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PROGRAMMER`S MANUAL

Imagens meramente ilustrativas

MP-4200 TH

POS Printer MP-4200 TH Programmer's Manual
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General Information

This symbol indicates that your product must be disposed of properly according to local laws and regulations. When your product reaches its end of life, contact Bematech or your local authorities to learn about recycling options.

Safety Information

This section presents important information intended to ensure safe and effective use of this product. Please read this section carefully and store it in an accessible location.

Electrical Safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the product, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are note sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation Safety

- Before installing the product and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact you retailer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or you retailer.

Summary

List of Tables

Acronyms and Abbreviations

Abreviation	Significance
bit	Binary digit
dpi	Dots per inch
JIS	Japanese Industrial Standards
TCP/IP	Suite of protocols used for Internet communication
USB	Universal Serial Bus
UTF-8	8-bit Unicode Transformation Format

Revision History

Date	Version	Description
April 2010	1.0	Initial release.

Chapter 1

Introduction

MP-4200 TH is a Bematech thermal printer designed to speed up receipt printing operations with high performance in both text and graphic modes. Its main features include:

- Printing speeds of up to 250mm/s in both text and graphic modes.
- Four paper widths: 58mm, 76mm, 80mm or 82.5mm.
- Two commands sets: ESC/Bematech or ESC/POS®.
- One USB device interface always available to connect with host computers.
- Two different models of optional serial RS-232 interfaces cards, one using a DB-9 connector and another using DB-25 connector, to allow serial communication with legacy and embedded hosts.
- One optional 10/100Mbit Ethernet interface card with integrated TCP/IP stack for wired remote printing through local area networks.
- One optional IEEE 802.11b/g Wi-Fi interface card with integrated TCP/IP stack for wireless remote printing through local area networks.
- Seven code pages available: 437 (USA and Standard Europe), 850 (Multilingual "Latin-1" – Western European Languages), 858 (Multilingual with Euro symbol), 860 (Portuguese), 862 (Hebrew), 864 (Arabic) and 866 (Cyrillic).
- Supports Traditional Chinese (Big 5E) and Simplified Chinese (GB2312 or EUC-CN).
- Supports Japanese (JIS and Shift JIS).
- Supports UTF-8 characters.
- Can generate fourteen different types of unidimensional bar codes (EAN-8, EAN-13, Code 39, Code 93, Code 128 (A, B and C), ITF, Codabar, UPC-A, UPC-E, ISBN, MSI or Plessey).
- Can generate PDF-417 bidimensional bar code.
- May be used to control up to two external cash drawers.
- Dot density of 203 x 203 dpi.

1.1 Objective

The purpose of this manual is to provide to developers and programmers detailed information about MP-4200 TH operation. All available commands are described to allow the use of MP-4200 TH to print receipts for any kind of application.

1.2 Structure

This manual is organized in four chapters. This first chapter provides some highlights about MP-4200 TH thermal printer and also some information on how to use this manual. The second chapter presents a summary of all the commands supported by the MP-4200 TH in a form of a quick reference guide. The third chapter provides in depth information about every command available in the ESC/Bematech mode of operation. The fourth chapter provides in depth information about every ESC/POS® command supported by MP-4200 TH printer when operating in the ESC/POS mode of operation.

Chapters three and four describe commands using up to nine arguments, as described in Table 1.

Arguments used to describe MP-4200 TH commands. **Table 1**

Argument	Significance
[Function]	Short description of the command functionality.
[Format]	Command code sequence.
[Range]	Shows command arguments ranges, if applicable.
[Default]	Gives default values for parameters, if applicable.
[Description]	Describes what the command does.
[Details]	Describes the usage of the command in detail and also its limitations.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[References]	Lists related commands, if applicable.
[Example]	Provides a short example on how to use the command.

Chapter 2

Quick Reference Guide

MP-4200 TH is a dual command set printer. A command set describes the behavior of the printer when sequences of bytes are received through the communication interface. The two command sets available at the MP-4200 TH are ESC/Bematech (or ESC/Bema for short) and ESC/POS®, but only one of them is active at a given time. There are commands specifically designed to switch from current command set to the other.

2.1 ESC/Bema Quick Reference Guide

ESC/Bema is a standard developed by Bematech, its partners and customers during several years of operation in the South America retail and bank automation markets.
The syntax used to summarize ESC/Bema commands in the tables throughout this section is described in the bullets below:

- ESC P means a command with no parameters.
- ESC Q n means a command with one parameter.
- ESC K n1 n2 means a command with two parameters.
- ESC D n1 ... nk means a command with variable number of parameters.

In the bullets above the ESC symbol represents the hexadecimal number 1B, according to ASCII table. The character P represents the hexadecimal number 50, as defined in the ASCII table too. In some circumstances hexadecimal numbers between 7F and FF can also be used as a part of a command. As these values cannot be represented using ASCII table, they will be represented with the value followed by the 'h' character.

In the next tables ESC/Bema commands are summarized.

Printer settings commands for ESC/Bema mode — **Table 2**

Command	Description	Hexadecimal Format
GS F9h 5 n	Select printer operating mode and save selected option to configuration memory.	1D F9 35 n
GS F9h 7 n	Set and save printer default code page for ESC/Bema command set.	1D F9 37 n
GS F9h 8 n	Set and save ESC/POS ideogram mode.	1D F9 38 n
GS F9h C 00h	Get printer current command set.	1D F9 43 00
GS F9h SP n	Select printer operating mode without saving selected option to printer configuration memory.	1D F9 20 n
GS F9h 1Fh 1	Return to mode in use prior to sending GS F9h SP n command.	1D F9 1F 31
ESC @	Initialize printer to its default settings.	1B 40
ESC b n	Select paper sensor to output paper-end signal.	1b 62 n
ESC v n	Activate drawer #1 for n milliseconds	1B 76 n
ESC 80h n	Activate drawer #2 for n milliseconds	1B 80 n
ESC i	Perform full paper cut	1B 69
ESC w	Perform full paper cut	1B 77
ESC m	Perform partial paper cut	1B 6D
ESC y n	Enable/disable panel keys	1B 79 n
ESC x	Enable dump mode	1B 78
ESC z n	Enable/disable automatic line feed	1B 7A n

ESC (A p_L p_H fn n_1 n_2 vol	Activate/deactivate buzzer	1B 28 41 p_L p_H fn n_1 n_2 vol
GS F9h – n	Set and save printer mode	1D F9 2D n
GS F9h ! n	Set and save paper width	1D F9 21 n
GS F9h , n	Enable/disable paper near-end sensor	1D F9 2C n
GS F9h + n	Set and save printing intensity	1D F9 2B n
GS FAh n	Set and save printer language	1D FA n
GS F9h ` n	Get printer information	1D F9 27 n
GS F9h (0	Load default user configuration	1D F9 28 30
GS F9h) 0	Print user configuration	1D F9 29 30
GS F8h F	Printer reset	1D F8 46
GS F7h BS NUL " i_1...i_4 s_1...s_4	Set IP address and subnet mask	1D F7 08 00 22 i_1...i_4 s_1...s_4
GS F7h EOT NUL ` g_1...g_4	Set default gateway IP address	1D F7 04 00 27 g_1...g_4
GS F9h D m n	Activate buzzer on cut	1D F9 44 m n
GS F9h E n	Set DHCP usage	1D F9 45 n
GS F9h S m ip_1..ip_4 n c_1..c_n	Set SNMP settings	1D F9 53 m ip_1..ip_4 n c_1..c_n
GS F9h W a s c m n e_1..e_m p_1..p_n	Set Wi-Fi settings	1D F9 57 a s c m n e_1..e_m p_1..p_n

Vertical positioning commands — **Table 3**

Command	Description	Hexadecimal Format
ESC C n	Set page size in lines	1B 43 n
ESC c n1 n2	Set page size in millimeters	1B 63 n1 n2
ESC J n	Performs a fine line feed	1B 4A n
FF	Feed one page	0C
LF	Feed one line	0A
ESC 2	Set text line height to 1/6 inches	1B 32
ESC 3 n	Set line feed to n/144 inches	1B 33 n
ESC f 1 n	Vertical skipping	1B 66 31 n
ESC A n	Feed paper by [n x 0,375]mm	1B 41 n

Horizontal positioning commands — **Table 4**

Command	Description	Hexadecimal Format
ESC f 0 n	Horizontal skipping	1B 66 30 n
HT	Horizontal tab	09
ESC D n_1...n_k NUL	Set horizontal tab marks	1B 44 n_1...n_k 00
ESC Q n	Set right margin	1B 51 n
ESC l n	Set left margin	1B 6C n
ESC a n	Character alignment	1B 61 n

Character formatting commands		Table 5
Command	**Description**	**Hexadecimal Format**
ESC – n	Enable/disable underline print mode	1B 2D n
ESC 4	Enable italic print mode	1B 34
ESC 5	Disable italic print mode	1B 35
ESC E	Enable emphasized print mode	1B 45
ESC F	Disable emphasized print mode	1B 46
ESC t n	Codepage selection	1B 74 n
ESC R n	Select an international character set	1B 52 n
ESC S n	Enable superscript and/or subscript print modes	1B 53 n
ESC T	Disable superscript and subscript print modes	1B 54
ESC N n	Select printing intensity	1B 4E n
ESC ! n	Select print mode	1B 21 n
ESC } n	Turn upside-down printing mode on/off	1B 7D n
ESC Z	Print supported Unicode sets	1B 5A
ESC [n	Print a specific Unicode set	1B 5B n

Print width, character width and height commands		Table 6
Command	**Description**	**Hexadecimal Format**
DC2	Disable condensed mode	12
DC4	Disable on-line expanded print	14
ESC d n	Enable/disable double height print mode	1B 64 n
ESC H	Disable condensed mode	1B 48
ESC P	Disable condensed mode	1B 50
ESC SI	Enable condensed mode	1B 0F
ESC SO	Enable on-line expanded mode	1B 0E
ESC V	Enable on-line double height mode	1B 56
ESC W n	Enable/disable expanded mode	1B 57 n
SI	Enable condensed mode	0F
SO	Enable on-line expanded mode	0E

Bitmap and graphic		Table 7
Command	**Description**	**Hexadecimal Format**
ESC $ n1 n2	Fill in blank bit columns	1B 24 n1 n2
ESC * ! n1 n2 b1...bn	24-bit graphics	1B 2A 21 n1 n2 b1 ... bn
ESC K n1 n2 b1...bn	8-bit graphics	1B 4B n1 n2 b1 ... bn
FS p n m	Print NV bit image	1C 70 n m
FS q n [x_L x_H y_L y_H d_1...d_k]1...[x_L x_H y_L y_H d_1...d_k]$_n$	Define NV bit image	1C 71 n [x_L x_H y_L y_H d_1...d_k]1...[x_L x_H y_L y_H d_1...d_k]$_n$
GS / m	Print downloaded bit image	1D 2F m
GS * x y d_1...$d_{(x \times y \times 8)}$	Define downloaded bit image	1D 2A x y d_1...$d_{(x \times y \times 8)}$
GS v 0 m x_L x_H y_L y_H d_1...d_k	Print raster bitmap	1D 76 30 m x_L x_H y_L y_H d_1...d_k

Communication related		Table 8
Command	**Description**	**Hexadecimal Format**
ENQ	Printer status enquiry	05
GS F8h 1	Printer extended status enquiry	1D F8 31
ETX	End buffer	03
STX	Clear buffer	02

Data control related		Table 9
Command	**Description**	**Hexadecimal Format**
CAN	Cancel last line	18
DEL	Cancel last character	7F

Barcode commands		Table 10
Command	**Description**	**Hexadecimal Format**
GS h n	Set barcode height	1D 68 n
GS w n	Set barcode width	1D 77 n
GS H n	Choose the position of human readable information (HRI) in the barcode	1D 48 n
GS f n	Set the font to be used for human readable information (HRI)	1D 66 n
GS k NUL $d_1 \ldots d_{11}$ NUL	Print an UPC-A barcode	1D 6B 00 $d_1 \ldots d_{11}$ 00
GS k A VT $d_1 \ldots d_{11}$	Print an UPC-A barcode	1D 6B 41 0B $d_1 \ldots d_{11}$
GS k SOH $d_1 \ldots d_6$ NUL	Print an UPC-E barcode	1D 6B 01 $d_1 \ldots d_6$ 00
GS k B ACK $d_1 \ldots d_6$	Print an UPC-E barcode	1D 6B 42 06 $d_1 \ldots d_6$
GS k STX $d_1 \ldots d_{12}$ NUL	Print an EAN-13 barcode	1D 6B 02 $d_1 \ldots d_{12}$ 00
GS k C FF $d_1 \ldots d_{12}$	Print an EAN-13 barcode	1D 6B 43 0C $d_1 \ldots d_{12}$
GS k ETX $d_1 \ldots d_7$ NUL	Print an EAN-8 barcode	1D 6B 03 $d_1 \ldots d_7$ 00
GS k D BEL $d_1 \ldots d_7$	Print an EAN-8 barcode	1D 6B 44 07 $d_1 \ldots d_7$
GS k EOT $d_1 \ldots d_n$ NUL	Print a CODE 39 barcode	1D 6B 04 $d_1 \ldots d_n$ 00
GS k E n $d_1 \ldots d_n$	Print a CODE 39 barcode	1D 6B 45 n $d_1 \ldots d_n$
GS k ENQ $d_1 \ldots d_n$ NUL	Print an ITF barcode	1D 6B 05 $d_1 \ldots d_n$ 00
GS k F n $d_1 \ldots d_n$	Print an ITF barcode	1D 6B 46 n $d_1 \ldots d_n$
GS k ACK $d_1 \ldots d_n$ NUL	Print a CODABAR barcode	1D 6B 06 $d_1 \ldots d_n$ 00
GS k G n $d_1 \ldots d_n$	Print a CODABAR barcode	1D 6B 47 n $d_1 \ldots d_n$
GS k H n $d_1 \ldots d_n$	Print a CODE 93 barcode	1D 6B 48 n $d_1 \ldots d_n$
GS k I n $d_1 \ldots d_n$	Print a CODE 128 barcode	1D 6B 49 n $d_1 \ldots d_n$
GS k 80h n_1 n_2 n_3 n_4 n_5 n_6 $d_1 \ldots d_n$	Print a PDF-417 barcode	1D 6B 80 n_1 n_2 n_3 n_4 n_5 n_6 $d_1 \ldots d_n$
GS k NAK $d_1 \ldots d_9$ NUL	Print an ISBN barcode	1D 6B 15 $d_1 \ldots d_9$ 00
GS k SYN $d_1 \ldots d_n$ NUL	Print a MSI barcode	1D 6B 16 $d_1 \ldots d_n$ 00
GS k 82h n $d_1 \ldots d_n$	Print a MSI barcode	1D 6B 82 n $d_1 \ldots d_n$
GS k ETB $d_1 \ldots d_n$ NUL	Print a PLESSEY barcode	1D 6B 17 $d_1 \ldots d_n$ 00
GS k 83h n $d_1 \ldots d_n$	Print a PLESSEY barcode	1D 6B 83 n $d_1 \ldots d_n$
GS k 84h n_1 n_2	Program barcode left margin	1D 6B 84 n_1 n_2

2.2 ESC/POS® Quick Reference Guide

ESC/POS® is a standard defined by Seiko Epson Corporation. ESC/POS® commands can be classified as executing or setting. An executing command makes the printer to execute something and does not affect further incoming data. On the other hand, a setting command makes the printer to change its internal flags that may affect incoming data.

ESC/POS® commands supported by MP-4200 TH are summarized in Table 11, Table 12 and Table 13.

Standard commands for ESC/POS® mode — **Table 11**

Command	Name	Command Classification		GS P function
		Executing	Setting	
HT	Horizontal tab	x		
LF	Print and line feed	x		
CR	Print and carriage return	x		
DLE EOT	Real-time status transmission	x		
DLE ENQ	Real-time request to printer	x		
DLE DC4	Generate pulse at real-time	x		
	Execute power-off sequence	x		
	Clear buffer	x		
ESC SP	Set right-side character spacing		x	x
ESC !	Select print mode(s)		x	
ESC $	Set absolute print position	x		x
ESC (A	Control beeper tones	x	x	
ESC *	Select bit-image mode	x		
ESC -	Turn underline mode on/off		x	
ESC 2	Select default line spacing		x	
ESC =	Select peripheral device		x	
ESC @	Initialize printer	x	x	
ESC D	Set horizontal tab marks		x	
ESC E	Turn emphasized mode on/off		x	
ESC G	Turn double-strike mode on/off		x	
ESC J	Print and paper feed	x		x
ESC M	Select character font			
ESC R	Select an international character set		x	
ESC V	Turn 90° clockwise rotation mode on/off		x	
ESC \	Set relative print position	x		x
ESC a	Select justification		x	
ESC c 3	Select paper sensor(s) to output paper-end signals		x	
ESC c 4	Select paper sensor(s) to stop printing		x	
ESC c 5	Enable/disable panel buttons		x	
ESC d	Print and feed n lines	x		
ESC i	Perform a partial cut	x		

ESC m	Partial paper cut	x		
ESC p	Generate pulse	x		
ESC t	Select character code table		x	
ESC u n	Transmit peripheral device status	x		
ESC v	Transmit paper sensor status	x		
ESC {	Turn upside-down printing mode on/off		x	
FS p	Print NV bit image	x		
FS q	Define NV bit image		x	
GS !	Select character size		x	
GS *	Define downloaded bit image		x	
GS /	Print downloaded bit image	x		
GS (A	Execute test print	x		
GS (D	Enable/disable real-time command		x	
GS 8 L GS (L	Process graphics data	x		
GS (N	Select character effects		x	
GS (k	Specify and print symbol	x	x	
GS :	Start/end macro definition	x	x	
GS B	Turn white/black reverse printing mode on/off		x	
GS H	Select printing position of HRI characters		x	
GS I	Transmit printer ID	x		
GS L	Set left margin		x	x
GS P	Set horizontal and vertical motion units		x	
GS V	Select cut mode and cut paper	x		x
GS W	Set printing area width		x	x
GS ^	Execute macro	x		
GS a	Enable/disable Automatic Status Back (ASB)	x	x	
GS f	Select font for HRI characters		x	
GS h	Set bar code height		x	
GS k	Print bar code	x		
GS r	Transmit status	x		
GS v 0	Print raster bit image	x		
GS w	Set bar code width		x	

Notes:- x means command enabled.

MP-4200 TH also supports ideograms for Traditional Chinese (Big-5E), Simplified Chinese (EUC-CN) and Japanese (JIS or Shift JIS). Table 12 shows MP-4200 TH ESC/POS commands dedicated to ideograms control.

Ideograms control — **Table 12**

Command	Name	Command Classification		GS P function
		Executing	Setting	
FS !	Set print mode(s) for ideograms		x	
FS &	Select ideogram mode		x	
FS -	Turn underline mode on/off for ideograms		x	
FS .	Cancel ideogram mode		x	
FS C	Select ideogram code system		x	
FS S	Set ideogram spacing		x	x
FS W	Turn quadruple-size mode on/off for ideograms		x	

Beyond ESC/POS® standard, MP-4200 TH also supports some miscellaneous commands in ESC/POS® mode to allow printer to be configured independent of current command set (ESC/Bema or ESC/POS®). The miscellaneous commands supported by MP-4200 TH in ESC/POS® mode are listed in Table 13.

Special miscellaneous — **Table 13**

Command	Description	Hexadecimal Format
GS F9h 5 n	Select printer operating mode and save selected option to configuration memory.	1D F9 35 n
GS F9h 7 n	Set and save printer default code page for ESC/Bema command set.	1D F9 37 n
GS F9h 8 n	Set and save ESC/POS ideogram mode.	1D F9 38 n
GS F9h C 00h	Get printer current command set.	1D F9 43 00
GS F9h SP n	Select printer operating mode without saving selected option to printer configuration memory.	1D F9 20 n
GS F9h 1Fh 1	Return to mode in use prior to sending GS F9h SP n command.	1D F9 1F 31
GS F9h – n	Set and save printer mode	1D F9 2D n
GS F9h ! n	Set and save paper width	1D F9 21 n
GS F9h , n	Enable/disable paper near-end sensor	1D F9 2C n
GS F9h + n	Set and save printing intensity	1D F9 2B n
GS FAh n	Set and save printer language	1D FA n
GS F9h ` n	Get printer information	1D F9 27 n
GS F9h (0	Load default user configuration	1D F9 28 30
GS F9h) 0	Print user configuration	1D F9 29 30
GS F8h 1	Printer extended status enquiry	1D F8 31
GS F8h F	Printer reset	1D F8 46
GS F7h BS NUL " $i_1 \ldots i_4$ $s_1 \ldots s_4$	Set IP address and subnet mask	1D F7 08 00 22 $i_1 \ldots i_4$ $s_1 \ldots s_4$
GS F7h EOT NUL ` $g_1 \ldots g_4$	Set default gateway IP address	1D F7 04 00 27 $g_1 \ldots g_4$
GS F9h D m n	Activate buzzer on cut	1D F9 44 m n
GS F9h E n	Set DHCP usage	1D F9 45 n
GS F9h S m $ip_1..ip_4$ n $c_1..c_n$	Set SNMP settings	1D F9 53 m $ip_1..ip_4$ n $c_1..c_n$
GS F9h W a s c m n $e_1..e_m$ $p_1..p_n$	Set Wi-Fi settings	1D F9 57 a s c m n $e_1..e_m$ $p_1..p_n$

Chapter 3

ESC/Bematech Command Set

This chapter presents detailed information about each ESB/Bematech command implemented by the MP-4200 TH printer.

GS F9h 5 n

[Function]	Select printer operating mode.	
[Format]	ASCII	GS F9h 5 n
	Hexadecimal	1D F9 35 n
	Decimal	29 249 53 n
[Range]	n = 0; n = 1; n = 48; n = 49;	
[Description]	If n is 0 (00h or 30h), ESC/Bema is selected.	
	If n is 1 (01h or 31h), ESC/POS is selected.	
[Notes]	This command modifies printer flags and save the new values to printer configuration memory.	

