Dot Impact Printer

STAR
Command Specifications

Rev. 1.91

Contents

1. GENERAL DESCRIPTION

This specifications document describes the command specifications for the STAR MODE on dot impact printers. Information contained herein applies to models with the following conditions.

- Dot impact printers
- Printer head: 72 DPI (vertical direction)
- Interfaces: Parallel/RS-232C/USB/Ethernet/Wireless LAN
- Paper width: 3 inch/2.25 inch/1.75 inch
- Paper feed minimum pitch: 1/144 inch (0.176 mm)

< Applicable Models:>
- Individual boards: BD100, BD500
- Complete printer product: SP2000, SP500, SP700

2. COMMAND FUNCTION LIST

• Standard Commands

Class	Commands	Name
Font Style and Character Set	ESC GS t	Specify code page
	ESC R	Specify international character set
	ESC /	Specify/cancel slash zero
	ESC 6	Switch to IBM character set #2 (only with standard specifications)
	ESC 7	Switch to IBM character set #1 (only with standard specifications)
	ESC M	Specify 7 x 9 font (half dots)
	ESC P	Specify 5 x 9 font (2P-1)
	ESC :	Specify 5 x 9 font (3P-1)
	ESC SP	Set character space
Character Expansion Settings	SO	Specify double-wide expanded characters
	DC4	Cancel double wide printing
	ESC W	Specify/cancel double-wide printing
	ESC h	Specify/cancel double-tall printing
Print Modes	ESC E	Select emphasized printing
	ESC F	Cancel emphasized printing
	ESC -	Select/cancel underline mode
	ESC _	Select/cancel upperline mode
	ESC 4	Specify white/black inversion and red color printing
	ESC 5	Cancel white/black inversion/specify black color printing
	ESC GS 4	Select red/black substitute function [ESC 4/5 setting]
	SI	Select upside-down printing
	DC2	Cancel upside-down printing
	ESC RS i	Specify/cancel rotating print mode
Line Spacing	LF	Line feed
	CR	Line feed (according to memory switch settings)
	ESC a	Feed paper n lines
	ESC 0	Set line feed to 1/8 inch
	ESC 1	Set line feed to 7/72 inch
	ESC z 0	Set line feed to 1/12 inch
	ESC z 1	Set line feed to 1/6 inch
	ESC A	Define n/72 inch pitch line feed
	ESC 2	Set ESC A line feed pitch
	ESC 3	Set line feed to n/216 inch line feed pitch (approximate value)
	ESC y	Set line feed to n/144 inch line feed pitch
	ESC J	Execute n/72 inch paper feed one time
	ESC I	Execute n/144 inch paper feed one time
Page Control	FF	Form feed
	ESC C	Set page length to n lines
	ESC C 0	Set page length to n inches
	VT	Feed paper to vertical tab position
	ESC B	Set vertical tab position
	ESC N	Set bottom margin to n lines
	ESC O	Cancel bottom margin

Class	Commands	Name
Horizontal Direction Position	ESC RS A	Set print region
	ESC l	Set left margin
	ESC Q	Set right margin
	HT	Move print position to horizontal tab position
	ESC D	Set/cancel horizontal tab position
	ESC GS a	Specify position alignment
	ESC GS A	Specify absolute position
	ESC GS R	Specify relative position
Download	ESC &	Register download characters
	ESC %	Specify/cancel download characters
Bit Image Graphics	ESC K	Standard density bit image
	ESC L	Double density bit image
	ESC ^	9 Dot bit image
Logos	ESC FS q	Register logo
	ESC FS p	Print logo
Cutter Control	ESC d	Paper cut instruction
External Device Drive	ESC BEL	Set pulse width for external device drive
	BEL	External device 1 drive instruction
	FS	External device 1 drive instruction (real time)
	SUB	External device 2 drive instruction (real time)
	EM	External device 2 drive instruction (real time)
	ESC GS EM DC1	Set external buzzer drive pulse condition
	ESC GS EM DC2	Execute external buzzer drive
Status	ENQ	Inquire ENQ status
	EOT	Inquire EOT status
	ESC ACK SOH	Inquire automatic status
	ESC RS a	Set automatic status transmission conditions
	ETB	Update ETB status (check after printing)
	ESC RS E	Clear ETB counter, ETB status
	ESC RS ETX	Send and initialize print end counter
	ESC ACK CAN	Real-time reset
Kanji characters (Note 1)	ESC p	Set to JIS Chinese character mode (Japanese specifications only)
	ESC q	Cancel JIS Japanese character mode (Japanese specifications only)
	ESC $	Set/cancel JIS Japanese character mode (Japanese specifications only)
	ESC s	Set two byte Kanji characters left/right spaces
	ESC t	Set 1 byte Kanji characters left/right spaces (Japanese specifications only)
	ESC r	Register Chinese download characters
	ESC u 1	Specify 16 x 16 dot [single density] Kanji characters.
	ESC u 0	Specify 16 x 16 dot [Double Density] Kanji characters
	ESC x 1	Specify two byte Kanji characters (cancel expanded Kanji characters)
	ESC x 0	Specify expanded Kanji characters (Double tall/Double high/Double high & wide)
	ESC w 1	Specify 2-byte 16 x 16 dot [Single Density] Kanji characters (Default)
	ESC w 0	Specify double high & wide Kanji characters

Class	Commands	Name
Others	RS	Ring buzzer
	CAN	Cancel print data and initialize commands
	DC3	Printer deselect
	DC1	Select printer
	ESC @	Command initialization
	ESC U	Select printing direction
	ESC GS # m	Set memory switch
	ESC #	Set memory switch
	ESC ? LF NUL	Reset printer and execute self print

Note 1   Kanji characters

• Japanese character control commands are ignored on models not installed with Japanese character fonts.

• All Japanese character control commands are ignored if the specification for the location of use is specified as SBCS (single byte countries) by the memory switch.

• Black Mark Related Commands

Class	Commands	Name
Black mark Related commands	ESC d (Note 2)	Paper cut instruction
	FF (Note 2)	Performs TOF operation
	ESC FF	Set top of form amount after detecting black mark
	ESC GS (F	Set top of form amount in black mark control
	ESC RS m	Enable, disable black mark detection

Note 2   These are commands whose operation specifications vary when the black mark function is enabled by the memory switch.

• USB Related Commands

Class	Commands	Name
USB Related commands		

• 2-Color Printing Related Commands

Class	Commands	Name
2-Color Printing Related Commands	ESC RS C	Select/cancel 2-color printing mode
	ESC 4	Specify red printing
	ESC 5	Specify black printing

3. COMMAND DETAILS
3-1 Explanation of Terms

• Reception buffer
The buffer for storing data (reception data) received from the host, as it is called the reception buffer.
Reception data is temporarily stored in the reception buffer, then processed sequentially.

• Line buffer
The buffer for storing image data for printing is called the line buffer.

• Line buffer full
The state in which the buffer has no more space available is called line buffer full.When the buffer is full, data in the line buffer is printed and a line feed is performed when new print data is processed.This is the same as a Line Feed.

• Top of line
The top of line is a state that satisfies the following conditions.
A. There is currently no print data in the line buffer.
B. The position is not specified with the horizontal direction position command.

• Printable region
This is the maximum printable area with the printer's specifications.

• Print region
This is the printing area specified by a command. (Print Region ≤ Printable Region)

• SBCS
This is an abbreviation of Single Byte Character Set.These are characters in languages that are displayed using the information in one byte.
In this specifications manual, it refers to the standard specifications (destination: single byte countries).

• DBCS
This is an abbreviation of Double Byte Character Set.These are characters in languages that are displayed using the information in two bytes.
In this specifications manual, it refers to the Chinese character specifications such as Japan, China and Taiwan (destination: double byte countries).

• Inch
This is a unit of length. 1 inch = 25.4 mm

• MSB
This is an abbreviation of Most Significant Bit.

• LSB
This is an abbreviation of Least Significant Bit.

• ASB function
This function sends an automatic status to the host when the printer's status changes.

• NSB function
This function sends an automatic status when the product enters reverse send mode for parallel I/F and USB I/F.
This function sends an automatic status when the print port (TCP#9100) is connected for Ethernet I/F and wireless LAN I/F.

3-2 Exception processing

1) Undefined codes

Codes from <00>H to <1F>H are targeted.When codes not defined as commands in this region are received, they are discarded.

(Ex.) If processing the data string of <30>H<31>H<03>H<32>H<0A>H<33>H, the printer will discard <03>H as an undefined code.

2) Undefined commands

When data continuing the codes of ESC and FS are codes not defined as commands, ESC and FS and subsequent codes are discarded.

(Ex.) If processing the data string of <30>H<1B>H<22>H<31>H<32>H, the printer will read and discard <1B>H<22>H as an undefined command.

3) Settings outside of the defined area

Processing values outside of the defined area in commands accompanying arguments, those commands are ignored and the preset values are unchanged.The processing of commands is terminated at the point values outside of the defined region are processed in arguments having a plurality of commands.

(Ex.) If processing the data string of <1B>H<52>H<15>H, the printer will discard the data string of <1B>H<52>H<15>H because although <1B>H<52>H is defined as a commands (ESC R) , the argument <15>H is outside of the definition. Therefore, the international character set that is already set experiences no change.

3-3 Standard Command Details
3-3-1 Font style and character set

ESC GS t n

[Name] Select code page

[Code]

ASCII	ESC	GS	t	n	
Hexadecimal	1B	1D	74	n	
Decimal	27	29	116	n	

[Defined Area]

Specifications 1	Specifications 2	Specifications 3
For SBCS	For SBCS	For SBCS
$0 \leq n \leq 21$	$0 \leq n \leq 21$	$0 \leq n \leq 21$
$32 \leq n \leq 34$	$32 \leq n \leq 34$	$32 \leq n \leq 34$
$64 \leq n \leq 79$	$64 \leq n \leq 79$	$64 \leq n \leq 79$
	$96 \leq n \leq 102$	$96 \leq n \leq 102$
For DBCS	For DBCS	For DBCS
Command disabled	Command disabled	n=0,128

[Initial Value] Memory SW settings

In specifications 1 and 2, the katakana page for Japanese character mode is fixed for DBCS settings.

[Function] Specify a code page.

n	Code page	Specifications 1		Specifications 2		Specifications 3	
		SBCS	DBCS	SBCS	DBCS	SBCS	DBCS
0	Normal*	○	-	○	-	○	○ (*1)
1	CodePage437 (USA, Std. Europe)	○	-	○	-	○	-
2	Katakana	○	-	○	-	○	-
3	CodePage437 (USA, Std. Europe)	○	-	○	-	○	-
4	Codepage 858 (Multilingual)	○	-	○	-	○	-
5	Codepage 852 (Latin-2)	○	-	○	-	○	-
6	Codepage 860 (Portuguese)	○	-	○	-	○	-
7	Codepage 861 (Icelandic)	○	-	○	-	○	-
8	Codepage 863 (Canadian French)	○	-	○	-	○	-
9	Codepage 865 (Nordic)	○	-	○	-	○	-
10	Codepage 866 (Cyrillic Russian)	○	-	○	-	○	-
11	Codepage 855 (Cyrillic Bulgarian)	○	-	○	-	○	-
12	Codepage 857 (Turkey)	○	-	○	-	○	-
13	Codepage 862 (Israel (Hebrew))	○	-	○	-	○	-
14	Codepage 864 (Arabic)	○	-	○	-	○	-
15	Codepage 737 (Greek)	○	-	○	-	○	-
16	Codepage 851 (Greek)	○	-	○	-	○	-
17	Codepage 869 (Greek)	○	-	○	-	○	-
18	Codepage 928 (Greek)	○	-	○	-	○	-
19	Codepage 772 (Lithuanian)	○	-	○	-	○	-
20	Codepage 774 (Lithuanian)	○	-	○	-	○	-
21	Codepage 874 (Thai)	○	-	○	-	○	-
32	Codepage 1252 (Windows Latin-1)	○	-	○	-	○	-
33	Codepage 1250 (Windows Latin-2)	○	-	○	-	○	-
34	Codepage 1251 (Windows Cyrillic)	○	-	○	-	○	-

n	Code page	Specifications 1		Specifications 2		Specifications 3	
		SBCS	DBCS	SBCS	DBCS	SBCS	DBCS
64	Codepage 3840 (IBM-Russian)	○	-	○	-	○	-
65	Codepage 3841 (Gost)	○	-	○	-	○	-
66	Codepage 3843 (Polish)	○	-	○	-	○	-
67	Codepage 3844 (CS2)	○	-	○	-	○	-
68	Codepage 3845 (Hungarian)	○	-	○	-	○	-
69	Codepage 3846 (Turkish)	○	-	○	-	○	-
70	Codepage 3847 (Brazil-ABNT)	○	-	○	-	○	-
71	Codepage 3848 (Brazil-ABICOMP)	○	-	○	-	○	-
72	Codepage 1001 (Arabic)	○	-	○	-	○	-
73	Codepage 2001 (Lithuanian-KBL)	○	-	○	-	○	-
74	Codepage 3001 (Estonian-1)	○	-	○	-	○	-
75	Codepage 3002 (Estonian-2)	○	-	○	-	○	-
76	Codepage 3011 (Latvian-1)	○	-	○	-	○	-
77	Codepage 3012 (Latvian-2)	○	-	○	-	○	-
78	Codepage 3021 (Bulgarian)	○	-	○	-	○	-
79	Codepage 3041 (Maltese)	○	-	○	-	○	-
96	Thai Character Code 42 (Thai)	-	-	○	-	○	-
97	Thai Character Code 11 (Thai)	-	-	○	-	○	-
98	Thai Character Code 13 (Thai)	-	-	○	-	○	-
99	Thai Character Code 14 (Thai)	-	-	○	-	○	-
100	Thai Character Code 16 (Thai)	-	-	○	-	○	-
101	Thai Character Code 17 (Thai)	-	-	○	-	○	-
102	Thai Character Code 18 (Thai)	-	-	○	-	○	-
128	UTF-8	-	-	-	-	-	○ (*2)

*1: Select UTF-8 code disabled (Specify kanji code in JIS or ShiftJIS/GB/BIG5/KS code)
*2: Select UTF-8 code enabled (Specify kanji code in UTF-8)

See the product specifications for each printer for the memory SW settings.

ESC R n

[Name]	Specify international character set			
[Code]	ASCII	ESC	R	n
	Hexadecimal	1B	52	n
	Decimal	27	82	n

[Defined Area]	$0 \leq n \leq 14$
	n = 64
[Initial Value]	SBCS: Memory SW settings
	DBCS: (Japan) n=8, (China/Taiwan) n=0,

[Function]   Specifies international characters according to the value of n.

n	International Characters
0	USA
1	France
2	Germany
3	UK
4	Denmark
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea
14	Ireland
64	Legal

See each printer's product specifications manual for details on the memory switch settings.
Note that if the code page 3041 (Maltese) is selected for the code page, international characters are disabled and the specified characters of code page 3041 are printed.

ESC / N

[Name]	Specify/cancel slash zero			
[Code]	ASCII	ESC	/	n
	Hexadecimal	1B	2F	n
	Decimal	27	47	n

[Defined Area]	n = 0, 1, 48, 49
[Initial Value]	Memory switch setting

[Function]   Specifies/cancels slash zero according to the value of n.

n	Setting
0, 48	Cancels slash zero
1, 49	Specifies slash zero

See each printer's product specifications manual for details on the memory switch settings.

ESC 6

[Name]   Switch to IBM character set #2
[Code]   ASCII   ESC   6
           Hexadecimal   1B   36
           Decimal   27   54

[Defined Area]   ---
[Initial Value]   ---

[Function]   Switches from IBM character set #1 to #2.
                      The subsequent <80> H to <9F> H codes are handled as character data.
                      When the character code table settings are for the IBM character set #1, this command is ignored.
                      This command is only effective in the standard mode.

ESC 7

[Name]   Switch to IBM character set #1
[Code]   ASCII   ESC   7
           Hexadecimal   1B   37
           Decimal   27   55

[Defined Area]   ---
[Initial Value]   ---

[Function]   Switches from IBM character set #2 to #1.
                      The subsequent <80> H to <9F> H codes are handled as control codes.
                      When the character code table settings are for the IBM character set #2, this command is ignored.
                      This command is only effective in the standard mode.

ESC M

[Name]   Specify 7 x 9 font (half dots) (default)

[Code]   ASCII   ESC   M
          Hexadecimal   1B   4D
          Decimal   27   77

[Defined Area]   ---
[Initial Value]   ---

[Function]   Specifies 7 x 9 (half) dot font.
              Sets the number of printable digits in one line to [total half dot count/(10 + character right space amount).

ESC P

[Name]   Specify 5 x 9 font (2P-1)

[Code]   ASCII   ESC   P
          Hexadecimal   1B   50
          Decimal   27   80

[Defined Area]   ---
[Initial Value]   ---

[Function]   Specifies 5 x 9 (2 pulse = 1) dot fonts.
              Sets the number of printable digits in one line to [total half dot count/(12 + character right space amount).

ESC :

[Name]   Specify 5 x 9 font (3P-1)
[Code]   ASCII   ESC   :
            Hexadecimal   1B   3A
            Decimal   27   58

[Defined Area]   ---
[Initial Value]   ---

[Function]   Specifies 5 x 9 (3 pulse = 1) dot fonts.
                    Sets the number of printable digits in one line to [total half dot count/(18 + character right space amount).

ESC SP n

[Name]   Specify character space
[Code]   ASCII   ESC   SP   n
            Hexadecimal   1B   20   n
            Decimal   27   32   n

[Defined Area]   0 ≤ n ≤ 15
[Initial Value]   n = 0

[Function]   Sets right space of characters with n half dots.
                    When in horizontal double-wide printing, the right space is also double.

3-3-2   Character Expansion Settings

SO

[Name]   Specify double-wide expanded characters
[Code]   ASCII   SO
              Hexadecimal   0E
              Decimal   14

[Defined Area]   ---
[Initial Value]   Cancel double-wide expanded characters

[Function]   Prints ANK characters and Kanji characters with characters expanded twice the normal width.
                      This command is equivalent to ESC W n (n = 1).

DC4

[Name]   Cancel double wide printing
[Code]   ASCII   DC4
              Hexadecimal   14
              Decimal   20

[Defined Area]   ---
[Initial Value]   Cancel double-wide expanded characters

[Function]   Cancels horizontal double-wide printing if the following commands specify horizontal double-wide printing.
                      • Double horizontal double-wide printing specifying command (SO)
                      • Specify/cancel the horizontal double-wide printing (ESC W)
                      This command is equivalent to ESC W n (n = 0).

ESC W n

[Name]   Specify/cancel expanded double-wide printing

[Code]   ASCII   ESC   W   n

             Hexadecimal   1B   57   n

             Decimal   27   87   n

[Defined Area]   n = 0, 1, 48, 49

[Initial Value]   n = 0 (Horizontal double-wide printing cancelled)

[Function]   Specifies/cancels horizontal double-wide printing for ANK characters and Kanji characters, according to an n value.

n	Function
0, 48	Cancel double wide printing
1, 49	Specify double-wide expanded printing

ESC h n

[Name]   Specify/cancel expanded double-tall printing

[Code]   ASCII   ESC   h   n

             Hexadecimal   1B   68   n

             Decimal   27   104   n

[Defined Area]   n = 0, 1, 48, 49

[Initial Value]   n = 0 (vertical double-tall printing cancelled)

[Function]   Specifies/cancels vertical double-tall printing for ANK characters, according to an n value.

n	Function
0, 48	Cancel printing double high expanded character height
1, 49	Specify double-tall expanded printing

Double high & wide expanded character printing is possible by combining the double-wide and double-tall expanded character commands.

The line feed amount including the expanded double-tall characters is twice the normal amount.However, in standard specifications, only the line feed amount is doubled for font configurations of 6 x 12 IBM block graphic characters.

When double-tall expanded characters and normal printing are mixed in the same line, they are aligned at the bottom.

Double-tall expanded is effective only for ANK characters, and not effective for Kanji characters.

3-3-3 Print mode

ESC E

[Name]   Select emphasized printing

[Code]   ASCII   ESC   E

                Hexadecimal   1B   45

                Decimal   27   69

[Defined Area]   ---

[Initial Value]   Emphasized printing cancelled.

[Function]   Specifies emphasized printing for subsequent data.

                When in emphasized printing, data is printed in two passes.

                This command is effective for both ANK characters and Kanji characters (prints with four passes for 2 pass Kanji characters, and with 8 passes for 4 pass Kanji characters).

ESC F

[Name]   Cancel emphasized printing

[Code]   ASCII   ESC   F

                Hexadecimal   1B   46

                Decimal   27   70

[Defined Area]   ---

[Initial Value]   Emphasized printing cancelled.

[Function]   Cancels emphasized printing for subsequent data.

ESC – n

[Name]   Specify/cancel underling mode

[Code]   ASCII   ESC   -   n

          Hexadecimal   1B   2D   n

          Decimal   27   45   n

[Defined Area]   n = 0, 1, 48, 49

[Initial Value]   n = 0 (Underline cancelled)

[Function]   Specifies underline according to the value of n.

n	Function
0, 48	Cancels underline
1, 49	Specifies underline

Underlines are applied to the 9th dot of the character.

Underlines are not applied to horizontal tabs and to specified horizontal direction positions.

When double-wide expanded characters have been specified, the underline is also expanded, but if double-tall expanded characters have been selected, the underline does not expand in the vertical direction. It remains a one-dot line.

This command is enabled for ANK characters and Kanji characters and is ineffective for block graphic characters.

ESC _ n

[Name]   Specify/cancel upperline

[Code]   ASCII   ESC   _   n

          Hexadecimal   1B   5F   n

          Decimal   27   95   n

[Defined Area]   n = 0, 1, 48, 49

[Initial Value]   n = 0 (Upperline cancelled)

[Function]   Specifies upperline according to the value of n.

n	Function
0, 48	Cancels upperline
1, 49	Specifies upperline

Upperlines are applied to the 1st dot of the character.

Upperlines are not applied to horizontal tabs and to specified horizontal direction positions.

When double-wide expanded characters have been specified, the upperline is also expanded, but if double-tall expanded characters have been selected, the upperline does not expand in the vertical direction. It remains a one-dot line.

This command is enabled for ANK characters and Kanji characters and is ineffective for block graphic characters.

ESC 4

[Name]   Specify white/black inversion and red color printing
[Code]   ASCII   ESC   4
              Hexadecimal   1B   34
              Decimal   27   52

[Defined Area]   ---
[Initial Value]   White/black inversion cancelled/black color printing specified

[Function]   The following shows the details of this command. They vary according to the model.
                  Spec. 1
                  • Specifies white/black inverted printing (only on models that do not handle two color printing)
                  Subsequent characters are printed, including the character pitch, with white and black inverted.
                  Printing is uni-directional. (SP2000, BD100)
                  Precautions for Use of This Command
                  (1) This command is enabled for ANK characters only. White/black is not inverted for Kanji characters and block graphic characters.
                  (2) Do not use this command when ANK fonts are set to 5 x 9 (3P=1) (Print quality is not guaranteed.)
                  (3) When the ANK font setting is 5 x 9 (2P=1), and character spacing is set to an odd number, the gap between characters will open, so set the character space to an even value.
                   • Specifies red color printing (only on models that handle two color printing)
                  Subsequent characters are printed in red.Red and black characters can be mixed on the same line.
                  This command is enabled for all print data (ANK characters, Kanji characters and bit images).
                  When switched to red colored, printing is uni-directional.
                  Spec. 2
                  This command function is based on the selection of red/black substitute function.
                  The red/black substitute function is selected by the memory switch or the command <ESC> <GS> "4" m n.
                  For details on selecting the red/black substitute function using a command, see the explanation of <ESC> <GS> "4" m n below, and for details on selecting the red/black substitute function using the memory switch, see the printer specifications manual.

