...bk1]
 Decimal 29 40 69 pL pH 3 [a1 b18...b11]...[ak bk8...bk1]

[Range] $10 \leq (pL + pH \times 256) \leq 65530$
 (where $(pL + pH \times 256) = 9 \cdot (k + 1) - 1$; $0 \leq pL \leq 255$; $0 \leq pH \leq 255$)
 m = 3
 $1 \leq a \leq 8$
 b = 48, 49, 50
 $1 \leq k \leq 7281$

[Description] Changes the setting of the memory switch specified with a using the value of b

b	Function
48	Sets the specified bit to 0
49	Sets the specified bit to 1
50	Does not change the previous status of the specified bit

- The total bits of the memory switch is 8.
- The value of b is processed in order of bit 8 to bit 1;
- If an error occurs in the process of writing data, the memory error process is executed.
- Set b as "2" (50) to the reserved bit.

- If the settings are changed, they become effective when the BA-T500 is reset other power is turned on again.
- The setting values can be checked by executing the self-test.

GS (E pL pH m a (m = 4) <Function 4>

[Format] ASCII GS (E pL pH m a
 Hex 1D 28 45 pL pH 04 a
 Decimal 29 40 69 pL pH 4 a

[Range] (pL + pH × 256) = 2 (pL = 2, pH = 0)
 m = 4
 1 ≤ a ≤ 8

[Function] Sends the setting values of the memory switch specified with a
 The contents of the transmit data are as follows:

Transmit data	Hex	Decimal	Number of data
① Header	37H	55	1 byte
② Flag	21H	33	1 byte
③ Data	30H, 31H	48, 49	8 bytes
④ NUL	00H	0	1 byte

Contents of data shown in ③ above:

The on/off setting of the memory switch is defined as [Off: Hex=30H/Decimal=48] or [On: Hex=31H / Decimal=49]. Each 1 byte for 8 memory switches are transmitted from bit 8 to bit 1.

Example: Transmitted data: "10110001"

(31H, 30H, 31H, 31H, 30H, 30H, 30H, 31H)

Switch No.	8	7	6	5	4	3	2	1
Status	On	Off	On	On	Off	Off	Off	On

- If an unsupported memory switch number is selected, this command is ignored.
- If this command is ignored, the printer doesn't send any data.

GS * x y d1...d(x × y × 8)

[Name] Define downloaded bit image

[Format] ASCII GS * x y d1...d(x × y × 8)
 Hex 1D 2A x y d1...d(x × y × 8)
 Decimal 29 42 x y d1...d(x × y × 8)

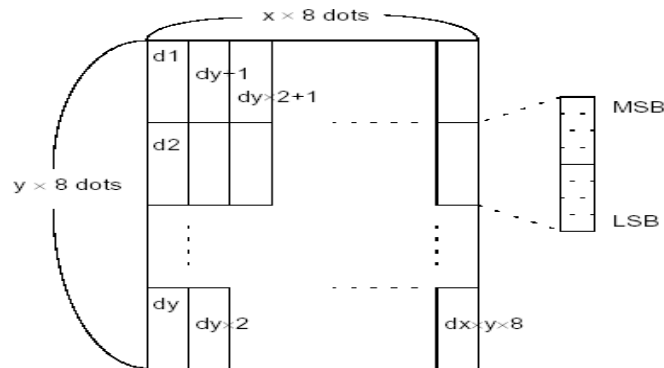
[Range] 1 ≤ x ≤ 255, 1 ≤ y ≤ 255
 x × y ≤ 2048
 0 ≤ d ≤ 255

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

♦ y specifies the number of dots in the vertical direction.

[Notes]

- The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it is $y \times 8$.
- If $x \times y$ is out of the specified range, this command is disabled.
- The maximum capacity for bit-images in RAM is 16K bytes.
- The execution of **ESC &** command will erase the bit-images in RAM downloaded with this command.
- The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
- The downloaded bit image definition is cleared when printer is reset or the power is turned off.
- The number for the bit-image downloaded is defined by **GS #** command.
- The following figure shows the relationship between the downloaded bit image and the printed data.



GS /

[Reference]

GS / m

[Name] Print downloaded bit image

[Format] ASCII GS / m

Hex 1D 2F m

Decimal 29 47 m

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

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

m selects a mode from the table below:

203DPI:

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

3, 51	Quadruple	101	101
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300DPI

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	300	300
1, 49	Double-width	300	150
2, 50	Double-height	150	300
3, 51	Quadruple	150	150

[Notes]

- This command is ignored if a downloaded bit image has not been defined.
- This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- The command sets the position after printing to the beginning of next line.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- The command prints bit-images in RAM and not that in NV memory. The number for the bit-image to be printed is defined by **GS #** command.

[Reference]

GS *, **GS #**

GS :

[Name] Start/end macro definition

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

[Description] Starts or ends macro definition.

[Notes]

- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
- When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.
- When **GS ***, **FS q** is received during macro definition, the printer ends macro definition and clears the definition.
- Macro operates once automatically when macro definition is over.
- 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.
- The contents of the macro can be defined up to 2046 bytes. If the macro definition exceeds 2046 bytes, excess data is processed as normal data.

[Reference]

GS ^

GS B n

[Name]	Control white/black reverse printing mode			
[Format]	ASCII	GS	B	n
	Hex	1D	42	n
	Decimal	29	66	n
[Range]	$0 \leq n \leq 255$			
[Description]	Turns on or off white/black reverse printing mode.			
	◆ When the LSB of n is 0, white/black reverse mode is turned off. ◆ When the LSB of n is 1, white/black reverse mode is turned on.			
[Notes]	▪ Only the LSB of n is valid.			
	▪ This command is available for all built-in characters and user-defined characters except HRI characters.			
	▪ When white/black reverse printing mode is on, it also applies to the character spacing set by ESC SP.			
	▪ This command does not affect bit images, user-defined bit images, bar codes, HRI characters, and spacing skipped by HT, ESC \$, and ESC \.			
	▪ This command does not affect the space between lines.			
	▪ Underline mode is disabled when white/black reverse mode is selected. (If underline was enabled, it will be re-enabled when white/black reverse mode is turned off.			
[Default]	n = 0			

GS C 0 n m

[Name]	Select counter print mode					
[Format]	ASCII	GS	C	0	n	m
	Hex	1D	43	30	n	m
	Decimal	29	67	48	n	m
[Range]	$0 \leq n \leq 5$					
	$0 \leq m \leq 2, 48 \leq m \leq 50$					
[Description]	Select a print mode for the serial number counter					
	n specifies the number of digitals to be printed as follows:					
	when n = 0, the printer prints the actual digits.					
	when n = 1 to 5, the printer prints the actual digits indicated by the number value.					
	m specifies the printing position within the entire range of printer digits as follow:					

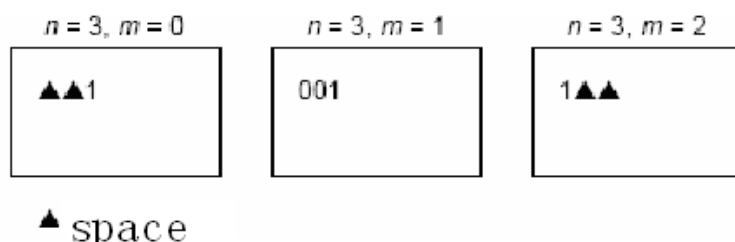
m	Printing position	Processing of digits less than those specified
0,48	Align right	Adds spaces to the left
1,49	Align right	Adds 0 to the left
2,50	Align left	Adds spaces to the right

[Notes] • If n or m out of the defined range, the previously set print mode is not changed.
• If $n = 0$, m does not have any meaning.

[Default] $n = 0, m = 0$

[Reference] **GS C 1, GS C 2, GS C, GS c**

[Examples]



GS C 1 aL aH bL bH n r

[Name] Select count mode (A)

[Format] ASCII GS C 1 aL aH bL bH n r
Hex 1D 43 31 aL aH bL bH n r
Decimal 29 67 49 aL aH bL bH n r

[Range] $0 \leq aL \leq 255$
 $0 \leq aH \leq 255$
 $0 \leq bL \leq 255$
 $0 \leq bH \leq 255$
 $0 \leq n \leq 255$
 $0 \leq r \leq 255$

[Description] Select a count mode for the serial number counter.

- aL, aH bL, bH specify the counter range.
- n indicates the stepping amount when counting up or down.
- r indicates the repetition number when the counter value is fixed.

[Notes] Count-up mode is specified when

$[aL + aH \div 256] < [bL + bH \div 256], n \neq 0$ and $r \neq 0$.

- Count-down mode is specified when

$[aL + aH \div 256] > [bL + bH \div 256], n \neq 0$ and $r \neq 0$.

- Count stop when

$[aL + aH \times 256] = [bL + bH \times 256], n = 0$ or $r = 0$.

- If setting count-up mode, the minimum value of the counter is [aL + aH x 256], the maximum number is [bL + bH x 256]. If counting up reaches a value exceeding the maximum, it is resumed with the minimum value.
- If setting count-down mode, the maximum value of the counter is [aL + aH x 256], the minimum number is [bL + bH x 256]. If counting down reaches a value less than the minimum, it is resumed with the maximum value.
- When this command is executed, the internal counter that indicates the repetition number specified by r is cleared.