GS F9h 7 n

[Function]	Set and save printer default code page for ESC/Bematech command set.	
[Format]	ASCII	GS F9h 7 n
	Hexadecimal	1D F9 37 n
	Decimal	29 249 55 n
[Range]	2 ≤ n ≤ 12; n = 14; n = 21	
[Default]	n = 2	
[Description]	This command selects the code page to be used, according to the following options.	
	If n is 2 (02h or 32h), CODEPAGE 850 is selected.	
	If n is 3 (03h or 33h), CODEPAGE 437 is selected.	
	If n is 4 (04h or 34h), CODEPAGE 860 is selected.	
	If n is 5 (05h or 35h), CODEPAGE 858 is selected.	
	If n is 6 (06h or 36h), CODEPAGE 866 is selected.	
	If n is 7 (07h or 37h), CODEPAGE 864 is selected.	
	If n is 8 (08h or 38h), UTF8 (Unicode) is selected.	
	If n is 9 (09h or 39h), Big-5E is selected.	
	If n is 10 (0Ah or 3Ah), JIS is selected.	
	If n is 11 (0Bh or 3Bh), SHIFT JIS is selected.	
	If n is 12 (0Ch or 3Ch), GB2312 is selected.	
	If n is 14 (0Eh or 3Eh), EUC-CN is selected.	
	If n is 21 (15h or 45h), CODEPAGE 862 is selected.	

GS F9h 8 n

[Function]	Set and save ESC/POS ideogram mode.	
[Format]	ASCII	GS F9h 8 n
	Hexadecimal	1D F9 38 n
	Decimal	29 249 56 n
[Range]	0 ≤ n ≤ 3	
[Default]	n = 0	
[Description]	If n is 0 (00h or 30h), UTF8 (Unicode) ideogram mode is selected.	
	If n is 1 (01h or 31h), ESC/POS Japanese ideogram mode is selected.	
	If n is 2 (02h or 32h), ESC/POS Simplified Chinese ideogram mode is selected.	
	If n is 3 (03h or 33h), ESC/POS Traditional Chinese ideogram mode is selected.	

GS F9h C 00h

[Function] Get printer current command set.

[Format]

ASCII	GS F9h C 00h
Hexadecimal	1D F9 43 00
Decimal	29 249 67 0

[Description] Return one byte with current command set. If returned byte is 0 (00h), printer is operating in ESC/Bema mode. If returned byte is 1 (01h), printer is operating in ESC/POS mode.

GS F9h SP n

[Function] Select printer operating mode of operation temporarily.

[Format]

ASCII	GS F9h SP n
Hexadecimal	1D F9 20 n
Decimal	29 249 32 n

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

[Description] If n is 0 (00h or 30h), ESC/Bema is selected.
If n is 1 (01h or 31h), ESC/POS is selected.

[Notes] This command modifies printer flags but does not save the new values to the printer configuration memory. The new mode starts as the printer has been just initialized (ESC @ has been executed).

GS F9h 1Fh 1

[Function] Return to previously set mode of operation.

[Format]

ASCII	GS F9h 1Fh 1
Hexadecimal	1D F9 1F 31
Decimal	29 249 31 49

[Description] Configuration command used to put printer mode back to that used before issuing GS F9h SP n command. The previous mode re-starts as the printer has been just initialized (ESC @ has been executed).

ESC @

[Function] Initialize printer to its default settings.

[Format]

ASCII	ESC @
Hexadecimal	1B 40
Decimal	27 64

[Description] All printer settings, including character font, line spacing, left margin, right margin and inverted mode are canceled and the printer returns to its initial state.

ESC b n

[Function] Select paper sensor to output paper-end signal.

[Format]

ASCII	ESC b n
Hexadecimal	1B 62 n
Decimal	27 98 n

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

[Default] n = 0

[Description] If n is 0 (00h or 30h), paper-end signal (PE) reflects paper sensor on parallel printers.
If n is 1 (01h or 31h), paper-end signal (PE) reflects drawer sensor on parallel printers.

[Notes] This command also affects the behavior of ENQ on all printer models.

ESC v n

[Function]	Activate drawer #1 for n milliseconds.	
[Format]	ASCII	ESC v n
	Hexadecimal	1B 76 n
	Decimal	27 118 n
[Range]	50 ≤ n ≤ 250	
[Description]	Activate drawer #1 pin for n milliseconds (50ms ≤ n ≤ 200ms).	

ESC 80h n

[Function]	Activate drawer #2 for n milliseconds.	
[Format]	ASCII	ESC 80h n
	Hexadecimal	1B 80 n
	Decimal	27 128 n
[Range]	50 ≤ n ≤ 250	
[Description]	Activate drawer #2 pin for n milliseconds (50ms ≤ n ≤ 200ms).	

ESC i

[Function]	Perform full paper cut.	
[Format]	ASCII	ESC i
	Hexadecimal	1B 69
	Decimal	27 105
[Description]	This command operates the auto-cutter, performing a full cut in the paper.	

ESC w

[Function]	Perform full paper cut.	
[Format]	ASCII	ESC w
	Hexadecimal	1B 77
	Decimal	27 119
[Description]	This command operates the auto-cutter, performing a full cut in the paper.	

ESC y n

[Function]	Enable/disable panel keys.	
[Format]	ASCII	ESC y n
	Hexadecimal	1B 79 n
	Decimal	27 121 n
[Range]	n = 0, 1	
[Default]	n = 1	
[Description]	Enable or disable panel keys. If n is 0 (00h or 30h), panel keys are disabled. If n is 1 (01h or 31h), panel keys are enabled.	

ESC x

[Function]	Enable dump mode.	
[Format]	ASCII	ESC x
	Hexadecimal	1B 78
	Decimal	27 120
[Description]	Dump mode is a function used to print data transmitted from host computer in hexadecimal numbers. This function is to be used by advanced users and programmers in checking commands	

sent to the printer.
[Note] The only way to exit the dump mode is turning off the printer"

ESC z n

[Function] Enable/disable automatic line feed.
[Format] ASCII ESC z n
Hexadecimal 1B 7A n
Decimal 27 122 n
[Range] n = 0, 1
[Default] n = 0
[Description] Enable or disable line feeding.
If n is 0 (00h or 30h), automatic line feed is disabled.
If n is 1 (01h or 31h), automatic line feed is enabled.
[Notes] When automatic line feed is enabled, the printer will perform a LF if a CR is received.

ESC (A p_L p_H fn n_1 n_2 vol

[Function] Activate/deactivate buzzer.
[Format] ASCII ESC (A p_L p_H fn n_1 n_2 vol
Hexadecimal 1B 28 41 p_L p_H fn n_1 n_2 vol
Decimal 27 40 65 p_L p_H fn n_1 n_2 vol
[Description] Activate or deactivate printer buzzer.
($p_L + p_H \times 256$) = 4, i.e., p_L must be 4 and p_H must be 0.
f_n = 1 or 31h – activate buzzer.
f_n = 0 or 30h – deactivate buzzer (deprecated).
n = ($n_1 + n_2 \times 256$) – time in milliseconds.
vol = 0, 1, 48 or 49 – volume (unused).

GS F9h - n

[Function] Set and save printer mode.
[Format] ASCII GS F9h – n
Hexadecimal 1D F9 2D n
Decimal 29 249 45 n
[Default] n = 0
[Description] Set printer priority to high quality of high speed.
n = 0 or 30h – normal.
n = 1 or 31h – high quality.
n = 2 or 32h – high speed.

GS F9h ! n

[Function] Set and save paper width.
[Format] ASCII GS F9h ! n
Hexadecimal 1D F9 21 n
Decimal 29 249 33 n
[Description] Set paper width as described in the table below:

n	Paper width (mm)	Printing width (mm)
00h	58	48
01h	76	72
02h	80	72
03h	80	76
04h	82.5	72
05h	82.5	76
06h	82.5	80

[Notes] This command has effect only when printer is in ESC/Bema operating mode. For ESC/POS mode paper width is always set to 80mm/73.5mm.

GS F9h , n

[Function] Enable/disable paper near-end sensor.
[Format] ASCII GS F9h , n
Hexadecimal 1D F9 2C n
Decimal 29 249 44 n
[Default] n = 1
[Description] Enable or disable paper near-end sensor (PNES). This setting is saved to configuration (non-volatile) memory.
n = 1 or 31h – enable PNES.
n = 0 or 30h – disable PNES.

GS F9h + n

[Function] Set and save printing intensity.
[Format] ASCII GS F9h + n
Hexadecimal 1D F9 2B n
Decimal 29 249 43 n
[Description] Obsolete and ignored. Kept here to maintain compatibility with earlier Bematech products.

GS FAh n

[Function] Set and save printer language.
[Format] ASCII GS FAh n
Hexadecimal 1D FA n
Decimal 29 250 n
[Description] Set printer language.
n = 0 or 30h – English
n = 1 or 31h – Portuguese
n = 2 or 32h – Spanish
n = 3 or 33h – German

GS F9h ‘ n

[Function] Get printer information.
[Format] ASCII GS F9h ‘ n
Hexadecimal 1D F9 27 n
Decimal 29 249 39 n
[Description] Retrieve printer information according to values described in the following table:

n	Information	Data type	Return size
0, 30h	Product code (“MP-4200 TH”)	ASCII string	10 bytes
1, 31h	Serial number	ASCII string	20 bytes
2, 32h	Manufacturing date	ASCII string	4 bytes
3, 33h	Firmware version	ASCII string	3 bytes
4, 34h	Reserved		
5, 35h	Manufacturing timestamp (“dd/mm/yy hh:mm:ss” format)	ASCII string	17 bytes
6, 36h	Reserved		
7, 37h	Reserved		
8, 38h	Interface type (0 = None; 1 = Serial DB-9; 2 = Serial DB-25; 3 = Ethernet, -1 = Unknown)	Integer	1 byte

GS F9h (0

[Function] Load default user configuration.
[Format] ASCII GS F9h (0
Hexadecimal 1D F9 28 30
Decimal 29 249 40 48
[Description] Reload all configurations from non-volatile memory and dipswitches.

GS F9h) 0

[Function] Print user configuration.
[Format] ASCII GS F9h) 0
Hexadecimal 1D F9 29 30
Decimal 29 249 41 48
[Description] Print on paper the current user configuration.

GS F8h F

[Function] Printer reset.
[Format] ASCII GS F8h F
Hexadecimal 1D F8 46
Decimal 29 248 70
[Description] Force a hardware reset on the printer.

GS F7h BS NUL " $i_1...i_4$ $s_1...s_4$

[Function] Set IP address and subnet mask.

[Format]

ASCII	GS F7h BS NUL " $i_1...i_4$ s1...s_4
Hexadecimal	1D F7 08 00 22 $i_1...i_4$ $s_4...s_4$
Decimal	29 247 8 0 34 $i_1...i_4$ $s_4...s_4$

[Description] Program a fixed IP address and subnet mask to the printer.

[Example] To define an IP address of 10.10.1.2 and a subnet mask of 255.255.0.0, the following command should be sent:

1D F7 08 00 22 0A 0A 01 02 FF FF 00 00

[Notes] Valid only when ethernet or wi-fi interface is being used.

GS F7h EOT NUL ' g1...g4

[Function] Set default gateway IP address

[Format]

ASCII	GS F7h EOT NUL ' g1...g4
Hexadecimal	1D F7 04 00 27 g1...g4
Decimal	29 247 4 0 39 g1...g4

[Default] 0.0.0.0

[Description] This command sets the default gateway IP address, where g1..g4 are the IP address octets.

[Notes] Valid only when ethernet or wi-fi interface is being used.

[Example] If you want to set the gateway address to 192.168.1.2 the command must be sent as 1D F7 04 00 27 C0 A8 01 02

GS F9h D m n

[Function] Activate buzzer on cut

[Format]

ASCII	GS F9h D m n
Hexadecimal	1D F9 44 m n
Decimal	29 249 68 m n

[Range] $0 \leq m \leq 2$

$0 \leq n \leq 255$

[Default] $m = 0$

$n = 200$

[Description]

- This command tells the printer to active the buzzer at the same time of a cut is being performed.
- The buzzer to be activated is defined by m as follow:

m	buzzer
0	none (deactivate previous settings)
1	internal
2	external

- (n × 100ms) defines the activation time

GS F9h E n

[Function] Set DHCP usage

[Format]

ASCII	GS F9h E n
Hexadecimal	1D F9 45 n
Decimal	29 249 69 n

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

[Default] $n = 0$

[Description] This command enables or disables the DHCP client of the printer.

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

[Notes] Valid only when ethernet or wi-fi interface is being used.

GS F9h S m ip_1..ip_4 n c_1..c_n

[Function] Set SNMP settings

[Format]

ASCII	GS F9h S m ip1..ip4 n c1..cn
Hexadecimal	1D F9 53 m ip1..ip4 n c1..cn
Decimal	29 249 83 m ip1..ip4 n c1..cn

[Range] $0 \leq n \leq 64$

[Default] $m = 0$

$n = 0$

[Description] This command sets SNMP trap parameters.

- When $m = 0$, SNMP traps are disabled.
- When $m \neq 0$, SNMP traps are enabled.
- n defines the SNMP community and is limited to 64 bytes.
- c1..cn define the community name.

[Notes] Valid only when ethernet or wi-fi interface is being used.

GS F9h W a s c m n e_1..e_m p_1..p_n

[Function] Set Wi-Fi settings

[Format]

ASCII	GS F9h W a s c m n e1..em p1..pn
Hexadecimal	1D F9 57 a s c m n e1..em p1..pn
Decimal	29 249 87 a s c m n e1..em p1..pn

[Range] $a = 0, 1$

$s = 0, 1, 2, 3, 4$

$0 \leq c \leq 13$

$0 \leq m \leq 32$

$0 \leq n \leq 63$

[Default] $a = 0$

$s = 0$

$c = 0$

$m = 0$

$n = 0$

[Description] This command sets Wi-Fi communication settings.

- a defines the access mode as follow:

a	Access mode
0	Access Point
1	Ad-hoc

- s defines the security mode as follow:

s	Security mode
0	No security
1	WEP 64-bit
2	WEP 128-bit
3	WPA-TKIP personal
4	WPA2-AES personal

- c defines the channel to use. Use c = 0 when a = 0.
- m defines the size of the ESSID.
- n defines the size of the passphrase.
- e1..em define the ESSID.
- p1..pn define the passphrase.

[Notes] Valid only when wi-fi interface is being used.

ESC C n

[Function] Set page size in lines.

[Format]

ASCII	ESC C n
Hexadecimal	1B 43 n
Decimal	27 67 n

[Range] $0 < n < 256$

[Default] $n = 12$

[Description] Set page size, where n represents the number of single height lines.

ESC c n_1 n_2

[Function] Set page size in millimeters.

[Format]

ASCII	ESC c n_1 n_2
Hexadecimal	1B 63 n_1 n_2
Decimal	27 99 n_1 n_2

[Range] $0 \leq n_1 \leq 255$

$0 \leq n_2 \leq 255$

[Description] Set page size in millimeters. The page size is calculated by the formula: 0.125mm x $[n_1 + (256 \times n_2)]$.

ESC J n

[Function] Perform fine line feed.

[Format]

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

[Range] $48 \leq n \leq 255$

[Description] Perform paper feeding of [(n – 48) x 0,125]mm.

[Notes] This command is widely used when printing graphics.

FF

[Function]	Feed one page.	
[Format]	ASCII	FF
	Hexadecimal	0C
	Decimal	12
[Description]	Performs a form feed, moving from current position to the top of next page.	
[Notes]	This command can be disabled by setting page size to zero.	

LF

[Function]	Feed one line.	
[Format]	ASCII	LF
	Hexadecimal	0A
	Decimal	10
[Description]	Print buffer contents, if any, and perform the feeding of one line according to default line spacing.	
[Notes]	After sending this command, the next character will be printed on the left margin of the next line.	

ESC 2

[Function]	Set text line height to 1/6 inches.	
[Format]	ASCII	ESC 2
	Hexadecimal	1B 32
	Decimal	27 50
[Description]	Set text line height to its default value, which is 1/6 inches.	
[Notes]	1/6 inches becomes the default line height when printer is turned on or when the ESC @ command is issued.	

ESC 3 n

[Function]	Set line feed to n/144 inches.	
[Format]	ASCII	ESC 3 n
	Hexadecimal	1B 33 n
	Decimal	27 51 n
[Range]	$18 \leq n \leq 255$	
[Description]	The line feed rate per line is specified by n/144 inches.	
[Notes]	This command takes effect immediately.	

ESC f 1 n

[Function]	Vertical skipping.	
[Format]	ASCII	ESC f 1 n
	Hexadecimal	1B 66 31 n
	Decimal	27 102 49 n
[Range]	$0 \leq n \leq 255$	
[Description]	Perform vertical skipping of n characters.	
[Notes]	Command 1B 66 01 n has the same effect.	

ESC A n

[Function] Feed paper by [n x 0,375]mm.

[Format]

ASCII	ESC A n
Hexadecimal	1B 41 n
Decimal	27 65 n

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

[Description] Perform paper feed of n x 0,375mm.

[Notes] If $n < 17$, the line feed will be equal to zero. For $n > 85$, the line feed will be equal to 32mm. For other values, the line feed is equal to n x 0,375mm.

ESC f 0 n

[Function] Horizontal skipping.

[Format]

ASCII	ESC f 0 n
Hexadecimal	1B 66 30 n
Decimal	27 102 48 n

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

[Description] Performs horizontal skipping of n characters.

[Notes] Hex command 1B 66 00 n takes the same effect.

HT

[Function] Horizontal tab.

[Format]

ASCII	HT
Hexadecimal	09
Decimal	9

[Description] Move print position to next tab mark in the current line.

[Notes] Tab marks exist by default at every eight character columns. Default tab mark positions can be modified by the ESC D command.

ESC D n_1 ... n_k NUL

[Function] Set horizontal tab marks.

[Format]

ASCII	ESC D n_1 ... n_k NUL
Hexadecimal	1B 44 n_1 ... n_k 00
Decimal	27 68 n_1 ... n_k 0

[Range] $1 \leq n \leq 255$
$0 \leq k \leq 32$

[Default] The default tab marks are at intervals of 8 characters (columns 9, 17, 25, ...) for font 12x24.

[Description] Set horizontal tab marks.

- n specifies the column number for setting a horizontal tab position from the beginning of the line.
- k indicates the total number of horizontal tab positions to be set.

[Notes]

- The horizontal tab mark is stored as a value of [character width × n], measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- This command cancels previous horizontal tab settings.
- When setting n = 8, the print position is moved to column 9 by sending HT.
- Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Transmit $[n]_k$ in ascending order and place a NUL code 0 at the end.
- When $[n]_k$ is less than or equal to the preceding value $[n]_{k-1}$, tab setting is finished and the following data is processed as normal data.
- ESC D NUL cancels all horizontal tab marks.
- The previously specified horizontal tab marks do not change, even if character width changes.

ESC Q n

[Function]	Set right margin.	
[Format]	ASCII E	SC Q n
	Hexadecimal	1B 51 n
	Decimal	27 81 n
[Range]	0 ≤ n ≤ 255	
[Description]	Set right margin in number of characters, starting from default left margin.	
[Notes]	If requested right margin is on the left side of current horizontal position, the new margin will become valid only in the next line.	

ESC l n

[Function]	Set left margin.	
[Format]	ASCII	ESC l n
	Hexadecimal	1B 6C n
	Decimal	27 108 n
[Range]	0 ≤ n ≤ 255	
[Description]	Set left margin in number of characters, starting from the default left margin.	
[Notes]	If requested left margin is on the right side of current horizontal position, the new margin will become valid only in the next line.	

ESC a n

[Function]	Character alignment.	
[Format]	ASCII	ESC a n
	Hexadecimal	1B 61 n
	Decimal	27 97 n
[Range]	n = 0, 1, 2	
[Default]	n = 0	
[Description]	This command set horizontal alignment justification. If n is 0 (00h or 30h), alignment is set to left justified. If n is 1 (01h or 31h), alignment is set to center justified. If n is 2 (02h or 32h), alignment is set to right justified.	
[Notes]	After initialization the default alignment is left justified.	

ESC - n

[Function]	Enable/disable underline print mode.	
[Format]	ASCII	ESC - n
	Hexadecimal	1B 2D n
	Decimal	27 45 n
[Range]	n = 0, 1	
[Default]	n = 0	
[Description]	Enable or disable underline print mode. If n is 0 (00h or 30h), underline mode is disabled. If n is 1 (01h or 31h), underline mode is enabled.	
[Notes]	After processing this command, the printer will underline every character or space sent for printing.	

ESC 4

[Function]	Enable italic print mode.

[Format]	ASCII	ESC 4
	Hexadecimal	1B 34
	Decimal	27 52
[Description]	Enable italic print mode.	
[Notes]	Italic is available in all other print modes.	

ESC 5

[Function]	Disable italic print mode.	
[Format]	ASCII	ESC 5
	Hexadecimal	1B 35
	Decimal	27 53
[Description]	Disable italic print mode.	

ESC E

[Function]	Enable emphasized print mode.	
[Format]	ASCII	ESC E
	Hexadecimal	1B 45
	Decimal	27 69
[Description]	Enable emphasized print mode.	
[Notes]	Emphasized mode is bolder than normal print. Emphasized is available in all other print modes.	

ESC F

[Function]	Disable emphasized print mode.	
[Format]	ASCII	ESC F
	Hexadecimal	1B 46
	Decimal	27 70
[Description]	Disable emphasized print mode.	

ESC t n

[Function]	Codepage selection.	
[Format]	ASCII	ESC t n
	Hexadecimal	1B 74 n
	Decimal	27 116 n
[Range]	$2 \leq n \leq 12$; $n = 14$; $n = 21$	
[Default]	$n = 2$	
[Description]	This command selects the code page to be used, according to the following options.	
	If n is 2 (02h or 32h), CODEPAGE 850 is selected.	
	If n is 3 (03h or 33h), CODEPAGE 437 is selected.	
	If n is 4 (04h or 34h), CODEPAGE 860 is selected.	
	If n is 5 (05h or 35h), CODEPAGE 858 is selected.	
	If n is 6 (06h or 36h), CODEPAGE 866 is selected.	
	If n is 7 (07h or 37h), CODEPAGE 864 is selected.	
	If n is 8 (08h or 38h), UTF8 (Unicode) is selected.	
	If n is 9 (09h or 39h), Big-5E is selected.	
	If n is 10 (0Ah or 3Ah), JIS is selected.	
	If n is 11 (0Bh or 3Bh), SHIFT JIS is selected.	
	If n is 12 (0Ch or 3Ch), GB2312 is selected.	