ESC 5

[Name]   Cancel white/black inversion/specify black color printing
[Code]   ASCII   ESC   5
              Hexadecimal   1B   35
              Decimal   27   53

[Defined Area]   ---
[Initial Value]   Cancel white/black inverted printing/specify black printing

[Function]   The following shows the details of this command. They vary according to the model.
                  Spec. 1
                  Cancels white/black inverted printing (only on models that do not handle two color printing)
                  Cancels white/black inverted printing
                  Specifies black printing (only on models that handle two color printing)
                  Cancels red color printing and prints subsequent data in black.
                  Spec. 2
                  This command function is based on the selection of red/black substitute function.
                  The red/black substitute function is selected by the memory switch or the command <ESC> <GS> "4" m n.
                  For details on selecting the red/black substitute function using a command, see the explanation of <ESC> <GS> "4" m n below, and for details on selecting the red/black substitute function using the memory switch, see the printer specifications manual.

ESC GS 4 m n

[Name]   Select red/black substitute function [ESC 4/5 setting]

[Code]   ASCII   ESC   GS   4   m   n

          Hexadecimal   1B   1D   34   m   n

          Decimal   27   29   52   m   n

[Defined Area]   m = 1, 2, 49, 50

                  When m = 1, 49 n = 0 to 3, 255

                  When m = 2, 50 n = 0, 2 to 5

                  When m = 83 n = 0, 1

[Initial Value]   Memory switch setting

[Function]   Selects red/black substitute function

              Selects characters targeted for adornment with m = 1 (ANK) or m = 2 (Kanji characters), and selects the <ESC> "4"/<ESC> "5" command functions with n.

              Sets the handling of adornment to space characters (ASCII 20Hex) with m = 83 ("S").

              This command is enabled only when in a state where adornment is cancelled by <ESC> "4" (when <ESC> "5" was specified).

When m = 1, 48 ("1") Targeted characters = ANK

m	n	<ESC> "4"/<ESC> "5" Command Functions (ANK)
1 , 49	0	White/black inverted printing (1 Pass)
1 , 49	1	<Option 1> White/black inversin (5 x 9 font print) + enhancing (2 passes)
1 , 49	2	<Option 2> Upper line + Underline + enhancing (2 passes)
1 , 49	3	<Option 3> Upper line + Underline + double tall expanded + enhancing (4 passes)
1 , 49	255	No adornment

When m = 2, 50 ("2") Targeted characters = Kanji characters

m	n	<ESC> "4"/<ESC> "5" Command Functions (Kanji characters)
2 , 50	0	No adornment
2 , 50	2	<Option 2> Upper line + Underline + enhancing (4 passes)
2 , 50	3	<Option 3> Upper line + Underline + double tall expanded + enhancing (4 passes)
2 , 50	4	<Option 4> White/Black Inverted + Double-Tall (2 passes)
2 , 50	5	<Option 5> White/Black Inverted + 4 X Expanded (2 passes)

When using <ESC> "5" to cancel adornments, it returns to the previously set adornments. (Adornments such as underline, upper line, double-tall expanded and enhancing are cancelled if there is no command to set them (for example the <ESC> "-" 1 specification for underlines).

Precautions for selecting <Option 1>

1.   **Prints white/black inverted characters using 5 x 9 fonts regardless of the current font size setting.**

2.   **Inserts a one dot string of black printing to the head of the white/black inverted characters.**

3.   **Printing data created on a conventional red/black printer, using 1 and 2 above, there are cases in which the printing position will shift to the right and a line of printable characters reduced.**

4.   **Download registered characters defined with 5 x9 fonts are printed regardless of the current font setting (7x9/5x9).**

5.   **Must not set "ANK default dot count = many" with the memory switch. (This will cause a white line to appear between characters.)**

Precautions for selecting <Option 2> and <Option 3>

1.   **Do not apply an upper line or an underline when rotating 90 or 270 degrees.**

When m = 83 ("S") Red/black adornment of ANK space characters (20H).

m	n	Red adornment of ANK space characters (20H).
83	0	Adorn
83	1	Do not adorn

This parameter specifies whether to adorn red/black for ANK space characters in red printing mode (black/white inverted).

The ANK space characters are limited to ASCII code 20H in this setting. In the character code table, if 7FHex is a space character, 7FHex is a target for this setting.

The following is an example of each setting. It is possible to avoid unnecessary adornment in printing patterns that provide spacing of printing positions with ANK space characters (20H) when red is specified.

(Print Example)
Print data: <ESC> "4" "TOTAL" 20H 20H 20H 20H 20H 20H 20H 20H 20H "$1234" <LF>

<Condition 1> ANK adornment = "black/white inverted printing," ANK space characters = "red/black adornment"

TOTAL $1234

<Condition 2> ANK adornment = "black/white inverted printing," ANK space characters = "no red/black adornment"

TOTAL $1234

SI

[Name]	Select upside-down printing		
[Code]	ASCII	SI	
	Hexadecimal	0F	
	Decimal	15	

[Defined Area]   ---

[Initial Value]   Upside-down printing cancelled

[Function]   Specifies upside-down printing

This command is enabled only when at the top of the line.Therefore, upside down and right-side up characters cannot both exist in the same line.

This command is enabled for following.

• ANK characters

• Kanji characters

• Bit images

DC2

[Name]	Cancel upside-down printing		
[Code]	ASCII	DC2	
	Hexadecimal	12	
	Decimal	18	

[Defined Area]   ---

[Initial Value]   Upside-down printing cancelled

[Function]   Cancels upside-down printing

This command is enabled only when at the top of the line.

ESC RS i n

[Name] Specify/cancel character rotated mode

[Code] ASCII   ESC   RS   i   n

          Hexadecimal   1B   1E   69   n

          Decimal   27   30   105   n

[Defined Area] $0 \leq n \leq 2$

                $48 \leq n \leq 50$ ("0" $\leq n \leq$ "2")

[Initial Value] Character rotation cancelled (n = 0)

[Function] Specifies direction to rotate print (clockwise) or to cancel rotation for subsequent data, according to the n value.

n	Set rotation
0, 48	Cancelled (0° rotation)
1, 49	270° rotation
2, 50	270° rotation

Rotated characters cannot be applied with underlines or upperlines.

The relationship between double-tall and double-wide is reverse to when cancelled when rotating.

When in Japanese character mode, rotation is effective for both ANK characters and Kanji characters.

Chinese character spacing is always applied with the two-byte Chinese character spacing value.

In standard specifications, rotating IBM block graphic characters is changed to vertical 8 dot fonts.

The following are precautions for 7 x 9 font character font specification.

• Characters are printed with 5 x 9 fonts (2P=1).

• Download characters registered with 5 x 9 fonts are printed.

• When rotation is cancelled, the characters return to 7 x 9 fonts. (When there is not 5 x 9 specification while rotation is specified.)

This command is effective only a font other than the Thai font is selected as the character code table.

(Rotation is automatically cancelled when the Thai character code is selected while this command is selected.)

3-3-4 Line Spacing

LF

[Name]   Line feed

[Code]   ASCII   LF

          Hexadecimal   0A

          Decimal   10

[Defined Area]   ---

[Initial Value]   Set line feed to 1/6 inch

[Function]   After printing data in the line buffer, paper is fed according to the currently set line feed amount.

CR

[Name]   Carriage return (Print line feed)

[Code]   ASCII   CR

          Hexadecimal   0D

          Decimal   13

[Defined Area]   ---

[Initial Value]   Set line feed to 1/6 inch

[Function]   Specifies the function according to the memory switch value.

Memory SW	Function
Condition (1)	Ignored
Condition (2)	Same as the <LF> code.
Condition (3)	Executes only printing, with no paper feed.

See each printer's product specifications manual for details on the memory switch settings.

ESC a n

[Name]   Feed paper n lines
[Code]   ASCII   ESC   a   n
          Hexadecimal   1B   61   n
          Decimal   27   97   n

[Defined Area] $1 \leq n \leq 127$
[Initial Value]   ---

[Function]   After printing data in the line buffer, paper is fed according to (currently set line feed amount x n).
              This paper feed amount is unaffected even if there are vertical expanded characters and double high and wide expanded characters in one line.

ESC 0

[Name]   Set line feed to 1/8 inch
[Code]   ASCII   ESC   0
          Hexadecimal   1B   30
          Decimal   27   48

[Defined Area]   ---
[Initial Value]   1/6 inch

[Function]   Sets subsequent line feed amounts to 1/8 inch.

ESC 1

[Name]   Set line feed to 7/72 inch
[Code]   ASCII   ESC   1
          Hexadecimal   1B   31
          Decimal   27   49

[Defined Area]   ---
[Initial Value]   1/6 inch

[Function]   Sets subsequent line feed amounts to 7/72 inch.

ESC z 0

[Name]   Set line feed to 1/12 inch

[Code]   ASCII   ESC   z   0   Or   ESC   z   "0"
          Hexadecimal   1B   7A   00   1B   7A   30
          Decimal   27   122   0   27   122   48

[Defined Area]   ---
[Initial Value]   1/6 inch

[Function]   Sets subsequent line feed amounts to 1/12 inch.

ESC z 1

[Name]   Set line feed to 1/6 inch

[Code]   ASCII   ESC   z   1   Or   ESC   z   "1"
          Hexadecimal   1B   7A   01   1B   7A   31
          Decimal   27   122   1   27   122   49

[Defined Area]   ---
[Initial Value]   1/6 inch

[Function]   Sets subsequent line feed amounts to 1/6 inch.

ESC A n

[Name]	Define n/72 inch pitch line feed		
[Code]	ASCII	ESC	A	n
	Hexadecimal	1B	41	n
	Decimal	27	65	n

[Defined Area]   0 ≤ n ≤ 85
[Initial Value]   n = 12 (1/6 inch line feed)

[Function]   Defines line feed amount for one line as n/72 inch.
To enable this code, ESC 2 (line feed pitch setting) must be sent.

ESC 2

[Name]	Set ESC A line feed pitch		
[Code]	ASCII	ESC	2
	Hexadecimal	1B	32
	Decimal	27	50

[Defined Area]   ---
[Initial Value]   ---

[Function]   Sets one line feed amount to the value defined by ESC A (n/72 inch pitch line feed definition).
Line feed amount is set to 1/6 inch if executing this command when ESC A (n/72 inch pitch line feed definition) is not set.

ESC 3 n

[Name]   Set line feed to n/216 inch line feed pitch (approximate value)

[Code]   ASCII   ESC   3   n

                Hexadecimal   1B   33   n

                Decimal   27   51   n

[Defined Area] $0 \leq n \leq 255$

[Initial Value]   n = 36 (1/6 inch)

[Function]   Sets subsequent line feed amounts to a value approximate to n/216 inch.

                Because the minimum pitch for the paper feed mechanism is 1/144 of an inch, the setting value will be approximated according to the following equation.

INT (n x 2/3 + 0.5)/144 of an inch

ESC y n

[Name]   Set line feed to n/144 inch line feed pitch

[Code]   ASCII   ESC   y   n

                Hexadecimal   1B   79   n

                Decimal   27   121   n

[Defined Area] $0 \leq n \leq 255$

[Initial Value]   n = 24 (1/6 inch)

[Function]   Sets subsequent line feed amounts to n/144 inch.

ESC J n

[Name]   Execute n/72 inch paper feed one time

[Code]   ASCII   ESC   J   n

            Hexadecimal   1B   4A   n

            Decimal   27   74   n

[Defined Area]   1 ≤ n ≤ 255

[Initial Value]   ---

[Function]   After printing data in the line buffer, paper is fed n/72 of an inch in the forward paper feed direction.

This paper feed amount is unaffected even if there are vertical expanded characters and double high and wide expanded characters in one line.

The single line feed amount setting value is not changed by this command.

ESC I n

[Name]   Execute n/144 inch paper feed one time

[Code]   ASCII   ESC   I   n

            Hexadecimal   1B   49   n

            Decimal   27   73   n

[Defined Area]   1 ≤ n ≤ 255

[Initial Value]   ---

[Function]   After printing data in the line buffer, paper is fed n/144 of an inch in the forward paper feed direction.

This paper feed amount is unaffected even if there are vertical expanded characters and double high and wide expanded characters in one line.

The single line feed amount setting value is not changed by this command.

3-3-5 Page Control Commands

FF

[Name]   Form feed

[Code]   ASCII   FF

          Hexadecimal   0C

          Decimal   12

[Defined Area]   ---
[Initial Value]   ---

[Function]   This command performs the following operations after the printer prints the printing data in the line buffer.

                  Operations are set by the memory switch.

Memory SW	Cutter Model	Tear Bar Model
Condition (1)	Executes a form feed	Executes a form feed.
Condition (2)	Feeds paper to the cutting position and performs a full cut. (*1)	Paper is fed to the tear-bar position. (*2)
Condition (3)	Executes a form feed.	Executes a form feed.
Condition (4)	Feeds paper to the cutting position and performs a partial cut. (*1)	Paper is fed to the tear-bar position. (*2)

(*1) Paper feed to cutting position: Executes a 1 inch paper feed.
(*2) Paper feed to tear-bar position: Executes a 7/6 inch paper feed.

See each printer's product specifications manual for details on the memory switch settings.

ESC C n

[Name]   Set page length to n lines
[Code]   ASCII   ESC   C   n
            Hexadecimal   1B   43   n
            Decimal   27   67   n

[Defined Area]   1 ≤ n ≤ 255
[Initial Value]   1/6 inch x 42

[Function]   This command sets the length of one page to [currently set line feed amount x n] lines
                    The current position is the top position of the page.
                    The page length set using this command is unaffected by changing the form feed amount later.
                    Moving to the top of the page is performed using the FF (form feed) command.
                    If a page length is set less than the bottom margin setting value that is currently set, the page length setting value is valid and the bottom margin setting value is cleared.

ESC C NUL n

[Name]   Set page length to n inches
[Code]   ASCII   ESC   C   NUL   n
            Hexadecimal   1B   43   00   n
            Decimal   27   67   0   n

[Defined Area]   1 ≤ n ≤ 127
[Initial Value]   n = 7

[Function]   This command sets the length of one page to n inches.The current position is the top position of the page.
                    The page length set using this command is unaffected by changing the form feed amount later.
                    Moving to the top of the page is performed using the FF (form feed) command.
                    If a page length is set less than the bottom margin setting value that is currently set, the page length setting value is valid and the bottom margin setting value is cleared.

VT

[Name]	Feed paper to vertical tab position	
[Code]	ASCII	VT
	Hexadecimal	0B
	Decimal	11

[Defined Area]   ---

[Initial Value]   ---

[Function]   This command performs paper feeds up to the next vertical tab position after the printer prints the data in the line buffer.

This command is ignored if there are no tabs set.

If a vertical tab is set, and the current position is the same as the vertical tab position, or if it is below that position, it feeds paper to the top of the next page.

ESC B n1 n2 … nk NUL

[Name]	Set vertical tab						
[Code]	ASCII	ESC	B	n1	n2	..	nk	NUL
	Hexadecimal	1B	42	n1	n2	..	nk	00
	Decimal	27	66	n1	n2	..	nk	0

[Defined Area] $1 \leq n \leq 255$

                 $1 \leq k \leq 16$

[Initial Value]   (Not set)

[Function]   Sets the vertical tab to (current form feed amount x n) position.

All other vertical tabs set before setting the vertical tab using this command are cancelled

A maximum of 16 vertical tabs can be set.However, the tab position must satisfy the condition of $1 \leq n1 \leq n2$ ... $\leq nk$.When receiving the illegal codes that do not satisfy the condition, tabs up to the illegal code are set, but those after the illegal code are discarded up to the NUL code so illegal code tab are not set.

The vertical tab set using this command is unaffected by changing the form feed amount later.

All vertical tabs are cleared by inputting ESC B NUL.

Double high and double high & wide character specifications are unaffected when using this setting.
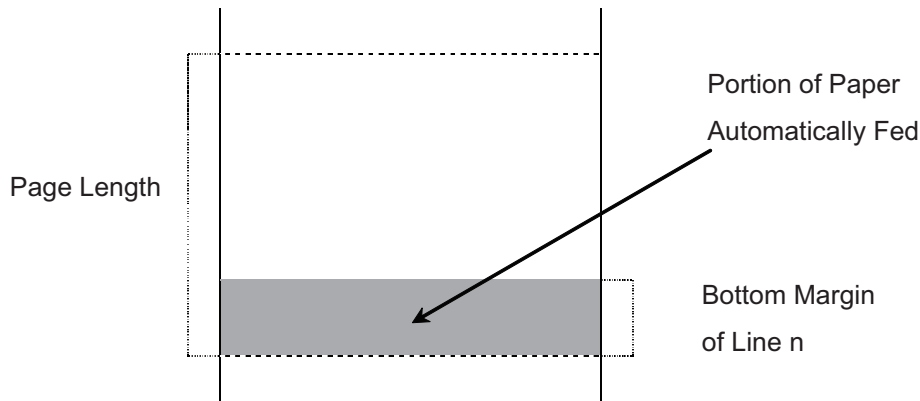
ESC N n

[Name]   Set bottom margin to n lines
[Code]   ASCII   ESC   N   n
           Hexadecimal   1B   4E   n
           Decimal   27   78   n

[Defined Area]   0 ≤ n ≤ 255 (Not full page length)
[Initial Value]   n = 0

[Function]   This command sets the bottom margin position to (current line feed amount x n).

The current position when setting is effective from the next page when within the bottom margin.
The bottom margin set using this command is unaffected by changing the form feed amount later.
The set bottom margin is cleared using the "ESC N NUL" or the "ESC O" commands.
The bottom margin setting value must be a value smaller than the length of one page. If a value higher the length of the page is specified, this setting is ignored.

ESC O

[Name]   Cancel bottom margin
[Code]   ASCII   ESC   O
           Hexadecimal   1B   4F
           Decimal   27   79

[Defined Area]   ---
[Initial Value]   Not set

[Function]   This command clears the bottom margin set using the ESC N (set bottom margin to n lines).

3-3-6 Horizontal Direction Printing Position

ESC RS A n

[Name]　Set print region

[Code]

ASCII	ESC	RS	A	n
Hexadecimal	1B	1E	41	n
Decimal	27	30	65	n

[Defined Area]　　Specification 1　　　$0 \leq n \leq 3$

　　　　　　　　　Specification 2　　　$0 \leq n \leq 5$

[Initial Value]　　MSW Setting

[Function]　　After printing data in the line buffer, this sets the printable region in the horizontal direction according to the n value.

　　　　　　Setting this command partway will print the data in the line buffer at that time, perform a line feed and then take affect from the next line.

n	Print Region (Number of Dots)	Spec. 1	Spec. 2
0	210 Dots	○	○
1	160 Dots	○	○
2	200 Dots	○	○
3	150 Dots	○	○
4	190 Dots	-	○
5	180 Dots	-	○

The next horizontal position settings are all initialized.
• Left margin
• Right margin
• Current horizontal position
• Horizontal tab position

The setting of this command is not initialized by <ESC> "@", <CAN>.

The horizontal position parameters are initialized by this command. Execute the commands related to position settings in the horizontal position after sending this command.

Sending example: <ESC> "@" → <ESC> <RS> "A" n → each command setting → print data

The following illustrates the relationship between the printable region, and the left and right margins.
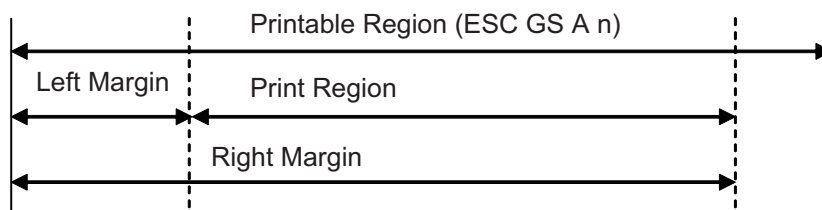
ESC l n

[Name]   Set left margin

[Code]   ASCII   ESC   l   n
          Hexadecimal   1B   6C   n
          Decimal   27   108   n

[Defined Area]   0 ≤ n ≤ (right margin -2) ≤ 255

[Initial Setting]   n = 0

[Function]   This command sets the left margin (current ANK character pitch x n) using the left edge as a reference after printing data in the line buffer. The left edge is also the reference for upside-down printing.

Setting this command partway will print the data in the line buffer at that time, perform a line feed and then take affect from the next line.

Character spacing is included in the character pitch but is unaffected by expansion settings.

The left margin set using this command is unaffected by changing the character pitch after being set.

The left margin must be at least a minimum of 18 dots. (*1)

If the printable region as set by the left and right margins is smaller than one character, including the space between characters, printing is not possible. A question mark (?) is printed instead of the character.

(*1) More than four characters of 7 x 9 fonts; more than three characters of 5 x 9 fonts (2P=1) (when character spacing = 0)
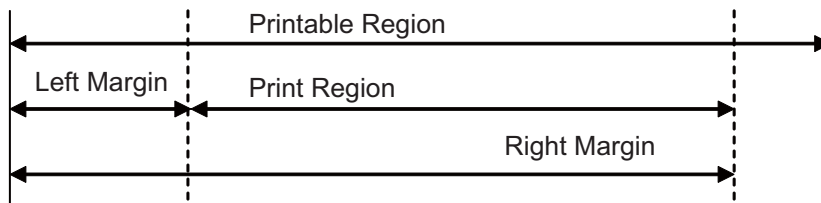
ESC Q n

[Name]   Set right margin

[Code]   ASCII   ESC   Q   n

            Hexadecimal   1B   51   n

            Decimal   27   81   n

[Defined Area] $2 \leq n \leq$ maximum printable digits ≤ 255

[Initial Value]   Maximum printable digits

[Function]   This command sets the printable region (current ANK character pitch x n) using the left edge as a reference after printing data in the line buffer.The left edge is also the reference for upside-down printing.

Setting this command partway will print the data in the line buffer at that time, perform a line feed and then take affect from the next line.

Character spacing is included in the character pitch but is unaffected by expansion settings.

The right margin set using this command is unaffected by changing the character pitch.

The print region within the defined range must be at least a minimum of 18 dots for the right margin.

If the printable region as set by the left and right margins is smaller than one character, including the space between characters, printing is not possible. A question mark ("?") is printed instead of the character.

(*1) More than four characters of 7 x 9 fonts; more than three characters of 5 x 9 fonts (2P=1) (when character spacing = 0)
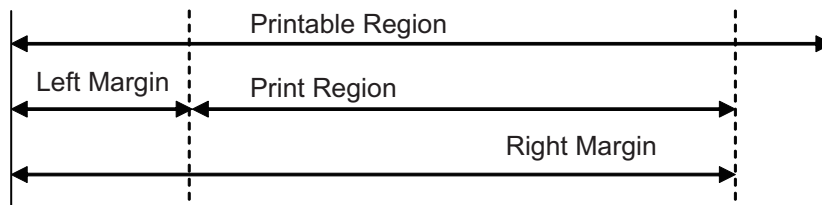
HT

[Name]	Move horizontal tab	
[Code]	ASCII	HT
	Hexadecimal	09
	Decimal	9

[Defined Area]   ---

[Initial Value]   ---

[Function]   Move print position to next horizontal tab position.

The current position moves to the next tab position when at the horizontal tab position.

This command is ignored with under the following conditions.
• When there is no horizontal tab set.
• When the current position is the same as the furthest right horizontal tab position or to the right of it.

In the underline/upperline modes, underlines and upperlines are not printed in the spaces created by a horizontal tab.

ESC D n1 n2 … nk NUL

[Name]	Set horizontal tab							
[Code]	ASCII	ESC	D	n1	n2	..	nk	NUL
	Hexadecimal	1B	44	n1	n2	..	nk	00
	Decimal	27	68	n1	n2	..	nk	0

[Defined Area] $1 \leq n \leq$ maximum printable digits ≤ 255
$0 \leq k \leq 32$

[Initial Value]   Not set

[Function]   Uses the left edge as a standard to set the horizontal tab to the position of (current ANK character pitch x n).

The horizontal tab reference point is the left edge, regardless of the left and right margin settings.

The right edge is also the reference for upside-down printing.

ANK character pitches, including right spaces, are unaffected by expansion settings.

All other horizontal tabs set before setting the horizontal tab using this command are cancelled

A maximum of 32 horizontal tabs can be set, but the tab position must satisfy the following conditions.

If the following conditions are not met, data up to the NUL code is discarded.Normal tabs that meet the conditions below are set and tabs after errors occur are not set.