[Default] aL = 1, aH = 0, bL = 255, bH = 255, n = 1, r = 1

[Reference] **GS C 0, GS C 2, GS C, GS c**

GS C 2 nL nH

[Name] Select counter

[Format]	ASCII	GS	C	2	nL	mH
	Hex	1D	43	32	nL	mH
	Decimal	29	67	50	nL	mH

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Description] Set the serial number counter value

- nL and nH determine the value of the serial number set by [nL + nH x 256].

[Notes] In count-up mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C 1** or **GS C**;, it is forced to convert to the minimum value.

- In count-down mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C 1** or **GS C**;, it is forced to convert to the maximum value.

[Default] □ nL = 1, nH = 0

[Reference] □ **GS C 0, GS C 1, GS C ; GS c**

GS C ; sa ; sb ; sn; sr; sc;

[Name] Select count mode

[Format]	ASCII	GS	C ;	sa ;	sb ;	sn ;	sr ;	sc ;
	Hex	1D	43	3B sa	3B sb	3B sn	3B sr	3B sc 3B
	Decimal	29	67	59 sa	59 sb	59 sn	59 sr	59 sc 59

[Range] 0 ≤ sa ≤ 65535

0 ≤ sb ≤ 65535

0 ≤ sn ≤ 255

0 ≤ sr ≤ 255

0 ≤ sc ≤ 255

These values are all character strings

[Description] Select a count mode for the serial number counter.

- sa, sb, sn, sr and scare all displayed in ASCII characters, using the codes for "0" to "9".
 - sa and sb set the counter range.
 - sn indicates the stepping amount of counting up or down.
- sr indicates the repetition number with the counter value fixed.
 - sc indicates the counter value.

- [Notes]
- Count-up mode is specified when: sa < sb ,sn $\neq$ 0 , sr $\neq$ 0.
 - Count-down mode is specified when: sa > sb , sn $\neq$ 0 , sr $\neq$ 0.
 - Count stop when: sa = sb or sn = 0 or sr = 0.
 - When count-up mode is specified, sa is the minimum counter value and sb is the maximum counter value. If the counter value set by sc is outside the counter operation range, the counter value is forced to convert to the minimum value.
 - When count-down mode is specified, sa is the maximum counter value and sb is the minimum counter value. If the counter value set by sc is outside the counter operation range, the counter value is forced to convert to the maximum value.
 - Parameters sa to sc can be omitted. If omitted, these argument values are unchanged.
 - Parameters sa to sc must not contain characters, except 0 to 9.
 - If an incorrect syntax is used, the corresponding parameter setting has no effect, and the data after that is processed as normal data.

[Default] sa = 1, sb = 65535, sn = 1, sr = 1, sc = 1

[Reference] GS C 0, GS C 1, GS C 2, GS c

GS H n

[Name] Select printing position for HRI characters

[Format]

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

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

[Description] Selects the printing position of HRI characters when printing a bar code.
n selects the printing position as follows:

n	Printing position
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code
3, 51	Both above and below the bar code

- [Notes]
- HRI indicates Human Readable Interpretation.
 - The commands (include white/black reverse, emphasized, character size, underline, 90° clockwise-rotation) don't affect HRI.
 - HRI characters are printed using the font specified by **GS f**.

[Default] n = 0
[Reference] **GS f, GS k**

GS I n

[Name] Transmit printer configuration
[Format] ASCII GS I n
Hex 1D 49 n
Decimal 29 73 n
[Range] n = 68, 69, 153
[Description] Transmits the printer configuration specified by n as follows:

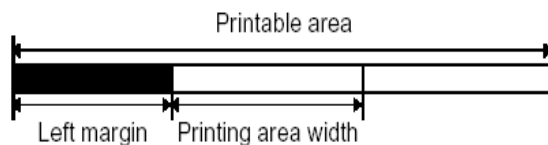
n	Printer configuration
68	Transmit firmware version
69	Transmit Boot Loader version
153	Transmit Printer name

[Notes]

- This command is only enabled for USB and/or serial interfaces. If printer has serial and USB interface, data return to serial and USB interface at the same time.

GS L nL nH

[Name] Set left margin
[Format] ASCII GS L nL nH
Hex 1D 4C nL nH
Decimal 29 76 nL nH
[Range] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$
[Description] Sets the left margin using nL and nH.
The left margin is set to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$ inches.



[Notes]

- This command is only effective when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, this command is ignored.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.

[Default] nL = 0, nH = 0

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

GS P xL xH yL yH

[Name] Set horizontal and vertical motion units

[Format] ASCII GS P xL xH yL yH
Hex 1D 50 xL xH yL yH
Decimal 29 80 xL xH yL yH

[Range] $x = xL + xH \times 256$, $y = yL + yH \times 256$

$0 \leq x \leq 360$, $0 \leq y \leq 360$

$0 \leq y \leq 360$

[Description] Sets the horizontal and vertical motion units to approximately 25.4/ x mm {1/ x inches} and approximately 25.4/ y mm {1/ y inches} respectively. When x and y are set to 0, the default setting of each value is used.

[Notes]

- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.

- In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):

.-Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**

.-Commands using y: **ESC 3, ESC J, GS V**

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

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

Commands using x: **ESC SP, ESC \$, ESC W, ESC \, FS S**

Commands using y: **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**

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

Commands using x: **ESC 3, ESC J, ESC W, GS \$, GS **

Commands using y: **ESC SP, ESC \$, ESC W, ESC \, FS S,**

GS V.

- If the related commands are not executed after changing motion unit, relative settings shall not be changed.

- The minimum motion unit is a combined result of this command and other commands.

300 DPI model: $x = 305$, $y = 305$; 203 DPI model: $x = 203$, $y = 203$

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

[Default]

[Reference]

GS V m GS V m n

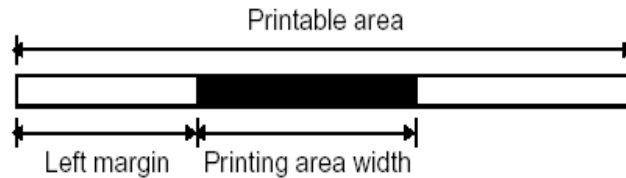
[Name]	Select cut mode and cut paper					
[Format]	ASCII	GS	V	m		
	Hex		1D	56	m	
	Decimal		29	86	m	
	ASCII	GS	V	m	n	
	Hex		1D	56	m	n
	Decimal		29	86	m	n
[Range]	. m = 0, 48 . m = 66, $0 \leq n \leq 255$					
[Description]	Selects a mode for cutting paper and executes paper cutting. The value of m selects the mode as follows:					

M	Print mode
0,48	Full cut
66	Feeds paper (n × vertical motion unit) inches and cuts the paper fully.

- [Notes for □ and □]
- [Note for □]
- This command is only effective when processed at the beginning of a line.
 - When m = 0 or 48, if the paper feed length (L1) is less than the minimum page length (L_m) specified when executing this command, the printer feeds paper (L_m-L1) long and cuts paper. Otherwise, the printer cuts paper directly.
 - When m = 66, the printer feeds paper (n × vertical motion unit) first. If the total paper feed length (L2) is less than the minimum page length (L_m) specified when executing this command, the printer feeds paper (L_m-L2) long and cuts. Otherwise, the printer cuts paper directly.
 - The horizontal and vertical motion units are specified by **GS P**.
 - The vertical motion unit (y) is used for calculating the paper feed length.
 - In marked paper mode cutting position is set with mark and cut paper.

GS W nL nH

[Name]	Set printing area width					
[Format]	ASCII	GS	W	nL	nH	
	Hex		1D	57	nL	nH
	Decimal	29	87	nL	nH	
[Range]	$0 \leq nL \leq 255$ $0 \leq nH \leq 255$					
[Description]	Sets the printing area width to the area specified by nL and nH. The printing area width is set to [(nL + nH × 256) × horizontal motion unit]] inches.					



[Notes]

- This command is only effective when processed at the beginning of the line in page mode.
- This command does not affect printing in page mode.
- If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin] is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin and print area width.

[Reference]

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

GS L, GS P

GS \ nL nH

[Name] Set relative vertical print position in page mode

[Format]

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

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

$0 \leq nH \leq 255$

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

- This command is ignored unless page mode is selected.

[Notes]

- When pitch N is specified to the movement downward:

$$nL + nH \times 256 = N$$

When pitch N is specified to the movement upward (the negative direction).

$$nL + nH \times 256 = 65536 - N$$

- Any setting that exceeds the specified printing area is ignored.
- This command function as follows specify motion unit, depending on the print starting position set by **ESC T**:
 - When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (y) is used.
 - 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**.

ESC \$, ESC T, ESC W, ESC \, GS \$, GS P

[Reference]

GS ^ r t m

[Name]	Execute macro
[Format]	ASCII GS ^ r t m Hex 1D 5E r t m Decimal 29 94 r t m
[Range]	$0 \leq r \leq 255$ $0 \leq t \leq 255$ $m = 0, 1$
[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 m = 0: The macro executes r times continuously at the interval specified by t (t x 250 ms). When m = 1: After waiting for the period specified by t, the PAPER OUT LED indicators blink and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation r times.
[Notes]	▪ The waiting time is t × 250 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, the command is disabled. ▪ When the macro is executed (m = 1), paper always cannot be fed by using the FEED button.
[Reference]	GS :

GS a n

[Name]	Enable / Disable Automatic Status Back (ASB)
[Format]	ASCII GS a n Hex 1D 61 n Decimal 29 097 n
[Range]	$0 \leq n \leq 255$
[Description]	Enables or disables Automatic Status Back function.