If n is 14 (0Eh or 3Eh), EUC-CN is selected.
If n is 21 (15h or 45h), CODEPAGE 862 is selected.

[Notes] CODEPAGE 850 is the default.

ESC R n

[Function] Select an international character set.

[Format]

ASCII	ESC R n
Hexadecimal	1B 52 n
Decimal	27 82 n

[Range] $0 \leq n \leq 12$

[Default] $n = 12$

[Description] This command selects the code page to be used, according to the following options.

If n is 0, CODEPAGE 437 is selected.

If $1 \leq n \leq 11$, CODEPAGE 858 is selected.

If n is 12, CODEPAGE 850 is selected.

[Notes] CODEPAGE 850 is the default. This command is similar to ESC t n. The last command received is effective.

ESC S n

[Function] Enable superscript and/or subscript print mode.

[Format]

ASCII	ESC S n
Hexadecimal	1B 53 n
Decimal	27 83 n

[Range] $n = 0, 1$

[Description] Enable superscript or subscript character mode.
If n is 0 (00h or 30h), the superscript is enabled. The next arriving characters will be printed on the upper side of the print line.
If n is 1 (01h or 31h), the subscript is enabled. The next arriving characters will be printed on the bottom side of the print line.

ESC T

[Function] Disable superscript and subscript print modes.

[Format]

ASCII	ESC T
Hexadecimal	1B 54
Decimal	27 84

[Description] Disable both superscript and subscript print modes.

ESC N n

[Function] Select printing intensity.

[Format]

ASCII	ESC N n
Hexadecimal	1B 4E n
Decimal	27 78 n

[Range] $0 \leq n \leq 4$

[Description] Obsolete. Kept here to maintain compatibility with earlier Bematech products.

ESC ! n

[Function] Select print mode.
[Format] ASCII ESC ! n
Hexadecimal 1B 21 n
Decimal 27 33 n
[Description] Selects the print mode depending on the value of n, as presented in the table below:

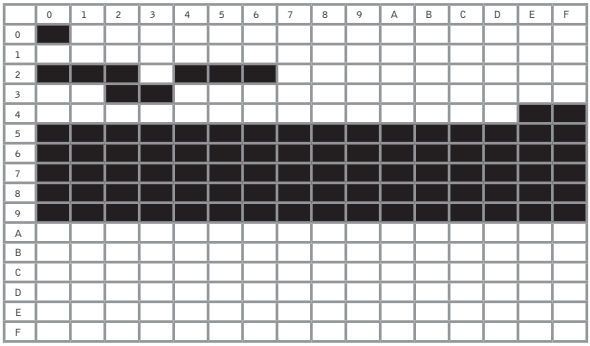
Bit	Function	Value	
		0	1
0	Undefined		
1	Undefined		
2	Undefined		
3	Emphasized	Clear	Set
4	Double height	Clear	Set
5	Double width	Clear	Set
6	Undefined		
7	Underline	Clear	Set

ESC } n

[Function] Turn upside-down printing mode on/off.
[Format] ASCII ESC } n
Hexadecimal 1B 7D n
Decimal 27 125 n
[Range] n = 0, 1
[Default] n = 0
[Description] Enable or disable upside-down printing mode, in the following conditions:
If n is 1 (01h or 31h), upside-down printing mode is enabled.
If n is 0 (00h or 30h), upside-down printing mode is disabled.

ESC Z

[Function] Print supported Unicode sets.
[Format] ASCII ESC Z
Hexadecimal 1B 5A
Decimal 27 90



ESC [n

[Function]	Print a specific Unicode set.	
[Format]	ASCII	ESC [n
	Hexadecimal	1B 5B n
	Decimal	27 91 n
[Range]	0 ≤ n ≤ 255	
[Description]	Print selected Unicode character set.	

DC2

[Function]	Disable condensed mode.	
[Format]	ASCII	DC2
	Hexadecimal	12
	Decimal	18
[Description]	Disable condensed mode, if previously set by ESC SI or SI command.	

DC4

[Function]	Disable on-line expanded print.	
[Format]	ASCII	DC4
	Hexadecimal	14
	Decimal	20
[Description]	Disable on-line expanded print, if previously set by ESC SO or SO command.	

ESC d n

[Function]	Enable/disable double height print mode.	
[Format]	ASCII	ESC d n
	Hexadecimal	1B 64 n
	Decimal	27 100 n
[Range]	n = 0, 1	
[Default]	n = 0	
[Description]	Enable or disable double height print mode, according to the following rules: If n is 0 (00h or 30h), double height is disabled. If n is 1 (01h or 31h), double height is enabled.	

ESC H

[Function]	Disable condensed mode.	
[Format]	ASCII	ESC H
	Hexadecimal	1B 48
	Decimal	27 72
[Description]	This command is the same as DC2 or ESC P.	

ESC P

[Function]	Disable condensed mode.	
[Format]	ASCII	ESC P
	Hexadecimal	1B 50
	Decimal	27 80
[Description]	This command is the same as DC2 or ESC H.	

ESC SI

[Function] Enable condensed mode.

[Format]

ASCII	ESC SI
Hexadecimal	1B 0F
Decimal	27 15

[Description] Turn on condensed mode.

ESC SO

[Function] Enable on-line expanded mode.

[Format]

ASCII	ESC SO
Hexadecimal	1B 0E
Decimal	27 14

[Description] If this command is received at the beginning of a line, expanded is valid for the whole line. Otherwise, condensed will be valid only for next incoming characters. In the next line the printer will return to normal mode.

ESC V

[Function] Enable on-line double height mode.

[Format]

ASCII	ESC V
Hexadecimal	1B 56
Decimal	27 86

[Description] If this command is received in the beginning of a line, double height is valid for the whole line. Otherwise, double height will be valid only for next incoming characters. In the next line the printer will return to normal mode.

ESC W n

[Function] Enable/disable expanded mode.

[Format]

ASCII	ESC W n
Hexadecimal	1B 57 n
Decimal	27 87 n

[Range] n = 0, 1

[Default] n = 0

[Description] Set expanded mode (double width).
If n is 0 (00h or 30h), expanded mode is disabled.
If n is 1 (01h or 31h), expanded mode is enabled.

[Note] This command can be sent to the printer at any time, and it will take effect immediately.

SI

[Function] Enable condensed mode.

[Format]

ASCII	SI
Hexadecimal	0F
Decimal	15

[Description] This command is the same as ESC SI.

SO

[Function] Enable on-line expanded mode.

[Format]

ASCII	SO
Hexadecimal	0E
Decimal	14

[Description] This command is the same as ESC SO.

ESC $ n_1 n_2

[Function] Fill in blank bit columns.

[Format]

ASCII	ESC $ n_1 n_2
Hexadecimal	1B 24 n_1 n_2
Decimal	27 36 n_1 n_2

[Description] This command fills in blank bit columns, from current column until column number (n_1+n_2*256), where n_1+n_2*256 should be less than or equal to N. 'N' is the printing width, depending on the print mode.

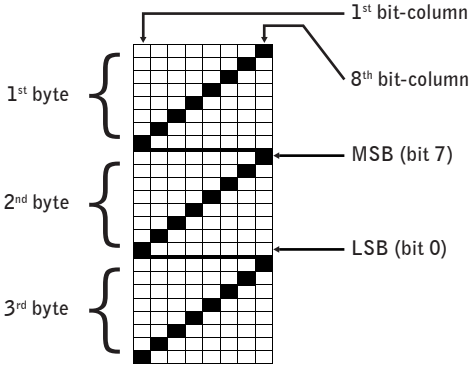
ESC * ! n_1 n_2 b_1 ... b_n

[Function] 24-bit graphics.

[Format]

ASCII	ESC * ! n_1 n_2 b_1 ... b_2
Hexadecimal	1B 2A 21 n_1 n_2 b_1 ... b_2
Decimal	27 42 33 n_1 n_2 b_1 ... b_2

[Description] This command downloads a 24-bit bit image with n_1+n_2*256 columns and b_1...b_n bytes to compose the image. Each column contains 3 bytes, as shown in the figure below.



This illustration shows a 24-bit graphic containing 8 bit-columns with 3 bytes height each (24 bits). It shows how bytes are interpreted by the printer when this command is used. A full print line with 'N' columns will need N*3 bytes. If the image to print has less than 'N' graphic columns, a LF command must be sent to perform line printing. Text and graphic may be mixed in the same line.

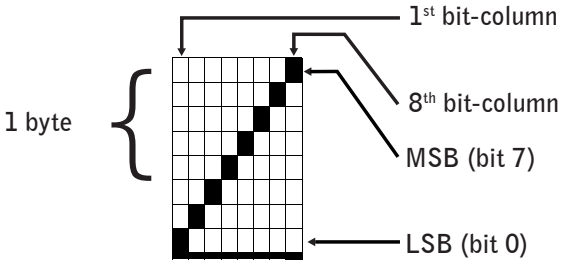
ESC K n_1 n_2 b_1 ... b_n

[Function] 8-bit graphics.

[Format]

ASCII	ESC K n_1 n_2 b_1 ... b_2
Hexadecimal	1B 4B n_1 n_2 b_1 ... b_2
Decimal	27 75 n_1 n_2 b_1 ... b_2

[Description] Select "8 pin" bit image (compatible with dot-matrix printers) where [n1+(n2*256)] is the number of columns, and each column is 1 byte in length. As to fill the line it is necessary to expand this single byte in 3 bytes, 8-bit images are always low resolution. The organization of an eight-bit image is presented in the figure below.



If the image to print has less than 'N' graphic columns, a LF must be sent to perform line printing. Text and graphic may be mixed in the same line.

FS p n m

[Function] Print non-volatile (NV) bit image.

[Format]

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

[Description] Print the n-th NV bit image using m print mode.

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

n is the NV bit image number, as defined by the FS q command.
m is bit image print mode.
This command has no effect when the n-th NV bit image is not defined.

FS q n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_n]1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_n]_n$

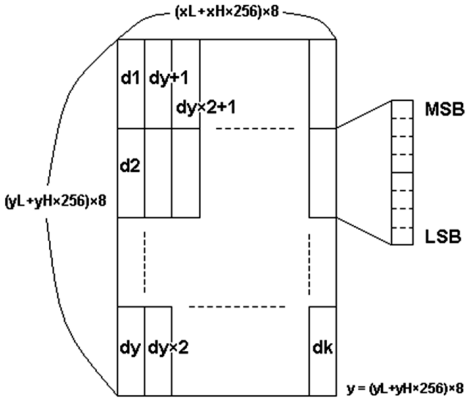
[Function] Define NV bit image.

[Format]

ASCII	FS q n $[x_L\ x_H\ y_L\ y_H$ d1 ... dn$]_1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_n]_n$
Hexadecimal	1C 71 n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots$ dn$]_1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_n]_n$
Decimal	28 112 n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots$ dn$]_1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_n]_n$

[Range]
$1 \le n \le 255$
$0 \le x_L \le 255$
$0 \le x_H \le 3$ (when $1 \le (x_L + x_H \times 256) \le 1023$)
$0 \le y_L \le 255$
$0 \le y_L \le 1$ (when $1 \le (yL + y_H \times 256) \le 288$)
$0 \le d \le 255$
$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256) \times 8$

[Description] Define n NV bit images to be stored on the non-volatile memory.
n specifies the number of NV bit images.
x_L, x_H specifies $(x_L + x_H \times 256) \times 8$ dots in the horizontal direction for the NV bit image.
y_L, y_H specifies $(y_L + y_H \times 256) \times 8$ dots in the vertical direction for the NV bit image.
This command erases all NV bit images defined previously and set new ones.



GS / m

[Function] Print downloaded bit image.

[Format]

ASCII	GS / m
Hexadecimal	1D 2F m
Decimal	29 47 m

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

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

m is bit image print mode.
This command has no effect when a downloaded bit image has not been defined.

GS * x y $d_1 \ldots d_{(x*y*8)}$

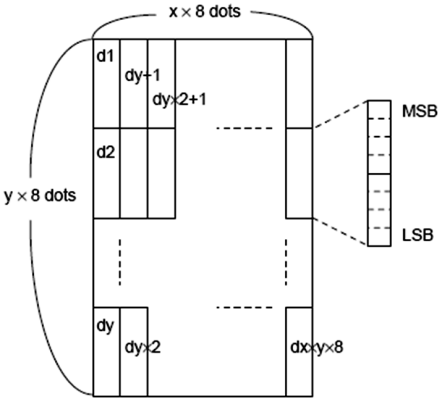
[Function] Define downloaded bit image.

[Format]

ASCII	GS * x y $d_1 \ldots d_{(x*y*8)}$
Hexadecimal	1D 2A x y $d_1 \ldots d_{(x*y*8)}$
Decimal	29 42 x y $d_1 \ldots d_{(x*y*8)}$

[Range] $1 \le x \le 255$
$1 \le y \le 64$
$0 \le d \le 255$

[Description] Defines a downloaded bit image using the specified number of dots.
(x × 8) defines the number of dots in the horizontal direction.
(y × 8) defines the number of dots in the vertical direction.
The downloaded bit image is cleared when ESC @ or FS q command is executed, when printer is restarted or when power supply is cycled.
The following picture shows the relationship between the downloaded bit image and print data:



GS v 0 m x_L x_H y_L y_H d_1 ... d_k

[Function] Print raster bitmap.

[Format]

ASCII	GS v 0 m x_L x_H y_L y_H d_1 ... d_k
Hexadecimal	1D 76 30 m x_L x_H y_L y_H d_1 ... d_k
Decimal	29 118 48 m x_L x_H y_L y_H d_1 ... d_k

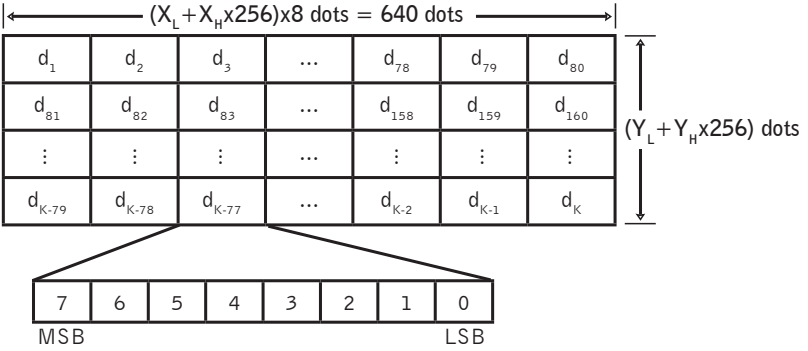
[Range] $0 \le m \le 3$ or $48 \le m \le 51$
$0 \le x_L \le 255$; $0 \le x_H \le 255$
$0 \le y_L \le 255$; $0 \le y_H \le 8$
$0 \le d \le 255$
$k = (x_L + x_H \times 256) \times (y_L + y_H \times 256)$ $(k \neq 0)$

[Description] Print raster bitmap using the mode defined by m:

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

x_L and x_H, define the number of bytes ($x_L + x_H \times 256$) in the horizontal direction for the bit image.
y_L and y_H define the number of bytes ($y_L + y_H \times 256$) in the vertical direction for the bit image.
Data outside printing area is discarded.
The position at which subsequent characters are printed for raster bit image is specified by HT, ESC $, ESC \ and GS L.
ESC a is affective on raster bit images.
d indicates bit-image data. Setting a bit to 1 prints a dot and clearing a bit does not print a dot

[Example] When printing 640 dots, $x_L + x_H \times 256$ must be 80, as illustrated on following figure:



ENQ

[Function] Printer status enquiry.
[Format] ASCII ENQ
Hexadecimal 05
Decimal 05
[Description] Issuing this command, the printer should return a status byte, as defined below:

Status bit number	Logic "0"	Logic "1"
0	Printer Off Line	Printer On Line
1	Paper Present	Paper Out
2*	Drawer pin low	Drawer pin high
2**	Paper Present	Paper Out
3	Print head raised	Print head down
4	Paper Full	Paper Near End
5	Command not executed	Command executed
6 – 7	Unused (always return "0")	

* Refer to drawer user's manual to know what this value mean.
** Drawer status or paper status on bit number 2 depends on ESC b.

GS F8h 1

[Function] Printer extended status enquiry.
[Format] ASCII GS F8h 1
Hexadecimal 1D F8 31
Decimal 29 248 49
[Description] Issuing this command makes the printer to return five status bytes.
The first byte is the printer status:

7	6 – 5	4	3	2	1	0
1	BufStat	Wait	Offline	OVR	0	0

Bit 2: OVR (Overrun Error)
0 – Printer is ready to receive data.

1 – Printer is in overrun condition. If more data is received, it will be lost.

Bit 3: Offline.
0 – Printer is on-line.
1 – Printer is off-line.

Bit 4: Wait.
0 – Printer is printing (busy condition).
1 – Printer buffer is empty, waiting for more data or commands.

Bit 6 & 5: BufStat - Buffer status.
00 – Printer buffer empty.
01 – Printer buffer is under 1/3 of its capacity.
10 – Printer buffer is above 1/3 of its capacity.
11 – Printer buffer is beyond ¾ of its capacity.

The second byte is the off-line status:

7	6	5	4	3	2	1	0
Cover	Error	NoPaper	Drawer	0	PS	PNES	1

Bit 1: PNES – Paper Near-end Sensor
0 – Paper is not near the end of roll.
1 – Paper is near the end of roll.
Bit 2: PS – Paper sensor
0 – Printer has paper.
1 – Printer has no paper at all.

Bit 4: Drawer
0 – Drawer sensor is in low level (logical 0).
1 – Drawer sensor is in high level (logical 1).

Bit 5: NoPaper
0 – Printer has paper.
1 – Printer has no paper at all.
Bit 6: Error
0 – No error condition exist in the printer.
1 – At least one error condition is being reported by the printer.

Bit 7: Cover
0 – Printer cover is opened.
1 – Printer cover is closed.

The third byte is printer error status:

7	6	5	4	3	2	1	0
1	RE	NRE	1	CE	CA	0	0

Bit 2: CA – Cutter Absence
0 – Cutter present.
1 – Cutter absent.

Bit 3: CE – Cutter Error
0 – No error condition detected in the cutter.
1 – Cutter error condition detected.
Bit 5: NRE – Non-recoverable Error
0 – NRE condition not detected.
1 – NRE condition detected.

Bit 6: RE – Recoverable Error
0 – RE condition not present.
1 – RE condition present.

The fourth byte is printer head and command set status:

7	6	5	4	3	2	1	0
1	CMD	0	1	0	HOH	0	1

Bit 2: HOH – Head Overheat
0 – Print head has normal temperature.
1 – Print head is overheated.

Bit 6: CMD – Current command set
0 – ESC/Bema command set
1 – ESC/POS command set

The fifth byte is firmware version and revision:

7	6 – 4	3 – 0
0	Firmware version	Firmware revision

[Notes] This command does not work in a parallel printer using Compatibility Mode.

ETX

[Function] End buffer.
[Format] ASCII ETX
Hexadecimal 03
Decimal 3
[Description] The printer will remain in the BUSY state from the moment it receives this command until the print buffer becomes empty. On serial interfaces DTR (RTS) will also remain deactivated while printing is on going.

STX

[Function] Clear buffer.
[Format] ASCII STX
Hexadecimal 02
Decimal 2
[Description] This command clears the print buffer without restoring default printer conditions.

CAN

[Function] Cancel last line.
[Format] ASCII CAN
Hexadecimal 18
Decimal 24
[Description] This command clears the last line sent to the printer. If data is already dispatched to print head, no action is taken.

DEL

[Function]	Cancel last character.	
[Format]	ASCII	DEL
	Hexadecimal	7F
	Decimal	127
[Description]	This command clears the last character sent to the printer. If the last character has been already dispatched to print head, no action is taken.	

GS h n

[Function]	Set barcode height.	
[Format]	ASCII	GS h n
	Hexadecimal	1D 68 n
	Decimal	29 104 n
[Range]	$1 \leq n \leq 255$	
[Default]	$n = 162$	
[Description]	Barcode height is set to n x 0.125 mm.	

GS w n

[Function]	Set barcode width.	
[Format]	ASCII	GS w n
	Hexadecimal	1D 77 n
	Decimal	29 119 n
[Range]	$2 \leq n \leq 4$	
[Default]	$n = 3$	
[Description]	This command changes barcode width.	
	$n = 2$ means normal width.	
	$n = 3$ means double width.	
	$n = 4$ means quadruple width.	

GS H n

[Function]	Choose the position of human readable information (HRI) in the barcode.	
[Format]	ASCII	GS H n
	Hexadecimal	1D 48 n
	Decimal	29 72 n
[Range]	$0 \leq n \leq 3$	
[Default]	$n = 1$	
[Description]	$n = 0$ means no HRI.	
	$n = 1$ means HRI on top of barcode.	
	$n = 2$ means HRI on bottom of barcode.	
	$n = 3$ means HRI on both top and bottom of barcode.	

GS f n

[Function]	Set the font to be used for human readable information (HRI).	
[Format]	ASCII	GS f n
	Hexadecimal	1D 66 n
	Decimal	29 102 n
[Range]	n = 0, 1, 48 or 49	
[Default]	$n = 0$	
[Description]	$n = 0$ or $n = 48$ selects the normal font.	
	$n = 1$ or $n = 49$ selects the condensed font.	

GS k NUL d_1 ... d_{11} NUL

[Function] Print an UPC-A barcode.

[Format]

ASCII	GS k NUL d_1 ... d_{11} NUL
Hexadecimal	1D 6B 00 d_1 ... d_{11} 00
Decimal	29 107 0 d_1 ... d_{11} 0

[Range] $48 \leq dn \leq 57$

[Description] d1...d11 is a sequence of 11 bytes containing barcode information. The checksum digit is added automatically by the printer.

GS k A VT d_1 ... d_{11}

[Function] Print an UPC-A barcode.

[Format]

ASCII	GS k A VT d_1 ... d_{11}
Hexadecimal	1D 6B 41 0B d_1 ... d_{11}
Decimal	29 107 65 11 d_1 ... d_{11}

[Range] $48 \leq d_n \leq 57$

[Description] This command is a copy of GS k NUL d1...d11 NUL.