  • $1 < n1 < n2 \ldots < nk$

  • $nk \leq$ Printable region

The horizontal tab set using this command is unaffected by changing the character pitch.

All horizontal tabs are cleared by inputting ESC D NUL.

ESC GS a n

[Name]   Specify position alignment

[Code]   ASCII   ESC   GS   a   n
           Hexadecimal   1B   1D   61   n
           Decimal   27   29   97   n

[Defined Area]   0 ≤ n ≤ 2
                  48 ≤ n ≤ 50 ("0" ≤ n ≤ "2")

[Initial Value]   n = 0

[Function]   This specifies position alignment for all data in one line, in the set print region.

n	Position alignment
0, 48	Left alignment
1, 49	Center alignment
2, 50	Right alignment

```
ABC
ABCD          }   <ESC><GS> "a" 0
ABCDE

                         ABC
<ESC><GS> "a" 1   {     ABCD
                        ABCDE

                                      ABC
              <ESC><GS> "a" 2   {     ABCD
                                     ABCDE
```
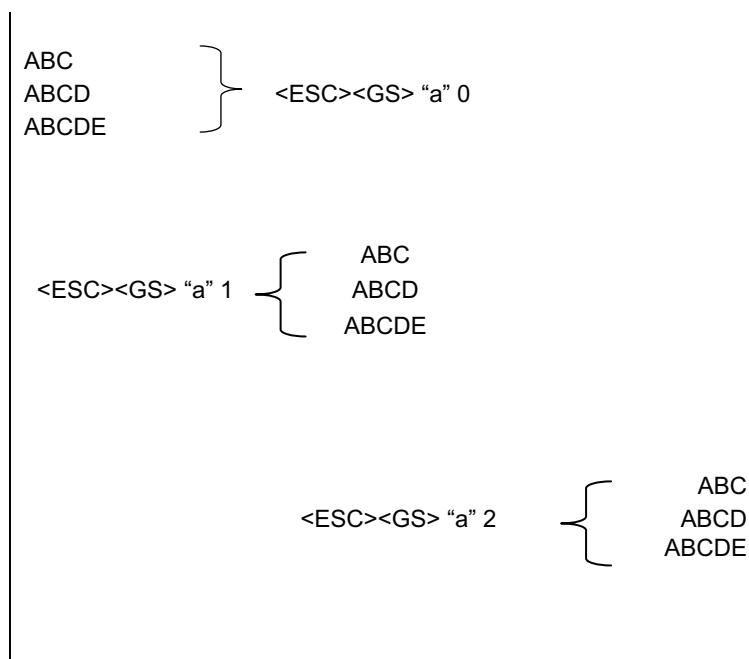
ESC GS A n1 n2

[Name]	Specify absolute position				
[Code]	ASCII	ESC	GS	A	n1 n2
	Hexadecimal	1B	1D	41	n1 n2
	Decimal	27	29	65	n1 n2

[Defined Area] $0 \leq n1 \leq 255$
$0 \leq n2 \leq 255$

[Initial Value]   ---

[Function]   Moves the printing position to the (n1 + n2 x 256) position based on the left margin.

The right margin is also the reference for upside-down printing.

This command is ignored if the print region is exceeded.

When print data is duplicated, the new print data is overwritten by the old print data. (the portion duplicated in the new data is deleted.) However, bit image data is OR processed for the old print data.

ESC GS R n1 n2

[Name]	Specify relative position				
[Code]	ASCII	ESC	GS	R	n1 n2
	Hexadecimal	1B	1D	52	n1 n2
	Decimal	27	29	82	n1 n2

[Defined Area] $0 \leq n1 \leq 255$
$0 \leq n2 \leq 255$

[Initial Value]   ---

[Function]   Moves the printing position from the current position to the (n1 + n2 x 256) position.

This command is ignored if the print region is exceeded.

When (n1 + n2 x 256) $\geq$ 32768, it moves {65536 – (n1 + n2 x 256)} dots in the left direction.

When (n1 + n2 x 256) < 32768, it moves (n1 + n2 x 256)} dots in the right direction.

When print data is duplicated, the new print data is overwritten by the old print data. (the portion duplicated in the new data is deleted.) However, bit image data is OR processed for the old print data.

3-3-7   Download

ESC & NUL n1 n2 [m d1 d2 d3 d4 d5 (d6 d7)] n2 - n1 + 1

[Name]   Register download characters (vertical 1 byte font)

[Code]   ASCII   ESC   &   NUL   n1   n2   [m d1 d2 d3 d4 d5 (d6 d7)] n2 - n1 + 1
          Hexadecimal   1B   26   00   n1   n2   [m d1 d2 d3 d4 d5 (d6 d7)] n2 - n1 + 1
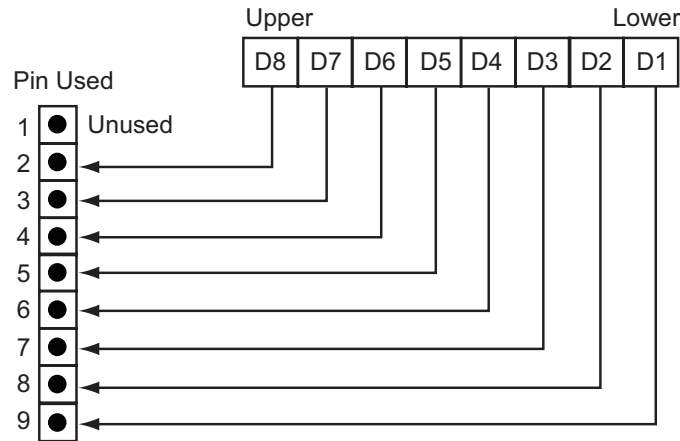   Decimal   27   38   0   n1   n2   [m d1 d2 d3 d4 d5 (d6 d7)] n2 - n1 + 1

[Defined Area] $33 \leq n1 \leq n2 \leq 127$ ($21h \leq n1 \leq n2 \leq 7Fh$)
                  m = 0, 128 (00h, 80h)
                  $0 \leq d1$ to $d7 \leq 255$
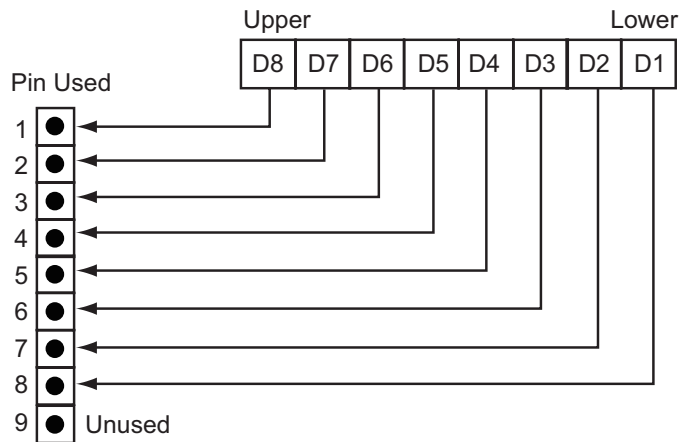
[Initial Value]   ---

[Function]   Registers download characters to the specified character code.

              A maximum of 10 download characters can be registered for 7 x 9 and 5 x 9 fonts.

              The range of the location to write download characters is specified by n1 and n2. When the registered character is 1 character, n1 = n2.

              If one has been already registered to an address, it is overwritten.

              This command registers download characters independent to each font.

              m indicates the relationship of the character pattern and the print head (see figure below).

              Definition data (d1 to d7) set the bits that correspond to the dots to print to "1," and the bits that correspond to the dots that are not printed to "0."

              Even if ESC @ (command initialization) is executed, the registered download character is not cleared.

              This command is effective only a font other than the Thai font is selected as the character code table. (Composed of vertical 1 byte except for the Thai font.)

Relationship of character pattern data and print head.

1. When m = 0 (00h):

| | Upper | | | | | | | Lower |
| Pin Used | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 |

1 ● Unused
2 ● ← D8
3 ● ← D7
4 ● ← D6
5 ● ← D5
6 ● ← D4
7 ● ← D3
8 ● ← D2
9 ● ← D1

2. When m = 128 (80h):

| | Upper | | | | | | | Lower |
| Pin Used | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 |

1 ● ← D8
2 ● ← D7
3 ● ← D6
4 ● ← D5
5 ● ← D4
6 ● ← D3
7 ● ← D2
8 ● ← D1
9 ● Unused

Note   • **When registering 7 x 9 fonts, dots adjacent in the horizontal direction do not print.**

            • **When character rotation is specified, 7 x 9 font registered characters cannot be printed. 5 x 9 font characters are always printed.**

[Ex.]   When selecting 7 x 9 fonts, and defining the character to 21H:
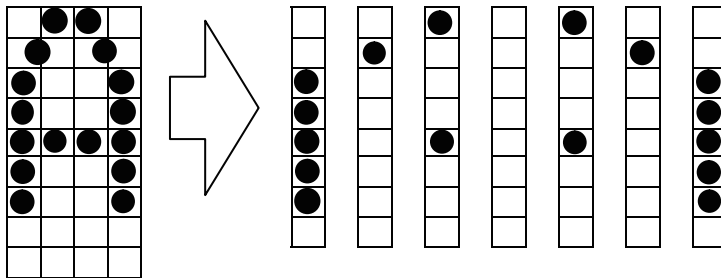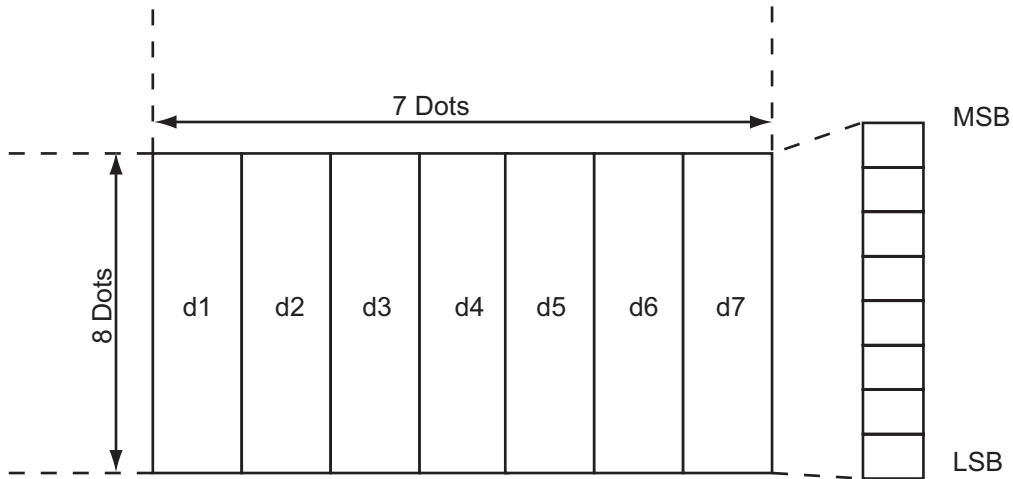

```
                        ESC  &  NUL n1  n2  m  d1  d2  d3  d4  d5  d6  d7
Code (Hexadecimal)      1B   26  00  21  21  80  3E  40  88  00  88  40  3E
```

(1 when printing corresponding bits, and 0 for no print)

[Ex.] When selecting 5 x 9 fonts, and defining the character to 21H:

5 Dots

8 Dots

d1 d2 d3 d4 d5

MSB

LSB
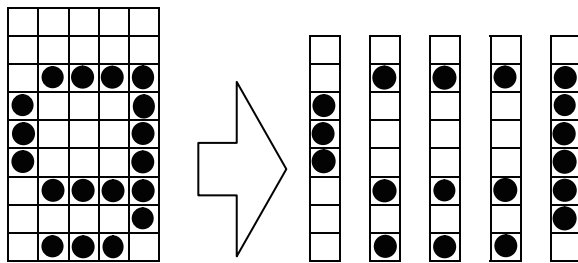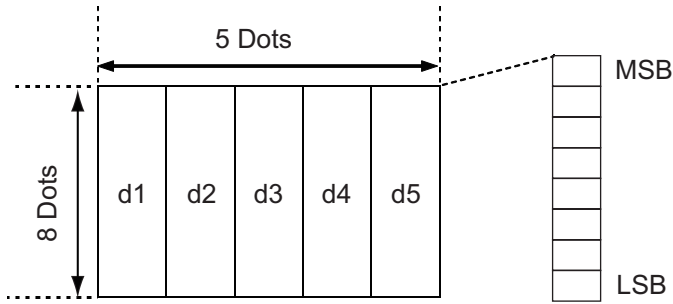
ESC & NUL n1 n2 m d1 d2 d3 d4 d5
Code (Hexadecimal)   1B 26 00 21 21 00 38 45 45 45 7E

(1 when printing corresponding bits, and 0 for no print)

ESC & m n1 n2 [d1 d2 d3 d4 d5 d6 d7 d8 d9 d10 .... ak dk] n2 - n1 + 1

[Name]   Define download characters (vertical 2 byte font)

[Code]   ASCII   ESC   &   m   n1   n2   [d1 d2 d3 d4.........dk-1 dk..] n2 - n1 + 1
         Hexadecimal   1B   26   m   n1   n2   [d1 d2 d3 d4 ....dk-1 dk] n2 - n1 + 1
         Decimal   27   38   m   n1   n2   [d1 d2 d3 d4 ....dk-1 dk] n2 - n1 + 1

[Defined Area]   • 7 x 9 Mode
                 m = 1
                 33 ≤ n1 ≤ n2 ≤ 127 (21h ≤ n1 ≤ n2 ≤ 7Fh)
                 0 ≤ 1 to 8 pins (d1 d3 d5 d7 … dk -1) ≤ 255
                 9 pin (d2 d4 d6 … dk) = 0, 128 (00h, 80h)
                 k = 14
                 • 9 x 9 Mode
                 m = 2
                 33 ≤ n1 ≤ n2 ≤ 127 (21h ≤ n1 ≤ n2 ≤ 7Fh)
                 0 ≤ 1 to 8 pins (d1 d3 d5 d7 … dk -1) ≤ 255
                 9 pin (d2 d4 d6 … dk) = 0, 128 (00h, 80h)
                 k = 18

[Initial Value]   ---

[Function]

Registers download characters to the specified character code.

Specify 1 row of data with 1 byte of 1 to 8 pins, and 1 byte of 9 pin.

It is possible to specify the ON dot up to 1 to 9 pins in the vertical direction. However, it is prohibited to specify the ON dot continuously in the horizontal direction.

A maximum of 10 download characters can be registered for 7 x 9 and 9 x 9 fonts.

The range of the location to write download characters is specified by n1 and n2. When the registered character is 1 character, n1 = n2.

If one has been already registered to an address, it is overwritten.

This command registers download characters independent to each font.

Indicates the relationship of the character pattern and the print head (see figure below).

Definition data (d1 to d7) set the bits that correspond to the dots to print to "1," and the bits that correspond to the dots that are not printed to "0."

Even if ESC @ (command initialization) is executed, the registered download character is not cleared.

This command is effective only a font other than the Thai font is selected as the character code table. (Composed of vertical 2 byte when using the Thai font.)

Relationship of character pattern data and print head.

[Ex.]　　　　　　　　When selecting 7 x 9 fonts, and defining the character to 21H:
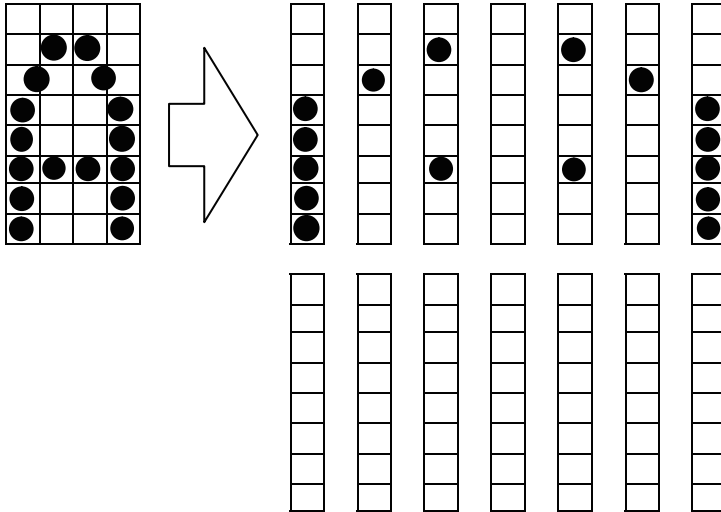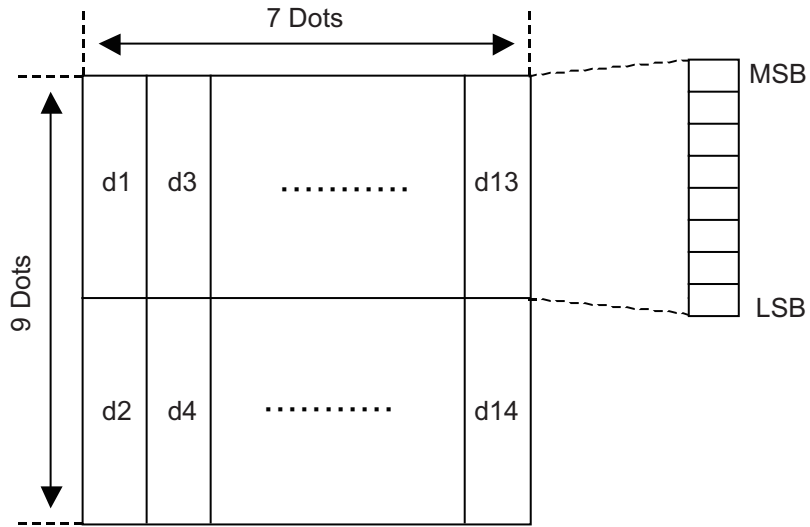

```
              ESC  &  m  c1 c2 d1 d2 d3 d4 d5 d6 d7 d8 d9 d10 d11 d12 d13 d14
Code (Hexadecimal)  1B 26 02 21 21 1F 00 20 00 44 00 00 00 44 00 20 00 1F 00
```

(1 when printing corresponding bits, and 0 for no print)

[Ex.:] When selecting 9 x 9 fonts, and defining the character to 21H:
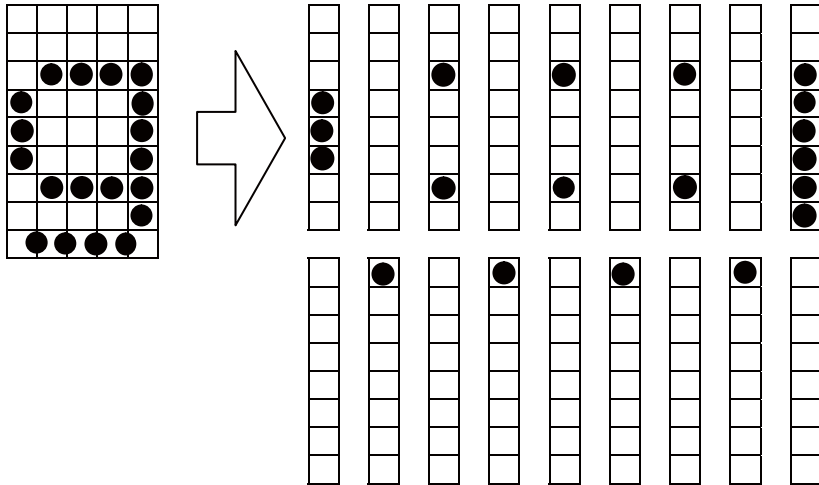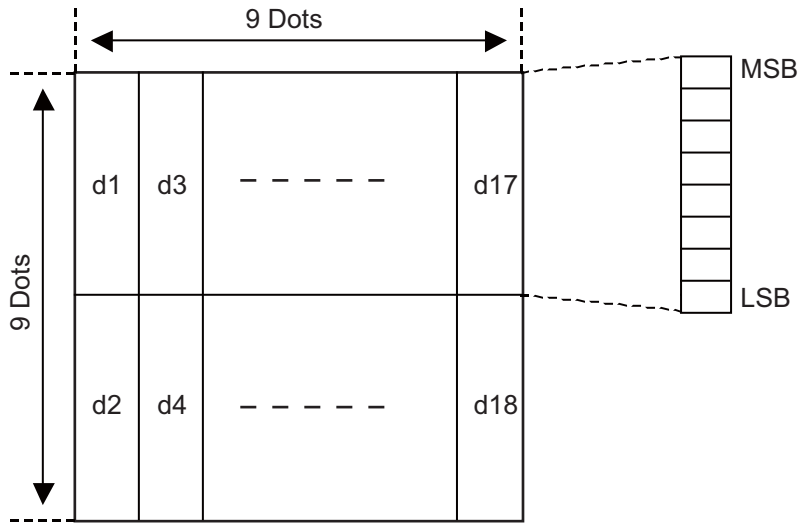
ESC & m c1 c2 x d1 d2 d3 d4 d5 d6 d7 d8 d9 d10 d11 d12 d13 d14 d15 d16 d17 d18
Code (Hex.) 1B 26 02 21 21 1C 00 00 80 22 00 00 80 22 00 00 80 22 00 00 80 3F 00

(1 when printing corresponding bits, and 0 for no print)

ESC % N

[Name]	Specify/cancel download characters			
[Code]	ASCII	ESC	%	n
	Hexadecimal	1B	25	n
	Decimal	27	37	n

[Defined Area]   n = 0, 1, 48, 49
[Initial Value]   Cancel download character

[Function]   Specifies/cancels download character according to n value.

n	
0, 48	Cancel download characters
1, 49	Specify download characters

<Print example of download characters>
1. Register download character (ESC & NUL n1 n2 m0 m1 m2…)
2. Specify download characters (ESC % n (n = 1))
3. Print download characters

3-3-8   Bit Image Graphics

ESC K n NUL d1 d2 … dn

[Name]	Standard density bit image							
[Code]	ASCII	ESC	K	n	NUL	d1	d2	..	dn
	Hexadecimal	1B	4B	n	00	d1	d2	..	dn
	Decimal	27	75	n	0	d1	d2	..	dn

[Defined Area]   1 ≤ n ≤ total dot count
                            0 ≤ d ≤ 255

[Initial Value]   ---

[Function]   This command prints bit images with only the data count determined by n.

The amount of data that can be printed in one line is limited to the total dot count. Data that exceeds the total dot count or the right margin is ignored.

See each printer's product specifications manual for details regarding the total dot count.

The printing of this command is a uni-directional print (SP2000, BD100).

After printing the bit image, the printer automatically returns to the character mode.

The following drawing shows the relationship of the print head needle wires and the data.
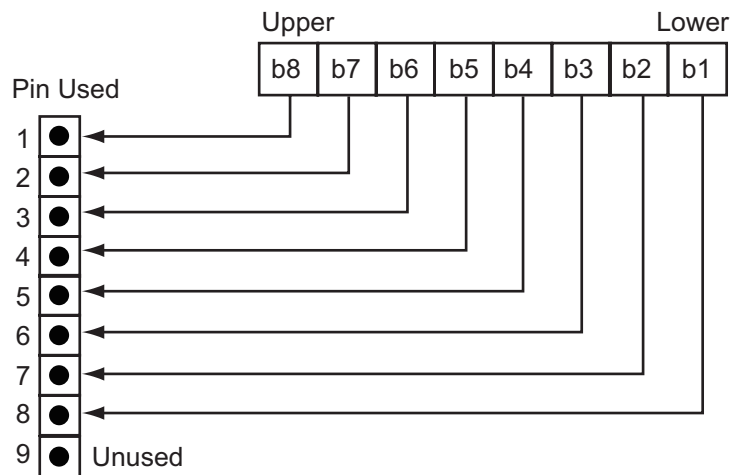
ESC L n1 n2 d1 d2 … dk

[Name]	Double density bit image							
[Code]	ASCII	ESC	L	n1	n2	d1	d2	..	dk
	Hexadecimal	1B	4C	n1	n2	d1	d2	..	dk
	Decimal	27	76	n1	n2	d1	d2	..	dk

[Defined Area]   1 ≤ (n1 + n2 x 256) ≤ total half dot count

k = n1 + n2 x 256

0 ≤ d ≤ 255

[Initial Value]   ---

[Function]   This command executes the bit image of a density doubled (half dot printing) for just the data count determined by n1 and n2.