When the LSB of n = 0, the ASB function is disabled.

When the LSB of n = 1, the ASB function is enabled.

Only the LSB of n is valid.

[Notes]

- If the ASB function is enabled, the printer automatically transmits a four byte data status. After this, a four byte data status is returned automatically when the printer status changes.
- Transmit data status only via serial and/or USB interface. If printer has serial and USB interface, data is returned to the serial and USB interfaces at the same time.
- The four byte status is defined as follows.

First byte (printer information)

Bit	Off/On	Hex.	Status for ASB
0	0/1	00	Paper adequate/ Paper near end
1	0/1	02	Top cover closed / Top cover open
2	0/1	00/04	Paper adequate/ Paper end
3	0/1	00/08	Print head temperature normal/ Print head overheated
4	0/1	00/10	Cutter normal/ Cutter error
5	0/1	00	Reserve
6	0/1	00	Reserve
7	0	00	Fixed to 0

Second byte (printer information)

Bit	Off/On	Hex.	Description
0	0/1	00/01	PRST without paper / PRST with paper
1	0/1	00/02	Normal/Paper jam on printing part
2	0/1	00/04	Normal/Paper jam on PRST
3	0/1	00/08	Normal/Black mark missing
4	0/1	00/10	Normal/Auto paper loading error
5	0/1	00/20	Buffer not full/buffer full
6	0/1	00/40	System normal/error
7	0	00	Fixed to 0

Third byte (printer information)

Bit	Off/On	Hex.	Description	Possible error*
0-4	00000/10000	00/10	Printer idle status Normal/Error	Top cover open, Print head overheated, paper end/ near end
	00001/10001	01/11	Printing status Normal/ Error	Top cover open, Print head overheated, paper end/ near end ,Paper jam
	00010/10010	02/12	Cutting paper status Normal/ Error	Top cover open, Print head overheated, paper end / near end , cutter error Paper jam
	00011/10011	03/13	PRST feeding paper status Normal/ Error	Top cover open, Print head overheated, paper end / near end , paper jam
	00100/10100	04/14	PRST waiting status Normal/Error	Top cover open, Print head overheated, paper end / near end

	00101/10101	05/15	PRST retraction status Normal/Error	Top cover open, Print head overheated, paper end / near end , paper jam
	00110/10110	06/16	PRST ejection status Error/Normal	Top cover open, Print head overheated, paper end / near end , paper jam
	00111/10111	07/17	Auto paper loading status Normal/Error	Top cover open, Print head overheated, paper end / near end
5	0/1	00/20	PrstIn with paper / PrstIn without paper	
6	0/1	00/40	No FEED button action/FEED button action	
7	0/1	00/80	Paper retract normally/user take the paper away in the process of retracting	

Fourth byte (printer information)

Bit	Off/On	Hex.	Description
0-3	000	00	Fixed to 0
4-7	111	70	Fixed to 1

Notes:

- The function of the fifth and the seventh bytes are optional (by setting the state of the PrstIn sensor), the fifth and the seventh bytes are 0 when the function is effective.
- The fifth and the seventh bytes both indicate states and do not effect the action of the printer.
- The seventh byte will be cleared after the next cut.
- PrstIn indicates the state of the PrstIn sensor before or after retraction, with paper means that the paper holder is full of paper or some paper is absorbed on the channels.
- When the PrstIn sensor is in 'with paper' state before retraction, the printer cannot determine if the paper was taken away by user in the retraction process
- Explanation of above printer status.
 - 1) Printing status is defined as the process from printing startup to printing finish.
 - 2) Cutting paper status is defined as the whole process from feeding paper to cutting position before cut to back paper to normal position after cut.
 - 3) PRST paper feeding status is defined as the process from the start of PRST presenting paper after cutting paper status to the start of PRST holding paper for being taken away.

[Reference]

DLE EOT n

GS f n

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

[Format] ASCII GS f n

Hex 1D 66 n

Decimal 29 102 n

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

[Description] Selects a font for the HRI characters used when printing a bar code.

n selects a font from the following table:

n	Font
0,48	Standard ASCII characters : 203DPI (12 × 24) 300DPI (18 × 34)
1,49	Compressed ASCII characters: 203DPI (9 × 17) 300DPI (12 × 24)

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

[Default] n = 0

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

GS h n

[Name] Select bar code height

[Format] ASCII GS h n

Hex 1D 68 n

Decimal 29 104 n

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

[Description] n specifies the number of dots in the vertical direction.

[Default] n = 162

[Reference] **GS k**

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

[Name] Print bar code

[Format] ASCII GS k m d1...d k NUL

Hex 1D 6B m d1...d k 00

Decimal 29 107 m d1...d k 0

ASCII GS k m n d1... dn

Hex 1D 6B m n d1... dn

Decimal 29 107 m n d1... dn

[Range] $0 \leq m \leq 6$, $m = 10, 11, 12$ (k and d depends on the bar code system used)

$65 \leq m \leq 73$, $m = 75, 76, 77$ (k and d depends on the bar code system used)

[Description] Selects a bar code system and prints the bar code.

m selects a bar code system as follows:

m	Bar Code System	Number of Characters	Remarks
□	0	UPC-A	$11 \leq k \leq 12$ $48 \leq d \leq 57$
	1	UPC-E	$11 \leq k \leq 12$ $48 \leq d \leq 57$
	2	JAN13 (EAN13)	$12 \leq k \leq 13$ $48 \leq d \leq 57$
	3	JAN 8 (EAN8)	$7 \leq k \leq 8$ $48 \leq d \leq 57$
	4	CODE39	$1 \leq k \leq 255$ $45 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43$
	5	ITF	$1 \leq k \leq 255$ $48 \leq d \leq 57$
	6	CODABAR	$1 \leq k \leq 255$ $48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
	10	PDF 417	$1 \leq k \leq 928$ $0 < d \leq 255$
	11	QR CODE	$1 \leq k \leq 928$ $0 < d \leq 255$
	12	MAXICODE	$1 \leq k \leq 84$ $48 \leq d \leq 57, 65 \leq d \leq 90, 97 \leq d \leq 122$
□	65	UPC-A	$11 \leq n \leq 12$ $48 \leq d \leq 57$
	66	UPC-E	$11 \leq n \leq 12$ $48 \leq d \leq 57$
	67	JAN13 (EAN13)	$12 \leq n \leq 13$ $48 \leq d \leq 57$
	68	JAN 8 (EAN8)	$7 \leq n \leq 8$ $48 \leq d \leq 57$
	69	CODE39	$1 \leq n \leq 255$ $45 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43$ $d1 = dk = 42 (1)$
	70	ITF	$1 \leq n \leq 255$ $48 \leq d \leq 57$
	71	CODABAR	$1 \leq n \leq 255$ $48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
	72	CODE93	$1 \leq n \leq 255$ $0 \leq d \leq 127$
	73	CODE128	$2 \leq n \leq 255$ $0 \leq d \leq 127$
	75	PDF417	$1 \leq n \leq 255$ $0 \leq d \leq 255$
	76	QR CODE	$1 \leq k \leq 255$ $0 \leq d \leq 255$
	77	MAXICODE	$1 \leq k \leq 84$ $48 \leq d \leq 57, 65 \leq d \leq 90$

[Notes]

- This command ends with a NUL code
- When UPC-A or UPC-E barcode system is selected, if more than 12 bytes barcode data is received, the printer will process the excess data as normal data.
- When JAN13 (EAN13) barcode system is selected, if more than 13 bytes barcodes data is received, the printer will process the excess data as normal data.
- When JAN8 (EAN8) barcode system is selected, if more than 8 bytes barcodes data is received, the printer will process the excess 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.
- The first data of CODABAR barcode should be between from 65 ~ 68, and the last data should be one of 42, 65, 66, 67, 68, 69, 78, 84.
- The first data and the last data of CODE39 barcode should be 42, otherwise the printer will force the first data and the last data to 42.
- When selecting QR CODE barcode, $d1...dk$ ($d1...dn$) consists of five parts, the format is as following:

1) Daabbcc,

D: Linking structure mode, input particular identifier "D", this mode is selectable. If this mode is selected, the rest three parameters and separate symbol should be specified.

aa: The position of particular symbol, input 2 bit numbers in hex.

bb: The sum of symbol, input 2 bit numbers in hex.

Cc: Even or odd data, input 2 bit numbers in hex.

It is a fixed separate symbol

2) E: Error correction class. Range: L, M, Q, H, the correction class increases in turn.

3) M: Mask figure reference, Range: Default is automatic mask.

4) M: Data input mode, Range: A or M, A means automatic mode (recommended mode), M means manual mode; If A mode is specified, you don't need specify the character mode; If M mode is specified, you must specify the character mode. Default mode is automatic mode.

5) <Character mode><DATA1>,

<Character mode><DATA2>,

<Character mode><DATA3>,

.....

<Character mode><DATAn>

Note: n>=200

Character input mode<N, A, B, K>

N: Number (0~9)

A: Number and alphabet mixed (0~9)(A~Z)(SP,\$,%,*,+,-,.,/,:)

Bxxxx: 8 bit as a byte (0x00~0xFF)

K: Katakana

The legal bar width: The ratio of wide and narrow bar can not be adjusted.