GS k SOH d_1 ... d_6 NUL

[Function] Print an UPC-E barcode.

[Format]

ASCII	GS k SOH d_1 ... d_6 NUL
Hexadecimal	1D 6B 01 d1 ... d6 00
Decimal	29 107 1 d1 ... d6 0

[Range] $48 \leq d_n \leq 57$

[Description] d_1...d_6 is a sequence of 6 bytes containing barcode information. The checksum digit is added automatically by the printer.

GS k B ACK d_1 ... d_6

[Function] Print an UPC-E barcode.

[Format]

ASCII	GS k B ACK d_1 ... d_6
Hexadecimal	1D 6B 42 06 d_1 ... d_6
Decimal	29 107 66 6 d_1 ... d_6

[Range] $48 \leq d_n \leq 57$

[Description] This command is a copy of GS k SOH d1...d6 NUL.

GS k STX d_1 ... d_{12} NUL

[Function] Print an EAN-13 barcode.

[Format]

ASCII	GS k STX d_1 ... d_{12} NUL
Hexadecimal	1D 6B 02 d_1 ... d_{12} 00
Decimal	29 107 2 d_1 ... d_{12} 0

[Range] $48 \leq d_n \leq 57$

[Description] d_1...d_{12} is a sequence of 12 bytes containing barcode information. Printer generates the 13th digit automatically.

GS k C FF d_1 ... d_{12}

[Function] Print an EAN-13 barcode.

[Format]

ASCII	GS k C FF d_1 ... d_{12}
Hexadecimal	1D 6B 43 0C d_1 ... d_{12}
Decimal	29 107 67 12 d_1 ... d_{12}

[Range] 48 ≤ dn ≤ 57
[Description] This command is a copy of GS k STX d_1...d_{12} NUL.

GS k ETX d_1 ... d_7 NUL

[Function] Print an EAN-8 barcode.
[Format] ASCII GS k ETX d_1 ... d_7 NUL
Hexadecimal 1D 6B 03 d_1 ... d_7 00
Decimal 29 107 3 d_1 ... d_7 0
[Range] 48 ≤ dn ≤ 57
[Description] d_1...d_7 is a sequence of 7 bytes containing barcode information. Printer generates the 8th digit automatically.

GS k D BEL d_1 ... d_7

[Function] Print an EAN-8 barcode.
[Format] ASCII GS k D BEL d_1 ... d_7
Hexadecimal 1D 6B 44 07 d_1 ... d_7
Decimal 29 107 68 7 d_1 ... d_7
[Range] 48 ≤ d_n ≤ 57
[Description] This command is a copy of GS k ETX d_1...d_7 NUL.

GS k EOT d_1 ... d_n NUL

[Function] Print a CODE 39 barcode.
[Format] ASCII GS k EOT d_1 ... d_n NUL
Hexadecimal 1D 6B 04 d_1 ... d_n 00
Decimal 29 107 4 d_1 ... d_n 0
[Range] d may be 32, 36, 37, 42, 43, 45-57 and 65-90 (uppercase letters).
[Description] d_1...d_n is a sequence of n bytes containing barcode information. The checksum digit is generated automatically by the printer. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k E n d_1 ... d_n

[Function] Print a CODE 39 barcode.
[Format] ASCII GS k E n d_1 ... d_n
Hexadecimal 1D 6B 45 n d_1 ... d_n
Decimal 29 107 69 n d_1 ... d_n
[Description] This command is a copy of GS k EOT d_1...d_n NUL.

GS k ENQ d_1 ... d_n NUL

[Function] Print an ITF barcode.
[Format] ASCII GS k ENQ d_1 ... d_n NUL
Hexadecimal 1D 6B 05 d_1 ... d_n 00
Decimal 29 107 5 d_1 ... d_n 0
[Range] 48 ≤ d_n ≤ 57
[Description] d_1...d_n is a sequence of n bytes containing barcode information. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k F n d_1 ... d_n

[Function] Print an ITF barcode.

[Format]

ASCII	GS k F n d_1 ... d_n
Hexadecimal	1D 6B 46 n d_1 ... d_n
Decimal	29 107 70 n d_1 ... d_n

[Range] 48 ≤ dn ≤ 57

[Description] This command is a copy of GS k ENQ d_1...d_n NUL.

GS k ACK d_1 ... d_n NUL

[Function] Print a CODABAR barcode.

[Format]

ASCII	GS k ACK d_1 ... d_n NUL
Hexadecimal	1D 6B 06 d_1 ... d_n 00
Decimal	29 107 6 d_1 ... d_n 0

[Range] d may be 36, 43, 45-57 and 65-68 (uppercase letters) or 97-100 (lowercase letters). Uppercase and lowercase letters cannot be combined in the same barcode.

[Description] d_1...d_n is a sequence of n bytes containing barcode information. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n). If d1 is a letter, the last character (dn) must be a letter too.

GS k G n d_1 ... d_n

[Function] Print a CODABAR barcode.

[Format]

ASCII	GS k G n d_1 ... d_n
Hexadecimal	1D 6B 47 n d_1 ... d_n
Decimal	29 107 71 n d_1 ... d_n

[Description] This command is a copy of GS k ACK d_1...d_n NUL.

GS k H n d_1 ... d_n

[Function] Print a CODE 93 barcode.

[Format]

ASCII	GS k H n d_1 ... d_n
Hexadecimal	1D 6B 48 n d_1 ... d_n
Decimal	29 107 72 n d_1 ... d_n

[Range] 0 ≤ d_n ≤ 127

[Description] d_1...d_n is a sequence of n bytes containing barcode information. The checksum digit is generated automatically by the printer. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k I n d_1 ... d_n

[Function] Print a CODE 128 barcode.

[Format]

ASCII	GS k I n d_1 ... d_n
Hexadecimal	1D 6B 49 n d_1 ... d_n
Decimal	29 107 73 n d_1 ... d_n

[Range] 0 ≤ d_n ≤ 127

[Description] d_1...d_n is a sequence of n bytes containing barcode information. The checksum digit is generated automatically by the printer. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k 80h n_1 n_2 n_3 n_4 n_5 n_6 d_1 ... d_n

[Function] Print a PDF-417 barcode.

[Format]

ASCII	GS k 80h n_1 n_2 n_3 n_4 n_5 n_6 d_1 ... d_n
Hexadecimal	1D 6B 80 n_1 n_2 n_3 n_4 n_5 n_6 d_1 ... d_n
Decimal	29 107 128 n_1 n_2 n_3 n_4 n_5 n_6 d_1 ... d_n

[Range]
$0 \leq n_1 \leq 8$
$1 \leq n_2 \leq 8$
$1 \leq n_3 \leq 4$
$0 \leq n_4 \leq 255$

[Description]
n_1 is the ECC level.
n_2 is the pitch height, with height = n_2 x 0.125mm.
n_3 is the pitch width, with width = n_3 x 0.125mm.
n_4 is the number of codewords per row – if n_4 is 0, the maximum number of columns allowed for the pitch width will be used. If the barcode can't fit the print width the printer automatically adjusts it for the maximum permitted width.
n_5 and n_6 indicate the number of bytes that will be coded, where
total = n_5 + n_6 x 256, and total must be less than 900.
d_1...d_n is the actual sequence of bytes that will be coded.

GS k NAK d_1 ... d_9 NUL

[Function] Print an ISBN barcode.

[Format]

ASCII	GS k NAK d_1 ... d_9 NUL
Hexadecimal	1D 6B 15 d_1 ... d_9 00
Decimal	29 107 21 d_1 ... d_9 0

[Range] d may be 45, 48-57 and 88. Uppercase and lowercase letters cannot be combined in the same barcode.

[Description] d_1...d_9 is the sequence of 9 bytes containing the barcode information. If hyphens are included in the information, as in the example below, they will not be computed as a d_n byte. After the ninth valid digit, an hyphen can be added followed by an "X" (58h) or any other digit (30h to 39h). In this case there are two options:
- Send the 00h and the barcode will be printed, or
- Send space (20h) and more 5 digits (30h to 39h)

Example:
1-56592-292-X 90000
1-56592-292-1 90000
1-56592-292-X
1-56592-292-1

GS k SYN d_1 ... d_n NUL

[Function] Print a MSI barcode.

[Format]

ASCII	GS k SYN d_1 ... d_n NUL
Hexadecimal	1D 6B 16 d_1 ... d_n 00
Decimal	29 107 22 d_1 ... d_n 0

[Range] $48 \leq d_n \leq 57$

[Description] d_1...d_n is a sequence of n bytes containing barcode information. The checksum digit is generated automatically by the printer. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k 82h n d_1 ... d_n

[Function] Print a MSI barcode.

[Format]

ASCII	GS k 82h n d_1 ... d_n
Hexadecimal	1D 6B 82 n d_1 ... d_n
Decimal	29 107 130 n d_1 ... d_n

[Description] This command is a copy of GS k SYN d_1...d_n NUL.

GS k ETB d_1 ... d_n NUL

[Function] Print a PLESSEY barcode.

[Format]

ASCII	GS k ETB d_1 ... d_n NUL
Hexadecimal	1D 6B 17 d_1 ... d_n 00
Decimal	29 107 23 d_1 ... d_n 0

[Range] d may be 48-57 plus 65-70 (uppercase letters) or 97-102 (lowercase letters). Uppercase and lowercase letters cannot be combined in the same barcode.

[Description] d_1...d_n is a sequence of n bytes containing barcode information. The checksum digit is generated automatically by the printer. The number of barcode digits is limited by the physical print width, as well as the programmed barcode width (GS w n).

GS k 83h n d_1 ... d_n

[Function] Print a PLESSEY barcode.

[Format]

ASCII	GS k 83h n d_1 ... d_n
Hexadecimal	1D 6B 83 n d_1 ... d_n
Decimal	29 107 131 n d_1 ... d_n

[Description] This command is a copy of GS k ETB d_1...d_n NUL.

GS k 84h n_1 n_2

[Function] Program barcode left margin.

[Format]

ASCII	GS k 84h n_1 n_2
Hexadecimal	1D 6B 84 n_1 n_2
Decimal	29 107 132 n_1 n_2

[Description] Set a left margin for printing barcodes. The margin position is given by [$n_1 + n_2$ x 256].

Chapter 4

ESC/POS® Command Set

This chapter presents detailed information about each ESC/POS® command implemented by the MP-4200 TH printer.

Some terms used in the description of ESC/POS command set need further explanation, as described below.

- Print buffer: a buffer that stores the image data to be printed.
- Print buffer full: the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the LF operation.
- Start of line: a state that satisfies the following conditions:
  - Print buffer is empty.
  - There is no data to print (including portions of data skipped due to HT).
  - The print position has not been specified by the ESC $ or ESC \ command.
- Printable area: the maximum space available for printing. The printable area under ESC/POS for MP-4200 TH is specified by horizontal direction (73.6mm {588/203"}).
- Printing area: a value set by the command. It must be always less than or equal to printable area.
- Ignore: a state in which all codes, including parameters, are read in and discarded, and nothing happens.
- MSB: Most Significant Bit
- LSB: Least Significant Bit

HT

[Function]	Horizontal tab.	
[Format]	ASCII	HT
	Hexadecimal	09
	Decimal 9	
[Description]	Move print position to the next horizontal tab mark.	
[Details]	• This command is ignored if next horizontal tab mark has not been set. • Horizontal tab marks are set with ESC D. • If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.	
[Reference]	ESC D	

LF

[Function]	Print and line feed.	
[Format]	ASCII	LF
	Hexadecimal	0A
	Decimal	10
[Description]	Print data in the print buffer, if any, and feed one line based on current line spacing.	
[Details]	This command set print position to the beginning of the next line.	
[Reference]	ESC 2, ESC 3	

CR

[Function] Print and carriage return.

[Format]

ASCII	CR
Hexadecimal	0D
Decimal	13

[Description] When automatic line feed is enabled, this command functions the same as LF; when automatic line feed is disabled this command is ignored.

[Details]
- Set print position to the beginning of the line.
- Automatic line feed is ignored with a serial interface model.

[Reference] LF

DLE EOT n

[Function] Real-time status transmission.

[Format]

ASCII	DLE EOT n
Hexadecimal	10 04 n
Decimal	16 4 n

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

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

n = 1: Transmit printer status
n = 2: Transmit offline status
n = 3: Transmit error status
n = 4: Transmit paper roll sensor status

[Details]
- The printer transmits current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command cannot be executed when the printer is busy. This command is executed even when printer is offline.
- When Auto Status Back (ASB) is enabled using the GS a command, the status transmitted by the DLE EOT command and the ASB status must be differentiated.
- Even though the printer is not selected using ESC = (select peripheral device), this command is effective.

[Notes]
- This command should not be used within a data sequence of another command that consists of 2 or more bytes.

n = 1: Printer status

Bit	On/Off	Hex	Dec	Function
0	Off	00	0	Not used. Fixed to off.
1	On	02	2	Not used. Fixed to on.
2	Off	00	0	Drawer open/close signal is LOW (connector pin 3).
	On	04	4	Drawer open/close signal is HIGH (connector pin 3).
3	Off	00	0	Printer online.
	On	08	8	Printer offline.
4	On	10	16	Not used. Fixed to on.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to off.

n = 2: Offline status

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

Bit 5: Becomes on when paper end sensor detects paper end.
n = 3: Error status

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

Bit 3: If these errors occur due to paper jam, it is possible to recover it by opening cover and closing it again. If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.
Bit 6: Becomes on when printing is stopped due to high print head temperature, the printer remains stopped until the print head temperature drops sufficiently or when the paper roll cover is open during printing.

n = 4: Continuous paper sensor status

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

[References] DLE ENQ, GS a, GS r

DLE ENQ n

[Function] Real-time request to printer.

[Format]
ASCII	DLE ENQ n
Hexadecimal	10 05 n
Decimal	16 5 n

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

[Description] Responds to a request from the host computer.
n = 1: Recover from an error and restart printing from the line where the error occurred.
n = 2: Recover from an error after clearing receive and print buffers.

[Notes] Do nothing command. Implemented to adhere to ESC/POS. Auto-cutter error recovery is performed by opening the cover and closing it again.

DLE DC4 f_n m t (f_n = 1)

[Function] Generate pulse at real-time.

[Format]
ASCII	DLE DC4 f_n m t
Hexadecimal	10 14 f_n m t
Decimal	16 20 f_n m t

[Range] $fn = 1$
m = 0, 1
$1 \leq t \leq 8$

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

m	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

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

[Details]
- When the printer is in an error status, this command is ignored.
- This command is ignored when an ESC p or a DLE DC4 is being executed in the same output pin.

- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline.
- This command is effective even when the printer is disabled with ESC = (Select peripheral device).

[Notes] • This can be enabled or disabled by GS (D command.

[Reference] ESC p, GS (D

DLE DC4 f_n a b (f_n = 2)

[Function] Execute power-off sequence.

[Format]

ASCII	DLE DC4 f_n m t
Hexadecimal	10 14 f_n m t
Decimal	16 20 f_n m t

[Visibility] Public

[Range] $fn = 2$
a = 1
b = 8

[Details] • Do nothing command. Implemented to adhere to ESC/POS.

DLE DC4 f_n d_1 ... d_7 (f_n = 8)

[Function] Clear buffer.

[Format]

ASCII	DLE DC4 f_n d_1 ... d_7
Hexadecimal	10 14 f_n d_1 ... d_7
Decimal	16 20 f_n d_1 ... d_7

[Range] $fn = 8$
$d_1 = 1$; $d_2 = 3$; $d_3 = 20$; $d_4 = 1$; $d_5 = 6$; $d_6 = 2$; $d_7 = 8$

[Details] • Do nothing command. Implemented to adhere to ESC/POS.

ESC SP n

[Function] Set right-side character spacing.

[Format]

ASCII	ESC SP n
Hexadecimal	1B 20 n
Decimal	27 32 n

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

[Default] n = 0

[Description] Set character spacing for the right side of a character to [n × horizontal motion unit].

[Details]
- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.
- This command does not affect the setting of ideograms.
- The horizontal motion unit can be specified by GS P. Changing horizontal motion unit does not affect the current right-side spacing.
- The GS P command can change horizontal and vertical motion units. However, the value cannot be less than minimum horizontal movement amount, and it must be in even units of minimum horizontal movement amount.
- The maximum right-side spacing is 31.91 mm {255/203"}. Any setting exceeding the maximum is converted to the maximum automatically.

[Reference] GS P

ESC ! n

[Function] Select print mode(s).

[Format]

ASCII	ESC ! n
Hexadecimal	1B 21 n
Decimal	27 33 n

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

[Default] $n = 0$

[Description] Select print mode(s) using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font C (14 × 24).
	On	01	1	Character font D (10.5 × 24).
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Details]

- When both double-height and double-width modes are selected, quadruple size characters are printed.
- The printer can underline all characters, but can not underline the space set by HT or 90° clockwise rotated characters.
- The thickness of the underline can be selected by ESC —, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- ESC E can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- ESC — can also turn on or off underline mode. However, the setting of the last received command is effective.
- GS ! can also select character size. However, the setting of the last received command is effective.
- Emphasized mode is effective for alphanumeric and ideograms. All print modes except emphasized mode is effective only for alphanumeric.

[References] ESC -, ESC E, GS !

ESC $ nL nH

[Function] Set absolute print position.

[Format]

ASCII	ESC $ nL nH
Hexadecimal	1B 24 nL nH
Decimal	27 36 nL nH

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

$0 \leq n_H \leq 255$

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

- The distance from the beginning of the line to the print position is ($n_L + n_H \times 256$).

[Details]
- Setting a value outside printable area is ignored.
- The horizontal motion unit is specified by GS P.
- The GS P command can change horizontal motion unit. However, the value cannot be less than minimum horizontal movement amount, and it must be in even units of minimum horizontal movement amount.

[References] ESC \, GS P

ESC (A ENQ NUL a d c t_1 t_2

[Function] Activate/deactivate buzzer.

[Format]

ASCII	ESC (A ENQ NUL a d c t_1 t_2
Hexadecimal	1B 28 41 05 00 61 64 c t_1 t_2
Decimal	27 40 65 5 0 97 100 c t_1 t_2

[Range] $0 \le c \le 63$; $0 \le t_1 \le 255$; $0 \le t_2 \le 255$

[Description] Activates the integrated buzzer.
- c specifies the number of beeping cycles.
- t_1 specifies buzzer on time ($t_1 \times 100$ ms) for each cycle.
- t_2 specifies buzzer off time ($t_2 \times 100$ ms) for each cycle.

ESC * m n_L n_H d_1 ... d_k

[Function] Select bit-image mode.

[Format]

ASCII	ESC * m n_L n_H d_1 ... d_k
Hexadecimal	1B 2A m n_L n_H d_1 ... d_k
Decimal	27 42 m nL n_H d_1 ... d_k

[Range] m = 0, 1 32, 33
$0 \le n_L \le 255$
$0 \le n_H \le 255$
$0 \le d \le 255$

[Description] Select bit-image mode using m for the number of dots specified by n_L and n_H, as follows:

m	Mode	Vertical Direction	Horizontal Direction		
		Dots	Dot Density	Dot Density	Data Count (K)
0	8-dot single-density	8	68 dpi	101 dpi	$n_L + n_H$ x256
1	8-dot double-density	8	68 dpi	203 dpi	$n_L + n_H$ x 256
32	24-dot single-density	24	203 dpi	101 dpi	($n_L + n_H$ x 256) x 3
33	24-dot double-density	24	203 dpi	203 dpi	($n_L + n_H$ x 256) x 3

[Details]
- If m is out of range, nL and the data following it are processed as normal data.
- (nL + nH × 256) indicate the number of bit image dots in the horizontal direction.
- If bit-image data input exceed the number of dots to be printed on a line, the excess data is ignored.
- d indicate bit-image data.
- If the width of the printing area set by GS L and GS W is less than the width required by the data sent with the ESC * command, the excess data will be performed on the line in question (but the printing cannot exceed the maximum printable area):
  - o The width of the printing area is extended to the right to accommodate the amount of data.
  - o If previous step does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.

ESC - n

[Function] Turn underline mode on/off.

[Format]

ASCII	ESC - n
Hexadecimal	1B 2D n
Decimal	27 45 n

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

[Default] $n = 0$

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

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

[Details]

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by HT.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using ESC !. Note, however, that the last received command is effective.
- This command does not affect ideogram printing.

[Reference] ESC !

ESC 2

[Function] Select default line spacing.

[Format]

ASCII	ESC 2
Hexadecimal	1B 32
Decimal	27 50

[Description] Select approximately 4.23 mm {1/6"} of line spacing.

[Reference] ESC 3

ESC = n

[Function] Select peripheral device.

[Format]

ASCII	ESC = n
Hexadecimal	1B 3D n
Decimal	27 61 n

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

[Default] $n = 1$

[Description] Select device to send data from the host computer, using n as follows:

Bit	On/Off	Hex	Decimal	Function
0	Off	00	0	Printer disabled.
	On	01	1	Printer enabled.
1-7	-	-	-	Undefined.

[Details] When printer is disabled, it ignores all data except those commands used for error-recovery commands (DLE EOT, DLE ENQ, DLE DC4).

ESC @

[Function] Initialize printer.

[Format]

ASCII	ESC @
Hexadecimal	1B 40
Decimal	27 64

[Description] Clear data in the print buffer and reset printer mode to that was in effect when power was turned on.

[Details]
- DIP switch settings are not checked again.
- Data in the receive buffer is not cleared.
- Macro definition is not cleared.
- NV bit image data is not cleared.
- Data on NV user memory is not cleared.

ESC D n_1 ... n_k NUL

[Function] Set horizontal tab marks.

[Format]

ASCII	ESC D n_1 ... n_k NUL
Hexadecimal	1B 44 n_1 ... n_k 00
Decimal	27 68 n_1 ... n_k 0

[Range] $1 \leq n \leq 255$
$0 \leq k \leq 32$

[Default] The default tab marks are at intervals of 8 characters (columns 9, 17, 25, ...) for font 14x24.

[Description] Set horizontal tab marks.
- n specifies the column number for setting a horizontal tab position from the beginning of the line.
- k indicates the total number of horizontal tab positions to be set.