The amount of data that can be printed in one line is only the total half-dot count. Data that exceeds the total half-dot count or the right margin is ignored.See each printer's product specifications manual for details regarding the total half-dot count.

The relationship of the print head needle wires and the data is the same as ESC K (standard density bit image).

When printing double-density bit images, dots adjacent in the horizontal direction do not print.

The printing of this command is a uni-directional print (SP2000, BD100).

After printing the bit image, the printer automatically returns to the character mode.

ESC ^ m n1 n2 d1 d2 … dk

[Name]   9/16/18 bit image graphics
[Code]   ASCII   ESC   ^   m   n1   n2   d1   d2   ..   dk
            Hexadecimal   1B   5E   m   n1   n2   d1   d2   ..   dk
            Decimal   27   94   m   n1   n2   d1   d2   ..   dk

[Defined Area]   Spec. 1
                      0 ≤ m ≤ 1 ("0" ≤ m ≤ "1")

                  Spec. 2
                  [9W Printer]
                  0 ≤ m ≤ 1 ("0" ≤ m ≤ "1")
                  [18W Printer]
                  0 ≤ m ≤ 5 ("0" ≤ m ≤ "5")

                  1 ≤ (n1 + n2 x 256) = printable region
                  0 ≤ d ≤ 255

[Initial Value]   ---

[Function]   This command prints bit images with only the data count determined by n1, and n2 at standard or double density.
                  Specify the horizontal print dot count (row) using n1 + n2 x 256 dots.

                  • m = 0:   Print standard density 9 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of dots.
                  • m = 1:   Print double density 9 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of half dots.
                              Dots adjacent in the horizontal direction do not print.

                  • m = 2:   Print standard density 16 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of dots.
                  • m = 3:   Print double density 16 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of half dots.
                              Dots adjacent in the horizontal direction do not print.

                  • m = 4:   Print standard density 18 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of dots.
                  • m = 5:   Print double density 18 dot bit images.
                              The maximum number of dots in the horizontal direction is the total number of half dots.
                              Dots adjacent in the horizontal direction do not print.

        Note **• Data exceeding the maximum number of dots or the right margin is ignored.**

              • Total number of dots and total number of half-dots follows the memory switch setting. (See the specifications manual)

              • When m is outside the defined area, the following process occurs.

              Spec. 1

              • Data after n1 is processed as normal data.

              Spec. 2

              • The dots for the horizontal print dot count (row) n1 + n2 x 256 are discarded.

              • When printing of the bit image is ended, the system returns to normal data processing.

The following drawing shows the relationship of the print head needle wires and the data.

1. When m = 0, 1 (9-dot bit image)

dn: 1 to 8 pin data
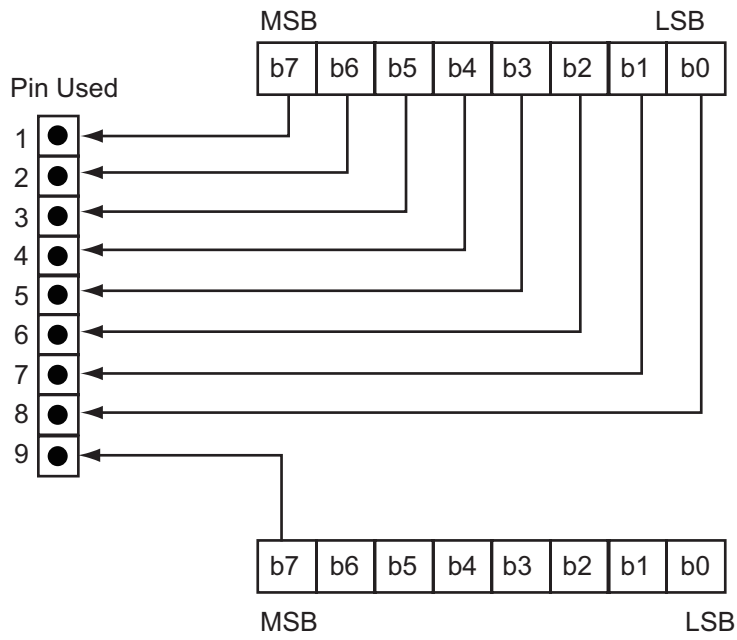
dn + 1: 9 pin data

2. When m = 2, 3 (16-dot bit image)

dn: 1 to 8 pin data

dn + 1: 9 to 16 pin data

3. When m = 4, 5 (18-dot bit image)

3-3-9 Logo

ESC FS q n [x11 x12 y11 y12 d1…dk]1…[xn1 xn2 yn1 yn2 d1…dk] n

[Name] Register logo

[Code]

ASCII	ESC	FS	q	n	[x11	x12	y11	y12	d1	..	dk]1	..	[xn1	xn2	yn1	yn2	d1	..	dk]n
Hexadecimal	1B	1C	71	n	[x11	x12	y11	y12	d1	..	dk]1	..	[xn1	xn2	yn1	yn2	d1	..	dk]n
Decimal	27	28	113	n	[x11	x12	y11	y12	d1	..	dk]1	..	[xn1	xn2	yn1	yn2	d1	..	dk]n

[Defined Area]
$1 \leq n \leq 255$
$0 \leq xn1 \leq 255$, $0 \leq xn2 \leq 3$
$1 \leq (xn1 + xn2 \times 256) \leq 1023$
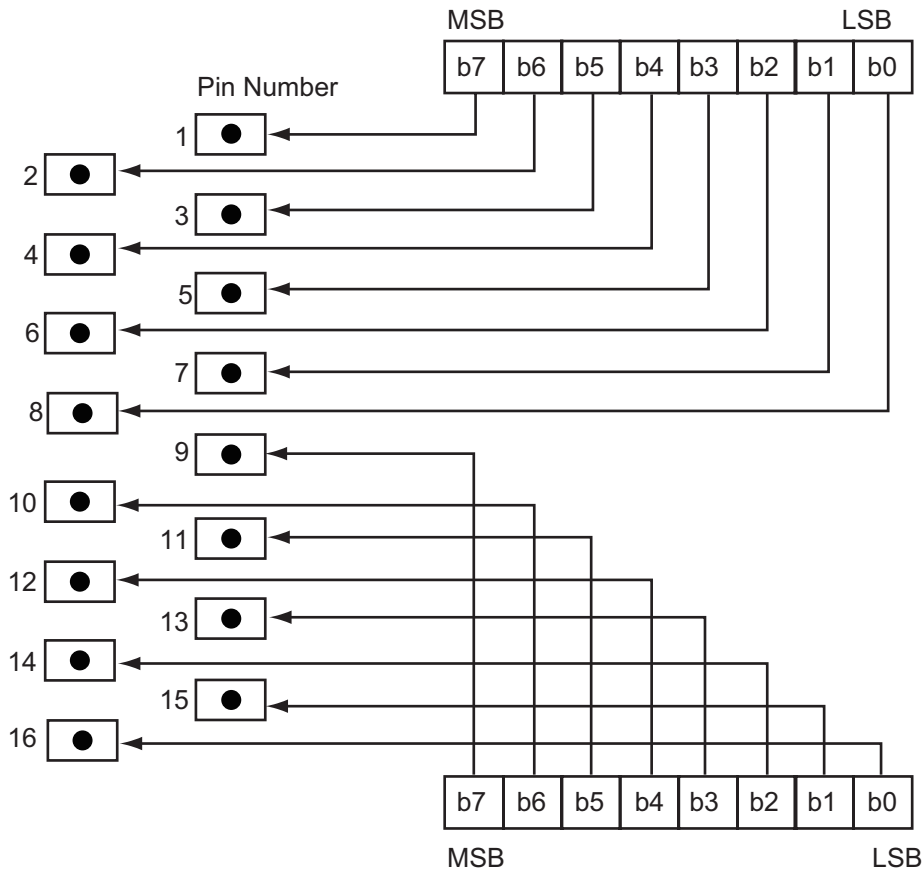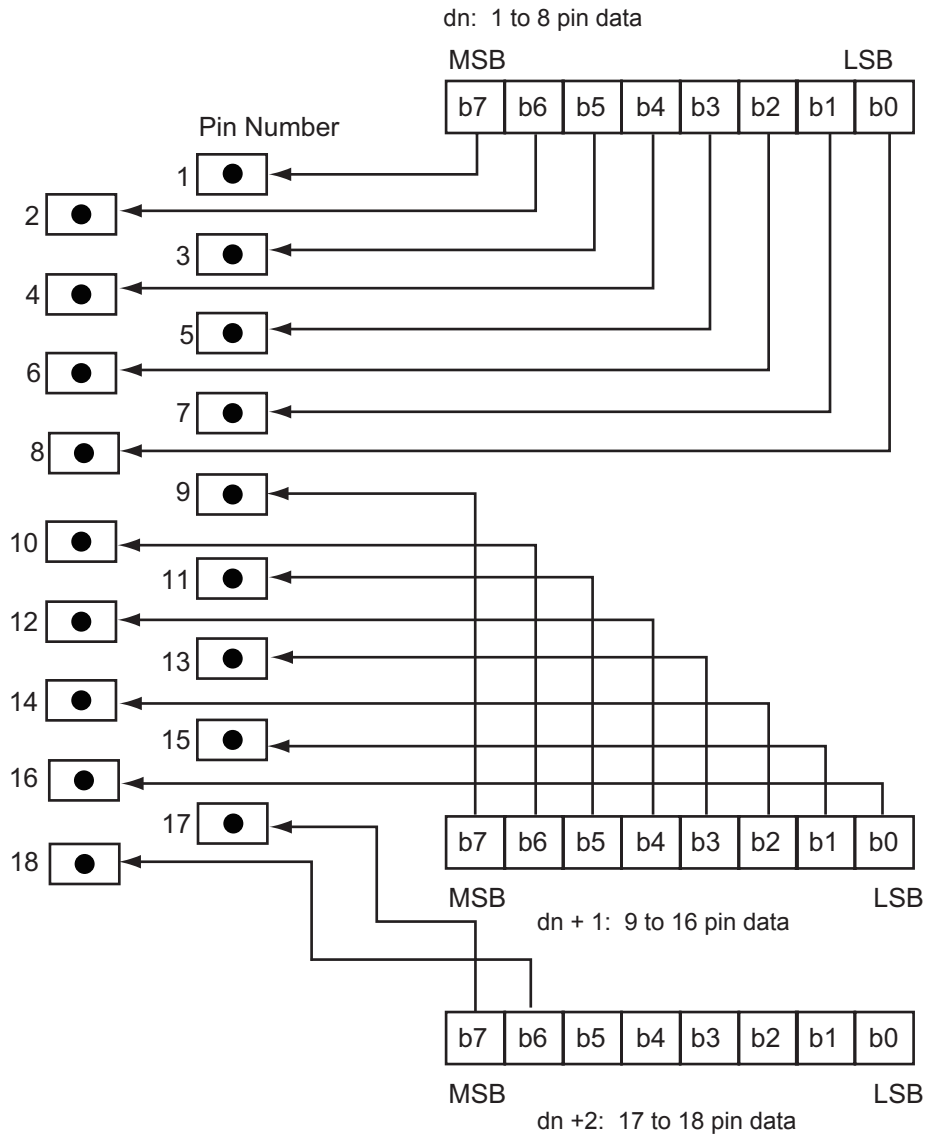$0 \leq yn1 \leq 255$, $0 \leq yn2 \leq 1$
$1 \leq (yn1 + yn2 \times 256) \leq 288$
$0 \leq d \leq 255$
$k = \{(xn1 + xn2 \times 256) \times (yn1 + yn2 \times 256) \times 8\}$

[Initial Value] ---

[Function] Parameter details

- n: Specifies registered logo count
- xn1, xn2:   Horizontal size of registered logo $\{(xn1 + xn2 \times 256) \times 8\}$ dots
- yn1, yn2:   Vertical size of registered logo $\{(yn1 + yn2 \times 256) \times 8\}$ dots
- d: Registered logo data
- k: Logo data count

• This command should be specified at the top of the line.
If there is unprinted data in the line buffer, this command is executed after printing that data at the point up to where ESC FS q is procssed.
• When the first parameter is determined to be free of error, the printer starts processing this command.
• When logo register processing starts, all previously defined data is deleted.
(It is not possible to reregister a portion of a plurality of defined logo data.)
• Logo registration numbers are defined in rising order from 1.
• If the defined area specified by the parameter is not empty, or if there is an error in the parameter specification, register processing is exited. (The pre-registered and complete data is effective.)
• The printer should be reset if logo registration is completed or register processing is aborted.
• If an error occurs while performing register processing (the time from when the first parameter is OK until the printer initialization is completed after registering a logo), error processing, mechanical operation and status processing cannot be performed.Also, data must not be sent from the host during that time.
• This command is executed only for logo registration and does not accompany the printing operation. Logos are printed using the ESC FS p (print NV logo) command.
• The NV memory capacity is 2 Mbits (256 Kbytes = 262,144 bytes). However, 4 Kbytes (4,096 bytes) are kept as parameter information separate to the data so the data region memory capacity is 258,048 Bytes.
Ex.:   When the registered data size per each one is 6 Kbytes (6,144 bytes), it is possible to register 258,048/6144 = 42.

Note • **If this command is used frequently, there is the possibility of damaging the non-volatile memory. Write to the non-volatile memory less than 10 times in one day.**

The relationships between input data and the actual print are shown on the next page.

Relationships of logo and registered data
xn = xn1 + xn2 x 256,   yn = yn1 + yn2 x 256

{(xn1 + xn2 x 256) x 8} dots

Data

MSB

LSB

(yn1 + yn2 x 256) bytes
(yn1 + yn2 x 256) x 8 dots

d[11]	d[21]				d[n1]
d[12]	d[22]				d[n2]
d[x1]	d[x2]				d[xn]
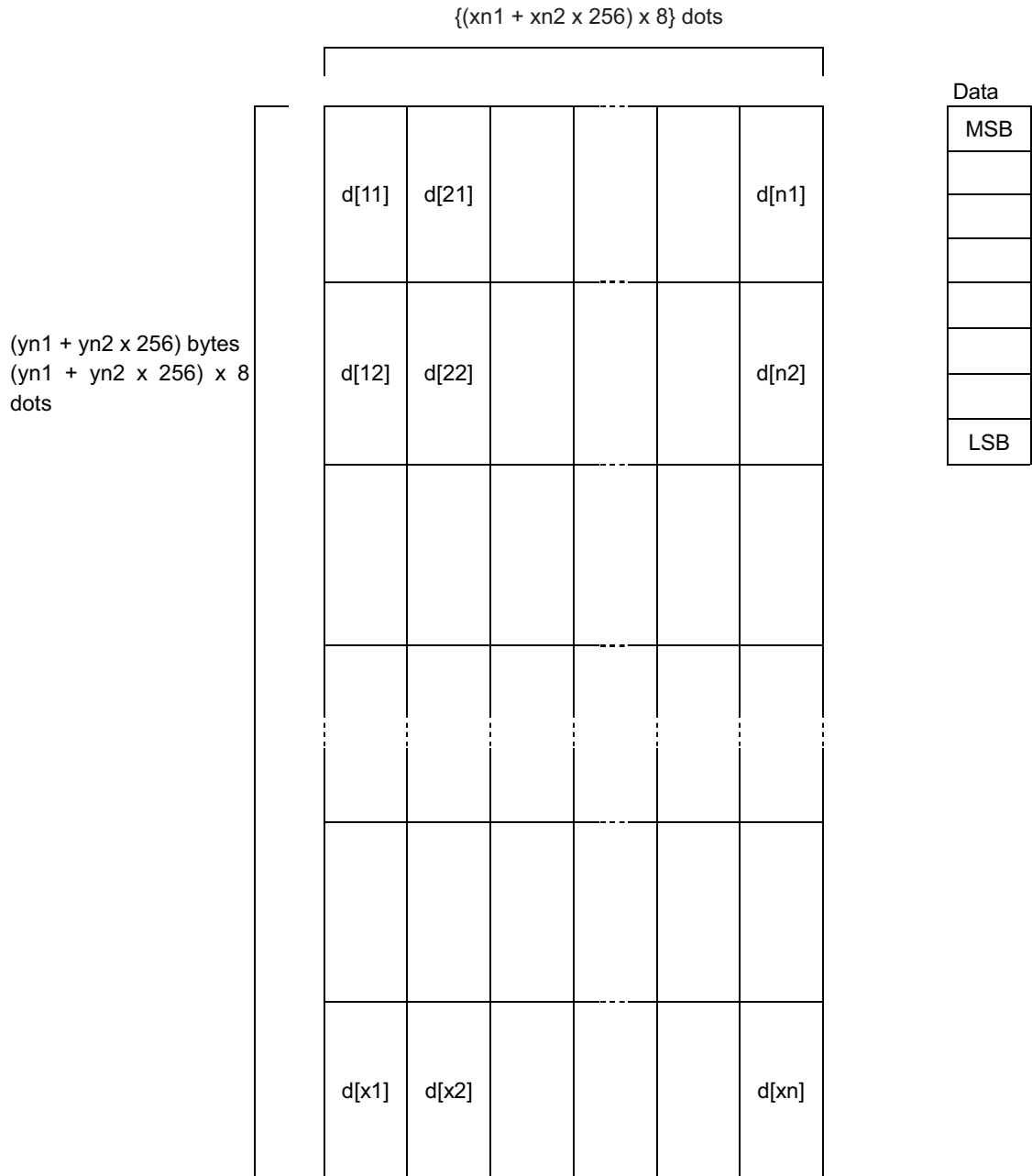
Data specification order (example of the above)
d[11] d[12] • • • • d[x1] d[21] d[22] • • • • d[x2] • • • • • • • • • • d[n1] d[n2] • • • • d[xn]

ESC FS p n m

[Name]   Print logo
[Code]   ASCII   ESC   FS   p   n   m
          Hexadecimal   1B   1C   70   n   m
          Decimal   27   28   112   n   m

[Defined Area]
                1 ≤ n ≤ 255 (When printing normally)
                0 ≤ m ≤ 3
                48 ≤ m ≤ 51 ("0" ≤ m ≤ "3")
[Initial Value]   ---
[Function]   Prints the logo of the number n registered using the logo registration command according to the print mode m.

n: Logo Specification

n	Function	Remarks
1 to 255	Specified logo number	

m: Print Mode

m	Print Size	Horizontal Direction Dot Density (DPI) *1	Vertical Direction Dot Density (DPI)	Remarks
0, 48	Normal	Double density (169.3)	Double density (144)	
1, 49	Horizontal double size	Standard density (84.7)	Double density (144)	
2, 50	Vertical double size	Double density (169.3)	Standard density (72)	
3, 51	Double high/wide	Standard density (84.7)	Standard density (72)	

*1: The actual value of the dot pitch in the horizontal direction is 0.30 mm for standard density and 0.15 mm for double density .

• If the parameter is within the defined region, execute this command after printing the unprinted data in the line buffer.
(Unprinted data is printed regardless of whether the specified logo was registered by n.)
Therefore, it is not possible to print with other data in the same line (characters, bit images, bar codes).
• For horizontal double density, logo data that is continuously ON in the horizontal direction, the printer automatically thins out the data.
In such cases, right side data of the data that is continuously ON is forced OFF.
• Print modes, excluding upside-down printing (enhanced, double, underline, character size, black/white inverted, and 90° right rotation) are unaffected.
• If the logo horizontal print size exceeds the print region, the portion exceeding the area is not printed.
• This command is affected by the following command settings.
    • Left margin (ESC l n)
    • Right margin (ESC Q n)
    • Position alignment (ESC GS a n)
    • Absolute position movement (ESC GS A n1 n2)
    • Absolute position movement (ESC GS R n1 n2)
    • Print region setting (ESC RS A n)
    • Horizontal tab (HT)
    • Upside-down printing (SI)

ESC RS L m

[Name] Logo batch control

[Code]

	ASCII	ESC	RS	L	m
	Hexadecimal	1B	1E	4C	m
	Decimal	27	30	76	m

[Defined Area]

1. Specifications 0 ≦ m ≦ 3, 48 ≦ m ≦ 51 ("0" ≦ m ≦ "3")

2. Specifications 0 ≦ m ≦ 3, 48 ≦ m ≦ 51 ("0" ≦ m ≦ "3"), m=255

[Initial Value]   ---

[Function]

Specifications 1

Batch printing is performed according to the print mode specified for all logos registered in m.

m: Print Mode

m	Logo control mode	Horizontal dot density	Vertical dot density	Remarks
0, 48	Normal size batch printing	Double density	Double density	
1, 49	Double width batch printing	Standard density	Double density	
2, 50	Double height batch printing	Double density	Standard density	*1
3, 51	Double width x double height batch printing	Standard density	Standard density	*1

Specifications 2

Perform control (batch print or clear all) specified in parameter m for logos.

When a logo batch clear (m=255) is performed, a reset is performed automatically.

m: Print Mode

m	Logo control mode	Horizontal dot density	Vertical dot density	Remarks
0, 48	Normal size batch printing	Double density	Double density	
1, 49	Double width batch printing	Standard density	Double density	
2, 50	Double height batch printing	Double density	Standard density	*1
3, 51	Double width x double height batch printing	Standard density	Standard density	*1
255	Logo batch clear	-	-	-

[Common specifications for specifications 1 and specifications 2]

*1 For 18 pin head models, the following printing is performed based on the settings in memory switches 0-7 (hidden).

MSW0-7= "0": Prints vertically using the equivalent of double density.

(The same data is printed for vertical data using odd numbered pins and even numbered pins.)

MSW0-7= "1": Prints vertically using standard density. (Vertical data is only printed using odd numbered pins.)

Also, MSW0-7 is only displayed in self-print when "1" is set.

[Batch print specifications]

- The following logo number is printed on the previous line for each logo print.

Since this line is printed in ANK, the currently set decorations are applied.

(Print example) "LONO No.1" (* Each logo number is entered in the section for "1")

- For horizontal double density, logo data that is continuously ON in the horizontal direction, the printer automatically thins out the data.

In such cases, right side data of the data that is continuously ON is forced OFF.

- If the logo horizontal print size exceeds the printing range, the portion exceeding the range is not printed.

- This test print is affected by the following command settings.

- Left margin (ESC I n)

- Right margin (ESC Q n)

- Position alignment (ESC GS a n)

- Print region setting (ESC RS A n)

- Upside-down printing (SI)

- After batch printing is output, paper is automatically fed to the cut position and the paper is cut (with a cutter).

3-3-11 Cutter Control

ESC d n

[Name]   Paper cut instruction

[Code]

ASCII	ESC	d	n
Hexadecimal	1B	64	n
Decimal	27	100	n

[Defined Area] $0 \leq n \leq 3$
                         $48 \leq n \leq 51$ ("0" $\leq n \leq$ "3")

[Initial Value]   ---

[Function]   This command executes the auto-cut according to the n specification, after printing data in the line buffer. After auto-cutter is executed, the printer considers that position to be the top of the page.

n	Auto-cutter
0, 48	Full cut at the current position.
	This command is ignored on tear-bar models.
1, 49	Partial cut at the current position.
	This command is ignored on tear-bar models.
2, 50	Paper is fed to cutting position, then a full cut is executed. (*!)
	On tear-bar models, paper is fed to the tear-bar position. (*2)
3, 51	Paper is fed to cutting position, then a partial cut is executed. (*1)
	On tear-bar models, paper is fed to the tear-bar position. (*2)

(*1) Paper feed to cutting position: Executes a 1 inch paper feed.
(*2) Paper feed to tear-bar position: Executes a 7/6 inch paper feed.

The auto-cutter function operates in the following ways on models that only have a full cut or a partial cut.
• Models that perform only a full cut.   Executes a full cut when for instructions calling for a partial cut.
• Models that perform only a partial cut.   Executes a partial cut when for instructions calling for a full cut.