For example:

1D 6B 0B 51 41 2C 30 31 32 33 34 35 36 37 38 39 41 42 43 44 20 32 44 20 63 6F 64 65 00

(Recommend automatic mode, the data mode symbol A can be omitted)

1D 6B 4c 12 48 4D 2C 4E 31 32 33 34 35 36 37 38 39 31 32 33 34 35

1D 6B 0B 4D 4D 2C 41 41 43 2D 34 32 00

1D 6B 0B 4C 4D 2C 4E 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 2C 41 41 42 43 2C
42 30 30 30 36 71 72 63 6F 64 65 00

1D 6B 0B 46 2C 4C 4D 2C 4E 30 31 32 33 34 35 36 37 38 39 2C 41 31 32 41 41 42 42 2C
42 30 30 30 36 71 72 63 6F 64 65 00

- When selecting MAXICODE barcode, the length of d1...d k (d1...dn) is not beyond the 84 characters, it consists of five parts, the format is as following:

- 1) 5 numbers of basic post code;
- 2) 4 numbers of the second post code;
- 3) 3 numbers of nation code;
- 4) 3 numbers of service class;
- 5) Character string.

Legal character: Number and alphabet;

Variable length: Adjustable.

The legal bar width: The ratio of wide and narrow bar can not be adjusted.

For example:

1D 6B 0C 33 32 37 38 39 35 35 35 35 38 34 30 36 36 36 54 48 49 53 20 50 41 43 4B 41 47
45 49 53 20 47 4F 49 4E 47 20 54 4F 20 44 41 54 41 4D 41 58 43 4F 52 50 2E 00

[Notes]

- 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 beyond of the specified range, the printer stops command processing and processes the following data as normal data.

[Notes in standard mode]

- If d is beyond the specified range, the command will be disabled.
- If the horizontal size is beyond printing area, the overrun parts will not be printed.
 - This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
 - This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, this command is ignored.
- After printing bar code, this command sets the print position to the beginning of the line.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[Notes in page mode]

- This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
- If d is beyond the specified range, this command is ignored.
- If bar code width is beyond the printing area, this command is ignored.

When CODE128 (m = 73) is used:

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

The following data should be selected in corresponding character sets.

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 not printed.

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

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

GS o n

[Name] Set all the parameters to define the QR CODE

[Format] ASCII GS o m nA nB nC

Hex 1D 6F m nA nB nC

Decimal 29 111 m nA nB nC

[Range] $m = 0, 1 \leq nA \leq 255, 0 \leq nB \leq 1, 1 \leq nC \leq 2$

[Description] the meaning of n is defined as follows:

Parameters	Meaning of the parameters
m	Fixed to 0
nA	Width of barcode basic cells
nB	Language mode 0:Chinese 1:Japanese
nC	Symbol type 1:Original type 0: Enhanced type

[Notes] When the parameter is beyond the range, this command will be disabled.

GS p n

[Name] Set all the parameters to define the PDF417

[Format] ASCII GS p nA nB nC nD nE nF

Hex 1D 70 nA nB nC nD nE nF

Decimal 29 112 nA nB nC nD nE nF

[Range] $1 \leq nA \leq 10, 1 \leq nB \leq 100, 3 \leq nC \leq 90, 1 \leq nD \leq 30, 1 \leq nE \leq 7, 2 \leq nF \leq 25$

[Description] the meaning of n is defined as follows:

parameters	meaning of the parameters
nA	Aspect scale factor of height
nB	Aspect Scale factor of width
nC	Number of rows
nD	Number of columns
nE	Width of basic cells
nF	Height of basic cells

[Notes] nA and nB are valid when nC and nD are equal to zero.

GS q n

[Name] Set error correcting grade of PDF417

[Format] ASCII GS q n

Hex 1D 71 n

Decimal 29 113 n

[Range] $0 \leq n \leq 8$

[Description] Set error correcting grade of PDF417

GS r n

[Name] Transmit status

[Format] ASCII GS r n

Hex 1D 72 n

Decimal 29 114 n

[Range] n = 1, 49

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

N	Function
1, 49	Transmits paper sensor status and paper end sensor status

- [Notes]
- This command is valid for serial model and / or USB model only. If printer has serial and USB interfaces, data is returned to serial and USB interfaces at the same time.
 - The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

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

[Reference] **DLE EOT**

GS w n

[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 (dots) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (dots)	Thick element width (dots)
2	2	2	5
3	3	3	8
4	4	4	10
5	5	5	13
6	6	6	15

♦ Single-level bar codes are as follows:

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

♦ Binary-level bar codes are as follows:

[Default] CODE39, ITF, CODABAR

[Reference] n = 2

GS k

3.Chinese character control commands

FS ! n

[Name] Set print mode for Chinese character

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

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

[Description] Set the print mode for Chinese character, using n as follows:

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

- [Notes]
- When double-width and double-height mode are set (including right and left side character spacing), the width and height are doubled at the same time.
 - The printer can underling all the character (including right and left side character spacing), except the space by HT and 90 degree clockwise-rotated characters
 - The thickness of underline is specified by FS, regardless with the character size
 - When some of the characters on a line are not in the same height, all the characters on the line are aligned at the baseline.
 - It is possible to emphasize the Chinese character by **FS W** or **GS !**, the last received command is effective.
 - It is possible to choose underline mode by **FS —**, the last received command is effective.

[Default] n = 0

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

FS &

[Name] Select Chinese character mode

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

[Description] Select Chinese character mode.

- [Notes]
- When the Chinese character mode is selected, the printer checks the code is for Chinese

character or not, then process the first byte and the second byte if the code is for Chinese.

- When use Chinese GB18030 character set, the printer process the third and the forth byte if the Chinese character is forth-byte code.

- The printer select Chinese character mode automatically when the power is turned on.

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

FS - n

[Name] Turn underline mode off/on for Chinese character

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

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

[Description] Turn underline mode off/on for Chinese character, based on the value of the n:

n	Function
0, 48	Turn underline mode off for Chinese character
1, 49	Turn underline mode on for Chinese character (1 dot thick)
2, 50	Turn underline mode on for Chinese character (2 dot thick)

[Notes] • The printer can underline all the character (including right and left side character spacing), except the space by HT and 90 degree clockwise-rotated characters.

- When the underline mode for Chinese characters is turned off, underline printing is no longer executed, but the previously specified thickness is not changed, the default thickness is 1 dot.

- The thickness of the underline will not change if the character size changes.

- It is possible to turn off the underline mode for Chinese characters using FS !, the last received command becomes effective.

[Default] n = 0

[Reference] **FS !**

FS .

[Name] Cancel Chinese character mode

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

[Description] Cancel Chinese character mode

[Notes] • When Chinese character mode is canceled, all the characters are processed one byte at a time as ASCII code.

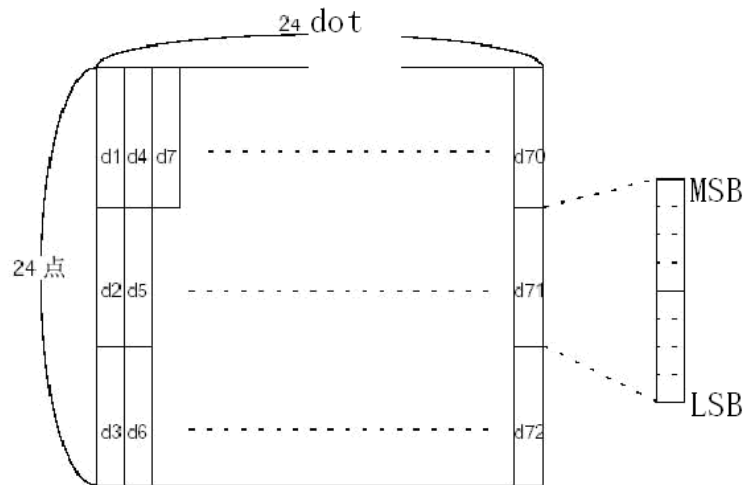
- The printer selects Chinese character mode automatically when the power is turned on.

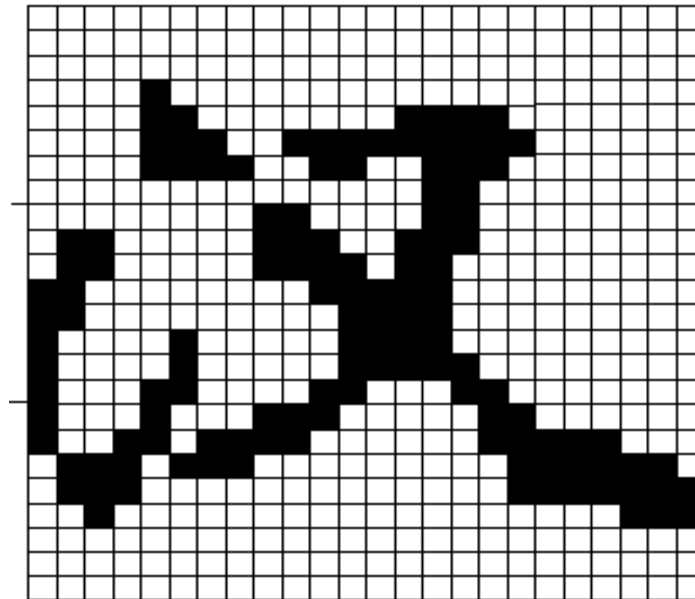
[Reference] **FS &**, **FS C**

FS 2 c1 c2 d1...dk

[Name]	Defined user-defined Chinese character					
[Format]	ASCII	FS	2	c1	c2	d1...dk
	Hex	1C	32	c1	c2	d1...dk
	Decimal	28	50	c1	c2	d1...dk
[Range]	c1, c2 indicate character code for the defined character c1 = FEH A1H ≤ c2 ≤ FEH 0 ≤ d ≤ 255 k = 72					
[Description]	Defined user-defined Chinese character specified by c1 and c2.					
[Notes]	- c1, c2 indicate character code for the defined character, c1 specifies first byte, c2 specifies the second byte. - d indicate data. 1 indicate to print 1 dot, 0 indicate not print a dot.					
[Default]	No user-defined Chinese character.					
[Reference]	FS C					

The relationship of a user-defined Chinese character and the data is described as follow,





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

FS S n1 n2

[Name] Set the right and left 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] Set the right spacing and the left spacing to n1 and n2 respectively.