[Details]
- The horizontal tab mark is stored as a value of [character width × n], measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- This command cancels previous horizontal tab settings.
- When setting n = 8, the print position is moved to column 9 by sending HT.
- Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Transmit [n]k in ascending order and place a NUL code 0 at the end.
- When [n]k is less than or equal to the preceding value [n]k-1, tab setting is finished and the following data is processed as normal data.
- ESC D NUL cancels all horizontal tab marks.
- The previously specified horizontal tab marks do not change, even if character width changes.

[Reference] HT

ESC E n

[Function] Turn emphasized mode on/off.

[Format]

ASCII	ESC E n
Hexadecimal	1B 45 n
Decimal	27 69 n

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

[Default] n = 0

[Description] Turn emphasized mode on or off.
- When the LSB of n is 0, emphasized mode is turned off.

- When the LSB of n is 1, emphasized mode is turned on.

[Details]
- Only the least significant bit of n is used.
- This command and ESC ! turn on and off emphasized mode in the same way.

[Reference] ESC !

ESC G n

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

[Format]

ASCII	ESC G n
Hexadecimal	1B 47 n
Decimal	27 71 n

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

[Default] $n = 0$

[Description] Turn double-strike mode on or off.

[Details]
- When the LSB of n is 0, double-strike mode is turned off.
- When the LSB of n is 1, double-strike mode is turned on.
- Only the least significant bit of n is used.
- Printer output is the same in double-strike mode and in emphasized mode.

[Reference] ESC E

ESC J n

[Function] Print and feed paper.

[Format]

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

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

[Default] $n = 0$

[Description] Print data in the print buffer and feed paper [n × vertical motion unit].

[Details]
- After printing, this command sets the print position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by ESC 2 or ESC 3.
- Vertical motion unit can be specified by GS P.
- The GS P command can change vertical motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be set in even units of minimum vertical movement amount.
- The maximum line spacing is 1016mm {40″}. When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Reference] GS P

ESC M n

[Function] Select character font.

[Format]

ASCII	ESC M n
Hexadecimal	1B 4D n
Decimal	27 77 n

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

[Description] Select a character font.

n	Function
0, 48	Character font C (14 x 24) selected.
1, 49	Character font D (10.5 x 24) selected.

[Details] ESC ! command can also select a character font. The setting of the last received command is effect.

[Reference] ESC !

ESC R n

[Function] Select an international character set.

[Format]

ASCII	ESC R n
Hexadecimal	1B 52 n
Decimal	27 82 n

[Range] $0 \leq n \leq 12$

[Default] $n \leq 0$

[Description] Selects an international character set n from the following table.

n	Character Set
0	U.S.A. (Codepage 437)
1 - 11	International (Codepage 858)
12	Latin America (Codepage 850)

ESC V n

[Function] Turn 90° clockwise rotation mode on/off.

[Format]

ASCII	ESC V n
Hexadecimal	1B 56 n
Decimal	27 86 n

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

[Default] n = 0

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

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

[Details]
- Even when underline mode is turned on, the printer does not underline characters 90° clockwise-rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double-width commands in normal mode.

[References] ESC !, ESC -

ESC \ nL nH

[Function] Set relative print position.

[Format]

ASCII	ESC \ n_L n_H
Hexadecimal	1B 5C n_L n_H
Decimal	27 92 n_L n_H

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

$0 \leq n_H \leq 255$

[Description] Sets the print starting position based on current position by using the horizontal motion unit.
- This command set the distance from the current position to [(nL + nH × 256) × horizontal motion unit].

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

$n_L + n_H \times 256 = N$
- When pitch N is specified to the left:

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

- The print starting position moves from current position to [N × horizontal motion unit].
- The horizontal motion unit can be specified by GS P.
- The GS P command can change the horizontal motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must set be in even units of the minimum horizontal movement amount.

[References] ESC $, GS P

ESC a n

[Function] Select justification.

[Format]

ASCII	ESC a n
Hexadecimal	1B 61 n
Decimal	27 97 n

[Range] $0 \le n \le 2$; $48 \le n \le 50$

[Default] n = 0

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

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

[Details]
- The command is enabled only when processed at the beginning of a line.
- This command executes justification in the printing area.
- This command justifies the space area according to HT, ESC $ or ESC \.

ESC c 3 n

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

[Format]

ASCII	ESC c 3 n
Hexadecimal	1B 63 33 n
Decimal	27 99 51 n

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

[Default] n = 15

[Description] Selects the paper sensor(s) to output paper end signals, using each bit of n as follows:

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

[Details]
- It is possible to select multiple sensors to output signal. Then, if any of the sensors detects a paper end, the paper end signal is output.
- The command is available only with a parallel interface printer, and it is ignored with other

interfaces.

- Sensor is switched during command execution. The paper end signal switching may be delayed depending on the receive buffer state.
- If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals.
- If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.
- When both sensors are disabled, the paper end signal always outputs a paper present status.

ESC c 4 n

[Function] Select paper sensor(s) to stop printing.

[Format]

ASCII	ESC c 4 n
Hexadecimal	1B 63 34 n
Decimal	27 99 52 n

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

[Default] $n = 0$

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

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

[Details]

- When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.
- When a paper-end is detected by the sensor, the printer goes offline and stops printing.
- When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

ESC c 5 n

[Function] Enable/disable panel buttons.

[Format]

ASCII	ESC c 5 n
Hexadecimal	1B 63 35 n
Decimal	27 99 53 n

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

[Default] $n = 0$

[Description] Enable or disable panel buttons.

- When the LSB of n is 0, panel buttons are enabled.
- When the LSB of n is 1, panel buttons are disabled.

[Details]

- Only the least significant bit of n is used.
- When panel buttons are disabled, none of them are usable when the printer cover is closed.
- The panel buttons are FEED and CUT.
- In the macro ready mode, the FEED button is enabled regardless of the settings of this command; however, the paper cannot be fed by using this button.

ESC d n

[Function] Print and feed n lines.

[Format]

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

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

[Description] Print data available in the print buffer and feed n lines.

[Details]

- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by ESC 2 or ESC 3.
- The maximum paper feed amount is 1016 mm {40″}. If the paper feed amount (n × line spacing) of more than 1016 mm {40″} is specified, the printer feeds the paper only 1016 mm {40″}.

[References] ESC 2, ESC 3

ESC i

[Function] Perform partial paper cut.

[Format]

ASCII	ESC i
Hexadecimal	1B 69
Decimal	27 105

[Description] Performs a partial cut of the roll paper.

ESC m

[Function] Perform partial paper cut.

[Format]

ASCII	ESC m
Hexadecimal	1B 6D
Decimal	27 109

[Description] This command operates the auto-cutter, performing a partial cut in the paper.

ESC p m t_1 t_2

[Function] Generate pulse.

[Format]

ASCII	ESC p m t_1 t_2
Hexadecimal	1B 70 m t_1 t_2
Decimal	27 112 m t_1 t_2

[Range] m = 0, 1, 48, 49
$0 \leq t_1 \leq 255$
$0 \leq t_2 \leq 255$

[Description] Outputs the pulse specified by t_1 and t_2 to connector pin m as follows:

m	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

[Details]
- The pulse ON time is [$t_1 \times 2$ ms] and the OFF time is [t2 $\times$ 2 ms].
- If $t_2 < t_1$, the OFF time is [$t_1 \times 2$ ms]

[Reference] DLE DC4

ESC t n

[Function] Select character code table.

[Format]

ASCII	ESC t n
Hexadecimal	1B 74 n
Decimal	27 116 n

[Range] n = 0, 2, 3, 17, 19, 22

[Default] n = 2

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

n	Connector pin
0	PC437 [U.S.A. and Standard Europe]
2	PC850 [Multilingual]
3	PC860 [Portuguese]
17	PC866 [Cyrillic]
19	PC858 [Multilingual with Euro symbol]
22	PC864 [Arabic]

ESC u n

[Function] Transmit peripheral device status

[Format]

ASCII	ESC u n
Hexadecimal	1B 75 n
Decimal	27 117 n

[Range] n = 0, 48

[Description] Transmits the peripheral device status as 1 byte of data.
- The peripheral device status to be transmitted is as follows:

Bit	Bin	Hex	Dec	Status
0	0	00	0	Drawer kick-out connector pin 3 is LOW.
	1	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-	-	-	Undefined.
4	0	00	0	Not used. Fixed to Off.
5,6	-	-	-	Undefined.
7	0	00	0	Not used. Fixed to Off.

ESC v

[Function] Transmit paper sensor status

[Format]

ASCII	ESC v
Hexadecimal	1B 76
Decimal	27 118

[Description] Transmits the status of paper sensor(s) as 1 byte of data.

- The paper sensor status to be transmitted is as follows:

Bit	Bin	Hex	Dec	Status
0,1	00	00	0	Roll paper near-end sensor: paper adequate.
	11	03	3	Roll paper near-end sensor: paper near end.
2,3	00	00	0	Roll paper end sensor: paper present.
	11	0C	12	Roll paper end sensor: paper not present.
4	00	00	0	Not used. Fixed to Off.
5,6	-	-	-	Undefined.
7	0	00	0	Not used. Fixed to Off.

ESC { n

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

[Format]

ASCII	ESC { n
Hexadecimal	1B 7B n
Decimal	27 123 n

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

[Default] $n = 0$

[Description] Turn upside-down print mode on/off.

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

[Details]

- Only the least significant bit of n is valid.
- This command is enabled only when processed at the beginning of a line.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

FS p n m

[Function] Print NV bit image.

[Format]

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

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

[Description] Print n-th NV bit image using mode specified by m.

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

- n is the number of the NV bit image to print, as defined by FS q command.
- m specifies the bit image mode.

[Details]
- NV bit image means a bit image stored in NV memory by FS q.
- This command is not effective when the specified NV bit image has not been defined.
- This command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the printable area width set by GS L and GS W for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (m=0, 48) and in double-height mode (m=2, 50), and it means 2 dots in double-width mode (m=1, 49) and in quadruple mode (m=3, 51).
    - o The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
    - o If printing area width cannot be extended vertically by one line, the left margin is reduced to accommodate one line vertically.
- If downloaded bit-image exceeds one line, the excess data is not printed.
- This command feeds dots (for the height n of the NV bit-image) in normal and double-width modes, and (for the height n × 2 of the NV bit-image) in double-height and quadruple modes, regardless of the line spacing specified by ESC 2 or ESC 3.
- After printing the bit image, this command sets the print position to the beginning of the next line and processes the data that follows as normal data.

[References] ESC *, FS q, GS /, GS v 0

FS q n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]_n$

[Function] Define NV bit image.

[Format]

ASCII	FS q n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]_1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]_n$
Hexadecimal	1C 71 n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]_n$
Decimal	28 113 n $[x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]1 \ldots [x_L\ x_H\ y_L\ y_H\ d_1 \ldots d_k]_n$

[Range] $1 \le n \le 255$; $0 \le x_L \le 255$; $0 \le x_H \le 3$ (when $1 \le [x_L + x_H \ldots 256] \le 1023$)
$0 \le y_L \le 255$; $0 \le y_H \le 1$ (when $1 \le [y_L + y_H \times 256] \le 288$)
$k = [x_L + x_H \times 256] \times [x_L + x_H \times 256] \times 8$
Total defined data area = 2M bits (256K bytes)

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

- x_L, x_H specifies $(x_L + x_H \times 256) \times 8$ dots in the horizontal direction.
- y_L, y_H specifies $(x_L + x_H \times 256) \times 8$ dots in the vertical direction.

[Details]
- This command cancels all NV bit images that have already been defined.
- The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- NV bit image means a bit image which is defined in a non-volatile memory by FS q and printed by FS p.
- This command is effective only when processed at the beginning of the line.
- This command is effective when at least 7 bytes <FS~y_H> are processed with normal values.
- In the first group of NV bit images if x_L, x_H, y_L, y_H is out of range, this command is disabled.
- After processing the first bit image, if there are other images with x_L, x_H, y_L, y_H out of range, the printer stops processing this command and starts writing already received images to NV memory.
- The d is data to be printed.
- This command defines n as the number of a NV bit image. Numbers should rise in order, starting from 1. Therefore, the first data group [x_L x_H y_L y_H d_1...d_k] is NV bit image 1, and the last data group [x_L x_H y_L y_H d_1...d_k] is NV bit image n. The total number of bit images should agree with number of NV bit images specified by command FS p.
- A data definition in NV bit image consists of [x_L x_H y_L y_H d_1...d_k]. Therefore, when only one NV bit image is being defined (n=1) the printer processes a data group [x_L x_H y_L y_H d_1...d_k] once.
- When this command is received during macro definition, the printer ends macro definition, and begins executing this command.
- Once a NV bit image is defined, it is not erased by performing ESC @, reset, or power off.

[Reference] FS p

GS ! n

[Function] Select a character size.

[Format]

ASCII	GS ! n
Hexadecimal	1D 21 n
Decimal	29 33 n

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

[Default] $n = 0$

[Description] Select character height using bits 0 to 3 and selects character width using bits 4 to 7, as follows:

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

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

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

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

[Reference] ESC !

GS * x y d_1 ... $d_{(x \times y \times 8)}$

[Function] Define downloaded bit image.

[Format]

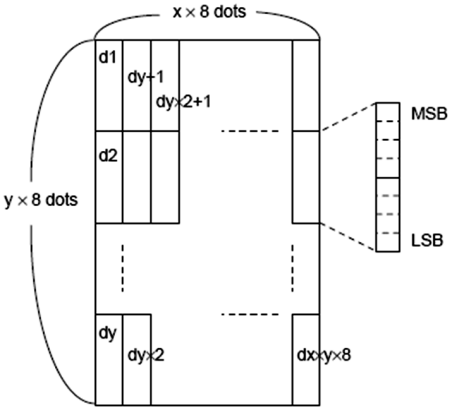
ASCII	GS * x y d_1 ... $d_{(x \times y \times 8)}$
Hexadecimal	1D 2A x y d_1 ... $d_{(x \times y \times 8)}$
Decimal	29 42 x y d_1 ... $d_{(x \times y \times 8)}$

[Range]
$1 \leq x \leq 255$
$1 \leq y \leq 48$
$x \times y \leq 1536$
$0 \leq d \leq 255$

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

[Details]
- The number of dots in the horizontal direction is $x \times 8$, and in the vertical direction is $y \times 8$.
- If $x \times y$ is out of range, this command is disabled.
- d indicates bit-image data. If a bit in data (d) is set, it will be printed, while if is cleared, the bit will not be printed.

- The downloaded bit image definition is cleared when:
  - o ESC @ is executed.
  - o FS q is executed.
  - o Printer is reset or the power is turned off.
- The following figure shows the relationship between downloaded bit image and print data:



Reference] GS /

GS / m

[Function] Print downloaded bit image.

[Format]

ASCII	GS / m
Hexadecimal	1D 2F m
Decimal	29 47 m

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

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

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

[Details]

- This command is ignored if a downloaded bit image has not been defined.
- This command is effective only when there is no data in the print buffer.
- This command has no effect in print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- If downloaded bit-image exceeds the printable area, the excess data is not printed.
- If the printing area width set by GS L and GS W is less than one line in vertical, the following processing is performed only on the line in question:
  - o The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.
  - o If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.

[Reference] GS *

GS (A pL pH n m

[Function] Execute test print.

[Format]

ASCII	GS (A p_L p_H n m
Hexadecimal	1D 28 41 p_L p_H n m
Decimal	29 40 65 p_L p_H n m

[Range] $(p_L+(p_H\times256)) = 2$ (p_L=2, p_H=0)
$0 \le n \le 2$, $48 \le n \le 50$
$1 \le m \le 3$, $49 \le m \le 51$

[Description]
- Executes a test print with a specified test pattern on a specified paper.
- pL and pH specifies the number of the parameter such as n, m to ($p_L + (p_H \times 256)$) bytes.

n specifies the paper to be tested.

n	Paper
0, 48	Paper roll.
1, 49	
2, 50	

m specifies a test pattern.

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

[Details]
- This command is enabled only when processed at the beginning of a line.
- When this command is received during macro definition, the printer ends macro definition and begins executing this command.
- After test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as user-defined characters, downloaded bit image, and macro, becomes undefined, the receive buffer and print buffer are cleared, and each setting returns to its default value.
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is being executed.

GS (D p_L p_H m [a_1 b_1] ... [a_k b_k]

[Function] Enable/disable real-time command.

[Format]

ASCII	GS (D p_L p_H m [a_1 b_1] ... [a_k b_k]
Hexadecimal	1D 28 44 p_L p_H m [a_1 b_1] ... [a_k b_k]
Decimal	29 40 68 pL pH m [a_1 b_1] ... [a_k b_k]

[Range] $(p_L + p_H\times256) = 3, 5$ (p_L=3, 5; p_H=0)
m = 20
a = 1, 2
b = 0, 1, 48, 49

[Default]

a	Real-time command type	Default
1	DLE DC4 f_n m t (f_n = 1): Generate pulse in real-time	Enabled (b = 1)
2	DLE DC4 f_n a b (f_n = 2): Execute power-off sequence	Disabled (b = 0)

[Description] Enable or disable real-time commands, as described below:

a	b	Function
1	0, 48	Disable DLE DC4 f_n m t (f_n = 1) processing.
	1, 49	Enable DLE DC4 f_n m t (f_n = 1) processing.
2	0, 48	Disable DLE DC4 f_n a b (f_n = 2) processing.
	1, 49	Enable DLE DC4 f_n a b (f_n = 2) processing

- p_L, p_H specifies ($p_L + p_H \times 256$) as the number of bytes after p_H (m and [a_1 b_1]...[a_k b_k]).
- a specifies the type of real-time command.
- b specifies when command is being enabled or disabled.

GS (L pL pH m fn [parameters]
GS 8 L p1 p2 p3 p4 m fn [parameters]

[Function] Process graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n [parameters]
Hexadecimal	1D 28 4C p_L p_H m f_n [parameters]
Decimal	29 40 76 p_L p_H m f_n [parameters]
ASCII	GS 8 L p1 p2 p3 p4 m fn [parameters]
Hexadecimal	1D 38 4C p1 p2 p3 p4 m fn [parameters]
Decimal	29 56 76 p1 p2 p3 p4 m fn [parameters]

[Range] fn = 0, 2, 3, 4, 48, 50, 51, 52, 64, 65, 66, 67, 69, 80, 81, 82, 83, 85 and 112.

[Description] Process graphics data according to function code fn:

f_n	Format	Function
0, 48	GS (L p_L p_H m f_n	Transmit NV graphics memory capacity.
2, 50	GS (L p_L p_H m f_n	Print graphics data in the print buffer.
3, 51	GS (L p_L p_H m f_n	Transmit the remaining capacity of NV graphics memory.
4, 52	GS (L p_L p_H m f_n	Transmit the remaining capacity of downloaded graphics memory.
64	GS (L p_L p_H m f_n d_1 d_2	Transmit the key code list for defined NV graphics.
65	GS (L p_L p_H m f_n d_1 d_2 d_3	Delete all NV graphics data.
66	GS (L p_L p_H m f_n kc_1 kc_2	Delete specified NV graphics data.
67	GS (L pL pH m fn a kc1 kc2 b x_L x_H y_L y_H [c d_1 ... dk]$_1$ ... [c d_1 ... d_k]$_b$	Define a raster NV graphics data.
69	GS (L p_L p_H m f_n kc_1 kc_2 x y	Print specified NV graphics data.
80	GS (L p_L p_H m f_n d_1 d_2	Transmit key code list for defined download graphics
81	GS (L p_L p_H m f_n d_1 d_2 d_3	Delete all downloaded graphics data.
82	GS (L p_L p_H m f_n kc_1 kc_2	Delete specified downloaded graphics data.
83	GS (L p_L p_H m f_n a kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]$_1$ ... [c d_1 ... d_k]$_b$	Define a raster downloaded graphics data.
85	GS (L p_L p_H m f_n kc_1 kc_2 x y	Print specified downloaded graphics data.
112	GS (L p_L p_H m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k	Store raster graphics data in the print buffer memory.

- p_L, p_H specifies ($p_L + p_H \times 256$) as the number of bytes after p_H (m, f_n and [parameters]).
- p_1, p_2, p_3, and p_4 specify ($p_1 + p_2 \times 256 + p_3 \times 65536 + p_4 \times 16777216$) as the number of bytes after p_4 (m, f_n, and [parameters]).

- [parameters] is described in each function.
- f_n defines the function code for the command.
- Function codes (f_n) are identical for both GS (L and GS 8 L commands. The only difference between them is the parameters (p_L, p_H, p_1, p_2, p_3, and p_4), used to specify the number of bytes after m. Because of that, GS (L can handle up to 65,535 bytes, while GS 8 L can handle up to 4,294,967,296 bytes.

[Notes]

- The graphic functionality provided by both GS (L and GS 8 L commands maintain upward compatibility with conventional NV graphics commands (FS p and FS q), downloaded graphics (GS * and GS /) and graphics (GS v 0).
- NV graphics (functions 48, 51, 64, 65, 66, 67 and 69) store data in NV memory.
- Downloaded graphics (functions 52, 80, 81, 82, 83 and 85) store data in volatile memory. This data is lost when command ESC @ is executed, the printer is reset or power is turned off.
- Graphics (functions 50 and 112) store data in the print buffer. Printing starts using function 50, which also clear the print buffer. Function 50 should be executed just after function 112.
- NV graphics and downloaded graphics data are managed using key codes, expressed as kc1 and kc2. The key codes have a 2-byte configuration and can be specified using the full range of character codes (32h to 7Eh).
- It is impossible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.
- It is impossible to create definitions for both downloaded graphics data (this command) and bit image data (GS *). Download bit image data definitions are deleted when this commands is used.
- Functions 64 and 80 require ESC/POS handshaking protocol, as described below:

Step	Host operation	Printer operation
1	This command sends function 64/80.	Function 64/80 is initiated.
2	Data is received from printer.	Key code list is sent.
3	Response code (*1) is sent.	Procedures (*2 and *3) are performed according to response code.

(*1) Response Code

ASCII	Hex	Dec	Request definition
ACK	60	6	Send next data group.
NAK	15	21	Resend just-received data group.
CAN	18	24	Cancel send operation.