3-3-12 External Device Drive

ESC BEL n1 n2

[Name] Set external drive device 1 pulse width

[Code]

	ASCII	ESC	BEL	n1	n2
	Hexadecimal	1B	07	n1	n2
	Decimal	27	7	n1	n2

[Defined Area] $1 \leq n1 \leq 127$
$1 \leq n2 \leq 127$

[Initial Value] n1 = 20 (Energizing time: 200 msec)
n2 = 20 (Delay time: 200 msec)

[Function] Sets the energizing and delay times for drive of the external device (such as cash drawers).
• Energizing time = 10 x n1 (ms)
• Delay time = 10 x n2 (ms)
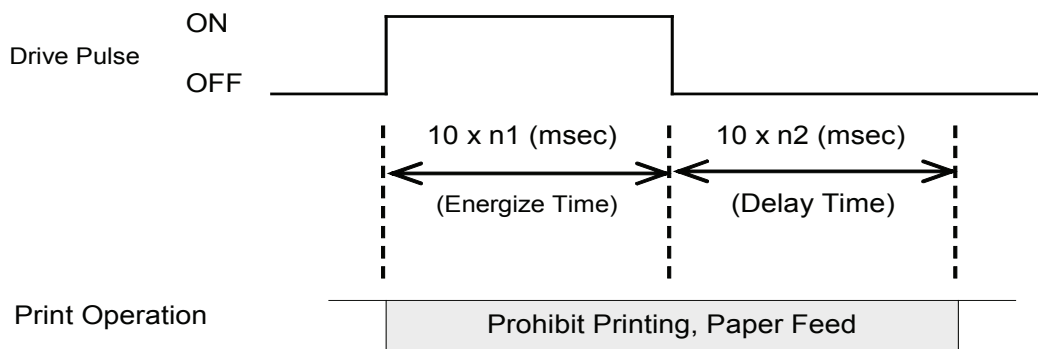
After printing, this is executed by BEL (External device 1 drive instruction) or FS (External device 1 drive instruction (real time)).

Handled in the following way when n1 and n2 are out of range.

• When n1 = 0, or n2 = 0, this command is ingored.

• When n1 > 128, n = 128, when n2 > 128, n = 128.

BEL

[Name] External device 1 drive instruction

[Code] ASCII   BEL

      Hexadecimal 07

      Decimal   7

[Defined Area]   ---

[Initial Value]   ---

[Function]   Executes the external device drive conditions set according to the ESC BEL (external device drive pulse width setting command).

        As with other commands, this command temporarily stores data in the data buffer, then executes in the order received.

Note External device 1 and external device 2 cannot be executed simultaneously.

FS

[Name] External device 1 drive instruction (real time)

[Code] ASCII   FS

      Hexadecimal 1C

      Decimal   28

[Defined Area]   ---

[Initial Value]   ---

[Function]   Executes the external device drive conditions set according to the ESC BEL (external device drive pulse width setting command).

        The printer executes this command immediately upon reception.

Note External device 1 and external device 2 cannot be executed simultaneously.

SUB

[Name]   External device 2 drive instruction (real time)
[Code]   ASCII   SUB
           Hexadecimal   1A
           Decimal   26

[Defined Area]   ---
[Initial Value]   ---

[Function]   Drives external device 2.The energizing time and delay time are fixed at 200 ms each.
                   The printer executes this command immediately upon reception.
                   This command is the same as the EM command.

> **Note   External device 1 and external device 2 cannot be executed simultaneously.**
>
> **This command is executed in real time only, so even if executed continuously, the drive occurs only once.**

EM

[Name]   External device 2 drive instruction (real time)
[Code]   ASCII   EM
           Hexadecimal   19
           Decimal   25

[Defined Area]   ---
[Initial Value]   ---

[Function]   Drives external device 2.The energizing time and delay time are fixed at 200 ms each.
                   The printer executes this command immediately upon reception.
                   This command is the same as the SUB command.

> **Note   External device 1 and external device 2 cannot be executed simultaneously.**
>
> **This command is executed in real time only, so even if executed continuously, the drive occurs only once.**

ESC GS EM DC1 m n1 n2

[Name]   Set external buzzer drive pulse condition

[Code]
	ASCII	ESC	GS	EM	DC1	m	n1	n2
	Hexadecimal	1B	1D	19	11	m	n1	n2
	Decimal	27	29	25	17	m	n1	n2

[Defined Area] $1 \leq m \leq 2$ $49 \leq m \leq 50$
$0 \leq n1 \leq 255$
$0 \leq n2 \leq 255$

[Initial Value]   n1 = 0, n2 = 0

[Function]   Set external buzzer drive pulse condition.
m specifies the buzzer drive terminal that sets the condition.

m	Buzzer Drive Terminals
1, 49	Buzzer drive terminal 1
2, 50	Buzzer drive terminal 2

n1 specifies the energizing time; n2 specifies the delay time.
• Energizing time   = 20 msec x n1
• Delay time   = 20 msec x n2
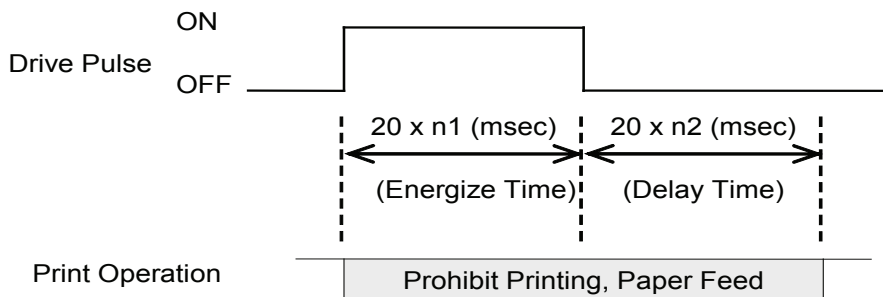
The drive of the external buzzer set by this command is performed by <ESC> <GS> <EM> <DC2> m n1 n2.
The set value is not initialized by <ESC> "@", or <CAN>.

ESC GS EM DC2 m n1 n2

[Name]   Execute external buzzer drive

[Code]

	ASCII	ESC	GS	EM	DC2	m	n1	n2
	Hexadecimal	1B	1D	19	12	m	n1	n2
	Decimal	27	29	25	18	m	n1	n2

[Defined Area] $1 \leq m \leq 2$ $49 \leq m \leq 50$
                  $1 \leq n1 \leq 20$
                  $n2 = 0$

[Initial Value]   ---

[Function]   Repeatedly drives the buzzer according to the ON/OFF conditions set by the external buzzer drive pulse condition command <ESC> <GS> <EM> <DC1> m t1 t2.

m specifies the buzzer drive terminal to drive.

m	Buzzer Drive Terminals
1, 49	Buzzer drive terminal 1
2, 50	Buzzer drive terminal 2

Specifies the number of times to repeat buzzer drive with $(n2 \times 256 + n1)$.

Buzzer cannot ring whle printer is printing.

This command is prohibited for use for anything other than ringing the buzzer.

(When this command is used for the drawer drive on models equipped with an external device terminal, it will be damaged, so it is absolutely prohibited.)

The buzzer can be stopped by pressing the paper feed switch while it is ringing.

Ex.
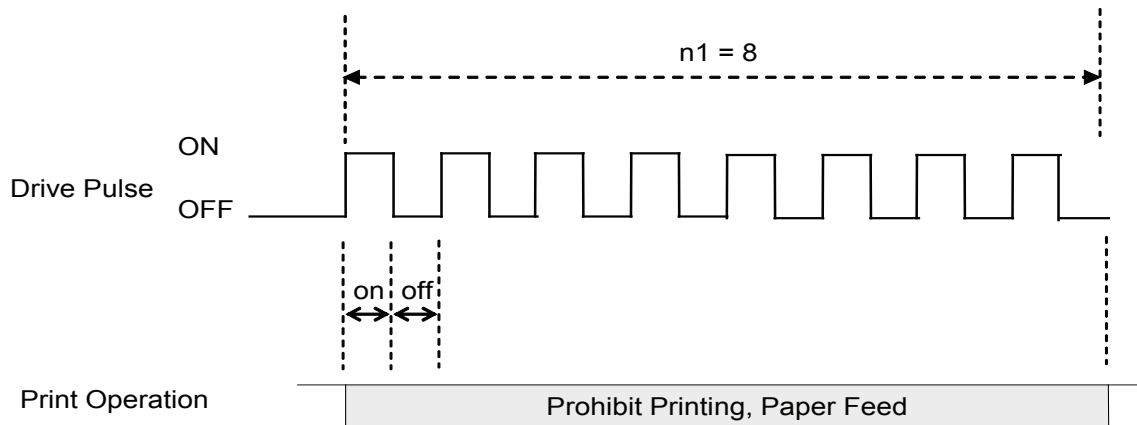
(Note) When off time = 0, it is possible to ring the buzzer continuously for only the amount of n1. For example, if on = 5 seconds, and off = 0, n1 = 20 times, the buzzer will ring for 100 seconds.

3-3-13 Status

ENQ

[Name]   Inquire ENQ status

[Code]   ASCII   ENQ

             Hexadecimal   05

             Decimal   5

[Defined Area]   ---

[Initial Value]   ---

[Function]   This command is effective only when using an interface capable of bi-directional data communications.

When this command is received, the printer sends the 1-byte of ENQ status in real time to the host (not taking it from the reception buffer, but executing it immediately upon reception from the host).

Bi-directional parallel interfaces enter a "data present" state.

See Appendix ENQ Command Status for details regarding status.

When this command is sent once to the printer, do not send the next ENQ command until the ENQ status has been received.

This command is not used when auto-status is valid.

EOT

[Name]   Inquire EOT status

[Code]   ASCII   EOT

             Hexadecimal   04

             Decimal   4

[Defined Area]   ---

[Initial Value]   ---

[Function]   This command is effective only when using an interface capable of bi-directional data communications.

When this command is received, the printer sends the 1-byte of EOT status in real time to the host (not taking it from the reception buffer, but executing it immediately upon reception from the host).

Bi-directional parallel interfaces enter a "data present" state.

See Appendix EOT Command Status for details regarding status.

When this command is sent once to the printer, do not send the next EOT command until the EOT status has been received.

This command is not used when auto-status is valid.

ESC ACK SOH

[Name]   Inquire status

[Code]   ASCII   ESC   ACK   SOH
             Hexadecimal   1B   06   01
             Decimal   27   6   1

[Defined Area]   ---
[Initial Value]   ---

[Function]   This command is effective only when using an interface capable of bi-directional data communications.

              When this command is received, the printer sends the status in real time to the host (not taking it from the reception buffer, but executing it immediately upon reception from the host).

              Bi-directional parallel interfaces enter a "data present" state.

              See the Appendix Auto Status for details regarding status.

              When in the serial interface DTR mode, and using a parallel interface, set so that the status can be inquired even when offline for errors, etc.

              This command is not used when auto-status is valid.

              When this command is sent once to the printer, do not send the next ESC ACK SOH command until the final auto status has been received.

ESC RS a n

[Name]   Set automatic status transmission conditions

[Code]   ASCII   ESC   RS   a   n
             Hexadecimal   1B   1E   61   n
             Decimal   27   30   97   n

[Defined Area]   Spec. 1 , 2
                     $0 \leq n \leq 3$, $48 \leq n \leq 53$ ("0" $\leq n \leq$ "3")
                     Spec. 3
                     $0 \leq n \leq 3$, $48 \leq n \leq 51$ ("0" $\leq n \leq$ "3")

[Initial Value]   DIP switch or memory switch setting

[Function]   See Appendix 2 for details regarding auto-status.

              Settings of this command are unaffected by the ESC @ (command initialization) command.

              See each printer's product specifications manual for details on the memory switch settings.

              The command is ignored (set to enable auto-status) when using Ethernet or wireless LAN.

              Spec. 1

n	Status transmission conditions
0, 48	ASB invalid
1, 49	ASB invalid

              Spec. 2

n	Status transmission conditions
0, 48	ASB invalid
1, 49	ASB valid

              Spec. 3

n	Status transmission conditions
0, 48	ASB invalid, NSB invalid
1, 49	ASB valid, NSB invalid
2, 50	ASB invalid, NSB valid
3, 51	ASB valid, NSB valid

ETB

[Name]   Update ETB status (check after printing)
[Code]   ASCII   ETB
            Hexadecimal   17
            Decimal   23

[Defined Area]   ---
[Initial Value]   Spec. 1 ---
                    Spec. 2 ETB countr = 0
[Function]   This command is effective only when using an interface capable of bi-directional data communications.

Spec. 1
This command waits until all printing is completed (the print motor is stopped), and after printing is completed, the auto status printer status 1-1 (ETB command) becomes 1 (ETB execution completed).
Note that when executing this command, and print data remains the line buffer, this command is executed after printing the remaining data.
The hose checks that this bit has changed to "1" thereby making it possible to ascertain that the printing of the sent data is completed.
This ETB status bit is cleared to "0" when returned to host.

The following shows the details of the processing in the printer with this command.
(1)   Reads out the ETB command from the reception buffer. .
(2)   Waits for the printing of data to be completed before the ETB command
(3)   After checking the end of printing, the auto status ETB status is set
(4)   Auto status transmission (only when auto status is valid)
See Appendix for details regarding the auto status.

Spec. 2
This command waits until all printing is completed (the print motor is stopped), and after printing is completed, the auto status printer status 1-1 (ETB command) becomes 1 (ETB execution completed), and the ETB counter is updated (incremented).
Note that when executing this command, and print data remains the line buffer, this command is executed after printing the remaining data.
The hose checks that this bit has changed to "1" thereby making it possible to ascertain that the printing of the sent data is completed.
This ETB status bit is cleared to "0" when returned to host.
Also, ETB is appended to the end of 1 data block and several blocks are sent at once. By getting the ETB counter sequentially, it is possible to confirm the end of printing the several blocks.
Note that the ETB counter is cleared to zero by the ESC RS E command.

The following shows the details of the processing in the printer with this command.
(1)   Reads out the ETB command from the reception buffer. .
(2)   Waits for the printing of data to be completed before the ETB command
(3)   After checking the end of printing, the auto status ETB status is set, and the ETB counter is incremented.
(4)   Auto status transmission (only when auto status is valid)
See Appendix for details regarding the auto status.

■ Notes on Ethernet use
The ASB (ETB counter) sent by <ETB> is sent to all connected hosts when multi-session is enabled.
Therefore, the ETB counter might not be recognized correctly if ETB is sent from multiple sessions..
Therefore, we recommend using the <ESC><GS><ETX> commands to confirm the print end counter.
See the list of the commands that correspond to each model.

ESC RS E n

[Name]   Initialize ASB ETB counter, and ETB status.
[Code]   ASCII   ESC   RS   E   n
           Hexadecimal   1B   1E   45   n
           Decimal   27   30   69   n

[Defined Area]   n = 0
                   n = 48 ("0")
[Initial Value]   ---
[Function]   Clears the ASB ETB counter to zero and clears the ETB status of the auto-status 1-1.

ESC GS ETX s n1 n2

[Name]   Send and initialize print end counter
[Code]   ASCII   ESC   GS   ETX   s   n1   n2
           Hexadecimal   1B   1D   03   s   n1   n2
           Decimal   27   30   3   s   n1   n2

[Defined Area]   Specifications 1 0 ≤ s ≤ 2
                   Specifications 2 0 ≤ s ≤ 4
                   0 ≤ n1 ≤ 255, 0 ≤ n2 ≤ 255

[Function]   This command is executed when reading from the reception buffer, and processing for the end print counter is performed according to "s" parameters.

s	Name	Function
0	See print end counter	Sends the current print end counter to the host.
		(Does not wait for printing to end or perform counting.)
1	Refresh print end counter	Performs the following operation.
		1. Prints out data in the line buffer if any data is detected.
		2. Waits until printing ends (motor stops).
		3. Refreshes the print end counter (+1)
		4. Sends the print end counter to the host.
2	Clear print end counter	Returns the print end counter to its default value (zero).
		(Does not wait for printing to end or send the end print counter to the host.)
3	Document start n1, n2 = 0	1. Data import mode settings
		2. Initialization processing
4	Document end n1, n2 = 0	1. Prints out data in the line buffer if any is detected.
		2. Waits until printing ends (motor stops).
		3. Releases data import mode.

The data format sent to the host when s=0 or s=1 are specified is shown below.

<Response data format>

[Code]   ASCII   ESC   GS   ETX   s   n1   n2   [Print end counter]   NUL
          Hexadecimal   1B   1D   03   s   n1   n2   [Print end counter]   00
          Decimal   27   30   3   s   n1   n2   [Print end counter]   0

* For ESC GS ETX s n1 n2, the specified content from the host is echoed back as they are, and then the print end counter value and NUL are sent.

[Print end counter] is 1 byte long, and the default value is 0x00.
For s=1, +1 is used whenever this command is processed. After 0xFF, it returns to 0x00.
In [Print end counter] exists in the printer regardless of the n1 and n2 values.
(There are no counters corresponding to n1 and n2 values.)

(Reference information) Differences between ETB command and this command

Item	ESC GS ETX s n1 n2	ETB
Effect on ASB (ETB status)	None	Affected
ASB generated	None	Generated
Effect of ASB enabled/disabled setting	None	Affected
Effect of the ESC RS E n command	None	Affected
Status transmission when using Ethernet (When multi-session enabled)	Only sends to the connected print session (host)	Sends ASB to all connected sessions (hosts)

*The ETB counter sent by the ETB command differs from this print end counter and they do not have an effect on each other.

The following shows communication examples of this command.

Communication example 1

Host transmission data		Printer response data	
ESC GS ETX **0x00** 0x00 0x00	→ ←	ESC GS ETX **0x00** 0x00 0x00 0x00 0x00	(See counter)
Print data +ESC GS ETX **0x01** 0x00 0x00	→ ←	ESC GS ETX **0x01** 0x00 0x00 0x01 0x00	(Update counter)
Print data +ESC GS ETX **0x01** 0x00 0x00	→ ←	ESC GS ETX **0x01** 0x00 0x00 0x02 0x00	(Update counter)

Communication example 2

Host transmission data		Printer response data	
ESC GS ETX **0x02** 0x02 0x00 ESC GS ETX **0x00** 0x02 0x00	→ ←	ESC GS ETX **0x00** 0x02 0x00 0x00 0x00	(Clear counter) (See counter)
Print data +ESC GS ETX **0x01** 0x02 0x11	→ ←	ESC GS ETX **0x01** 0x02 0x11 0x01 0x00	(Update counter)
Print data +ESC GS ETX **0x01** 0x02 0x12	→ ←	ESC GS ETX **0x01** 0x02 0x12 0x02 0x00	(Update counter)
Print data +ESC GS ETX **0x01** 0x02 0x13	→ ←	ESC GS ETX **0x01**0x02 0x13 0x03 0x00	(Update counter)
Print data +ESC GS ETX **0x01** 0x02 0x14	→ ←	ESC GS ETX **0x01** 0x02 0x14 0x04 0x00	(Update counter)

<n1 and n2 usage examples>

- For Ethernet: Specify n1 = host ID and n2 = document number, acquire the print end counter, and then check if it is compatible with the host ID and document ID information for the source..

- For other than Ethernet: Specify n1+ n2*256 as the document ID and the document ID, and then check the compatibility in the same way

- If the compatibility between the transmission source and the responder are not checked: Always fixed at n1=0 and n2=0.

When s=3 and s=4 are specified (document start command + document end command), a data cancel mode operation is performed.

If an error is generated after the document start command has been received, data received before the document end command was received is discarded when recovering from the error. When the document end command is not recognized, all received data is discarded. Timeout is set to 10 seconds and the data import mode is automatically canceled.

[Restrictions]
1) Throughput decline

The initialization process performed when s=3 is specified uses the same command initialization as ESC @ (command initialization).

<T: TOP commend/E: END command>
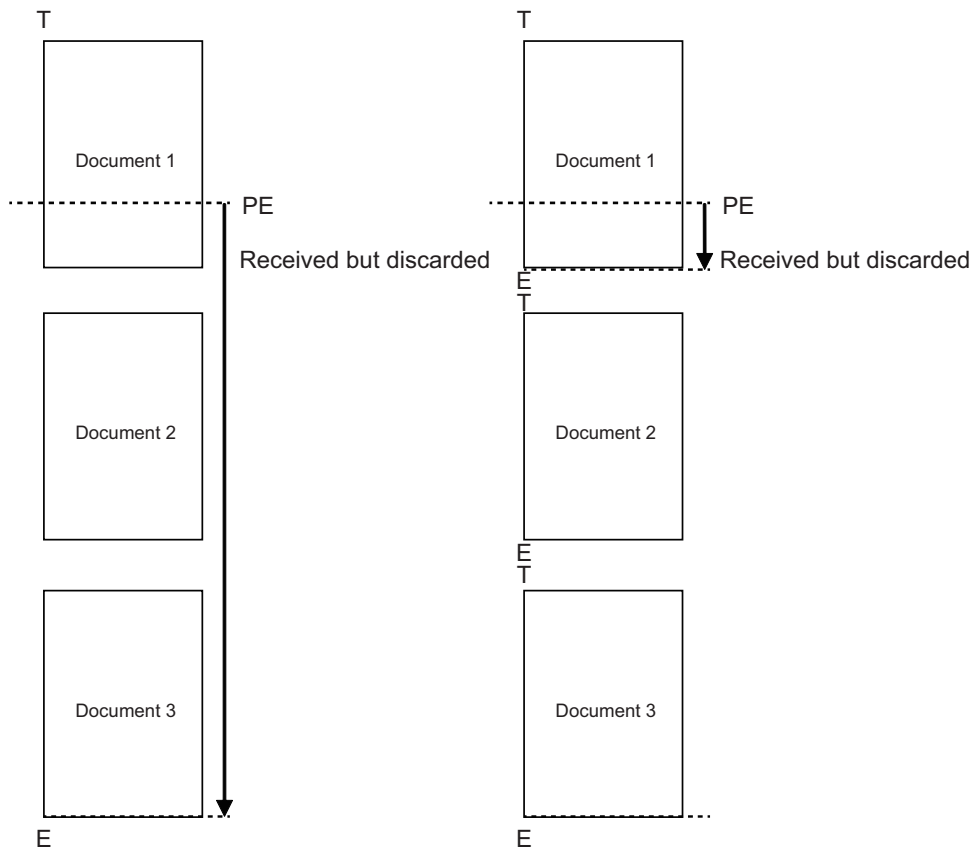
ESC ACK CAN

[Name]	Execute real-time printer reset			
[Code]	ASCII	ESC	ACK	CAN
	Hexadecimal	1B	06	18
	Decimal	27	6	24

[Defined Area]   ---
[Initial Value]   ---

[Function]   Performs a real-time printer reset.

3-3-14 Kanji Characters (only on models that carry Kanji characters)

ESC p

[Name]	Specify JIS Japanese character mode (Japanese specifications only)		
[Code]	ASCII	ESC	p
	Hexadecimal	1B	70
	Decimal	27	112

[Defined Area]   ---
[Initial Value]   Select JIS Japanese character mode

[Function]   Specifies JIS Japanese character mode

When in JIS Japanese character mode, all character codes are handled as 2 byte Kanji characters (First byte: upper code; second byte: lower code).Even when setting the JIS Kanji mode, the control code is valid.

This command is ignored for models not equipped with Japanese characters and when the specification for the location of use is specified as SBCS (single byte countries) by the memory switch.

Spec. 1
When the lower code is 20h, 7Fh, it is handled as a space code.

Spec. 2
When the lower code is 20h, 7Fh, 2 bytes are ignored.

This command is ignored when UTF-8 is specified (command: ESC GS t 128) for DBCS.

ESC q

[Name]	Cancel JIS Japanese character mode (Japanese specifications only)		
[Code]	ASCII	ESC	q
	Hexadecimal	1B	71
	Decimal	27	113

[Defined Area]   ---
[Initial Value]   Cancel JIS Japanese character mode

[Function]   Cancel JIS Japanese character mode

This command is ignored for models not equipped with Japanese characters and when the specification for the location of use is specified as SBCS (single byte countries) by the memory switch.

This command is ignored when UTF-8 is specified (command: ESC GS t 128) for DBCS.