- The left spacing is [n1 × horizontal or vertical motion unit] inch, and the right spacing is [n2 × horizontal or vertical motion unit] inch.

[Notes] • When double-width is set, the right and the left spacing is doubled.

- In standard mode, the horizontal motion unit is used.
- In page mode, it is depending on starting position of the printable area as follows.
 - When the starting position is set to the upper left or lower right, the horizontal motion unit is used.
 - When the starting position is set to the upper right or lower left, the vertical motion unit is used.
 - The maximum spacing of Chinese character is 36 mm, all setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0, n2 = 0

FS W n

[Name] Select/cancel quadruple-size mode of Chinese character

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

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

[Description] Select/cancel quadruple-size mode of Chinese character .

- When the LSB of n is 0, quadruple-size mode of Chinese character is turned off.
- When the LSB of n is 1, quadruple-size mode of Chinese character is turned on.

[Notes] • Only the LSB of n is effective.

- When quadruple-size mode is turned on, the size of Chinese character is same as when double-width mode and double-height mode are both turned on.
 - When quadruple-size mode is turned off, the characters are printed in normal size.
 - All the character are aligned at the baseline.
- **FS !** or **GS !** also can select or cancel quadruple-size mode of Chinese character, the last received command is effective.

[Default] n = 0

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

4. Programming Instructions

4.1 General Information

- 1) All programming examples are given in Hex.
- 2) Commands cited in the instructions are bolded and underlined. For instance, **1B 40**. Data following the commands are not underlined. For instance, 42 43.
- 3) Contents in parentheses are interpretations of the commands. Parentheses and their contents are not parts of the commands transmitted to printer.

4.2 Programming ABC

4.2.1 Print modes

a) Standard mode (Line mode)

Standard mode is the default print mode of Kiosk series. In this mode, the printer prints data and feed paper as long as the line buffer full (data buffered is enough for one print line) or receiving a print command. For instance, **0A**.

Examples:

1B 40 (Initialize the printer)

41 42 43 44 45 46

0A (Print)

Printout: ABCDEF

b) Page mode

In this mode, the printer stores all print data in memory as a virtual page. The virtual page is physically printed when the printer receives a print command such as **1B 0C** or **0C**.

Examples:

1B 4C (switch to page mode)

1B 57 20 00 00 00 60 02 20 03 (set print area in page mode)

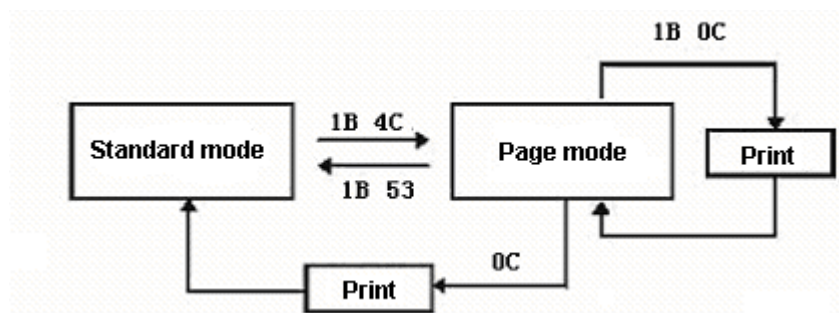
50 72 69 6E 74 20 49 6E 20 50 61 67 65 20 4D 6F 64 65 33 33 33

0C (print)

1D 56 00 (cut paper).

Printout: Print In Page Mode 333

The standard mode is switched with page mode as follows.



4.2.2 Paper supported

Black mark paper is thermal sensitive paper on which black marks are published regularly. The black marks are referenced to set print area and cut position. Refer to relative user's manual for detailed black mark requirements.

Examples:

1B 63 30 02 (select black mark paper)

1D 0C (move the next label to print position) 33 33 33 33 42 6C 61 63 6B 20 4D 61 72 6B 20 50 61 70 65 72

0A (print)

1D 56 00 (cut paper)

Printout: 3333Black Mark Paper

Continuous paper is normal thermal sensitive paper rolls which is not used for fixing position.

Examples:

1B 63 30 00 (select continuous paper) 33 33 33 33 20 53 65 72 69 65 73 20 50 61 70 65 72

0A (print)

1D 56 00 (cut paper)

Printout: 3333 Series Paper

4.2.3 PRST action modes

Refer to commands 1B 63 38 n and 1B 63 39 n for detailed information.

If the PRST is enabled, the PRST will startup to hold the front end of printed paper during printing and accommodate the printed paper. When the printing is finished and the paper is cut, the PRST hands out the printout by holding the back-end of printed paper and waits for a specified time for the user to take it away. After the waiting time, the PRST will

- a) In retraction mode, retract the printout into a waste-bin to avoid environmental pollution and keep secret of user-specified information in case the user do not take away the printout within limited time.
- b) In ejection mode, discharge the printout to enable the next print (customized model).
- c) In waiting mode, wait until the user takes the printout away and discharge it before next printing starts.

If the PRST is disabled, the PRST has no action during printing or after printing. With this selection, the PRST part is disassembled to avoid paper jam.

Examples:

- 1) Select continuous paper, standard mode, PRST retraction mode and print.

0A (Set the print starting position to the beginning of the line)

1B 40 (initialize printer)

1B 63 30 00 (select continuous paper)

1B 63 39 04 (set PRST waiting time)

1B 63 38 00 (select PRST action mode)

1B 53 (switch to standard mode)

33 33 33 33 33 20 49 6E 20 73 74 61 6E 64 61 72 64 20 6D 6F 64 65 2E 20 54 68 65 20 70 61 70 65 72 20 69
73 20 63 6F 6E 74 69 6E 75 6F 75 73 2E 20 54 68 65 20 70 72 65 73 65 6E 74 65 72 73 20 69 6E 20 72 65 74
72 61 63 74 69 6F 6E 20 6D 6F 64 65 21

0A (print)

1D 56 00 (cut paper)

After transmits the above command, then

Printout: 33333 In standard mode. The paper is continuous. The presenters in retraction mode!

PRST action: After printing and cutting, the PRST presents out the printed paper and waits for the user to take it away. If the printout is not taken away within 4 seconds, the PRST retracts the paper into a waste bin.

2) Select marked paper, page mode and PRST ejection mode.

0A(set the print starting position to the beginning of the line)

1B 40 (initialize printer)

1B 63 30 02 (select black mark paper)

1B 63 39 04 (set PRST waiting time)

1B 63 38 02 (set PRST action mode)

1B 4C (switch into pager mode)

1B 57 00 00 00 00 80 02 00 04 (select print area)

33 33 33 33 33 20 49 6E 20 70 61 67 65 20 6D 6F 64 65 20 61 6E 64 20 74 68 65 20 70 61 70 65 72 20 69 73
20 62 6C 61 63 6B 20 6D 61 72 6B 20 70 61 70 65 72 20 74 68 65 20 70 72 65 73 65 6E 74 65 72 20 69 73 20
69 6E 20 65 6A 65 63 74 69 6F 6E 20 6D 6F 64 65 21

0C (print)

1D 56 00 (cut paper)

After transmits the command, then

Printout: 33333 In page mode and the paper is black mark paper the presenter is in ejection mode!

PRST action: After printing and cutting, the PRST presents out the printed paper and wait until the user takes it away.

4.3 Programming examples

In this paragraph, the most commonly used commands are outlined below (Refer to 2. command set for detailed usage). The general programming approach followed by programmers is “initialization->set printing and print data->print and present printout->status check”, read descriptions below carefully for quickly mastering this approach.

4.3.1 Initialization

1) Initialize printer :**1B 40**.

2) Select paper type :**1B 63 30 n**, n = 0 (continuous paper); n = 2 (black mark paper).

- 3) Select print mode :**1B 53** switch to standard mode (Default) **1B 4C** switch to page mode.
- 4) Select PRST action mode :**1B 63 38 n,1B 63 39 n**.