(*2) Processing According to Response Code (When Send Data Remains (indicated by identification status of send data group))

ASCII	Description
ACK	Initiates operation to send next data.
NAK	Resends the just-received data.
CAN	Cancels processing initiated by this command.

(*3) Processing According to Response Code (When No More Send Data Remains (indicated by identification status of send data group))

ASCII	Description
ACK, CAN	Cancels procedure initiated by this command.
NAK	Resends the just-received data.

GS (L p_L p_H m f_n <f_n = 48>

[Function] Transmit NV graphics memory capacity.

[Format]

ASCII	GS (L p_L p_H m f_n
Hexadecimal	1D 28 4C p_L p_H m f_n
Decimal	29 40 76 p_L p_H m f_n

[Range] (p_L + p_H×256) = 2 (p_L=2; p_H=0)
m = 48
f_n = 0, 48

[Description] Transmits the entire capacity of the NV graphics area, in bytes, as described in the table below:

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	30	48	1
Entire capacity	30 to 39	48 to 57	1 to 8
NUL	00	0	1

The decimal value for the entire capacity is converted to text data and sent, starting from the high order end.

GS (L p_L p_H m f_n <f_n = 50>

[Function] Print graphics data in the print buffer.

[Format]

ASCII	GS (L p_L p_H m f_n
Hexadecimal	1D 28 4C p_L p_H m f_n
Decimal	29 40 76 p_L p_H m f_n

[Range] (p_L + p_H×256) = 2 (p_L=2; p_H=0)
m = 48
fn = 2, 50

[Description] Print buffered graphics data previously stored by GS (L <function 112>.

[Notes]
- Printer cannot print when there is no graphics data stored in the print buffer.

GS (L p_L p_H m f_n <f_n = 51>

[Function] Transmit the remaining capacity of NV graphics memory.

[Format]

ASCII	GS (L p_L p_H m f_n
Hexadecimal	1D 28 4C p_L p_H m f_n
Decimal	29 40 76 p_L p_H m f_n

[Range] (p_L + p_H×256) = 2 (p_L=2; p_H=0)
m = 48
fn = 3, 51

[Description]
- Transmit the number of bytes of remaining memory (unused area) in the NV graphics area, as described below.

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	30	48	1
Entire capacity	30 to 39	48 to 57	1 to 8
NUL	00	0	1

• The decimal value for the unused capacity is converted to text data and sent, starting from the high order end.
• This function cannot be used together with NV bit images (FS q).

GS (L p_L p_H m f_n <f_n = 52>

[Function] Transmit the remaining capacity of downloaded graphics memory.
[Format] ASCII GS (L p_L p_H m f_n
Hexadecimal 1D 28 4C p_L p_H m f_n
Decimal 29 40 76 p_L p_H m f_n
[Range] (p_L + p_H×256) = 2 (p_L=2; p_H=0)
m = 48
ƒn = 4, 52
[Description] • Transmit the number of bytes of remaining memory (unused area) in the downloaded graphics area, as described below.

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	72	114	1
Identification status (*1) (*2)	40 or 41	64 or 65	1
Data (*3)	30 to 39	48 to 57	2 to 80
NUL	00	0	1

• The decimal value for the unused capacity is converted to text data and sent, starting from the high order end.
• This function cannot be used together with downloaded bit images (GS *).

GS (L p_L p_H m f_n d_1 d_2 <f_n = 64>

[Function] Transmit key code list for defined NV graphics.
[Format] ASCII GS (L p_L p_H m f_n d_1 d_2
Hexadecimal 1D 28 4C p_L p_H m f_n d_1 d_2
Decimal 29 40 76 p_L p_H m f_n d_1 d_2
[Range] (p_L + p_H×256) = 4 (p_L=4; p_H=0)
m = 48
ƒn = 64
d_1 = 75
d_2 = 67
[Description] • Transmit defined NV graphics key code list, as described below. This function does require ESC/POS Handshaking Protocol.

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	72	114	1
Identification status (*1) (*2)	40 or 41	64 or 65	1
Data (*3)	30 to 39	48 to 57	2 to 80
NUL	00	0	1

(*1) When the number of NV graphics data group exceeds 40, the groups are divided into blocks in compliance with the following conditions:

- o When unsent data is present, the Identification status byte (byte 3) is set to hexadecimal value 41h (decimal value 65).
- o When unsent data is not present, the Identification status byte (byte 3) is set to hexadecimal value 40h (decimal value 64).

(*2) If the number of NV graphics data groups is 40 or less, they are sent in single batch, with the Identification status byte (byte 3) set to hexadecimal value 40h (decimal value 64).

(*3) The data groups are arranged according to the key codes.

- When no key codes are present, printer response looks like:

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	72	114	1
Identification status	40	64	1
NUL	00	0	1

- This function cannot be used together with NV bit images (FS q).

GS (L p_L p_H m f_n d_1 d_2 d_3 <f_n = 65>

[Function] Delete all NV graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n d_1 d_2 d_3
Hexadecimal	1D 28 4C p_L p_H m f_n d_1 d_2 d_3
Decimal	29 40 76 p_L p_H m f_n d_1 d_2 d_3

[Range] (p_L + p_H×256) = 5 (p_L=5; p_H=0)
m = 48
fn = 65
d_1 = 67
d_2 = 76
d_3 = 82

[Description]
- Delete all NV graphics data defined with function 67.
- This function should be send at the beginning of a line.
- This function cannot be used inside macros.

GS (L p_L p_H m f_n kc_1 kc_2 <f_n = 66>

[Function] Delete specified NV graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n kc_1 kc_2
Hexadecimal	1D 28 4C p_L p_H m f_n kc_1 kc_2
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2

[Range] (p_L + p_H×256) = 4 (p_L=4; p_H=0)
m = 48
fn = 66
32 ≤ kc_1 ≤ 126
32 ≤ kc_2 ≤ 126

[Description]
- Deletes the NV graphics data defined by the key codes kc_1 and kc_2.
- This function should be send at the beginning of a line.
- This function cannot be used inside macros.

GS (L p_L p_H m f_n a kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d1 ... d_k]b <f_n = 67>
GS 8 L p_1 p_2 p_3 p_4 m f_n a kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... dk]1 ... [c d_1 ... d_k]$_b$

[Function] Define a raster NV graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$
Hexadecimal	1D 28 4C p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$
ASCII	GS 8 L p_1 p_2 p_1 p_2 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$
Hexadecimal	1D 38 4C p_1 p_2 p_3 p_4 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$
Decimal	29 56 76 p_1 p_2 p_3 p_4 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... dk]1 ... [c d_1 ... d_k]$_b$

[Range]
$12 \le (p_L + p_H \times 256) \le 65,535$
$12 \le (p_1 + p_2 \times 256 + p_3 \times 65536 + p_4 \times 16777216) \le 4,718,604$
$m = 48$
$fn = 67$
$a = 48$
$32 \le kc_1 \le 126$
$32 \le kc_2 \le 126$
$b = 1$
$1 \le (x_L + x_H \times 256) \le 8,192 \quad (0 \le x_L \le 255, 0 \le x_H \le 32)$
$1 \le (y_L + y_H \times 256) \le 2,304 \quad (0 \le y_L \le 255, 0 \le y_H \le 9)$
$c = 49$
$0 \le d \le 255$
$k = (\text{int}((x_L + x_H \times 256) + 7) / 8) \times (y_L + y_H \times 256)$

[Description] Define a raster NV graphics data as a record specified by the key code kc_1 and kc_2 in the NV graphics area.

- o b specifies the number of colors for the defined data.
- o x_L and x_H specify the number of dots in the horizontal direction ($x_L + x_H \times 256$).
- o y_L and y_H specify the number of dots in the vertical direction ($y_L + y_H \times 256$).
- o c specifies the color of defined data.
- o d specify raster data.
- o k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.

- If the specified key code already exists in NV memory, data will be overwritten.

[Notes]
- This function is incompatible with macros, so make sure to avoid including it when defining macros.
- In cases where there is insufficient capacity available for storing NV graphics data, this function cannot be used. Function 51 should be used to check the available capacity in the NV graphics data area.
- This function should be send at the beginning of a line.
- The data for byte k of d1 ... dk is processed as a single item of defined NV graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.
- Specify single data groups [c d_1 ... d_k] when monochrome is selected (b = 1) as the color.
- NV graphics data is printed using function 69.
- Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.
- The relationship between raster NV graphics data and print results is shown in the table below.

d1	d2	...	d_x
d_x+1	d_x+2	...	d_xx2
:	:	...	:
...	d_k-2	d_k-1	d_k

$x = x_L + x_H \times 256$

GS (L p_L p_H m f_n kc_1 kc_2 x y <f_n = 69>

[Function] Print specified NV graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n kc_1 kc_2 x y
Hexadecimal	1D 28 4C p_L p_H m f_n kc_1 kc_2 x y
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2 x y

[Range]
$(p_L + p_H \times 256) = 6$ (p_L=6; p_H=0)
m = 48
fn = 69
$32 \le kc_1 \le 126$
$32 \le kc_2 \le 126$
x = 1, 2
y = 1, 2

[Description]
- Prints the NV graphics data defined by the key codes kc_1 and kc_2.
- x = 2 defines double height NV graphics print.
- y = 2 defines double width NV graphics print.

[Notes]
- This function is used to print NV graphics data defined using function 67.
- The specified key code must exist for the printer to print NV graphics data.
- Settings for text effect (bold, underline, orientation, etc. except for upside-down) and font size do not affect the printing of the NV graphics data.

GS (L p_L p_H m f_n d_1 d_2 <f_n = 80>

[Function] Transmit key code list for defined downloaded graphics.

[Format]

ASCII	GS (L p_L p_H m f_n d_1 d_2
Hexadecimal	1D 28 4C p_L p_H m f_n d_1 d_2
Decimal	29 40 76 p_L p_H m f_n d_1 d_2

[Range]
$(p_L + p_H \times 256) = 4$ (p_L=4; p_H=0)
m = 48
f_n = 80
d_1 = 75
d_2 = 67

[Description]
- Transmit defined downloaded graphics key code list, as described below. This function does require ESC/POS Handshaking Protocol.

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	73	115	1
Identification status (*1) (*2)	40 or 41	64 or 65	1
Data (*3)	30 to 39	48 to 57	2 to 80
NUL	00	0	1

(*1) When the number of downloaded graphics data group exceeds 40, the groups are divided into blocks in compliance with the following conditions:
When unsent data is present, the Identification status byte (byte 3) is set to hexadecimal value 41h (decimal value 65).
When unsent data is not present, the Identification status byte (byte 3) is set to hexadecimal value 40h (decimal value 64).
(*2) If the number of NV graphics data groups is 40 or less, they are sent in single batch, with the Identification status byte (byte 3) set to hexadecimal value 40h (decimal value 64).
(*3) The data groups are arranged according to the key codes.

- When no key codes are present, printer response looks like:

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	73	114	1
Identification status	40	64	1
NUL	00	0	1

- This function cannot be used together with downloaded bit images (GS *).

GS (L p_L p_H m fn d_1 d_2 d_3 <f_n = 81>

[Function] Delete all downloaded graphics data.

[Format]
ASCII	GS (L p_L p_H m f_n d_1 d_2 d_3
Hexadecimal	1D 28 4C p_L p_H m f_n d_1 d_2 d_3
Decimal	29 40 76 p_L p_H m f_n d_1 d_2 d_3

[Range] ($p_L + p_H \times 256$) = 5 (p_L=5; p_H=0)
m = 48
fn = 81
d_1 = 67
d_2 = 76
d_3 = 82

[Description]
- Delete all downloaded graphics data defined with function 83.
- This function should be used at the beginning of a line.
- This function cannot be used inside macros.

GS (L p_L p_H m f_n kc_1 kc_2 <f_n = 82>

[Function] Delete specified downloaded graphics data.

[Format]
ASCII	GS (L p_L p_H m f_n kc_1 kc_2
Hexadecimal	1D 28 4C p_L p_H m f_n kc_1 kc_2
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2

[Range] (pL + $p_H \times 256$) = 4 (p_L=4; p_H=0)
m = 48
fn = 82
$32 \leq kc_1 \leq 126$
$32 \leq kc_2 \leq 126$

[Description]
- Deletes the downloaded graphics data defined by the key codes kc_1 and kc_2.
- This function should be used at the beginning of a line.
- This function cannot be used inside macros.

GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1 ... dk]1 ... [c d1 ... dk]b <fn = 83>
GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1 ... dk]1 ... [c d1 ... dk]b

[Function] Define a raster downloaded graphics data.

[Format]
ASCII	GS (L p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]$_1$ ... [c d_1 ... d_k]$_b$
Hexadecimal	1D 28 4C p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]$_1$ ... [c d_1 ... d_k]$_b$
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]$_1$ ... [c d_1 ... d_k]$_b$
ASCII	GS 8 L p_1 p_2 p_1 p_2 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... dk]$_1$ ... [c d_1 ... d_k]$_b$
Hexadecimal	1D 38 4C p_1 p_2 p_3 p_4 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... dk]$_1$ ... [c d_1 ... d_k]$_b$
Decimal	29 56 76 p_1 p_2 p_3 p_4 m f_n kc_1 kc_2 b x_L x_H y_L y_H [c d_1 ... d_k]1 ... [c d_1 ... d_k]$_b$

[Range] $12 \le (p_L + p_H \times 256) \le 65{,}535$
$12 \le (p_1 + p_2 \times 256 + p_3 \times 65536 + p_4 \times 16777216) \le 4{,}718{,}604$
$m = 48$
$fn = 83$
$a = 48$
$32 \le kc_1 \le 126$
$32 \le kc_2 \le 126$
$b = 1, 2$
$1 \le (x_L + x_H \times 256) \le 8{,}192$ $(0 \le x_L \le 255,\ 0 \le x_H \le 32)$
$1 \le (y_L + y_H \times 256) \le 2{,}304$ $(0 \le yL \le 255,\ 0 \le y_H \le 9)$
$c = 49, 50$
$0 \le d \le 255$

[Description] Define a raster downloaded graphics data as a record specified by the key code kc_1 and kc_2 in the downloaded graphics area.

- o b specifies the number of colors for the defined data.
- o x_L and x_H specify the number of dots in the horizontal direction ($x_L + x_H \times 256$).
- o y_L and y_H specify the number of dots in the vertical direction ($y_L + y_H \times 256$).
- o c specifies the color of defined data.
- o d specify raster data.
- o k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.

• If the specified key code already exists in downloaded memory, data will be overwritten.

[Notes]
• Downloaded graphics indicate image data groups defined in the printer's internal volatile memory (RAM). Once the download graphics data have been defined, they are available until GS (L <function 83> or ESC @ is executed. The downloaded graphics data are lost when the power is turned off or the printer is reset.
• This function is incompatible with macros, so make sure to avoid including it when defining macros.
• In cases where there is insufficient capacity available for storing downloaded graphics data, this function cannot be used. Function 52 should be used to check the available capacity in the downloaded graphics data area.
• The data for byte k of d_1 ... dk is processed as a single item of defined downloaded graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.
• Specify single data groups [c d_1 ... d_k] when monochrome is selected (b = 1) as the color.
• Downloaded graphics data is printed using function 85.
• Note that it is not possible to create definitions for both downloaded graphics data (this command) and downloaded bit image data (GS *). Downloaded bit image data definitions are deleted when this command is used.
• The relationship between raster downloaded graphics data and print results is shown in the table below.

d_1	d_2	...	d_x
d_x+1	d_x+2	...	$d_x x_2$
:	:	...	:
...	d_k-2	d_k-1	d_k

$x = x_L + x_H \times 256$

GS (L p_L p_H m f_n kc_1 kc_2 x $_y$ <f_n = 85>

[Function] Print specified downloaded graphics data.
[Format]
ASCII	GS (L p_L p_H m f_n kc_1 kc_2 x $_y$
Hexadecimal	1D 28 4_C p_L p_H m f_n kc_1 kc_2 x y
Decimal	29 40 76 p_L p_H m f_n kc_1 kc_2 x y

[Range] $(p_L + p_H \times 256) = 6$ $(p_L=6;\ p_H=0)$

m = 48
*f*n = 85
32 ≤ kc_1 ≤ 126
32 ≤ kc_2 ≤ 126
x = 1, 2
y = 1, 2

[Description]
- Prints the downloaded graphics data defined by the key codes kc_1 and kc_2.
- x = 2 defines double height downloaded graphics print.
- y = 2 defines double width downloaded graphics print.

[Notes]
- This function is used to print downloaded graphics data defined using function 83.
- The specified key code must exist for the printer to print downloaded graphics data.
- Settings for text effect (bold, underline, orientation, etc. except for upside-down) and font size do not affect the printing of the downloaded graphics data.

GS (L p_L p_H m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k <f_n = 112>
GS 8 L p_1 p_2 p_3 p_4 m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k

[Function] Define a raster downloaded graphics data.

[Format]

ASCII	GS (L p_L p_H m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k
Hexadecimal	1D 28 4C p_L p_H m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k
Decimal	29 40 76 p_L p_H m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k
ASCII	GS 8 L p_1 p_2 p_1 p_2 m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k
Hexadecimal	1D 38 4C p_1 p_2 p_3 p_4 m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k
Decimal	29 56 76 p1 p2 p3 p4 m f_n a b_x b_y c x_L x_H y_L y_H d_1 ... d_k

[Range]
11 ≤ (p_L + p_H...256) ≤ 32,778
11 ≤ (p_1 + p_2×256 + p_3×65536 + p_4×16777216) ≤ 32,778
m = 48; f_n = 112; a = 48; 0 ≤ d ≤ 255
1 ≤ (x_L + x_H×256) ≤ 1,024 (0 ≤ x_L ≤ 255, 0 ≤ x_H ≤ 8)
1 ≤ (y_L + y_H×256) ≤ 1,476 (0 ≤ y_L ≤ 255, 0 ≤ y_H ≤ 2: by = 1)
1 ≤ (y_L + y_H×256) ≤ 738 (0 ≤ y_L ≤ 255, 0 ≤ y_H ≤ 2: by = 2)
c = 49, 50

[Description] Store raster graphics data in the print buffer.
- bx specify horizontal mode (normal or double width) and by specify vertical mode (normal or double height).
- x_L and x_H specify the number of dots in the horizontal direction (x_L + x_H×256).
- yL and yH specify the number of dots in the vertical direction (y_L + y_H×256).
- c specifies the color of defined data.
- d specify raster data.
- k indicates the number of the graphics data. k is an explanation parameter; therefore it does not need to be transmitted.

[Notes]
- This function is incompatible with macros, so make sure to avoid including it when defining macros.
- Settings for text effect (bold, underline, orientation, etc. except for upside-down) and font size do not affect the printing of the raster graphics data.
- The data for byte k of d1 ... dk is processed as a single item of defined graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.
- Raster graphics data is printed using function 50.
- The relationship between raster graphics data and print results is shown in the table below.

d_1	d_2	...	d_x
d_x+$_1$	d_x+$_2$	...	d_xx$_2$
:	:	...	:
...	d_{k-2}	d_{k-1}	d_k

x = x_L + x_Hx256

GS (N p_L p_H f_n [parameter]

[Function] Select character effects.

[Format]

ASCII	GS (N p_L p_H f_n
Hexadecimal	1D 28 4E p_L p_H f_n
Decimal	29 40 78 p_L p_H f_n

[Range] f_n = 48

[Description] Selects character effects, according to fn value, as described in the table below.

f_n	Function
48	Select character color.

[Notes]
- p_L, p_H specifies (p_L + p_H × 256) as the number of bytes after p_H (f_n and [parameter]).
- Setting of this command affect printing of alphanumeric, multilingual, user-defined characters and user defined ideograms.
- Setting of this command is effective until ESC @ is executed, the printer is reset of the power is turned off.
- Setting of this command does not affect printing of graphics, bit image, bar code (including HRI characters) and two dimension code.
- The color of the graphics can be specified by GS (L.
- Dual color printing depends on dual color thermal paper usage. Color #1 is black and uses high energy in the print head. Color #2 is red and uses low energy in the print head.
- This command is effective only in models with dual color feature enabled.

GS (N p_L p_H f_n m <f_n = 48>

[Function] Select character color.

[Format]

ASCII	GS (N p_L p_H f_n m
Hexadecimal	1D 28 4E p_L p_H f_n m
Decimal	29 40 78 p_L p_H f_n m

[Range] (p_L + p_H×256) = 2 (p_L=2; p_H=0)
f_n = 48
m = 48, 49, 50

[Default] m = 49

[Description] Selects character color specified by m as follows.

m	Character color
48	Not (do not print).
49	Color #1 (Black)
50	Color #2 (Red)

[Notes]
- When underline is turned on, the underline will be printed in the color specified by this function.
- In white/black reverse print mode, the printer treats the character as non-printing dots and prints the background in the color specified by this function.
- This command is effective only in models with dual color feature enabled.

GS (k p_L p_H c_n f_n [parameters]

[Function] Specify and print symbol.

[Format]

ASCII	GS (k p_L p_H c_n f_n [parameters]
Hexadecimal	1D 28 6B p_L p_H c_n f_n [parameters]
Decimal	29 40 107 pL p_H c_n f_n [parameters]

[Range] c_n = 48 (PDF417 code).
f_n = 65, 66, 67, 68, 69, 70, 80, 81, 82.

[Description] Process data for two-dimensional codes.
- Symbol type is specified by c_n.
- Function code f_n specifies the function.

c_n	f_n	Function
48	65	PDF417: Set number of columns in the data region.
	66	PDF417: Set number of rows.
	67	PDF417: Set the width of the module.
	68	PDF417: Set the row height.
	69	PDF417: Set the error correction level.
	70	PDF417: Select options.
	80	PDF417: Store data in the symbol storage area.
	81	PDF417: Print symbol data in the symbol storage area.
	82	PDF417: Transmit the size information of the symbol data in the symbol storage area

- p_L, p_H specifies ($p_L + p_H \times 256$) as the number of bytes after pH (cn and fn and [parameters].
- [parameters] are described in each function.

[Notes]
- The symbol data specified by function 80 $d_1...d_k$ is stored in memory and it can be printed using function 81. The symbol data in the symbol storage area is reserved until the following processing is performed:
  - o Function 80 is executed.
  - o ESC @ is executed.
  - o The printer is reset or the power is turned off.
- When processing function 81 or 82, the setting values of functions 65 to 70 are used. If the printable area is not large enough, the symbol may not be printed.
- Executing function 81 after executing function 80 repeatedly prints the same symbol data.
- By using functions 65 to 70 combined with function 81, the same symbol data $d_1...d_k$ is printed differently.
- By using function 82, the symbol size printed by function 81 is available.