ESC $ n

[Name]   Specify/cancel JIS Japanese character mode (Japanese specifications only)

[Code]   ASCII   ESC $ n

          Hexadecimal   1B   24   n

          Decimal   27   36   n

[Defined Area]   n = 0, 1, 48, 49

[Initial Value]   Memory switch setting

[Function]   Specifies and cancels the shift JIS Japanese character mode.

n	JIS Japanese Character Mode
0, 48	Cancels the shift JIS Japanese character mode (Selection of block graphics mode)
1, 49	Specify shift JIS Japanese character mode

When in shift JIS Japanese character mode, if the data is <80>H to <9F>H or <E0>H to <FF>H, this is handled as 2 byte Kanji characters (First byte: upper code; second byte: lower code).Even when setting the shift JIS Japanese character mode, the control code is valid.

When the shift JIS Chinese character mode is canceled, the block graphics mode is selected. At that time, if the data is <80>H to <9F>H or <E0>H to <FF>H, this is handled as 1 byte of block graphic characters.

This command is ignored for models not equipped with Japanese characters and when the specification for the location of use is specified as SBCS (single byte countries) by the memory switch.

See each printer's product specifications manual for details on the memory switch settings.

Spec. 1
When the lower code is 7Fh, it is handled as a space code.

Spec. 2
When the lower code is 7Fh, 2 bytes are ignored.

This command is ignored when UTF-8 is specified (command: ESC GS t 128) for DBCS.

ESC s n1 n2

[Name]　Set two byte Kanji characters left/right spaces

[Code]　ASCII　　　　ESC　s　n1　n2
　　　　Hexadecimal　1B　73　n1　n2
　　　　Decimal　　　27　115　n1　n2

[Defined Area]　0 ≤ n1 ≤ 255
　　　　　　　　0 ≤ n2 ≤ 255
　　　　　　　　(However, n1 + n2 + character width ≤ printable region)

[Initial Value]

• Japanese specifications　　　Memory switch setting

Memory SW	n1	n2
Condition (1)	0	2
Condition (2)	0	4

• For China and Taiwan specifications
Spec. 1:　n = 0, n2 = 4
Spec. 2:　　Memory switch setting

Memory SW	n1	n2
Condition (1)	0	4
Condition (2)	0	2

[Function]　n1, n2 specified spaces are Japanese character spaces. n1 is the left side character; n2 is the right side character.

The values of n1 and n2 when using two-byte 8 x 16, two-byte 16 x 16 and double-tall 8 x 16 characters correspond to 1/2 dots; the n1 and n2 values when using double high and wide 16 x 16 characters correspond to 1 dot.

If the Japanese character size including the right and left spaces (n1 + character width + n2) exceeds the print region, printing will not be possible and a question mark ("?") will be printed instead.

This command is ignored for models not equipped with Chinese fonts (for overseas) and when the specification for the location of use is specified as SBCS (single byte countries) by the memory switch. See each printer's product specifications manual for details on the memory switch settings.

ESC t n1 n2

[Name]　Set 1 byte Kanji characters left/right spaces (Japanese specifications only)

[Code]　ASCII　　　　ESC　t　n1　n2
　　　　Hexadecimal　1B　74　n1　n2
　　　　Decimal　　　27　116　n1　n2

[Defined Area]　0 ≤ n1 ≤ 255
　　　　　　　　0 ≤ n2 ≤ 255
　　　　　　　　(However, n1 + n2 + character width ≤ printable region)

[Initial Value]　Memory switch setting

Memory SW	n1	n2
Condition (1)	0	1
Condition (2)	0	2

[Function]　n1, n2 specified spaces are Japanese character spaces. n1 is the left side character; n2 is the right side character.

The values of n1 and n2 when using two-byte 8 x 16, two-byte 16 x 16 and double-tall 8 x 16 characters correspond to 1/2 dots; the n1 and n2 values when using double high and wide 16 x 16 characters correspond to 1 dot.

If the Japanese character size including the right and left spaces (n1 + character width + n2) exceeds the print region, printing will not be possible and a question mark ("?") will be printed instead.

This command is ignored for models not equipped with Japanese characters and when the specification for the location of use is specified as SBCS (single byte countries) by the memory switch. See each printer's product specifications manual for details on the memory switch settings.

ESC r c1 c2 d1...dk

[Name]	Register Chinese download characters						
[Code]	ASCII	ESC	r	c1	c2	d1	..	dk
	Hexadecimal	1B	72	c1	c2	d1	..	dk
	Decimal	27	114	c1	c2	d1	..	dk

[Defined Area] $0 \leq d \leq 255$

                $k = 32$

                c_1 and c_2 differ according to specifications and code type (see table below).

[Initial Value]   All spaces

[Function]   Registers Japanese download characters to c_1 and c_2 addresses, but the following shows the possible code range.

                If one has been already registered to an address, it is overwritten.

                Chinese download characters once defined are valid until redefined or the power is turned OFF.

                The definition range varies according to model. (Below: Specs. 1, 2, and 3)

Spec. 1

Specifications	c1	c2	Registration count
Japanese Language Characters	c1 = 77h	20h ≤ c2 ≤ 29h	10 Characters
Kanji Characters	c1 = F8h	21h ≤ c2 ≤ 2Ah	10 Characters
Taiwan Characters	c1 = FEh	F0h ≤ c2 ≤ F9h	10 Characters

Spec. 2

Specifications	c1	c2	Registration count
Japanese Language Characters	c1 = 77h	20h ≤ c2 ≤ 29h	10 Characters
Kanji Characters	c1 = FAh	21h ≤ c2 ≤ 2Ah	10 Characters
Taiwan Characters	c1 = FEh	F0h ≤ c2 ≤ F9h	10 Characters

Spec. 3

Specifications	c1	c2	Registration count
Japanese Language Characters	c1 = 77h	20h ≤ c2 ≤ 7Dh	94 Characters
Kanji Characters	c1 = FEh	A1h ≤ c2 ≤ FEh	94 Characters
Taiwan Characters	c1 = FEh	A1h ≤ c2 ≤ FEh	94 Characters

                Defined Japanese download characters are accessed with two-bytes, in the same way as other Kanji characters. At that time, c_1 is the first byte, c_2 is the second byte.

                d1, d2 • • • d32 are character data.

They are designed as shown below and data is sent sequentially.
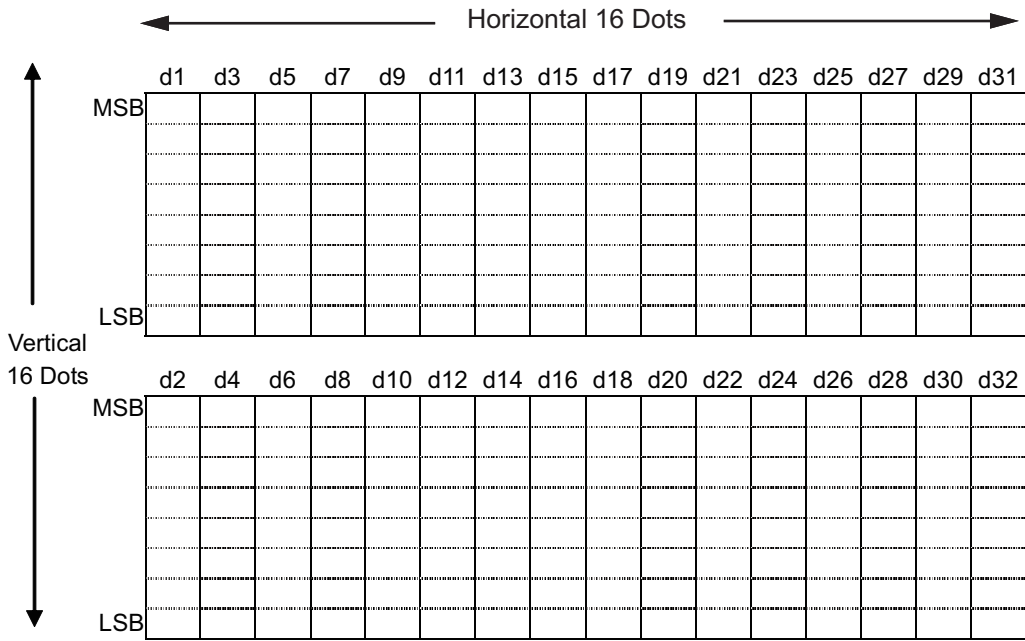
The font of Chinese download characters is composed of 16 x 16 dot patterns.

Bits that correspond to the dots to print are "1," and the bits that correspond to the dots that are not printed are "0."

ESC u 1

[Name]	Specify 16 x 16 dot [single density] Kanji characters.						
[Code]	ASCII	ESC	u	1	Or	ESC	u	"1"
	Hexadecimal	1B	75	01		1B	75	31
	Decimal	27	117	1		27	117	149

[Defined Area]   ---

[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Specify 16 x 16 dot [single density] Kanji characters.

When two-bytes is selected, they become two-pass characters (state (B) to state (A))Dots continuous horizontally are thinned for printing.

This command sets to the double-tall expanded character mode by combining with ESC x 0 (Specify expanded Kanji characters) (state (B) → state (C))

See "Relationship of Kanji Character Size Selection."

ESC u 0

[Name]	Specify 16 x 16 dot [Double Density] Kanji characters						
[Code]	ASCII	ESC	u	0	Or	ESC	u	"0"
	Hexadecimal	1B	75	00		1B	75	30
	Decimal	27	117	0		27	117	148

[Defined Area]   ---

[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Specify 16 x 16 dot [double density] Kanji characters.

When two-bytes is selected, they become four-pass characters (state (A) to state (B))Dots continuous horizontally are printing.

This command sets to the 4 x expanded character mode by combining with ESC x 0 (Specify expanded Kanji characters) (state (A) → state (D))

See "Relationship of Kanji Character Size Selection."

ESC x 1

[Name]   Specify two byte Kanji characters (cancel expanded Kanji characters)

[Code]

	ESC	x	1	Or	ESC	x	"1"
ASCII	ESC	x	1	Or	ESC	x	"1"
Hexadecimal	1B	78	01		1B	78	31
Decimal	27	120	1		27	120	49

[Defined Area]   ---

[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Cancels specify Chinese character expansion, and sets to two-byte Kanji characters

When 16 x 16 dot Kanji characters [single density] are selected, they become two-pass characters (state (C) to state (A))

When 16 x 16 dot Kanji characters [double density] are selected, they become four-pass characters (state (D) to state (B))

See "Relationship of Kanji Character Size Selection."

ESC x 0

[Name]   Specify expanded Kanji characters (Double high/double high & wide)

[Code]

	ESC	x	0	Or	ESC	x	"0"
ASCII	ESC	x	0	Or	ESC	x	"0"
Hexadecimal	1B	78	00		1B	78	30
Decimal	27	120	0		27	120	48

[Defined Area]   ---

[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Sets Chinese character expansion.

When 16 x 16 dot Kanji characters [double density] are selected, they become two-pass characters (double-tall size: state (A) to state (C))

When 16 x 16 dot Kanji characters [double density] are selected, they become horizontally and vertically expanded characters (double high & wide size: state (B) to state (D))

See "Relationship of Kanji Character Size Selection."

ESC w 1

[Name]   Specify two-byte 16 x 16 dot Kanji characters [Single Density] (Default)
[Code]   ASCII   ESC   w   1   Or   ESC   w   "1"
         Hexadecimal   1B   77   01   1B   77   31
         Decimal   27   119   1   27   119 49

[Defined Area]   ---
[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Cancels specify Japanese character expansion, and sets to two-byte 16 x 16 dot Kanji characters [single density]
                    Kanji characters become two-pass characters (to state (A))
                    When the power is turned off, this is set.
                    See "Relationship of Kanji Character Size Selection."

ESC w 0

[Name]   Specify double high & wide Kanji characters
[Code]   ASCII   ESC   w   0   Or   ESC   w   "0"
         Hexadecimal   1B   77   00   1B   77   30
         Decimal   27   119   0   27   119 48

[Defined Area]   ---
[Initial Value]   Specify two-byte 16 x 16 dot (single density) Kanji characters.

[Function]   Sets double high & wide (double-wide/double-high) 16 x 16 Kanji characters. (to state (D))
                    See "Relationship of Kanji Character Size Selection."

<Relationship of Chinese Character Size Selection>

```
┌─────────────────────────────┐    ESC x 0    ┌─────────────────────────────┐
│         State (A)           │ ───────────→  │         State (C)           │
│ Two-byte 16 x 16 Dot Kanji  │               │      Double high Kanji      │
│      [Single Density]       │ ←─────────── │ (Double-high size, 2-pass Print)│
│       (2-pass Print)        │    ESC x 1    │                             │
└─────────────────────────────┘               └─────────────────────────────┘

  ESC u 0 │  │ ESC u 1          ESC w 0          ESC u 0 │  │ ESC u 1
          │  │        ESC w 1                            │  │

┌─────────────────────────────┐    ESC x 0    ┌─────────────────────────────┐
│         State (B)           │ ───────────→  │         State (D)           │
│ Two-byte 16 x 16 Dot Kanji  │               │   Double high & wide Kanji  │
│      [Double Density]       │ ←─────────── │ (Double wide x double high size,│
│       (4-pass Print)        │    ESC x 1    │        2-pass Print)        │
└─────────────────────────────┘               └─────────────────────────────┘
```
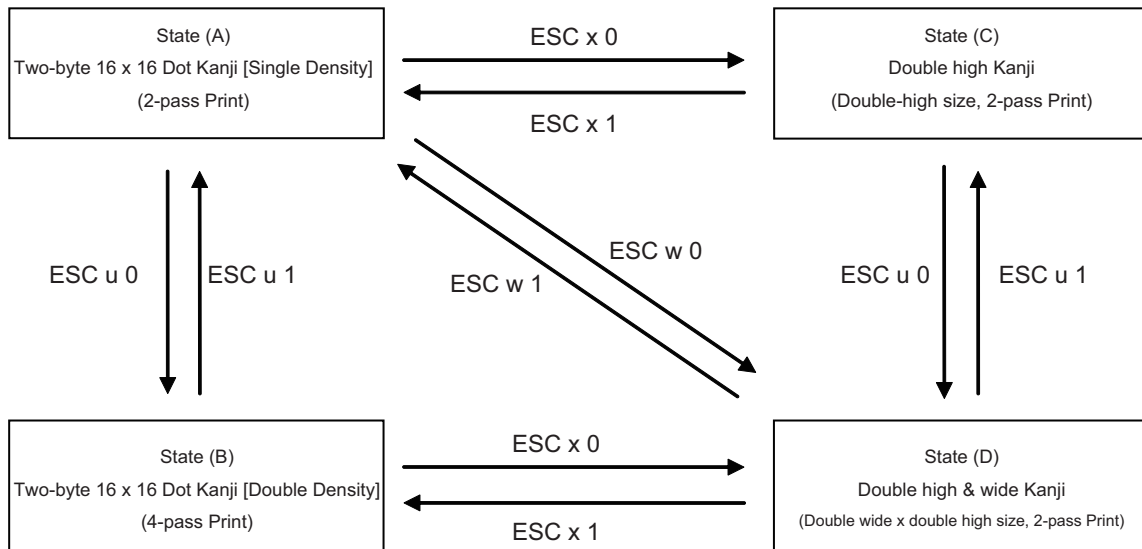
* See 5. Appendix 5-2 Expansion Position for details on the differences of dot configurations of [single density] and [double density] in two-byte 16 x 16 dot Kanji characters. This section uses a Japanese character to illustrate the difference.

3-3-15 Others

RS

[Name]   Ring buzzer
[Code]   ASCII   RS
           Hexadecimal   1E
           Decimal   30

[Defined Area]   ---
[Initial Value]   ---

[Function]   Issues a short buzzer sound from the printer.

CAN

[Name]   Cancel print data and initialize commands
[Code]   ASCII   CAN
           Hexadecimal   18
           Decimal   24

[Defined Area]   ---
[Initial Value]   ---

[Function]   When the reception buffer and line buffer are cleared, the set commands are initialized.
                    Immediately executed not when taking out from the reception buffer, but when received from the host.
                    DIPSW and memory switch re-read is not performed.
                    The following shows the specifications that are not initialized by this command.
                    • DC1 and DC3 select/deselect status
                    • ESC BEL external device drive conditions
                    • Auto status valid/invalid conditions

DC3

[Name]   Printer deselect
[Code]   ASCII   DC3
            Hexadecimal   13
            Decimal   19

[Defined Area]   ---
[Initial Value]   Select printer

[Function]   Deselects printer.
                    All received data is discarded until the next DC1 (printer select) is received.

DC1

[Name]   Select printer
[Code]   ASCII   DC1
            Hexadecimal   11
            Decimal   17

[Defined Area]   ---
[Initial Value]   Select printer

[Function]   This cancels the deselect state of the DC3 (printer deselect) and selects the printer.

ESC @

[Name]   Command initialization
[Code]   ASCII   ESC   @
          Hexadecimal   1B   40
          Decimal   27   64

[Defined Area]   ---
[Initial Value]   ---

[Function]   Initializes each command after printing data in the line buffer.
              DIPSW and memory switch re-read is not performed.
              The following shows the specifications that are not initialized by this command.
              • DC1 and DC3 select/deselect status
              • ESC BEL external device drive conditions
              • Auto status valid/invalid conditions
              • Sets to enable, disable black mark detection

ESC U n

[Name]   Select printing direction
[Code]   ASCII   ESC   U   n
          Hexadecimal   1B   55   n
          Decimal   27   85   n

[Defined Area] $0 \leq n \leq 2$
                  $48 \leq n \leq 50$ ("0" $\leq n \leq$ "2")
[Initial Value]   Standard Specifications (Memory switch: Sets SBCS) : n = 0
                  Japanese Character Specifications (Memory switch: Sets DBCS) : n = 2 or n = 0 (*1 Depends on the model)

[Function]   Executes print direction specified by this command after printing data in the line buffer.

n	Printing Direction
0, 48	Specify bi-directional printing
1, 49	Specify uni-directional printing
2, 50	Specify ANK bi-directional, Japanese character single direction (only on models installed with Kanji characters)

Bi-directional printing is faster than uni-directional printing.

With uni-directional printing, printing is performed only when the print head moves from left to right.

When n = 2, the printer prints ANK continuous printing bi-directionally. Continuous printing including Kanji characters is done in multiple passes on the first line only when the head moves from the left to the right. On the next line, it prints in a multiple of passes only when the head moves from the right to the left.However, if there are ruled lines in one line of print, or if the paper feed amount after printing exceeds 1/6 of an inch, printing is uni-directional from the left to the right.

Regarding n = 1, depending on the model, settings can be made valid or invalid using the memory switch.

See each printer's product specifications manual for details on the memory switch settings.

(*1) Depends on the model
n = 2: Models that use a DC motor for the carriage motor.
n = 0: Models that use a stepping motor (logical seeking) for the carriage motor.

ESC GS # m N n1 n2 n3 n4 LF NUL

[Name]　　Set memory switch

[Code]

		ESC	GS	#	m	N	n1	n2	n3	n4	LF	NUL
ASCII		ESC	GS	#	m	N	n1	n2	n3	n4	LF	NUL
Hexadecimal		1B	1D	23	m	N	n1	n2	n3	n4	0A	00
Decimal		27	29	35	m	N	n1	n2	n3	n4	10	0

[Defined Area]　　48 ≤ n1 ≤ 57 ("0" ≤ n1 ≤ "9"), 65 ≤ n1 ≤ 70 ("A" ≤ n1 ≤ "F"), 97 ≤ n1 ≤ 102 ("a" ≤ n1 ≤ "f")

48 ≤ n2 ≤ 57 ("0" ≤ n2 ≤ "9"), 65 ≤ n2 ≤ 70 ("A" ≤ n2 ≤ "F"), 97 ≤ n2 ≤ 102 ("a" ≤ n2 ≤ "f")

48 ≤ n3 ≤ 57 ("0" ≤ n3 ≤ "9"), 65 ≤ n3 ≤ 70 ("A" ≤ n3 ≤ "F"), 97 ≤ n3 ≤ 102 ("a" ≤ n3 ≤ "f")

48 ≤ n4 ≤ 57 ("0" ≤ n4 ≤ "9"), 65 ≤ n4 ≤ 70 ("A" ≤ n4 ≤ "F"), 97 ≤ n4 ≤ 102 ("a" ≤ n4 ≤ "f")

Specifications 1
m = 87, 84, 44, 43, 45, 64 (m = "W", "T", ",", "+", "-", "@")
48 ≤ N ≤ 57 ("0" ≤ N ≤ "9") , 65 ≤ N ≤ (*)70 ("A" ≤ N ≤ "F") , 97 ≤ N ≤ (*)102 ("a" ≤ N ≤ "f") *
Specifications 2
m = 87, 84, 44, 43, 45, 64 (m = "W", "T", ",", "+", "-", "@")
48 ≤ N ≤ 57 ("0" ≤ N ≤ "9") , (65 ≤ N ≤ (*)70)"A" ≤ N ≤ "F") , 97 ≤ N ≤ (*)102 ("a" ≤ N ≤ "f") *
Specifications 3
m = 87, 84, 44, 43, 45, 64 (m = "W", "T", ",", "+", "-", "@", "*")
48 ≤ N ≤ 57 ("0" ≤ N ≤ "9") , 65 ≤ N ≤ (*)70 ("A" ≤ N ≤ "F") , 97 ≤ N ≤ 102 ("a" ≤ N ≤ "f") *
* The domain for the memory switch number N differs depending on the model.

[Default values]　　----

[Function]　　Defines the memory switch using the definition command specified by the following classes, and then sends the write command to set the memory switch.
T After writing the setting defined by this write command to the non-volatile memory, the printer is automatically reset.

Do not turn off the power to the printer while writing to the non-volatile memory. If the printer is turned off, the memory switch settings will be corrupted and all memory switch settings may be offset to their default settings.
By specifying m=42 ("*"), specification 3 built-in models can load the default settings.
(See the "Special Appendix Command List By Model" for details on each model.)
Consider the life of the non-volatile memory and avoid over-use of this command.

Function	Class	m	N	n1 n2 n3 n4
Data definition write & reset	Write	"W"	Fixed at "0"	Fixed at "0000"
Data definition write & reset & self-printing	Write	"T"	Fixed at "0"	Fixed at "0000"
Data definition (Specify data)	Definition	","	N	n1 n2 n3 n4
Data definition (Set specified bit)	Definition	"+"	N	n1 n2 n3 n4
Data definition (Clear specified bit)	Definition	"-"	N	n1 n2 n3 n4
Data definition (Initialize all data)	Definition	"@"	Fixed at "0"	Fixed at "0000"
Data definition (Load default settings)	Definition	"*"	Fixed at "0"	Fixed at "0000"

m　　　　　　Mode Selection
N　　　　　　Memory switch number to specify
n1 n2 n3 n4　Setting Data　　m = "," → Specified data
　　　　　　　　　　　　　　m = "+" → Bit number to set
　　　　　　　　　　　　　　m = "-" → Bit number to clear

[Note]　　The status of this command varies depending on the model, so check the special appendix.

ESC # N m n1 n2 n3 n4 LF NUL

[Name]	Set memory switch

[Code]	ASCII	ESC	#	N	m	n1	n2	n3	n4	LF	NUL
	Hexadecimal	1B	23	N	m	n1	n2	n3	n4	0A	00
	Decimal	27	35	N	m	n1	n2	n3	n4	10	0

[Defined Area]   m = 44, 43, 45 (m = ",", "+", "-")

            48 ≤ N ≤ 57 ("0" ≤ N ≤ "9"), 65 ≤ N ≤ 70 ("A" ≤ N ≤ "F")

            48 ≤ n1 ≤ 57 ("0" ≤ n1 ≤ "9"), 65 ≤ n1 ≤ 70 ("A" ≤ n1 ≤ "F")

            48 ≤ n2 ≤ 57 ("0" ≤ n2 ≤ "9"), 65 ≤ n2 ≤ 70 ("A" ≤ n2 ≤ "F")

            48 ≤ n3 ≤ 57 ("0" ≤ n3 ≤ "9"), 65 ≤ n3 ≤ 70 ("A" ≤ n3 ≤ "F")

            48 ≤ n4 ≤ 57 ("0" ≤ n4 ≤ "9"), 65 ≤ n4 ≤ 70 ("A" ≤ n4 ≤ "F")

[Initial Value]   ---

[Function]   Sends command to write after defining memory switch using the definition command specified by the following classes.