4.3.2 Set printing and print data (character /barcode/bit image)

1) Set print area and print position

- a) Horizontal tab (**09**)
- b) Set horizontal absolute print position (**1B 24**)
- c) Set horizontal tab positions (**1B 44**)
- d) Select print direction in page mode (**1B 54 n**)
- e) Set print area in page mode (**1B 57**)
- f) Set relative print position (**1B 5C nL nH**)
- g) Select justification (**1B 61 n**)
- h) Set absolute vertical print position in page mode (**1D 24**)
- i) Set left margin (**1D 4C**)
- j) Set horizontal and vertical motion unit (**1D 50**)
- k) Set print area width (**1D 57**)
- l) Set relative vertical print position in page mode (**1D 5C**)

Examples:

- a) Set print area in page mode (width:76, height:100)

0A (set the print starting position to the beginning of the line)

1B 4C (switch to page mode)

1B 57 20 00 00 00 60 02 20 03 (set print area)

(The following hex string will print "Print In Page Mode 33333333333333333333333333333333")

50 72 69 6E 74 20 49 6E 20 50 61 67 65 20 4D 6F 64 65 20 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33

33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33

0C (print)

1D 56 00 (cut paper)

- b) Set horizontal tab position and absolute print position

0A(set the print starting position to the beginning of the line)

1B 40 (Initialize printer)

1B 53(switch to standard mode)

33 33 33 33 33 33

1B 44 08 10 20 00 (set horizontal tab position)

09 (move the print position to the next horizontal tab position)

33 33 33 33

09 (move the print position to the next horizontal tab position)

33 33 33 33

09 (move the print position to the next horizontal tab position)

33 33 33 33

0A (print)

33 33

0A (print)

33 33

1B 24 50 00 (set absolute print position)

(The following hex string will print "New absolute start position 3333333333333333")

4E 65 77 20 61 62 73 6F 6C 75 74 65 20 73 74 61 72 74 20 70 6F 73 69 74 69 6F 6E 20 33 33 33 33 33 33 33

33 33 33 33 33 33 33 33

0A (print)

1D 56 00 (cut paper)

c) Select print direction in page mode

1B 4C (switch to page mode)

1B 57 20 00 00 00 60 02 20 03 (set print area in page mode)

1B 54 00 (select print direction in page mode)

30 30 30 30 30 30 30 30 30 30 30 30

0A (print)

1B 54 01 (select print direction in page mode)

31 31

0A (print)

1B 54 02 (select print direction in page mode)

32 32

0A (print)

1B 54 03 (select print direction in page mode)

33 33

0A (print)

(The following hex string will print "Print End")

50 72 69 6E 74 20 45 6E 64

0C (print)

1D 56 00 (cut paper)

2) Set character property

- a) Turn underline mode on/off (1B 2D n)
- b) Select print mode (1B 21 n)
- c) Turn up-side-down printing mode on/off (1B 7B n)
- d) Select character size (1D 21)
- e) Turn white/black reverse printing mode on/off (1D 42 n)

Examples:

0A (set the print starting position to the beginning of the line)

1B 40 (initialize printer)

1B 53 (switch to standard mode)

(The following hex string will print "Select underline print mode")

53 65 6C 65 63 74 20 75 6E 64 65 72 6C 69 6E 65 20 70 72 69 6E 74 20 6D 6F 64 65

1B 2D 02 (turn underline mode on)

(The following hex string will print "Now it works! Select Print mode")

4E 6F 77 20 69 74 20 77 6F 72 6B 73 21 20 53 65 6C 65 63 74 20 50 72 69 6E 74 20 6D 6F 64 65

1B 21 01 (select print mode)

33 33 33 33 33 33 33

1B 21 00 (select print mode)

(The following hex string will print "Open inverse print mode")

4F 70 65 6E 20 69 6E 76 65 72 73 65 20 70 72 69 6E 74 20 6D 6F 64 65

0A (print)

1B 7B 01 (turn upside-down printing mode on)

(The following hex string will print "OK!")

4F 4B 21

0A (print)

1B 7B 00 (turn upside-down printing mode off)

(The following hex string will print "OK! Now I'll show you zoom mode")

4F 4B 21 20 4E 6F 77 20 49 27 6C 6C 20 73 68 6F 77 20 79 6F 75 20 7A 6F 6F 6D 20 6D 6F 64 65

0A (print)

1D 21 33 (select character size)

(The following hex string will print "OK! It works!")

4F 4B 21 20 49 74 20 77 6F 72 6B 73 21

0A (print)

1D 21 00 (select character size)

1D 42 01 (turn white/black reverse printing mode on)

33 33 33 33 33 33 33

1D 42 00 (turn white/black reverse printing mode off)

33 33 33 33 33

0A (print)

1D 56 00 (cut paper)

3) Print character/barcode/bit image

a) Print characters

To print ASCII characters, send ASCII codes of characters to printer.

Examples:

1B 40 (initialize printer)

4D 69 63 72 6F 63 6F 6D 20 43 6F 72 70 6F 72 61 74 69 6F 6E

0A (print)

1D 56 00 (cut paper)

Printout: "Microcom Corporation"

b) Print barcode (Refer to command set for detailed information)

- Select barcode height (1D 68)
- Select barcode width (1D 77)
- Select font for HRI characters (1D 66)
- Select printing position for HRI characters (1D 48)
- Print barcode (1D 6B)

Example 1: print Code 128 in standard mode

0A (set the print starting position to the beginning of the line)

1B 40 (initialize printer)

1B 53 (switch to standard mode)

(The following hex string will print "Print Code 128")

50 72 69 6E 74 20 43 6F 64 65 20 31 32 38

1D 68 78 (Select barcode height)

1D 77 03 (Select barcode width)

1D 66 00 (Select font for HRI characters)

1D 48 03 (Select printing position for HRI characters)

1D 6B 49 0B 7B 42 4E 6F 2E 31 32 33 34 35 36 (print barcode)

1D 56 00 (cut paper)

Example 2: print code128 in page mode

0A (set the print starting position to the beginning of the line)

1B 4C (switch to page mode)

1B 57 20 00 00 00 60 02 20 03 (set print area in page mode)

1D 5C 80 00 (set relative vertical print position in page mode)

1D 68 78 (set barcode height)

1D 77 03 (set barcode width)

1D 66 00 (select font for HRI characters)

1D 48 03 (select printing position for HRI characters)

1D 6B 49 0B 7B 42 4E 6F 2E 31 32 33 34 35 36 (print barcode)

0C (print)

1D 56 00 (cut paper)

Note: In page mode, the value for relative vertical print position should be larger than the selected barcode height. Otherwise, the barcode will not be printed completely.

c) Print bit images

User may download a bit image into RAM or Flash and print it (Refer to Command set for details).

Examples: Download a bit image (bit image number 0) into RAM and print it.

0A (set the print starting position to the beginning of the line)

1B 53 (switch to standard mode)

1D 23 00 (specify a number for the bit image to be downloaded)

1D 2F 00 (print downloaded bit image)

1D 2F 01 (print download bit image)

1D 2F 02 (print downloaded bit image)

1D 2F 03 (print downloaded bit image)

1D 56 00 (cut paper)

4.3.3 Print and cut paper

To print in line mode, use command **0A**. To print in page mode, use command **0C** or **1B 0C** (do not clear buffer). Cut paper command is **1D 56 00**.

Examples:

1B 4C (switch to page mode)

1B 57 20 00 00 00 60 02 20 03 (set print area in page mode)

(The following hex string will print "Print In Page Mode")

50 72 69 6E 74 20 49 6E 20 50 61 67 65 20 4D 6F 64 65

1B 0C (print without clearing buffer)

1D 56 00 (cut paper)

1B 0C (print without clearing buffer)

1D 56 00 (cut paper)

0C (print and clear buffer)

1D 56 00 (cut paper)

4.3.4 Status check

User may check the printer status (normal or error) through either real-time status transmission command or automatic status back function which can transmit status data to host automatically when error (paper end, print head open, cutter error, paper jam etc.) occurs.

1) Real-time status transmission (**10 04 n**) command

This command is automatically enabled when the printer is turned on or when an error occurs after the printer is powered on. Users can use the real-time enable/disable command (**1B 63 40 n**) to turn on / off real time commands. When printing with printer drivers, the real-time command is automatically disabled by the printer driver. If you want to check printer status with the real-time status transmission command after printing, you must enable the real-time command by using command **1B 63 40 n**.

Note: do not check printer status while the printer is printing with the printer driver due to following reasons.

- a) If the status inquiry command is sent to the printer in API mode through USB port, the printer will process this command as normal bit image data and consequently cause abnormal printout.
- b) If the status inquiry command is sent to the printer through the serial interface or the USB interface, the printer will also process this command data as normal bit image data and consequently cause abnormal printout.

2) ASB (**1D 61 n**)

If the ASB command is enabled, the printer will automatically transmit a four-byte status to host when error occurs or specified printer status changes.

How to obtain correct printer status using **ASB**.

- a) First confirm if the fourth byte is synchronous data and first three bytes are set to text.
- b) Printer process status is transmitted based on the third byte of the printers return value. The lower four bits of third byte gives information on what process the printer is in and whether there are any errors.

c) The status of the first byte and second byte based on printer process status give exact printer status information.

For example, "01 04 15 F0" is returned by printer.

F0 is synchronous data which cannot be analyzed.

15 : i.e. "10+05" and "05" means the printer is in PRST retraction process and "10" means that there are error occurring in this process.

04 : means PRST paper jam

01 : means the paper is near end

From information above, the user can learn that printing has finished but PRST has failed to retract the printout (after the programmed waiting time) and the paper is near end.

The detailed information refers to **1D 61 n**

4.3.5 Download bit images into RAM or FLASH

User may download one or more bit images into RAM (RAM bit images) or FLASH (FLASH bit images). Bit images in FLASH are retained when the printer is powered off while those in RAM are cleared when the printer is turned off or initialized using command **1B 40**. Therefore, the user would need to re-download the bit images into RAM whenever the printer is restarted or initialized.