GS (k p_L p_H c_n f_n n <f_n = 65>

[Function] PDF417: Set number of columns in the data region.
[Format]

ASCII	GS (k p_L p_H c_n f_n n
Hexadecimal	1D 28 6B p_L p_H c_n f_n n
Decimal	29 40 107 p_L p_H c_n f_n n

[Range] ($p_L + p_H \times 256$) = 3 (p_L=3; p_H=0)
c_n = 48 (PDF417 code)
f_n = 65
0 ≤ n ≤ 30

[Default] n = 0

[Description] Sets the number of columns in the data region for PDF417.
- When n = 0, automatic processing is selected.
- When n ≠ 0, the number of columns in the data region is set to n codeword.

[Notes]
- Setting of this function affect the processing of functions 81 and 82.
- When auto processing (n = 0) is selected, the maximum number of columns in the data area is 30 columns.

- The following data is not included in the number of columns:
  - o Start pattern and stop pattern.
  - o Indicator codeword of left and right.
- When automatic processing (n = 0) is selected, the number of columns is calculated by the print area when processing functions 81, 82, module width (function 67), and option setting (function 70).
- Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k p_L p_H c_n f_n n <f_n = 66>

[Function] PDF417: Set number of rows.

[Format]

ASCII	GS (k p_L p_H c_n f_n n
Hexadecimal	1D 28 6B p_L p_H c_n f_n n
Decimal	29 40 107 p_L p_H c_n f_n n

[Range] (p_L + p_H×256) = 3 (p_L=3; p_H=0)
c_n = 48 (PDF417 code)
f_n = 66
n = 0 (automatic processing)

[Description] Set number of rows for PDF417. Only automatic processing (n = 0) is available.

GS (k p_L p_H c_n f_n n <f_n = 67>

[Function] PDF417: Set the width of the module.

[Format]

ASCII	GS (k p_L p_H c_n f_n n
Hexadecimal	1D 28 6B p_L p_H c_n f_n n
Decimal	29 40 107 p_L p_H c_n f_n n

[Range] (p_L + p_H×256) = 3 (p_L=3; p_H=0)
c_n = 48 (PDF417 code)
f_n = 67
2 ≤ n ≤ 8

[Default] n = 3

[Description] Set to n dots the width of the module for PDF417.

[Notes]
- Settings of this function affect the processing of functions 81 and 82.
- Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k p_L p_H c_n f_n n <f_n = 68>

[Function] PDF417: Set the row height.

[Format]

ASCII	GS (k p_L p_H c_n f_n n
Hexadecimal	1D 28 6B p_L p_H c_n f_n n
Decimal	29 40 107 p_L p_H c_n f_n n

[Range] (p_L + p_H×256) = 3 (p_L=3; p_H=0)
c_n = 48 (PDF417 code)
f_n = 68
2 ≤ n ≤ 8

[Default] n = 3

[Description] Set row height to [n × (module width)] for PDF417.

[Notes]
- Settings of this function affect the processing of functions 81 and 82.
- Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k p_L p_H c_n f_n m n <f_n = 69>

[Function] PDF417: Set the error correction level.

[Format]

ASCII	GS (k p_L p_H c_n f_n m n
Hexadecimal	1D 28 6B p_L p_H c_n f_n m n
Decimal	29 40 107 p_L p_H c_n f_n m n

[Range] (p_L + p_H×256) = 4 (p_L=4; p_H=0)
c_n = 48 (PDF417 code)
f_n = 69
m = 48, 49
48 ≤ n ≤ 56 [m = 48]
1 ≤ n ≤ 40 [m = 49]

[Default] m = 49, n = 1

[Description] Set error correction level for PDF417.

m	Function
48	The error correction level is set by "level".
49	The error correction level is set by "ratio". The ratio is [n x 10%]

[Notes]

- Settings of this function affect the processing of functions 81 and 82.
- Error correction level is specified by either "level" or "ratio."
- Error correction level specified by "level" (m = 48) is as follows. The number of the error correction codeword is fixed regardless of the number of codeword in the data area.

n	Function	Number of error correction codeword
48	Error correction level 0	2
49	Error correction level 1	4
50	Error correction level 2	8
51	Error correction level 3	16
52	Error correction level 4	32
53	Error correction level 5	64
54	Error correction level 6	128
55	Error correction level 7	256
56	Error correction level 8	512

- Error correction level specified by "ratio" (m = 49) is as follows. The error correction level is defined by [number of data codeword × n × 0.1 = (A)]. The number of the error correction codeword changes depending on the number of codeword in the data area.

(A)	Function	Number of error correction codeword
0 – 3	Error correction level 1	4
4 – 10	Error correction level 2	8
11 – 20	Error correction level 3	16
21 – 45	Error correction level 4	32
46 – 100	Error correction level 5	64
101 – 200	Error correction level 6	128
201 – 400	Error correction level 7	256
401 or more	Error correction level 8	512

- The error correction codeword calculated by modulus 929.
- Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k p_L p_H c_n f_n n <f_n = 70>

[Function] PDF417: Select option.

[Format]

ASCII	GS (k p_L p_H c_n f_n n
Hexadecimal	1D 28 6B p_L p_H c_n f_n n
Decimal	29 40 107 p_L p_H c_n f_n n

[Range] (p_L + p_H×256) = 3 (p_L=3; p_H=0)
c_n = 48 (PDF417 code)
f_n = 70
n = 0 (standard PDF417)

[Description] Select option for PDF417. Only standard PDF417 is supported.

GS (k p_L p_H c_n f_n m d_1 ... d_k <f_n = 80>

[Function] PDF417: Store data in the symbol storage area.

[Format]

ASCII	GS (k p_L p_H c_n f_n m d_1 ... d_k
Hexadecimal	1D 28 6B p_L p_H c_n f_n m d_1 ... d_k
Decimal	29 40 107 p_L p_H c_n f_n m d_1 ... d_k

[Range] 4 ≤ (p_L + p_H×256) ≤ 65,535 (p_L ≤ 255; p_H ≤ 255)
c_n = 48 (PDF417 code)
f_n = 80
m = 48
0 ≤ d ≤ 255
k = (p_L + p_H×256) – 3

[Description] Store PDF417 symbol data (d_1 ... d_k) in the symbol storage area.

[Notes]
- Data stored in the symbol storage area is processed by functions 81 and 82. This data is not destroyed after execution of function 81 or 82.
- k bytes of d_1...d_k are processed as symbol data.
- Specify only the data codeword of the symbol with this function. The information listed below is added automatically by the printer:
  - Start pattern and stop pattern.
  - Indicator codeword of left and right.
  - The descriptor of symbol length (the first codeword in the data area).
  - The error correction codeword calculated by modulus 929.
- Settings of this function are effective until the following processing is performed:
  - Function 80 is executed.
  - ESC @ is executed.
  - The printer is reset or the power is turned off.

GS (k p_L p_H c_n f_n m <f_n = 81>

[Function] PDF417: Print symbol data in the symbol storage area.

[Format]

ASCII	GS (k p_L p_H c_n f_n m
Hexadecimal	1D 28 6B pL pH cn fn m
Decimal	29 40 107 pL pH cn fn m

[Range] (p_L + p_H×256) = 3 (p_L=3; p_H=0)
cn = 48 (PDF417 code)
f_n = 81
m = 48

[Description] Encodes and prints the PDF417 symbol data stored in the symbol storage area by function 80.

[Notes]
- A symbol that size exceeds the print area cannot be printed.
- If there is any an inconsistence in the data of symbol storage area, it cannot be printed.
  - There is no data (function 80 was not executed).
  - If [(number of columns × number of rows) < number of codeword] when auto processing is specified for number of columns and number of rows.
  - Number of codeword exceeds 928 in the data area.

- The following data are added automatically by the encode process:
  - o Start pattern and stop pattern.
  - o Indicator codeword of left and right.
  - o The descriptor of symbol length (the first codeword in the data area).
  - o The error correction codeword calculated by modulus 929.
  - o Pad codeword.
- When auto processing (function 65) is specified, the number of columns is calculated by the current print area, module width (function 67), option setting (function 70), and the codeword in the data area. Maximum number of columns is 30.
- Printing of symbol is not affected by print mode (emphasized, double-strike, underline, white/black reverse printing, or 90° clockwise-rotated), except for character size and upside-down print mode.
- This command executes paper feeding for the amount needed for printing the symbol regardless of the paper feed amount set by the paper feed setting command. The print position returns to the left side of the printable area after printing the symbol.
- The quiet zone is not included in the printing data. Be sure to include the quiet zone when using this function.

GS (k pL pH cn fn m <fn = 82>

[Function] PDF417: Transmit the size information of the symbol data in the symbol storage area.

[Format]

ASCII	GS (k p_L p_H c_n f_n m
Hexadecimal	1D 28 6B p_L p_H c_n f_n m
Decimal	29 40 107 p_L p_H c_n f_n m

[Range] $(p_L + p_H \times 256) = 3$ $(p_L=3;\ p_H=0)$
$c_n = 48$ (PDF417 code)
$f_n = 82$
m = 48

[Description] Transmit the size information for the encoded PDF417 symbol data stored in symbol storage area by function 80.

[Notes]
- The size information for each data is as follows:

Transmit data	Hex	Dec	Data bytes
Header	37	55	1
Identifier	2F	47	1
Horizontal size (*1)	30 – 39	48 – 57	1 – 5
Separator	1F	31	1
Vertical size (*1)	30 – 39	48 – 57	1 – 5
Separator	1F	31	1
Fixed value	31	49	1
Separator	1F	31	1
Other information (*2)	30 or 31	48 to 49	1
NUL	00	0	1

(*1) "Horizontal size" and "vertical size" indicate the number of dots of the symbol.
(*2) "Other information" indicates whether printing of the data in the symbol storage area is possible or impossible. The "other information" is the following.

Hex	Dec	Condition
30	48	Printing is possible.
31	49	Printing is impossible.

- The decimal value of the vertical size and horizontal size is converted to text data and sent starting from the high order end.
- Size information indicates the size of symbol printed by function 81.
- The quiet zone is not included in the size information.

GS :

[Function] Start/end macro definition.

[Format]

ASCII	GS :
Hexadecimal	1D 3A
Decimal	29 58

[Description] Start/end macro definition.

[Details]
- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
- When GS ^ is received during macro definition, the printer ends macro definition and clears the definition.
- Macro content is not cleared by ESC @. Therefore, ESC @ can be included in the contents of a macro.
- Macro contents may have up to 2048 bytes. If a macro is defined with more than 2048 bytes, excess data is not stored.

[Reference] GS ^

GS B n

[Function] Turn white/black reverse printing mode on/off.

[Format]

ASCII	GS B n
Hexadecimal	1D 42 n
Decimal	29 66 n

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

[Default] $n = 0$

[Description] Turn on/off white/black reverse printing mode.
- When the LSB of n is 0, white/black reverse mode is turned off.
- When the LSB of n is 1, white/black reverse mode is turned on.

[Details]
- Only the least significant bit of n is valid.
- This command is valid for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applies to character spacing set by ESC SP.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters and spacing skipped by HT, ESC $, and ESC \.
- This command does not affect the spaces between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

GS H n

[Function] Select print position for HRI characters.

[Format]

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

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

[Default] $n = 0$

[Description] Select print position for HRI in barcodes. n selects the print position as follows:

n	Print position
0, 48	Not printed.
1, 49	Above barcode.
2, 50	Below barcode.
3, 51	Both above and below barcode.

[Details]
- HRI stands for Human Readable Interpretation.
- HRI characters are printed using the font specified by GS f.

[References] GS f, GS k

GS I n

[Function] Transmit printer ID.

[Format]

ASCII	GS I n
Hexadecimal	1D 49 n
Decimal	29 73 n

[Range] $1 \leq n \leq 3, 49 \leq n \leq 51, 65 \leq n \leq 69$

[Description] Transmits the printer ID specified by n as follows:

n	Printer ID	Specification	ID (Hex)
1, 49	Printer ID Model	MP-4200 TH	55
2, 50	Type ID	See table below.	
3, 51	ROM version ID	Depends on ROM version.	
65	Firmware version	Depends on firmware version.	
66	Manufacturer	Bematech	
67	Printer name	MP-4200 TH	
68	Serial number	Depends on serial number.	
69	Type of model	Japanese model: KANJI JAPANESE Simplified Chinese: CHINA EUC-CN Traditional Chinese: TAIWAN BIG-5E	

n = 2: Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte character code not supported.
	On	01	1	Two-byte character code supported.
1	On	02	2	Auto-cutter equipped.
2	Off	00	0	Not used. Fixed to off.
3	Off	00	0	Not used. Fixed to off.
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to off.

[Details]

- When DTR/DSR control is selected in the serial interface model, the printer transmits printer ID after confirming that the host is ready to receive data.
- When XON/XOFF control is selected in the serial interface model, the printer transmits the printer ID without confirming the condition of the DSR signal.
- The printer ID is transmitted when command bytes are processed in the receive buffer. Therefore, there may be a time gap between receiving this command and transmitting the status, depending on the receive buffer status.
- When printer ID transmission is specified with ($1 \leq n \leq 3$) or ($49 \leq n \leq 51$), one byte code is transmitted.
- When Auto Status Back (ASB) is enabled using GS a, the printer ID transmitted by GS I and the ASB status must be differentiated.
- When printer ID is specified with ($65 \leq n \leq 69$), the [Header + Data + NUL] contents is transmitted, where:
    - Header: Hexadecimal = 5Fh / Decimal = 95 (1 byte)
    - Data: Printer information
    - NUL: Hexadecimal = 00h / Decimal = 0 (1 byte)

GS L n_L n_H

[Function] Set left margin.

[Format]

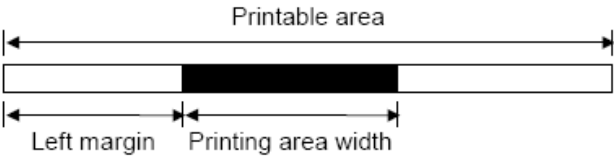
ASCII	GS L n_L n_H
Hexadecimal	1D 4C n_L n_H
Decimal	29 79 n_L n_H

[Range] $0 \leq n_L \leq 255$
$0 \leq n_H \leq 255$

[Default] nL = 0, n_H = 0

[Description] Set left margin using n_L and n_H.

- The left margin is set to [(n_L + n_H × 256) × horizontal motion unit)] inches.



[Details]

- This command is effective only when processed at the beginning of a line.
- If settings exceed printable area, the maximum value of the printable area is used.
- The horizontal and vertical motion units are specified by GS P. Changing the horizontal and vertical motion unit does not affect the current left margin.

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

[References] GS P, GS W

GS P x y

[Function] Set horizontal and vertical motion units.

[Format]

ASCII	GS P x y
Hexadecimal	1D 50 x y
Decimal	29 80 x y

[Range] $0 \leq x \leq 255$
$0 \leq y \leq 255$

[Description] Sets the horizontal and vertical motion units to approximately 25.4/x mm {1/x inches} and approximately 25.4/y mm {1/y inches}, respectively.

[Details]
- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
- The following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):
  - Commands using x: ESC SP, ESC $, ESC \, FS S, GS L, GS W
  - Commands using y: ESC 3, ESC J, GS V
- The command does not affect previously specified values.
- The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

[References] ESC SP, ESC $, ESC 3, ESC J, ESC \, GS L, GS V, GS W

GS V m

[Function] Select paper cut mode.

[Format]

ASCII	GS V m
Hexadecimal	1D 56 m
Decimal	29 86 m

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

[Description] If m = 0 or m = 48 perform a full paper cut.
If m = 1 or m = 49 perform a partial paper cut.

[Details]
- This command is effective only if processed at the beginning of a line.

GS V m n

[Function] Feed and cut paper.

[Format]

ASCII	GS V m n
Hexadecimal	1D 56 m n
Decimal	29 86 m n

[Range] m = 66
$0 \leq n \leq 255$

[Description] Feed and cut paper. For this command, m should be 66 and n is the amount of paper to feed. First of all, paper is advanced and then cut.

[Details]
- This command is effective only if processed at the beginning of a line.
- When n = 0, the printer feeds the paper to the cutting position and cuts it.
- When $n \neq 0$, the printer feeds the paper to (cutting position + [n × vertical motion unit]) and cuts it.
- The horizontal and vertical motion units are specified by GS P.
- The paper feed amount is calculated using the vertical motion unit (y). However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.

GS W n_L n_H

[Function] Set printing area width.

[Format]

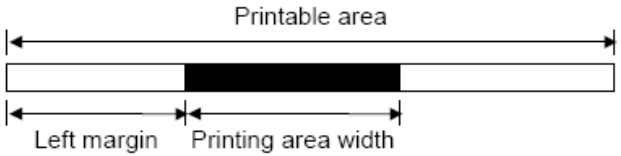
ASCII	GS W n_L n_H
Hexadecimal	1D 57 n_L n_H
Decimal	29 87 n_L n_H

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

$0 \le n_H \le 255$

[Default] $n_L = 0$; $n_H = 2$

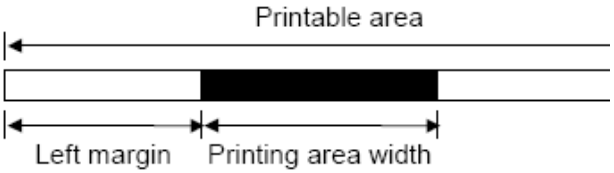
[Description] Set printing area width to $[(n_L + n_H \times 256) \times$ horizontal motion unit$]$.



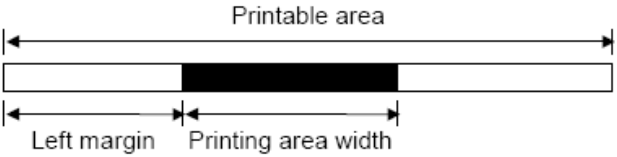
[Details]

- This command is effective only when processed at the beginning of a line.
- If settings exceed printable area, the maximum value of the printable area is used.
- The horizontal and vertical motion units are specified by GS P. Changing the horizontal and vertical motion unit does not affect the current left margin.
- The horizontal motion unit (x) is used for calculating left margin. The calculated result is truncated to the minimum value of the mechanical pitch.
- If requested printing area width less than one character the following processing is performed:

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



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



3. If printing area width cannot be extended, the right margin is reduced to accommodate one character.

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

1. The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.
2. If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one line in vertical.

- The commands which set the printing area width for bit image printing and its minimum widths are as follows:
- Bit image (ESC *):
  Single density mode = 2 dots
  Double density mode = 1 dot
- Downloaded bit image (GS /):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot

- NV bit image (FS p):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot
- Raster bit image (GS v 0):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot

[References] GS L, GS P

GS ^ r t m

[Function] Execute macro.

[Format]

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

[Range]
0 ≤ r ≤ 255
0 ≤ t ≤ 255
m = 0, 1

[Description] Execute a macro.

- r specifies the number of macro executions.
- t specifies the waiting time between consecutive macro executions.
- m specifies macro executing mode.
  - o When the LSB of m = 0, the macro executes r times continuously at the interval specified by t.
  - o When the LSB of m = 1, after waiting for the period specified by t, the INFO led blinks and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once again. The printer repeats this operation r times.

[Details]

- The waiting time is t × 100 ms for every macro execution.
- If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
- If the macro is not defined or if r is 0, nothing is executed.
- When a macro is executed (m = 1), paper cannot be fed using the FEED button.

[Reference] GS :

GS a n

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

[Format]

ASCII	GS a n
Hexadecimal	1D 61 n
Decimal	29 97 n

[Range] 0 ≤ n ≤ 255

[Description] Enable or disable ASB and specify which status items should be included according to n, as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4 - 7	-	-	-	Undefined.

[Details]

• If any status item is enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever an enabled status item changes.
• If all status items are disabled, the ASB function is also disabled.
• If ASB is enabled by default, as soon as printer is turned on and is able to transmit and receive data transmits, the status is send.
• The four status bytes are transmitted without confirming whether the host is ready to receive data or not. The four status bytes must be consecutive, except for the XOFF code.
• Since this command is executed after data is processed in the receive buffer, there may be a time gap between command reception and status transmission.
• When printer is disabled by ESC = (Select peripheral device), the four status bytes are transmitted whenever the status changes.
• The status to be transmitted are as follows:

Firs byte (Printer information)

Bit	On/Off	Hex	Dec	Function
0	Off	00	0	Not used. Fixed to off.
1	Off	00	0	Not used. Fixed to off.
2	Off	00	0	Drawer kick-out connector pin is LOW.
	On	04	4	Drawer kick-out connector pin is HIGH.
3	Off	00	0	Printer online.
	On	08	8	Printer offline.
4	On	10	16	Not used. Fixed to on.
5	On	00	0	Cover is closed.
	Off	20	32	Cover is opened.
6	On	00	0	Paper is not being fed by FEED button.
	Off	40	64	Paper is being fed by FEED button.
7	Off	00	0	Not used. Fixed to off.

o Second byte (Printer information)

Bit	Off/On	Hex	Dec	Function
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	No auto-cutter error.
	On	08	8	An auto-cutter error has occurred.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	No unrecoverable error.
	On	20	32	An unrecoverable error has occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	An automatically recoverable error has occurred.
7	Off	00	0	Not used. Fixed to Off.

• Bit 3: If these errors occur due to paper jam, it is possible to recover by correcting the cause of the error and executing DLE ENQ n ($1 \leq n \leq 2$). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.
• Bit 6: When printing is stopped due to high print head temperature, the printer remains stopped until the print head temperature drops sufficiently. This error can also occur when paper roll cover is opened.

o Third byte (Paper sensor information)

Bit	Off/On	Hex	Dec	Function
0, 1	Off	00	0	Paper roll near-end sensor: paper OK.
	On	03	3	Paper roll near-end sensor: paper near end.
2, 3	Off	00	0	Paper roll end sensor: paper present.
	On	0C	12	Paper roll end sensor: paper not present.
4	Off	10	16	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

o Fourth byte (Paper sensor information)

Bit	Off/On	Hex	Dec	Function
0, 3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to off.