            This command is set only and not changed for the current operating environment.

            Changed settings are valid after the power is turned on again, or when the printer is reset.

            Consider the life of the non-volatile memory and avoid over-sue of this command.

Function	Class	m	N	n1 n2 n3 n4
Data Definition (Data Specification)	Definition	","	N	n1 n2 n3 n4
Data definition (set specified bit)	Definition	"+"	N	n1 n2 n3 n4
Data definition (clear specified bit)	Definition	"-"	N	n1 n2 n3 n4

- m: Mode Selection
- N: Memory switch number to specify
- n1 n2 n3 n4:   Setting Data   m = "," → Specified data

                                       m = "+" → Bit number to set

                                       m = "-" → Bit number to clear

Note   **The status of this command varies according to the model, so check the special appendix.**

ESC ? LF NUL

[Name]   Reset printer and execute self print

[Code]   ASCII   ESC   ?   LF   NUL
            Hexadecimal   1B   3F   0A   00
            Decimal   27   63   10   0

[Defined Area]   ---
[Initial Value]   ---

[Function]   Hardware resets the printer and executes on self print.

                After sending this command, the next data is not sent until the printer is online (in a state wherein it can receive data).

3-4   Black Mark Related Commands

The Star black mark related commands are to control the top of form (black mark) functions.
This commands are effective only when black mark function is valid.

<Black mark specifications>
1.   Top of form (black mark detection) operation
A.   Selectable when power is turned on (reset signal is input), when self-print test is completed and by the memory switch.

Memory switch setting	When power is turned on (reset signal is input), when self-print ends
Condition (1)	Maintain
Condition (2)	Top of form (black mark detection) to printing start position

B.   Press FEED.
Executes top of form (black mark) to printing start position

C.   Command
See the following command details.

D.   Other Errors, Detailed Settings
Refer to each printer's specification manual.

2   Black Mark Error
A.   Enter black mark error
• When white is detected when feeding paper (*depends on the model) beyond a predetermined length.
Enter black mark error
• When black is detected when feeding paper (*depends on the model) beyond a predetermined length.
BM/PE dual use model → enter paper out error
BM independent model → enter black mark error
* Depends upon the model
See the Product Specifications Manual for each printer for details on the predetermined length and the BM sensor specifications (dual use and dedicated).

B.   Operation during a black mark error
 • Offline
 • Only the following commands are valid. Other commands are stored in the reception buffer.
   • ENQ: Inquire ENQ status
   • EOT: Inquire EOT status
   • ESC ACK SOH: Inquire automatic status
 • Auto status is valid.

C.   Black mark error canceling method
Refer to each printer's specification manual.

3.   Ignore Commands
When black mark is valid, the following page length control commands are invalid.

Class	Commands	Function
Page control	ESC C	3 bytes ignored (Set line page length to n lines)
	ESC C 0	4 bytes ignored (Set line page length to n inches)
	VT	1 byte ignored (Feed paper to vertical tab position)
	ESC B	Ignored until NUL (Set vertical tab position)
	ESC N	3 bytes ignored (Set bottom margin to n lines)
	ESC O	2 bytes ignored (Cancel bottom margin)

ESC d n

[Name]   Paper cut instruction

[Code]   ASCII   ESC   d   n

           Hexadecimal   1B   64   n

           Decimal   27   100   n

[Defined Area] $0 \leq n \leq 3$

                  $48 \leq n \leq 51$ ("0" $\leq n \leq$ "3")

[Initial Value]   ---

[Function]   This command executes the auto-cut according to the n specification, after printing data in the line buffer.
                  After auto-cutter is executed, the printer considers that position to be the top of the page.

n	Auto-cutter
0, 48	Full cut at the current position.
	This command is ignored on tear-bar models.
1, 49	Partial cut at the current position.
	This command is ignored on tear-bar models.
2, 50	Paper is fed to cutting position, then a full cut.
	On tear-bar models, paper is fed to the cutting position.
3, 51	Paper is fed to cutting position, then a partial cut.
	On tear-bar models, paper is fed to the cutting position.

The auto-cutter function operates in the following ways on models that only have a full cut or a partial cut.
- Models that perform only a full cut: Executes a full cut when for instructions calling for a partial cut.
- Models that perform only a partial cut: Executes a partial cut when for instructions calling for a full cut.

The cutting position is the position (after detection of the black mark) set by the ESC GS (F (Set top of form amount in black mark control).

If not set by these commands, paper is fed to the initial position set by the memory switch.

- The cutting position (black mark) varies according to the paper used and to customer specifications.

- Refer to the printer product specifications you use for details regarding the distance to the cutting position (the physical value from the black mark to the print head to the cutter position).

FF

[Name]   Performs TOF operation
[Code]   ASCII   FF
             Hexadecimal   0C
             Decimal   12

[Defined Area]   ---
[Initial Value]   ---

[Function]   This command performs the following operations after the printer prints the printing data in the line buffer.

Operations are set by the memory switch.

Memory SW	Cutter Model	Tear Bar Model
Condition (1)	Paper feed to printing start position	Paper feed to printing start position
Condition (2)	Feeds paper to the cutting position and performs a full cut. (*)	Paper feed to cutting position
Condition (3)	Paper feed to printing start position	Paper feed to printing start position
Condition (4)	Feeds paper to the cutting position and performs a partial cut. (*)	Paper feed to cutting position

(*) The auto-cutter function operates in the following ways on models that only have a full cut or a partial cut.
• Models that perform only a full cut: Executes a full cut when for instructions calling for a partial cut.
• Models that perform only a partial cut: Executes a partial cut when for instructions calling for a full cut.

The printing start position is the position (after detection of the black mark) set by the ESC FF (Set top of form amount after detecting black mark) and ESC GS (F (Set top of form amount in black mark control) commands.

The cutting position is the position (after detection of the black mark) set by the ESC GS (F (Set top of form amount in black mark control).

If not set by these commands, paper is fed to the initial position set by the memory switch.

• The print starting position (black mark) varies according to the paper used and to customer specifications.

• Refer to the printer product specifications you use for details regarding the distance to the print starting position (the physical value from the black mark to the print head to the cutter position).

ESC FF n1 n2

[Name]   Set top of form amount after detecting black mark

[Code]   ASCII   ESC   FF   n1   n2
         Hexadecimal   1B   0C   n1   n2
         Decimal   27   12   n1   n2

[Defined Area] $0 \le n1 \times 256 + n2 \le 2047$ (however, less that the length between marks)

[Initial Value]   Memory switch setting

[Function]   This command sets the amount for top of form after black mark detection ($n1 \times 256 + n2$) to steps.
(1 step = 1/144 of an inch)

The setting value of this command affects the printer initialization command (ESC @).

If the parameter is outside of the defined range, this command is received and discarded.

The settings of top of form by this command are valid in executing the top of form operation using the FF (top of form operation) and pressing the Feed switch.To make the setting value valid, set this command before the execution command.

The paper position varies according to the printer type.

See each printer's product specifications manual for details on the memory switch settings.

ESC GS (F p1 p2 a m n1 n2

[Name]	Set top of form amount in black mark control									
[Code]	ASCII	ESC	GS	(	F	p1	p2	a	m	n1	n2
	Hexadecimal	1B	1D	28	46	p1	p2	a	m	n1	n2
	Decimal	27	29	40	70	p1	p2	a	m	n1	n2

[Defined Area]   p1 = 4, p2 = 0

a = 1, 2

m = 0, 48

0 ≤ n1 + n2 x 256 ≤ 1700 (however, less that the length between marks)

[Initial Value]   Memory switch setting

[Function]   Set top of form position (printing start position and cutting position) when using black mark control.

(p1 + p2 x 256) specifies the subsequent reception byte count.

a selects the target to set.

a = 1: Amount of movement of the printing start position (FF, Feed switch) corresponding to the black mark position.

a = 2: Amount of movement of the cutting position (ESC d) corresponding to the black mark position.

m specifies the direction of position movement.m = specifies the direction of paper feed with 0, 48.

n1, n2 specify the actual amount of movement((n1 + n2 x 256) x 1/144 of an inch)

The setting value of this command affects the printer initialization command (ESC @).

If the parameter is outside of the defined range, this command is received and discarded.

The setting (a = 1) of movement to the printing starting position is valid in executing the top of form operation using the FF (top of form operation) and pressing the Feed switch.To make the setting value valid, set this command before the execution command.

The settings of the movement of the cutting position (a = 2) are valid when executing ESC d (paper cut).To make the setting value valid, set this command before the execution command.

The initial value of the set movement amounts abide the memory switch settings.The paper position varies according to the printer type.

See each printer's product specifications manual for details on the memory switch settings.

ESC RS m n

[Name]   Enable, disable black mark detection

[Code]   ASCII   ESC   RS   m   n

          Hexadecimal   1B   1E   6D   n

          Decimal   27   30   109   n

[Defined Area]   n = 0, 1, 2, 48, 49, 50
[Initial Value]   Memory SW

[Function]   Switchest to enable/disable black mark (BM) detection control

When switching the setting, operations are the same as when switching to enable/disable using the memory switch. (However, that excludes the TOF operation that occurs when the power is turned ON.)

n	Black mark detection settings
0, 48	Invalid
1, 49	Valid
2, 50	Executes validate + TOP to the BM cutting position + paper full cut (SP542) This command executes a BM TOF + paper full cut only when the current setting is specified from invalid to valid using this command. (*)

(*) Precautions when specifying n = 2

Normally, when specifed from a state where BM is valid to become invalid, the TOF to the BM cutting position + paper full cut is not executed. However, if this command (n = 2) is specified when the BM TOF has not been executed once, the same operation is executed after replacing paper.

For reference, see the functions and commands below that are affected when this setting is switched.

Affected Functions

Function	When BM is Valid (n = 1, 2, 49, 50)	When BM is Invalid (n = 0, 48)
Press FEED	Top of form to printing start position	Feed one line
BM Error	Supported	Invalid
Memory switch (for BM)	Supported	Invalid
EOT status (for BM)	Supported	Invalid
ASB status (for BM)	Supported	Invalid

Affected Commands

Class	Commands	When BM is Valid (n = 1, 2, 49, 50)	When BM is Invalid (n = 0, 48)
BM Command	FF	Top of form to printing start position	Form feed
	ESC d 2	TOF to cutting position + full cut	Paper fed to cutting position + full cut
	ESC d 3	TOF to cutting position + partial cut	Paper fed to cutting position + partial cut
Page control	ESC C	Ignored	Set page length to n lines
	ESC C 0	Ignored	Set page length to n inches
	VT	Ignored	Feed paper to vertical tab position
	ESC B	Ignored	Set vertical tab position
	ESC N	Ignored	Set bottom margin to n lines
	ESC O	Ignored	Cancel bottom margin

Note that at the point that this setting is switched, the current position is cleared to its default value in the same way as turning the power ON.

Also, the auto-status BM sensor detection is also initialized to white.

This command is normally used with black mark detection set to "valid" by the memory switch, and it is recommended to switch to "invalid" just once if necessary. Do not dynamically switch between valid and invalid for each receipt.

3-5 USB Related Commands

The following commands control USB interface functions.

3-6   2-Color Printing Command Details

ESC RS C n

[Name]   Select/cancel 2-color printing mode

[Code]   ASCII   ESC   RS   C   n

             Hexadecimal   1B   1E   43   n

             Decimal   27   30   67   n

[Defined Area] $0 \leq n \leq 1$

                      $48 \leq n \leq 49$ ("0" $\leq n \leq$ "1")

[Initial Value]   DIP switch

[Function]

n	Select/cancel 2-color printing mode
0, 48	Cancel 2-color printing mode
	When in two-color print mode, this command cancels 2-color printing mode.
	This command is ignored when the 2-color print mode is already cancelled.
	The specification of this command is not cleared by ESC @ CAN.
	The following processes are executed by canceling the 2-color print mode using this command.
	• Prints data in line buffer in 2-color print mode, if unprinted data exists in the line buffer.
	• Waits to stop printing when printing in 2-color print mode.
1, 49	Select 2-color printing mode
	This command selects 2-color print mode, when in single color print mode.
	This command is ignored already in the 2-color print mode.
	The specification of this command is not cleared by ESC @ CAN.
	The following processes are executed by selecting the 2-color print mode using this command.
	• Prints data in line buffer in the single-color print mode, if unprinted data exists in the line buffer.
	• Waits to stop printing when printing in single-color print mode.
	• Initializes print color setting (2-color print mode setting)

ESC 4

[Name]   Specify white/black inversion and red color printing

[Code]   ASCII   ESC   4

            Hexadecimal   1B   34

            Decimal   27   52

[Defined Area]   ---

[Initial Value]   White/black inversion cancelled/black color printing specified

[Function]   The following shows the details of this command. They vary according to the model.

            Spec. 1

            • Specifies white/black inverted printing (only on models that do not handle two color printing)

            Subsequent characters are printed, including the character pitch, with white and black inverted.

            Printing is uni-directional. (SP2000, BD100)

            Precautions for Use of This Command

            (1) This command is enabled for ANK characters only. White/black is not inverted for Kanji characters and block graphic characters.

            (2) Do not use this command when ANK fonts are set to 5 x 9 (3P=1) (Print quality is not guaranteed.)

            (3) When the ANK font setting is 5 x 9 (2P=1), and character spacing is set to an odd number, the gap between characters will open, so set the character space to an even value.

            • Specifies red color printing (only on models that handle two color printing)

            Subsequent characters are printed in red.Red and black characters can be mixed on the same line.

            This command is enabled for all print data (ANK characters, Kanji characters and bit images).

            When switched to red colored, printing is uni-directional.

            Spec. 2

            This command function is based on the selection of red/black substitute function.

            The red/black substitute function is selected by the memory switch or the command <ESC> <GS> "4" m n.

            For details on selecting the red/black substitute function using a command, see the explanation of <ESC> <GS> "4" m n below, and for details on selecting the red/black substitute function using the memory switch, see the printer specifications manual.

ESC 5

[Name]   Cancel white/black inversion/specify black color printing

[Code]   ASCII   ESC   5

            Hexadecimal   1B   35

            Decimal   27   53

[Defined Area]   ---

[Initial Value]   Cancel white/black inverted printing/specify black printing

[Function]   The following shows the details of this command. They vary according to the model.

            Spec. 1

            Cancels white/black inverted printing (only on models that do not handle two color printing)

            Cancels white/black inverted printing

            Specifies black printing (only on models that handle two color printing)

            Cancels red color printing and prints subsequent data in black.

            Spec. 2

            This command function is based on the selection of red/black substitute function.

            The red/black substitute function is selected by the memory switch or the command <ESC> <GS> "4" m n.

            For details on selecting the red/black substitute function using a command, see the explanation of <ESC> <GS> "4" m n below, and for details on selecting the red/black substitute function using the memory switch, see the printer specifications manual.

4. CHARACTER CODE TABLE

See the character code specifications

5. APPENDIX

5-1 Status Specifications

This function is effective only when using an interface capable of bi-directional data communications.

Refer to your printer's product specification manual to verify if the interface cable on the printer you use is capable of bi-directional data communications.

5-1-1 ENQ Command Status

This status is the one the printer transmits using the ENQ command.

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Compulsion SW	Open	Closed	○	○	○	○	○		
6	Buffer overflow	No error	Overflow	○	○	○	○	○		
5	Reception Buffer Empty	Has Data	Empty	○	○	○	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	Paper end	Paper	No paper	○	○	○	○	○		
2	Mechanical Error	No Error	Error	○	○	○	○	○		
1	Framing Error	No Error	Error	○	○	○	○	○		
0	Parity Error	No Error	Error	○	○	○	○	○		

• Framing error/parity error

These errors occur when using a serial I/F.(For anything other than a serial interface, always Bit 0 = Bit 1 = 0.)

With these errors, the information at that time is held and the error status is sent when there is an inquiry of the status by this command.

• Compulsion SW

When the conversion switch is ON, Bit 7 = 1.

5-1-2 EOT Command Status

This status is the one the printer transmits using the EOT command.

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7				-	-	-	-	-		
6				-	-	-	-	-		
5				-	-	-	-	-		
4	Fixed at "1"		-	-	-	-	-	-		
3	Paper end	Paper	No paper	○	○	○	○	○		
2	Paper near-end	Paper	No paper	x	○	x	○	○		
1	Black mark detection error	No Error	Error	x	x	○	○	○		
0	Fixed at "0"		-	-	-	-	-	-		

• Paper end
  Same as the ENQ status Bit 3
• Bit 5 to 7 states are unknown

5-1-3　Automatic Status

Auto status is a group of states that are automatically returned from the printer to the host when the printer's status has changed.Automatic status is composed of "Header 1," "Header 2" and "plurality of bytes of the printer status and is continuously returned to the host.The host always uses an identifying method to identify the data for every byte received.

(It is possible that Xon/Xoff codes are exceptionally mixed in the auto status in the Xon/Xoff mode (when using a serial I/F), so it is necessary to consider that on the receiving side.)The valid/invalid conditions of the auto status abide by the DIPSW or the memory switch settings for the initial values.

It is possible to change the conditions using the ESC RS a n command after turning ON the power.

Also, it is possible to get the auto status using the ESC ACK SOH command, regardless of the valid/invalid conditions.

1. Header 1

Header 1 is the 1 byte length information transmitted at the head of the automatic status.

The table below shows the composition of the Header 1.Header 1 represents the entire status transmission byte count, including Header 1, using bit 1 to bit 3 and bit 5.The host gets the transmission byte information and always receives the status data for that amount transmission bytes.For reference, the table below shows the relationship of actual transmission bytes and the Header 1.Because the bit 0 that indicates that this is the Header 1 is normally 1 (the second byte and beyond is 0), to detect the Header 1, it is acceptable to verify that bit 0 is 1 and bit 4 = 0 for this data.Note that bit 6 is for future expansion and is ignored in host-side processes.

<Header 1 (First Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Reserved (Fixed at 0)		-	-	-	-	-	-		
5	Number of printer status bytes			○	○	○	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	Number of printer status bytes			○	○	○	○	○		
2	Number of printer status bytes			○	○	○	○	○		
1	Number of printer status bytes			○	○	○	○	○		
0	Fixed at "1"	-		-	-	-	-	-		

Actual transmission byte count and header 1 table

Transmission Byte Count n (7 ≤ n ≤ 15)	Header 1
7	00001111B (0F Hex)
8	00100001B (21 Hex)
9	00100011B (23 Hex)
10	00100101B (25 Hex)
11	00100111B (27 Hex)
12	00101001B (29 Hex)
13	00101011B (2B Hex)
14	00101101B (2D Hex)
15	00101111B (2F Hex)

2. Header 2

Header 2 is the 1 byte length information transmitted from the second byte of the auto status.The table below shows the composition of the Header 2.

Header 2 represents the auto status version (called automatic status version below) using bit 1 to bit 3 and bit 5.

For reference, the table below shows the relationship of actual version bytes and the Header 2.The auto status version will be used as new information is added to the printer status bit positions that were empty, by adding new functions in the future.

When the host does not control the auto status version, it is acceptable to ignore Header 2 received.

<Header 2 (Second Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	ASB status expansion	No Expansion	Expansion	-	-	-	-	-		
6	Version Number		-	○	○	○	○	○		
5	Version Number			○	○	○	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	Version Number			○	○	○	○	○		
2	Version Number			○	○	○	○	○		
1	Version Number			○	○	○	○	○		
0	Fixed at "0"	-		-	-	-	-	-		

Actual automatic status version and header 2 table

Version Number n	Header 2	Contents
1	00000010B (02 Hex)	Up to printer status 5 (7th byte) loaded
2	00000100B (04 Hex)	
3	00000110B (06 Hex)	Up to printer status 7 (9th byte) loaded
4	00001000B (08 Hex)	
5	00001010B (0A Hex)	
6	00001100B (0C Hex)	
7	00001110B (0E Hex)	
8	00100000B (20 Hex)	
9	00100010B (22 Hex)	
	-	
-	-	
-	-	
30	01101100B (6C Hex)	
31	01101110B (6E Hex)	

3. Printer Status

Printer status is the status of the printer sent from the 3rd byte of the automatic status.

For the printer status, (the number of bytes added in Header 1 minus two) is returned.

Printer status is always updated or new information. (No log exists.)

The following shows the composition of the status.

<Printer status 1 Printer status (Third Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	OFFLINE By Switch Input	No	Occurs	○	○	○	x	x		
5	Cover Status	Closed	Open	x	x	x	x	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	ON-LINE/OFF-LINE Status	ON-LINE	OFF-LINE	○	○	○	○	○		
2	Compulsion SW	Open	Closed	○	○	○	○	○		
1	<ETB> Command	Not Executed	Executed	○	○	○	○	○		
0	Fixed at "0"		-	-	-	-	-	-		

(*) Bit 1 cleared to zero (0) when received at the host (by clearing bit 1 to 0, auto status is not targeted to occur).

<Printer status 2 Error Information (Fourth Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Stopped by high head temperature	Not stopped	Stopped	○	○	○	○	○		
5	Non-recoverable Error	No Error	Error	x	x	○	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	Auto-cutter Error	No Error	Error	○	○	○	○	○		
2	Mechanical Error	No Error	Error	○	○	○	○	○		
1	Not Used (Fixed at "0")			-	-	-	-	-		
0	Fixed at "0"		-	-	-	-	-	-		

<Printer status 3 Error Information (Fifth Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Buffer overflow	No Error	Error	○	○	○	○	○		
5	Not Used (Fixed at "0")			-	-	-	-	-		
4	Fixed at "0"		-	-	-	-	-	-		
3	Black mark detection error	No Error	Error	x	x	○	○	○		
2	Not Used (Fixed at "0")			-	-	-	-	-		
1	Not Used (Fixed at "0")			-	-	-	-	-		
0	Fixed at "0"		-	-	-	-	-	-		

(*) Bit 6 is cleared to 0 when sent to the host.

<Printer status 4 Sensor Information (Sixth Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Not Used (Fixed at "0")		-	-	-	-	-	-		
5	Black Mark Detection Status	White detection	Black detection	-	-	○	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	Paper end	Paper	No paper	○	○	○	○	○		
2	Paper near-end	Paper	No paper	x	○	x	○	○		
1	Not Used (Fixed at "0")			-	-	-	-	-		
0	Fixed at "0"		-	-	-	-	-	-		

<Printer status 5 Sensor Information (Seventh Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Not Used (Fixed at "0")			-	-	-	-	-		
5	Not Used (Fixed at "0")			-	-	-	-	-		
4	Fixed at "0"		-	-	-	-	-	-		
3	Not Used (Fixed at "0")			-	-	-	-	-		
2	Not Used (Fixed at "0")			-	-	-	-	-		
1	Not Used (Fixed at "0")			-	-	-	-	-		
0	Fixed at "0"		-	-	-	-	-	-		

<Printer status 6 ETB Information (Eighth Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	ETB Counter (Bit 4)			-	-	-	○	○		
5	ETB Counter (Bit 3)			-	-	-	○	○		
4	Fixed at "0"		-	-	-	-	-	-		
3	ETB Counter (Bit 2)			-	-	-	○	○		
2	ETB Counter (Bit 1)			-	-	-	○	○		
1	ETB Counter (Bit 0)			-	-	-	○	○		
0	Fixed at "0"		-	-	-	-	-	-		

<Printer status 7 Sensor Information (Ninth Byte)>

Bit	Contents	Status		By model						
		"0"	"1"	BD100	SP2000	BD500	SP500	SP700		
7	Fixed at "0"		-	-	-	-	-	-		
6	Not Used (Fixed at "0")			-	-	-	-	-		
5	Not Used (Fixed at "0")			-	-	-	-	-		
4	Fixed at "0"		-	-	-	-	-	-		
3	Not Used (Fixed at "0")			-	-	-	-	-		
2	Not Used (Fixed at "0")			-	-	-	-	-		
1	Not Used (Fixed at "0")			-	-	-	-	-		
0	Fixed at "0"		-	-	-	-	-	-		

4. Cautions

Do not use ENQ, EOT, ESC, ACK and SOH when auto status is valid.Invalidate the automatic status in advance using the DIPSW (memory switch) or the ESC RS a n command to query these.