Refer to command **1D 2A** (download bit images into RAM) and **1C 71** (download bit images into NV) for detailed information on how to perform the download. In both RAM bit image download and NV bit image download, a number must be specified for the image to be downloaded. Please read carefully the commands **1D 2A** and **1C 71** for the difference between RAM bit image download and NV bit image download.

Bit image data processing (example using BMP format bit images)

1. The data is arranged in column data type in the bit image download command. Refer to command **1D 2A** and **1C 71** for details.

2. BMP format bit image data is arranged in line data type. Normally, a monochromatic BMP image is made of sixty two (62) bytes of BMP image attributes description (including bit image width and height etc.) and normal image data. The BMP image data is arranged in multiples of 4 bytes. For example, if the width is 34 dots, 8 bytes instead of 5 bytes are needed to store the data. Therefore, the total amount of bytes a bit image occupies in the memory is "(Line width in bits+31)/32*4 * line height in bits"

Below is an example written in VC++ (for reference only).

Note: A non-monochrome BMP image must be transformed into a monochrome image (1-bit color depth) before downloading it to the printer. Both the height (in pixels) and width (in pixels) of the BMP image shall be a multiple of eight (8), otherwise the printer may not be able to handle the data correctly.

```
/**
//Function: AntiRotateBmp90D
//
//Utility: Transform bmp format bit image into a format that the printer can accept
//Parameter: pBmpData---Pointer to source data
// nPixelsOfWidth---bit image width (in dots)
// nPixelsOfHeight---bit image height (in dots)
// pBmpDataRotated---Pinter to target data
//Value return: 1: data transformation ok. 0: parameter error.
**/
```

```

//*****//
int AntiRotateBmp90D(
    char *pBmpData,
    const int nPixelsOfWidth,
    const int nPixelsOfHeight,
    char *pBmpDataRotated
)
{
    // Define process variables
    int nBytesOfWidth = 0,nBytesOfHeight = 0;
    int i=0,col=0,row=0,index = 0,colbyte = 0;
    char* midData;
    unsigned char tempdata = 0,colnum = 0,rownum = 0;
    unsigned char temp[8] = {0x80,0x40,0x20,0x10,0x08,0x04,0x02,0x01};

    //Comparing parameters
    if (pBmpData == NULL || pBmpDataRotated == NULL) return 0;
    if (nPixelsOfWidth <= 0 || nPixelsOfHeight <= 0) return 0;
    if ((nPixelsOfWidth % 8) != 0 || (nPixelsOfHeight % 8) != 0) return 0;

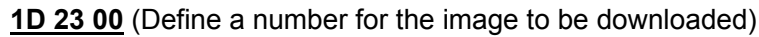
    //get real image dimension
    nBytesOfWidth = (nPixelsOfWidth+31)/32*4;
    nBytesOfHeight = nPixelsOfHeight / 8;

    //White/black reverse,the value 1 in BMP data is for white which is contrary to the printer definition.
    midData = (char*)malloc(nBytesOfWidth*nPixelsOfHeight+1);
    for(i=0;i<nBytesOfWidth*nPixelsOfHeight;i++){midData[i] = 0xff-pBmpData[i];}

    //Rotation. BMP data is arranged in lines while data downloaded to printer are arranged in columns.
    for (row = 0; row <nPixelsOfWidth; row++){
        for (colbyte = 0; colbyte < nBytesOfHeight; colbyte++){
            index = row * nBytesOfHeight + colbyte;
            pBmpDataRotated[index] = 0x00;
            for (col = 0; col < 8; col++){
                colnum = col % 8;
                rownum = row % 8;
                if(colnum >= rownum)
                    tempdata = temp[col] & (midData[(nPixelsOfHeight-1-colbyte*8-col) *
nBytesOfWidth + row / 8] >> (colnum-rownum));
                else
                    tempdata = temp[col] & (midData[(nPixelsOfHeight-1-colbyte*8-col) *
nBytesOfWidth + row / 8] << (rownum-colnum));
                pBmpDataRotated[index] |= tempdata;
            }
        }
    }
    //release interim buffer

```

Example: Download a bit image into RAM and print it.

[illegible]

1D 2F 00 (Print the RAM bit image)

4.3.6 Recommendations on applicable flow for programm

Make good use of ASB command during programming, since the ASB command is able to automatically transmit printer status messages. Remember to enable the ASB function by using command **1D 61** after the printer is turned on.

1) Inquiry printer status

Make sure to send printing data only when the printer is in normal status. We provide all status of printer, at last printer transmits data to print in normal idle status.

2) Transmits the data to be printed (include the command settings before printing)

If printed data is bit image, don't transmit status inquiry command when processing printing data.

3) Check printer status after printing. If the ASB is enabled, the status is transmitted automatically.

Appendix A: ASCII TABLE

ASCII	Decimal	HEX	ASCII	Decimal	HEX	ASCII	Decimal	HEX	ASCII	Decimal	HEX
NULL	0	00	SP	32	20	@	64	40	`	96	60
SOH	1	01	!	33	21	A	65	41	a	97	61
STX	2	02	"	34	22	B	66	42	b	98	62
EXT	3	03	#	35	23	C	67	43	c	99	63
EOT	4	04	\$	36	24	D	68	44	d	100	64
ENQ	5	05	%	37	25	E	69	45	e	101	65
ACK	6	06	&	38	26	F	70	46	f	102	66
BEL	7	07	'	39	27	G	71	47	g	103	67
BS	8	08	(	40	28	H	72	48	h	104	68
HT	9	09	)	41	29	I	73	49	i	105	69
LF	10	0A	*	42	2A	J	74	4A	j	106	6A
VT	11	0B	+	43	2B	K	75	4B	k	107	6B
FF	12	0C	,	44	2C	L	76	4C	l	108	6C
CR	13	0D	-	45	2D	M	77	4D	m	109	6D
SO	14	0E	.	46	2E	N	78	4E	n	110	6E
SI	15	0F	/	47	2F	O	79	4F	o	111	6F
DLE	16	10	0	48	30	P	80	50	p	112	70
DC1	17	11	1	49	31	Q	81	51	q	113	71
DC2	18	12	2	50	32	R	82	52	r	114	72
DC3	19	13	3	51	33	S	83	53	s	115	73
DC4	20	14	4	52	34	T	84	54	t	116	74
NAK	21	15	5	53	35	U	85	55	u	117	75
SYN	22	16	6	54	36	V	86	56	v	118	76
ETB	23	17	7	55	37	W	87	57	w	119	77
CAN	24	18	8	56	38	X	88	58	x	120	78
EM	25	19	9	57	39	Y	89	59	y	121	79
SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
FS	28	1C	<	60	3C	\	92	5C		124	7C
GS	29	1D	=	61	3D	]	93	5D	}	125	7D
RS	30	1E	>	62	3E	^	94	5E	~	126	7E
US	31	1F	?	63	3F	_	95	5F		127	7F

Appendix B: Code Page Table

Code Page 0 (PC437: USA)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0 0000	NUL	DLE	SP	0	@	P	'	p	Ç	É	á	176	192	208	224	240
1 0001		XON	!	1	A	Q	a	q	ü	æ	í	177	193	209	225	±
2 0010			"	2	B	R	b	r	é	Æ	ó	178	194	210	226	ˆ
3 0011		XOFF	#	3	C	S	c	s	â	ô	ú	179	195	211	227	≤
4 0100	EOT	DC4	\$	4	D	T	d	t	ä	ö	ñ	180	196	212	228	ƒ
5 0101	ENQ		%	5	E	U	e	u	à	ò	Ñ	181	197	213	229	ƒ
6 0110			&	6	F	V	f	v	á	ú	ä	182	198	214	230	÷
7 0111			.	7	G	W	g	w	ç	û	ø	183	199	215	231	≈
8 1000		CAN	(	8	H	X	h	x	ê	ÿ	é	184	200	216	232	°
9 1001	HT		)	9	I	Y	i	y	ë	ö	í	185	201	217	233	•
A 1010	LF		*	:	J	Z	j	z	è	ù	í	186	202	218	234	•
B 1011		ESC	+	;	K	[	k	{	ï	φ	½	187	203	219	235	251
C 1100	PF	FS	,	<	L	\	l	!	î	£	¼	188	204	220	236	252
D 1101	CR	GS	-	=	M	]	m	{	ï	¥	í	189	205	221	237	253
E 1110			.	>	N	^	n	~	Ä	ƒ	«	190	206	222	238	254
F 1111			/	?	O	_	o	SP	Å	f	»	191	207	223	239	255

Code Page 1(Katakana)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	一 128	上 144	SP 160	一 176	タ 192	ミ 208	二 224	× 240
1	0001	一 129	下 145	。 161	ア 177	チ 193	ム 209	ト 225	門 241
2	0010	一 130	ナ 146	「 162	イ 178	ツ 194	メ 210	キ 226	年 242
3	0011	一 131	ト 147	」 163	ウ 179	テ 195	モ 211	コ 227	月 243
4	0100	一 132	一 148	・ 164	エ 180	ト 196	ヤ 212	▲ 228	日 244
5	0101	一 133	一 149	・ 165	オ 181	ナ 197	ユ 213	▲ 229	時 245
6	0110	一 134	一 150	ヲ 166	カ 182	ニ 198	ヨ 214	▼ 230	分 246
7	0111	一 135	一 151	ア 167	キ 183	ヌ 199	ラ 215	▼ 231	秒 247
8	1000	一 136	「 152	イ 168	ク 184	ネ 200	リ 216	♠ 232	千 248
9	1001	一 137	「 153	ウ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	1010	一 138	「 154	エ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	1011	一 139	「 155	オ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	1100	一 140	「 156	ヤ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	1101	一 141	「 157	ユ 173	ス 189	ヘ 205	ン 221	○ 237	人 253
E	1110	一 142	「 158	ヨ 174	セ 190	ホ 206	・ 222	/ 238	※ 254
F	1111	一 143	「 159	ッ 175	ソ 191	マ 207	° 223	＼ 239	SP 255