5. How to Identify Statuses

Command/Functions	Status							
	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
XON	0	0	0	1	0	0	0	1
XOFF	0	0	0	1	0	0	1	1
ENQ	*	*	*	0	*	*	*	*
EOT	*	*	*	1	*	*	*	0
Auto Status (Header 1)	0	*	*	0	*	*	*	1
Auto Status (Other than Header 1)	0	*	*	0	*	*	*	0

0 = fixed at "0" bits/1 = fixed at "1" bits/* = variable bits.

5-1-4 Printer Status Transmission Specification when using Ethernet and Wireless LAN Interfaces

The following explains the printer status transmission specification when using Ethernet and wireless LAN interfaces.

1)   Transmission Format:

 • When transmitting only STAR ASB:

> | STAR ASB (Second byte Bit-7=1) | + | Length | (Length = 0x0000)

• When transmitting printer status other than STAR ASB:

> | STAR ASB (Second byte Bit-7=1) | + | Length | + Status Data

<Length Details>
• 2 byte value indicating status data byte count (0x0000 ≤ Length ≤ 0x0200)
• When the status data is 10 bytes: Length = 0x000a
• When transmitting only STAR ASB: Add Length = 0x0000
• When STAR ASB Second byte Bit-7, and Length is added, Bit-7 = 1 is set.

For status analysis, the total byte count of ASB is detected using the first byte of STAR ASB, and whether length is added with the second byte Bit-7 of STAR ASB is detected. By getting the byte count of subsequent status data using the length, the status can be analyzed.

2)   Status Data Transmission format

| Status Type | + | Break Character 1 | + | Data Type | + | Status Length | + | **_Printer Status_** | + | Break Character 2 |

A. Status Type (2 byte or 4 byte)
• First and second bytes
Indicate a factor of printer status occurring.
• "00":   Reserved
• "01" to "09":   Star real-time status request command
• "10" to "49":   Star status request command
• "50":   Reserved
• "51" to "59":   Reserved
• "60" to "99":   Reserved
• "A0" to "FF":   Reserved
• Third and fourth bytes
If the factor is the command, indicates the n parameter of the command.
If there is no n parameter, the third and fourth bytes can be omitted.

B. Classification character 1 (1 Byte)
Sends ":" (3AH).

C. Data Type (1byte)
Indicates the data type of the printer status, and sends "B" (binary type, 42H).

D. Status length (2 bytes)
2 byte value indicating byte count of printer status

E. Printer status (variable)
Status sent by printer
The content of the status differs according to the cause.
Refer to Commands That are Factors, and Automatic Status for details on the content of the status.

F. Classification character 2 (1 byte)
Send ";" (3BH).

3) Status Transmission Specifications List

Status Factors	STAR ASB	Length	Status Data						
			Status Type		Break Character 1 (3AH)	Data Type (42H)	Status Length	Printer Status	Break Character 2 (3BH)
			1st and 2nd Bytes Factors	3rd and 4th Bytes n Parameter					
Automatic Status (*)	ASB	0x0000	--	--	--	--	--	--	--
ESC ACK SOH Automatic Status Request	ASB	0x0000	--	--	--	--	--	--	--
ENQ ENQ Status Request	ASB	0x0008	"01"	Omitted	":"	"B"	0x0001	Status	";"
EOT EOT Status Request	ASB	0x0008	"02"	Omitted	":"	"B"	0x0001	Status	";"
ESC GS ETX n1 n2 Print End Counter Request	ASB	0x000F	"20"	Omitted	":"	"B"	0x0008	Status	";"

(*) Automatic status is sent to all hosts connected to TCP#9100 port.

5-2 Expansion Position

5-2-1 7 x 9 Fonts

Head Pin No.

Normal Dot

Half Dot

Head Pin No.

Normal 7 x 9

Double high 7 x 9

Bit Image

5-2-2 5 x 9 (2P-1) Fonts

Head Pin No.

Normal Dot

Head Pin No.

Normal 5 x 9

Double high 5 x 9

Bit Image

5-2-2　Japanese Character Fonts

ANK 7 x 9

● First Pass

Two-byte Kanji 16 x 16 [Single Density]

● First Pass

○ Second Pass

Normal Dot
Half Dot
1/144 Inch
1/72 Inch

ANK 7 x 9

● First Pass

Two-byte Kanji 16 x 16 (Double-density)

○ First Pass　　● Third Pass

○ Second Pass　● Fourth Pass

Normal Dot
Half Dot
1/144 Inch
1/72 Inch

Head Pin No.
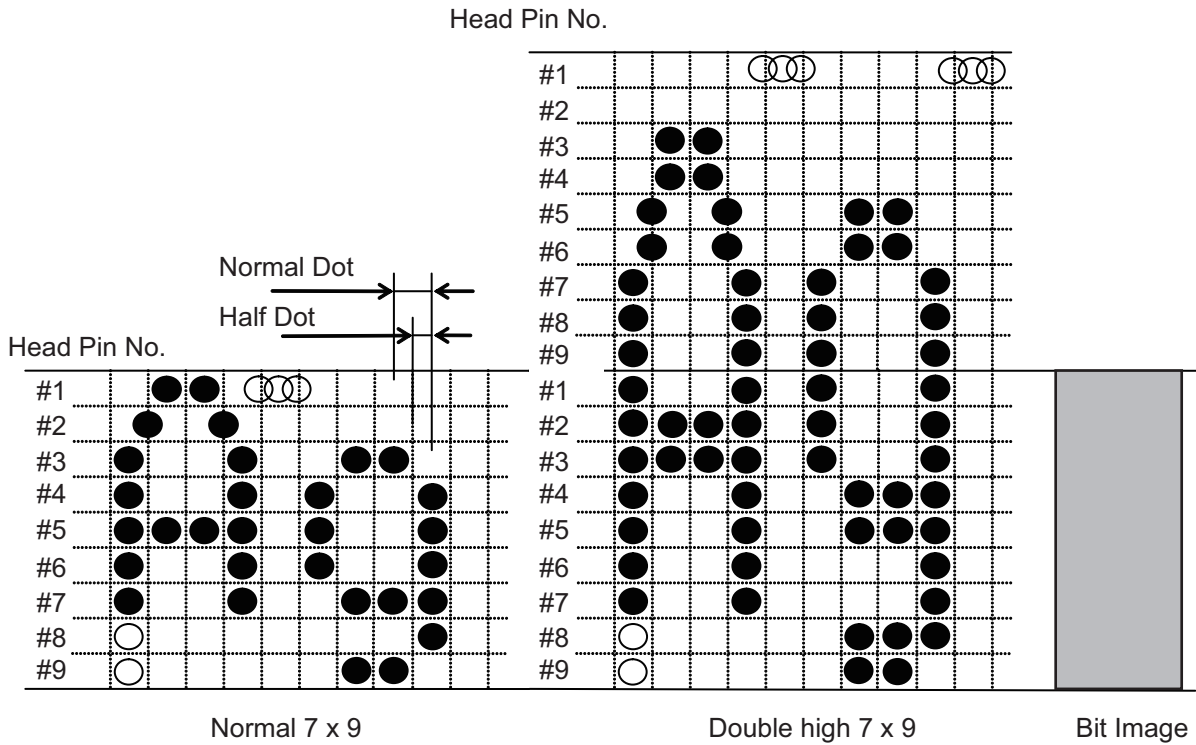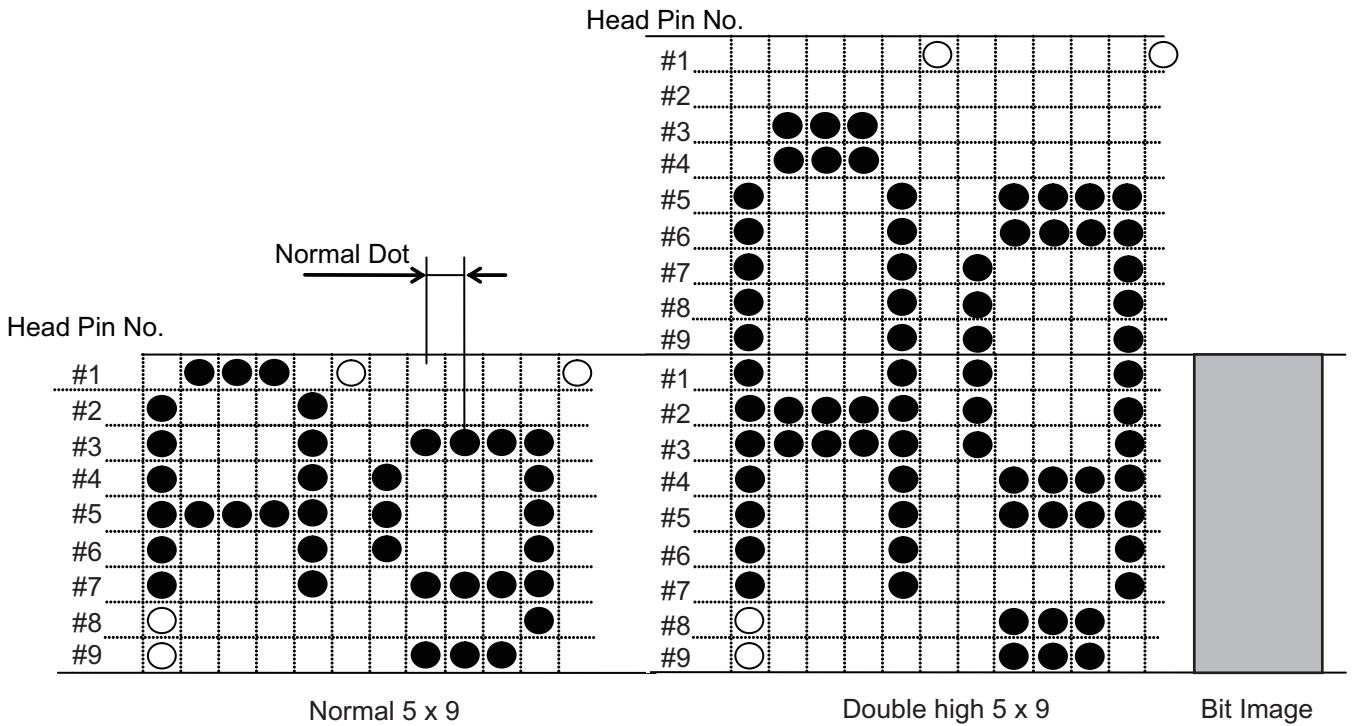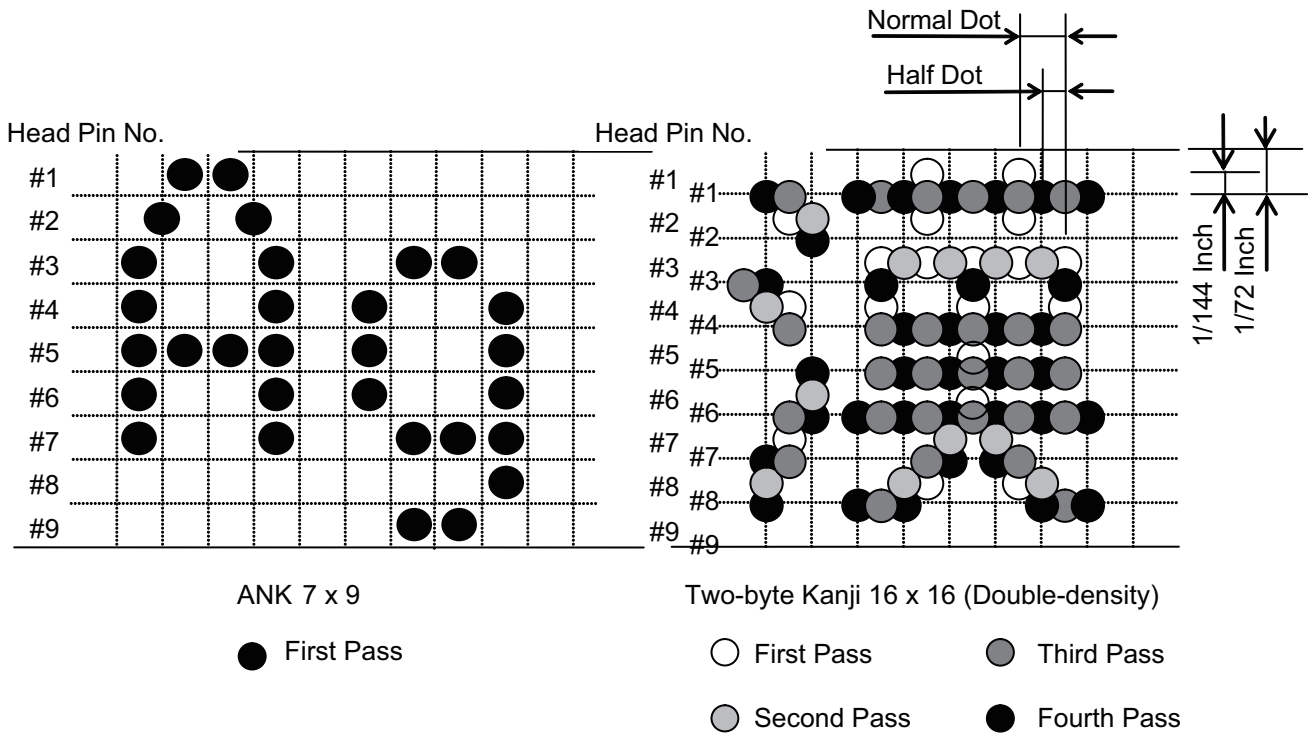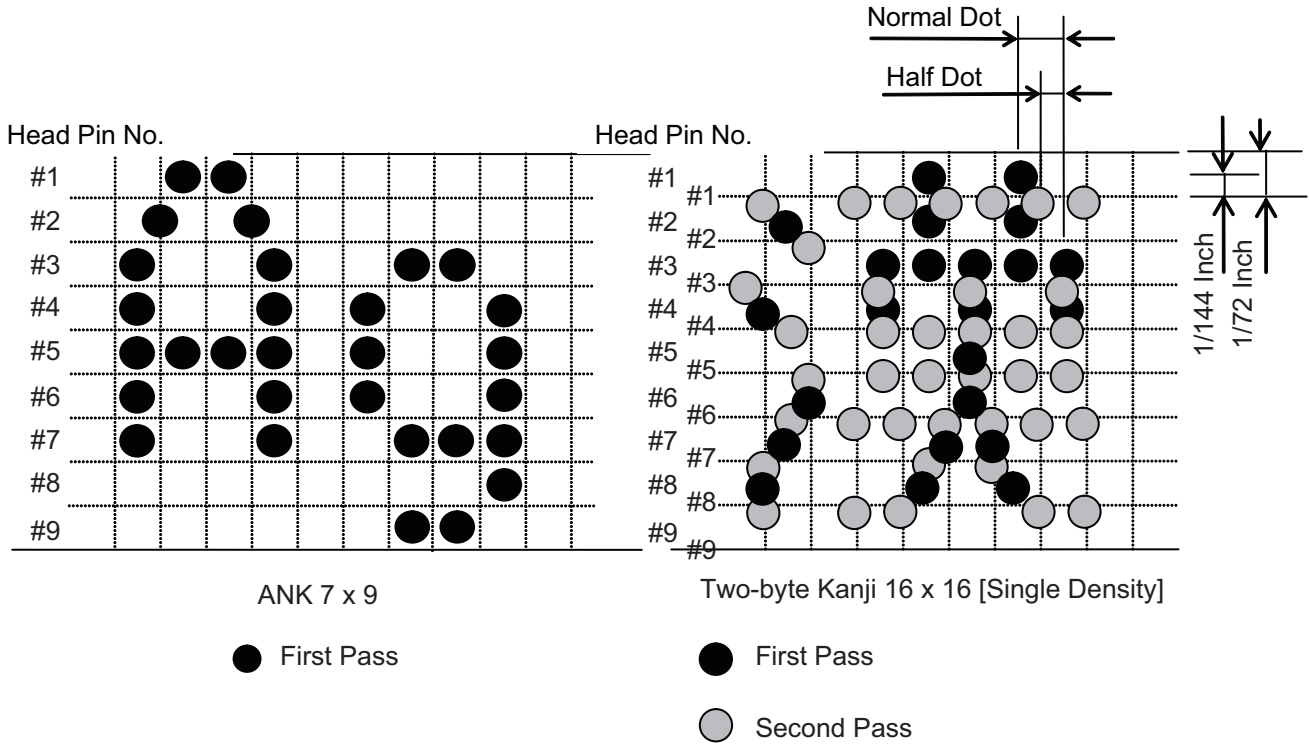
6. SPECIAL APPENDIX   COMMAND LIST BY MODEL

• Standard Commands

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
Font Style and Character Set	ESC GS t	○ Spec. 1	○ Spec. 1	○ Spec. 1	○ Spec. 1	Spec. 2 (Ver. 3.2 or older) Spec. 3 (Ver. 3.3 or later)		
	ESC R	○	○	○	○	○		
	ESC /	○	○	○	○	○		
	ESC 6	○	○	○	○	○		
	ESC 7	○	○	○	○	○		
	ESC M	○	○	○	○	○		
	ESC P	○	○	○	○	○		
	ESC :	○	○	○	○	○		
	ESC SP	○	○	○	○	○		
Character Expansion Settings	SO	○	○	○	○	○		
	DC4	○	○	○	○	○		
	ESC W	○	○	○	○	○		
	ESC h	○	○	○	○	○		
Print Modes	ESC E	○	○	○	○	○		
	ESC F	○	○	○	○	○		
	ESC -	○	○	○	○	○		
	ESC _	○	○	○	○	○		
	ESC 4	○	○	○	○(*2)	○		
	ESC 5	○	○	○	○(*2)	○		
	ESC GS 4	-	-	-	○	○		
	SI	○	○	○	○	○		
	DC2	○	○	○	○	○		
	ESC RS i	○	○	○	○	○		
Line Spacing	LF	○	○	○	○	○		
	CR	○	○	○	○	○		
	ESC a	○	○	○	○	○		
	ESC 0	○	○	○	○	○		
	ESC 1	○	○	○	○	○		
	ESC z 0	○	○	○	○	○		
	ESC z 1	○	○	○	○	○		
	ESC A	○	○	○	○	○		
	ESC 2	○	○	○	○	○		
	ESC 3	○	○	○	○	○		
	ESC y	○	○	○	○	○		
	ESC J	○	○	○	○	○		
	ESC I	-	-	-	○	○		
Page Control	FF	○	○	○	○	○		
	ESC C	○	○	○	○	○		
	ESC C 0	○	○	○	○	○		
	VT	○	○	○	○	○		
	ESC B	○	○	○	○	○		
	ESC N	○	○	○	○	○		
	ESC O	○	○	○	○	○		

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
Horizontal Direction Position	ESC RS A	-	-	-	○ Spec. 1	○ Spec. 2		
	ESC I	○	○	○	○	○		
	ESC Q	○	○	○	○	○		
	HT	○	○	○	○	○		
	ESC D	○	○	○	○	○		
	ESC GS a	○	○	○	○	○		
	ESC GS A	-	-	-	○	○		
	ESC GS R	-	-	-	○	○		
Download	ESC &	○	○	○	○	○		
	ESC %	○	○	○	○	○		
Bit Image Graphics	ESC K	○	○	○	○	○		
	ESC L	○	○	○	○	○		
	ESC ^	○	○	○	○	○		
Logos	ESC FS q	-	-	-	-	○		
	ESC FS p	-	-	-	-	○		
	ESC RS L	-	-	-	-	Spec. 1 (Ver. 1.2 or older) Spec. 2 (Ver. 1.3 or later)		
Cutter Control	ESC d	○	○	○	○	○		
External Device Drive	ESC BEL	○	○	○	○	○		
	BEL	○	○	○	○	○		
	FS	○	○	○	○	○		
	SUB	Ignored	○	Ignored	○	○		
	EM	Ignored	○	Ignored	○	○		
	ESC GS EM DC1	-	-	-	-	○		
	ESC GS EM DC2	-	-	-	-	○		
Status	ENQ	○	○	○	○	○		
	EOT	○	○	○	○	○		
	ESC ACK SOH	○	○	○	○	○		
	ESC RS a	○ Spec. 1	○ Spec. 1	○ Spec. 1	○(*10) Spec. 2 (Ver. 3.0 or older) Spec. 3 (Ver. 4.0 or later)	○ (*9 , *10) Spec. 2 (Ver. 1.2 or older) Spec. 3 (Ver. 2.0 or later)		
	ETB	○ Spec. 1	○ Spec. 1	○ Spec. 1	○ Spec. 2	○ Spec. 2		
	ESC RS E	-	-	-	○	○		
	ESC GS ETX	-	-	-	○(*10) Spec. 1	○ (*10) Spec. 1 (Ver. 2.0 or older) Spec. 2 (Ver. 3.0 or later)		
	ESC ACK CAN	-	-	-	○ (Ver. 4.0 or later)	○ (Ver. 2.0 or later)		

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
Kanji Characters (*1)	ESC p	Δ	Δ	Δ	Δ	Δ		
	ESC q	Δ	Δ	Δ	Δ	Δ		
	ESC $	Δ	Δ	Δ	Δ	Δ		
	ESC s	○ Spec. 1	○ Spec. 1	○ Spec. 1	○ Spec. 2	○ Spec. 2		
	ESC t	Δ	Δ	Δ	Δ	Δ		
	ESC r	○ Spec. 1	○ Spec. 1	○ Spec. 1	○ Spec. 2	○ Spec. 3		
	ESC u 1	○	○	○	○	○		
	ESC u 0	○	○	○	○	○		
	ESC x 1	○	○	○	○	○		
	ESC x 0	○	○	○	○	○		
	ESC w 1	○	○	○	○	○		
	ESC w 0	○	○	○	○	○		
Others	RS	○	○	○	○	○		
	CAN	○	○	○	○	○		
	DC3	○	○	○	○	○		
	DC1	○	○	○	○	○		
	ESC @	○	○	○	○	○		
	ESC U	○	○	○	○	○		
	ESC GS # m	-	-	○ Spec. 1	○ Spec. 1	Spec. 2 (Ver. 2.0 or older) Spec. 3 (Ver. 3.0 or later)		
	ESC #	○	○	Ignored	Ignored	Ignored		
	ESC ?	○	○	○	○	○		

• Black Mark Related Commands

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
Black mark Related Commands	ESC d (Note 3)	-	-	○	○	○		
	FF (Note 3)	-	-	○	○	○		
	ESC FF	-	-	○	○	○		
	ESC GS (F	-	-	○	○	○		
	ESC RS m	-	-	-	○	○		

• USB Related Commands

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
USB Related Commands								

• 2-Color Printing Related Commands

Class	Commands	Model Name						
		BD100	SP2000	BD500	SP500	SP700		
2-Color Printing Related Commands	ESC RS C	-	-	-	-	○		
	ESC 4	-	-	-	-	○		
	ESC 5	-	-	-	-	○		

(Note 1) Kanji characters

• Δ: Enabled only on printer models equipped with Kanji characters.

• Japanese character control commands are ignored on models not installed with Japanese character fonts.

• Japanese character control commands are ignored if the specification for the location of use is specified as SBCS (single byte countries) by the memory switch.

(Note 2)

Red/black substitute function can be selected by the memory switch. Refer to each printer's specification manual.

Red/black substitute function can be selected by the command ESC GS 4.

(Note 3)

These are commands whose operation specifications vary when the black mark function is enabled.

(Note 9)

For SP700 Ver. 1.3 and 1.4, the command is ignored (ASB disabled) in the USB printer class.

(Note 10) Support information for Ethernet I/F

SP500 Ver 3.0 or older, SP700 Ver 1.4 or older: Command disabled

SP500 Ver 4.0 or later, SP700 Ver 2.0 or later*: Depends on the usage in combination with the Ethernet I/F (firmware version) as follows.

  - IFBD-HE05/06 Firmware version (Main) V1.0.1: Command disabled

  - IFBD-HE05/06 Firmware version (Main) V1.1.0: Command enabled

  - IFBD-HE07/08: Command enabled

 (*) See the product specifications for IFBD-HE07/08-BE07 for versions that support the SP700 IFBD-HE07/08.