Code Page 2 (PC850: Multilingual)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Á 160	⌘ 176	Ł 192	Š 208	Ó 224	— 240
1	0001	Ü 129	Æ 145	Í 161	⌘ 177	± 193	Đ 209	ß 225	± 241
2	0010	É 130	Æ 146	Ó 162	⌘ 178	± 194	Ê 210	Ô 226	— 242
3	0011	Â 131	Ô 147	Ú 163	 179	† 195	Ë 211	Ò 227	¼ 243
4	0100	Ä 132	Ö 148	Ñ 164	† 180	— 196	È 212	Õ 228	¶ 244
5	0101	À 133	Ò 149	Ñ 165	À 181	† 197	ı 213	Œ 229	§ 245
6	0110	Ä 134	Û 150	À 166	À 182	Ä 198	Í 214	µ 230	÷ 246
7	0111	Ç 135	Ù 151	Ω 167	À 183	À 199	Î 215	þ 231	ˆ 247
8	1000	Ê 136	Ÿ 152	¿ 168	© 184	Ł 200	Ï 216	þ 232	° 248
9	1001	Ë 137	Ö 153	® 169	¶ 185	ŕ 201	Ĵ 217	Ú 233	“ 249
A	1010	È 138	Û 154	¬ 170	 186	± 202	ŕ 218	Û 234	· 250
B	1011	İ 139	ø 155	½ 171	¶ 187	± 203	■ 219	Û 235	¹ 251
C	1100	Î 140	£ 156	‡ 172	¶ 188	† 204	■ 220	Ÿ 236	³ 252
D	1101	Ì 141	Ø 157	İ 173	Φ 189	= 205	İ 221	Ÿ 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	± 206	Î 222	238	■ 254
F	1111	Å 143	f 159	» 175	ƒ 191	œ 207	■ 223	239	SP 255

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

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

Code Page 5 (PC865: Nordic)

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

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	€ 128	SP 144	SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	0001	SP 129	‘ 145	í 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	, 130	, 146	¢ 162	, 178	Â 194	Ò 210	â 226	ò 242
3	0011	f 131	“ 147	£ 163	, 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	” 132	” 148	¤ 164	, 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	... 133	• 149	¥ 165	µ 181	Å 197	Õ 213	å 229	ö 245
6	0110	† 134	— 150	¡ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	‡ 135	— 151	§ 167	, 183	Ç 199	× 215	ç 231	+ 247
8	1000	^ 136	~ 152	•• 168	, 184	È 200	Ø 216	è 232	ø 248
9	1001	‰ 137	™ 153	© 169	¡ 185	É 201	Ù 217	é 233	ù 249
A	1010	Š 138	š 154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	‘ 139	’ 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	SP 141	SP 157	- 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	1110	Ž 142	ž 158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SP 143	Ÿ 159	— 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	А 128	Р 144	а 160	Ѡ 176	Ѐ 192	Ѳ 208	Ѣ 224	Ѥ 240
1	0001	Б 129	С 145	б 161	ѡ 177	ѧ 193	ѳ 209	с 225	ѥ 241
2	0010	В 130	Т 146	в 162	Ѣ 178	Ѩ 194	Ѵ 210	т 226	Ѧ 242
3	0011	Г 131	У 147	г 163	ѣ 179	ѩ 195	ѵ 211	у 227	ѧ 243
4	0100	Д 132	Ф 148	д 164	Ѥ 180	Ѫ 196	Ѷ 212	ф 228	Ѩ 244
5	0101	Е 133	Х 149	е 165	ѥ 181	ѫ 197	ѷ 213	х 229	ѩ 245
6	0110	Ж 134	Ц 150	ж 166	Ѧ 182	Ѭ 198	Ѹ 214	ц 230	Ѫ 246
7	0111	З 135	Ч 151	з 167	ѧ 183	ѭ 199	ѹ 215	ч 231	ѫ 247
8	1000	И 136	Ш 152	и 168	Ѩ 184	Ѯ 200	Ѻ 216	ш 232	Ѭ 248
9	1001	Й 137	Щ 153	й 169	ѩ 185	ѯ 201	ѻ 217	щ 233	ѭ 249
A	1010	К 138	Ъ 154	к 170	Ѫ 186	Ѱ 202	Ѽ 218	ъ 234	Ѯ 250
B	1011	Л 139	Ы 155	л 171	ѫ 187	ѱ 203	ѽ 219	ы 235	ѯ 251
C	1100	М 140	Ь 156	м 172	Ѭ 188	Ѳ 204	Ѿ 220	ь 236	Ѱ 252
D	1101	Н 141	Э 157	н 173	ѭ 189	ѳ 205	ѿ 221	э 237	ѱ 253
E	1110	О 142	Ю 158	о 174	Ѯ 190	Ѵ 206	ѿ 222	ю 238	Ѳ 254
F	1111	П 143	Я 159	п 175	ѯ 191	ѵ 207	ѿ 223	я 239	SP 255

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	Ł 192	đ 208	Ó 224	- 240
1	0001	ũ 129	Ĺ 145	í 161	⌘ 177	Ł 193	Đ 209	Ȯ 225	" 241
2	0010	é 130	ĭ 146	ó 162	⌘ 178	Ł 194	Ǧ 210	Ô 226	˘ 242
3	0011	â 131	ô 147	ú 163	⌘ 179	Ł 195	Ě 211	Ń 227	˘ 243
4	0100	ä 132	ö 148	À 164	⌘ 180	Ł 196	ď 212	ń 228	˘ 244
5	0101	û 133	Ľ 149	ą 165	Á 181	⌘ 197	Ň 213	ň 229	§ 245
6	0110	ć 134	ĩ 150	ž 166	Â 182	Ǻ 198	ı 214	Š 230	÷ 246
7	0111	ç 135	ś 151	ž 167	Ě 183	Ǻ 199	î 215	š 231	˘ 247
8	1000	ı 136	ś 152	Ę 168	Ś 184	Ł 200	ě 216	Ř 232	˘ 248
9	1001	ē 137	Ö 153	ę 169	⌘ 185	Ł 201	Ų 217	Ú 233	˘ 249
A	1010	Ő 138	Ü 154	170	⌘ 186	Ł 202	ŕ 218	ı 234	˘ 250
B	1011	ő 139	Ŧ 155	ž 171	⌘ 187	203	219	Ű 235	û 251
C	1100	î 140	ĩ 156	Č 172	⌘ 188	204	220	ý 236	Ř 252
D	1101	Ž 141	Ľ 157	š 173	Ž 189	205	221	Ý 237	ř 253
E	1110	Ä 142	× 158	« 174	ž 190	206	222	ı 238	■ 254
F	1111	Ć 143	č 159	» 175	⌘ 191	207	223	˘ 239	SP 255

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	Ł 192	Š 208	Ó 224	— 240
1	0001	Ü 129	æ 145	í 161	⌘ 177	± 193	Đ 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	⌘ 178	Ƨ 194	Ê 210	Ô 226	— 242
3	0011	â 131	ô 147	ú 163	 179	† 195	Ë 211	Ö 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	† 180	— 196	È 212	Ø 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	À 181	† 197	€ 213	Ö 229	§ 245
6	0110	å 134	û 150	ä 166	Â 182	ã 198	í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	Á 183	Ä 199	Î 215	þ 231	¾ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	Ł 200	Ï 216	þ 232	° 248
9	1001	ë 137	ÿ 153	® 169	† 185	ŕ 201	Ɔ 217	Û 233	° 249
A	1010	è 138	Û 154	¬ 170	 186	± 202	ŕ 218	Û 234	° 250
B	1011	ï 139	ø 155	½ 171	¶ 187	Ƨ 203	■ 219	Ü 235	¹ 251
C	1100	î 140	£ 156	¼ 172	¶ 188	† 204	■ 220	Ý 236	³ 252
D	1101	ì 141	Ø 157	ì 173	Φ 189	— 205	¡ 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	† 206	Ï 222	— 238	■ 254
F	1111	Å 143	ƒ 159	» 175	Ƨ 191	¤ 207	■ 223	’ 239	SP 255

Appendix C: Code 128 Bar Code

A.1 Description of the CODE128 Bar Code

Code 128 bar codes can encode 128 unique ASCII characters, 2-digit numerals and special characters by using one bar code character that is defined by combining code set A, code set B and code set C. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

The following special characters are also available in CODE128:

- SHIFT characters

In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as a character for code set A. The character recovers the previous code set before SHIFT when starting from the second character. SHIFT characters are used only for switching between code set A and code set B, but cannot make the current code set enter or exit code set c status.

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

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

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

Code set C allows only FNC1.

A.2 Character Set

Characters in Code Set A:

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

Characters in Code Set B:

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

Characters in Code Set C

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