[References] DLE EOT, GS r

GS f n

[Function] Select font for Human Readable Interpretation (HRI) characters.
[Format] ASCII GS f n
Hexadecimal 1D 66 n
Decimal 29 102 n
[Range] n = 0, 1, 48, 49
[Default] n = 0
[Description] Select a font for the HRI characters used during a barcode printing. n selects a font from the following table:

n	Print position
0, 48	Font C (14 x 24).
1, 49	Font D (10.5 x 24).

[Details]
- HRI stands for Human Readable Interpretation.
- HRI characters are printed at the position specified by GS H.

[References] GS H, GS k

GS h n

[Function] Select barcode height.
[Format] ASCII GS h n
Hexadecimal 1D 68 n
Decimal 29 104 n
[Range] $1 \leq n \leq 255$
[Default] n = 192
[Description] Select barcode height. n specifies the number of dots in the vertical direction.
[Reference] GS k

(1) GS k m d_1 ... d_k NUL
(2) GS k m n d_1 ... d_n

[Function] Print barcode.

[Format]

ASCII	(1) GS k m d_1 ... d_k NUL	
	(2) GS k m n d_1 ... d_n	
Hexadecimal	(1) 1D 6B m d_1 ... d_k 00	
	(2) 1D 6B m n d_1 ... d_n	
Decimal	(1) 29 107 m d_1 ... d_k 0	
	(2) 29 107 m n d_1 ... d_n	

[Range] (1) $0 \le m \le 6$ (k and d depends on the barcode system used)
(2) $65 \le m \le 73$ (n and d depends on the barcode system used)

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

m		Barcode System	Number of Characters	Remarks
(1)	0	UPC-A	$11 \le k \le 12$	$48 \le d \le 57$
	1	UPC-E	$11 \le k \le 12$	$48 \le d \le 57$
	2	EAN13	$12 \le k \le 13$	$48 \le d \le 57$
	3	EAN8	$7 \le k \le 8$	$48 \le d \le 57$
	4	CODE39	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 90$, 32, 36, 37, 43, 45, 46, 47
	5	ITF	$1 \le k$ (even number)	$48 \le d \le 57$
	6	CODABAR	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 68$, 36, 43, 45, 46, 47, 58
(2)	65	UPC-A	$11 \le n \le 12$	$48 \le d \le 57$
	66	UPC-E	$11 \le n \le 12$	$48 \le d \le 57$
	67	EAN13	$12 \le n \le 13$	$48 \le d \le 57$
	68	EAN8	$7 \le n \le 8$	$48 \le d \le 57$
	69	CODE39	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 90$, 32, 36, 37, 43, 45, 46, 47
	70	ITF	$1 \le n \le 255$ (even number)	$48 \le d \le 57$
	71	CODABAR	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 68$, 36, 43, 45, 46, 47, 58
	72	CODE93	$1 \le n \le 255$	$0 \le d \le 127$
	73	CODE128	$2 \le n \le 255$	$0 \le d \le 127$

[Details for (1)]
- This command ends with a NUL code.
- When the barcode system used is UPC-A or UPC-E, the printer prints barcode data after receiving the 12 bytes.
- When the barcode system used is EAN13, the printer prints barcode after receiving 13 bytes.
- When the bar code system used is EAN8, the printer prints barcode after receiving 8 bytes.
- The amount of data for ITF barcode must be even. When an odd number of bytes are input, the printer ignores the last byte.

[Details for (2)]
- n indicates the number of barcode bytes, and the printer processes n bytes from the next character data as barcode data.
- If n is outside of the specified range, the printer stops command processing and starts processing incoming data as normal data.

[Details]
- If d is outside of the range, the printer only feeds paper and processes incoming data as normal data.
- If the horizontal size exceeds printing area, the printer only feeds the paper.
- This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by ESC 2 or ESC 3.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following m as normal data.
- After printing barcode, this command sets the print position to the beginning of the line.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[References] GS H, GS f, GS h, GS w

GS r n

[Function] Transmit status.

[Format]

ASCII	GS r n
Hexadecimal	1D 72 n
Decimal	29 114 n

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

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

n	Function
1, 49	Transmit paper sensor status.
2, 50	Transmit drawer kick-out connector status.

[Details]
- When serial interface with DTR/DSR control is being used the printer transmits only 1 byte after confirming the host is ready to receive data. If the host computer is not ready to receive data, the printer waits until the host is ready. When serial interface with XON/XOFF control is being used the printer transmits only 1 byte without confirming the condition of the DSR signal.
- This command is executed when commands bytes are processed in the receive buffer. Therefore, there may be a time gap between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using GS a, it is possible to differentiate status transmitted by GS r and by ASB.
- The status types to be transmitted are shown below:

o Paper sensor status (n = 1, 49)

Bit	On/Off	Hex	Dec	Function
0, 1	Off	00	0	Paper roll near-end sensor status: OK.
	On	03	3	Paper roll near-end sensor status: low paper.
2, 3	Off	00	0	Paper roll end sensor status: OK.
	On	0C	12	Paper roll end sensor status: low paper.
4	Off	00	0	Not used. Fixed to off.
5, 6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

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

o Drawer kick-out connector status (n = 2, 50)

Bit	On/Off	Hex	Dec	Function
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1 - 3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to off.
5, 6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

[References] DLE EOT, GS a

GS v 0 m x_L x_H y_L y_H d_1 ... d_k

[Function] Print raster bit image.

[Format]
ASCII GS v 0 m x_L x_H y_L y_H d_1 ... d_k
Hexadecimal 1D 76 30 m x_L x_H y_L y_H d_1 ... d_k
Decimal 29 118 48 m x_L x_H y_L y_H d_1 ... d_k

[Range]
$0 \le m \le 3, 48 \le m \le 51$
$0 \le x_L \le 255; 0 \le x_H \le 255$
$0 \le y_L \le 255; 0 \le y_H \le 8$
$0 \le d \le 255$
$k = [(x_L + x_H \times 256) \times (y_L + y_H \times 256)] \quad (k \neq 0)$

[Description] Select raster bit-image mode (m), as follows:

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

[Details]
- x_L, x_H, select the number of data bytes ($x_L + x_H \times 256$) in the horizontal direction for the bit image.
- y_L, y_H, select the number of data bytes ($y_L + y_H \times 256$) in the vertical direction for the bit image.
- This command is effective only when there is no data in the print buffer.
- This command has no effect in all print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.
- If the printing area width set by GS L and GS W is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (m=0, 48) and double-height (m=2, 50) modes, 2 dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.
- Data outside printing area is read and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by HT (Horizontal Tab), ESC $ (Set absolute print position), ESC \ (Set relative print position), and GS L (Set left margin). If the position at which subsequent characters are to be printed is not a multiple of 8, print speed may decrease.
- The ESC a (Select justification) setting is also effective on raster bit images.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.
- d indicates bit-image data. Setting a bit prints a dot and resetting a bit does not print a dot.

GS w n

[Function] Set barcode width.
[Format] ASCII GS w n
Hexadecimal 1D 77 n
Decimal 29 119 n
[Range] $2 \leq n \leq 6$
[Default] $n = 3$
[Description] Set barcode horizontal size. n specifies barcode width as follows:

n	Module width (mm) for Multi-level Barcode	Binary-level Barcode	
		Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.500	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

Multi-level bar codes are as follows: UPC-A, UPC-E, EAN13, EAN8, CODE93, CODE128
Binary-level bar codes are as follows: CODE39, ITF, CODABAR
[Reference] GS k

GS F9h 5 n

[Function] Select printer operating mode.
[Format] ASCII GS F9h 5 n
Hexadecimal 1D F9 35 n
Decimal 29 249 53 n
[Range] $n = 0$; $n = 1$; $n = 48$; $n = 49$;
[Default] $n = 0$
[Description] If n is 0 (00h or 30h), ESC/Bema is selected.
If n is 1 (01h or 31h), ESC/POS is selected.
[Notes] This command modifies printer flags and save the new values to printer configuration memory.

GS F9h 7 n

[Function] Set and save printer default code page for ESC/Bema command set.
[Format] ASCII GS F9h 7 n
Hexadecimal 1D F9 37 n
Decimal 29 249 55 n
[Range] $2 \leq n \leq 12$; $n = 14$; $n = 21$
[Default] $n = 2$
[Description] This command selects the code page to be used, according to the following options.

If n is 2 (02h or 32h), CODEPAGE 850 is selected.
If n is 3 (03h or 33h), CODEPAGE 437 is selected.
If n is 4 (04h or 34h), CODEPAGE 860 is selected.
If n is 5 (05h or 35h), CODEPAGE 858 is selected.
If n is 6 (06h or 36h), CODEPAGE 866 is selected.
If n is 7 (07h or 37h), CODEPAGE 864 is selected.

If n is 8 (08h or 38h), UTF8 (Unicode) is selected.
If n is 9 (09h or 39h), Big-5E is selected.
If n is 10 (0Ah or 3Ah), JIS is selected.
If n is 11 (0Bh or 3Bh), SHIFT JIS is selected.
If n is 12 (0Ch or 3Ch), GB2312 is selected.
If n is 14 (0Eh or 3Eh), EUC-CN is selected.
If n is 21 (15h or 45h), CODEPAGE 862 is selected.

GS F9h 8 n

[Function]	Set and save ESC/POS ideogram mode.	
[Format]	ASCII	GS F9h 8 n
	Hexadecimal	1D F9 38 n
	Decimal	29 249 56 n
[Visibility]	Public	
[Range]	$0 \leq n \leq 3$	
[Default]	$n = 0$	
[Description]	If n is 0 (00h or 30h), UTF8 (Unicode) ideogram mode is selected.	
	If n is 1 (01h or 31h), ESC/POS Japanese ideogram mode is selected.	
	If n is 2 (02h or 32h), ESC/POS Simplified Chinese ideogram mode selected.	
	If n is 3 (03h or 33h), ESC/POS Traditional Chinese ideogram mode is selected.	

GS F9h C 00h

[Function]	Get printer current command set.	
[Format]	ASCII	GS F9h C 00h
	Hexadecimal	1D F9 43 00
	Decimal	29 249 67 0
[Description]	Return one byte with current command set. If returned byte is 0 (00h), printer is operating in ESC/Bema mode. If returned byte is 1 (01h), printer is operating in ESC/POS mode.	

GS F9h SP n

[Function]	Select printer operating mode of operation temporarily.	
[Format]	ASCII	GS F9h SP n
	Hexadecimal	1D F9 20 n
	Decimal	29 249 32 n
[Range]	$n = 0$; $n = 1$; $n = 48$; $n = 49$;	
[Description]	If n is 0 (00h or 30h), ESC/Bema is selected.	
	If n is 1 (01h or 31h), ESC/POS is selected.	
[Notes]	This command modifies printer flags but does not save the new values to the printer configuration memory. The new mode starts as the printer has been just initialized (ESC @ has been executed).	

GS F9h 1Fh 1

[Function]	Return to previously set mode of operation.	
[Format]	ASCII	GS F9h 1Fh 1
	Hexadecimal	1D F9 1F 31
	Decimal	29 249 31 49
[Description]	Configuration command used to put printer mode back to that used before issuing GS F9h SP n command. The previous mode re-starts as the printer has been just initialized (ESC @ has been executed).	

GS F9h - n

[Function] Set and save printer mode.
[Format] ASCII GS F9h – n
Hexadecimal 1D F9 2D n
Decimal 29 249 45 n
[Default] n = 0
[Description] Set printer priority to high quality of high speed.
n = 0 or 30h – normal.
n = 1 or 31h – high quality.
n = 2 or 32h – high speed.

GS F9h ! n

[Function] Set and save paper width.
[Format] ASCII GS F9h ! n
Hexadecimal 1D F9 21 n
Decimal 29 249 33 n
[Description] Set paper width as described in the table below:

n	Paper width (mm)	Printing width (mm)
00h	58	48
01h	76	72
02h	80	72
03h	80	76
04h	82.5	72
05h	82.5	76
06h	82.5	80

[Notes] This command has effect only when printer is in ESC/Bema operating mode. For ESC/POS mode paper width is always set to 80mm/73.5mm.

GS F9h , n

[Function] Enable/disable paper near-end sensor.
[Format] ASCII GS F9h , n
Hexadecimal 1D F9 2C n
Decimal 29 249 44 n
[Default] n = 1
[Description] Enable or disable paper near-end sensor (PNES). This setting is saved to configuration (non-volatile) memory.
n = 1 or 31h – enable PNES.
n = 0 or 30h – disable PNES.

GS F9h + n

[Function] Set and save printing intensity.
[Format] ASCII GS F9h + n
Hexadecimal 1D F9 2B n
Decimal 29 249 43 n
[Description] Obsolete. Kept here to maintain compatibility with earlier Bematech products.

GS FAh n

[Function] Set and save printer language.

[Format]

ASCII	GS FAh n
Hexadecimal	1D FA n
Decimal	29 250 n

[Description] Set printer language.
n = 0 or 30h – English
n = 1 or 31h – Portuguese
n = 2 or 32h – Spanish
n = 3 or 33h – German
n = 4 or 34h – Italian
n = 5 or 35h – French
n = 6 or 36h – Simplified Chinese
n = 7 or 37h – Traditional Chinese
n = 8 or 38h – Japanese

GS F9h ' n

[Function] Get printer information.

[Format]

ASCII	GS F9h ' n
Hexadecimal	1D F9 27 n
Decimal	29 249 39 n

[Description] Retrieve printer information according to values described in the following table:

n	Information	Data type	Return size
0, 30h	Product code ("MP-4200 TH")	ASCII string	10 bytes
1, 31h	Serial number	ASCII string	20 bytes
2, 32h	Manufacturing date	ASCII string	4 bytes
3, 33h	Firmware version	ASCII string	3 bytes
4, 34h	Reserved		
5, 35h	Manufacturing timestamp ("dd/mm/yy hh:mm:ss" format)	ASCII string	17 bytes
6, 36h	Reserved		
7, 37h	Reserved		
8, 38h	Interface type (0 = None; 1 = Serial DB-9; 2 = Serial DB-25; 3 = Ethernet, -1 = Unknown)	Integer	1 byte

GS F9h (0

[Function] Load default user configuration.

[Format]

ASCII	GS F9h (0
Hexadecimal	1D F9 28 30
Decimal	29 249 40 48

[Description] Reload all configurations from non-volatile memory and dipswitches.

GS F9h) 0

[Function] Print user configuration.

[Format]

ASCII	GS F9h) 0
Hexadecimal	1D F9 29 30
Decimal	29 249 41 48

[Description] Print on paper the current user configuration.

GS F8h 1

[Function] Printer extended status enquiry.

[Format]

ASCII	GS F8h 1
Hexadecimal	1D F8 31
Decimal	29 248 49

[Description] Issuing this command makes the printer to return five status bytes.

The first byte is the printer status:

7	6 – 5	4	3	2	1	0
1	BufStat	Wait	Offline	OVR	0	0

Bit 2: OVR (Overrun Error)
0 – Printer is ready to receive data.
1 – Printer is in overrun condition. If more data is received, it will be lost.

Bit 3: Offline.
0 – Printer is on-line.
1 – Printer is off-line.

Bit 4: Wait.
0 – Printer is printing (busy condition).
1 – Printer buffer is empty, waiting for more data or commands.

Bit 6 & 5: BufStat - Buffer status.
00 – Printer buffer empty.
01 – Printer buffer is under 1/3 of its capacity.
10 – Printer buffer is above 1/3 of its capacity.
11 – Printer buffer is beyond ¾ of its capacity.

The second byte is the off-line status:

7	6	5	4	3	2	1	0
Cover	Error	NoPaper	Drawer	0	PS	PNES	1

Bit 1: PNES – Paper Near-end Sensor
0 – Paper is not near the end of roll.
1 – Paper is near the end of roll.

Bit 2: PS – Paper sensor
0 – Printer has paper.
1 – Printer has no paper at all.

Bit 4: Drawer
0 – Drawer sensor is in low level (logical 0).
1 – Drawer sensor is in high level (logical 1).

Bit 5: NoPaper
0 – Printer has paper.
1 – Printer has no paper at all.

Bit 6: Error
0 – No error condition exist in the printer.
1 – At least one error condition is being reported by the printer.

Bit 7: Cover
0 – Printer cover is opened.
1 – Printer cover is closed.

The third byte is printer error status:

7	6	5	4	3	2	1	0
1	RE	NRE	1	CE	CA	0	0

Bit 2: CA – Cutter Absence
0 – Cutter present.
1 – Cutter absent.

Bit 3: CE – Cutter Error
0 – No error condition detected in the cutter.
1 – Cutter error condition detected.

Bit 5: NRE – Non-recoverable Error
0 – NRE condition not detected.
1 – NRE condition detected.

Bit 6: RE – Recoverable Error
0 – RE condition not present.
1 – RE condition present.

The fourth byte is printer head and command set status:

7	6	5	4	3	2	1	0
1	CMD	0	1	0	HOH	0	1

Bit 2: HOH – Head Overheat
0 – Print head has normal temperature.
1 – Print head is overheated.

Bit 6: CMD – Current command set
0 – ESC/Bema command set
1 – ESC/POS command set

The fifth byte is firmware version and revision:

7	6 – 4	3 – 0
0	Firmware version	Firmware revision

[Notes] Valid only when ethernet or wi-fi interface is being used.

GS F8h F

[Function] Printer reset.
[Format] ASCII GS F8h F
Hexadecimal 1D F8 46
Decimal 29 248 70
[Description] Force a hardware reset on the printer.

GS F9h D m n

[Function] Activate buzzer on cut.
[Format] ASCII GS F9h D m n
Hexadecimal 1D F9 44 m n
Decimal 29 249 68 m n
[Range] m = 0, 1, 2
0 ≤ n ≤ 255
[Default] m = 0, n = 2
[Description] Set buzzer activation on paper cut.
If m = 0 no buzzer is activated
If m = 1 the internal buzzer is activated
If m = 2 the external buzzer is activated
The activation time is n x 100ms.

GS F9h E n

[Function] Set DHCP usage.
[Format] ASCII GS F9h E n
Hexadecimal 1D F9 45 n
Decimal 29 249 69 n
[Range] 0 ≤ n ≤ 255
[Default] n = 0
[Description] If LSB of n is 1, the DHCP is enabled.

GS F7h BS NUL " $i_1...i_4$ $s_1...s_4$

[Function] Set IP address and subnet mask.
[Format] ASCII GS F7h BS NUL " $i_1...i_4$ $s_1...s_4$
Hexadecimal 1D F7 08 00 22 $i_1...i_4$ $s_4...s_4$
Decimal 29 247 8 0 34 $i_1...i_4$ $s_4...s_4$
[Description] Program a fixed IP address and subnet mask to the printer.
[Example] To define an IP address of 10.10.1.2 and a subnet mask of 255.255.0.0, the following command should be send:
1D F7 08 00 22 0A 0A 01 02 FF FF 00 00
[Notes] Valid only when Ethernet interface is being used.

FS ! n

[Function] Set print mode(s) for ideograms.
[Format] ASCII FS ! n
Hexadecimal 1C 21 n
Decimal 28 33 n
[Range] 0 ≤ n ≤ 255
[Default] n = 0
[Description] Set print mode for ideograms, using n as follows:

Bit	On/Off	Hex	Dec	Function
0, 1	-	-	-	Undefined.
2	Off	00	0	Double-width mode is OFF.
	On	04	4	Double-width mode is ON.
3	Off	00	0	Double-height mode is OFF.
	On	08	8	Double-height mode is ON.
4 – 6	-	-	-	Undefined.
7	Off	00	0	Underline mode is OFF.
	On	80	128	Underline mode is ON.

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

[References] FS -, FS W, GS !

FS &

[Function] Select ideogram mode.

[Format]

ASCII	FS &
Hexadecimal	1C 26
Decimal	28 38

[Description] Switch from codepage to ideogram mode.

[Notes]
- When ideogram code system is SHIFT JIS, the printer performs only internal flag operations. Printing is not affected.

  Behavior when in Japanese mode (JIS and SHIFT JIS):
- This command is effective only when the JIS code system is selected.
- When ideogram mode is selected, the printer processes all ideogram codes for each two bytes.
- Ideogram codes are processed in the order of the first byte and second byte.
- Ideogram mode is not selected when the power is turned on.
- Using FS C, the ideogram code system is selected.

  Behavior when in Chinese mode (EUC-CN and BIG-5E):
- When ideogram mode is selected, the printer checks whether the code is for ideograms or not, then processed the first byte and the second byte if the code is for ideograms.
- Ideogram codes are processed in the order of the first byte and second byte.
- Ideogram mode is selected when the power is turned on.

[References] FS ., FS C

FS - n

[Function] Turn underline mode on/off for ideograms.

[Format]

ASCII	FS - n
Hexadecimal	1C 2D n
Decimal	28 45 n

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

[Default] $n = 0$

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

n	Function
0, 48	Turn off underline mode for ideograms.
1, 49	Turn on underline mode for ideograms (1-dot thick).
2, 50	Turn on underline mode for ideograms (2-dot thick).

[Notes]
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by HT and 90° clockwise-rotated characters.
- After underline mode for ideograms is turned off by setting n to 0, underline printing is no longer performed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.
- The specified line thickness does not change even when the character size changes.
- It is possible to turn underline mode on or off using FS !, and the last received command is effective.

[Reference] FS !

FS .

[Function] Cancel ideogram mode.

[Format]

ASCII	FS .
Hexadecimal	1C 2E
Decimal	28 46

[Description] Cancel ideogram mode.

[Notes] Behavior in Japanese models (JIS and SHIFT JIS):
- This command is effective only when the JIS code system is selected.
- When the ideogram mode is not selected, all character codes are processed one byte at a time as ASCII code.
- Ideogram mode is not selected when the power is turned on.

Behavior in Chinese models (EUC-CN and BIG-5E):
- When the ideogram mode is not selected, all character codes are processed one byte at a time as ASCII codes.
- Ideogram mode is selected when the power is turned on.

[References] FS &, FS C

FS C n

[Function] Select ideogram code system.

[Format]

ASCII	FS C n
Hexadecimal	1C 43 n
Decimal	28 67 n

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

[Default] $n = 0$

[Description] Selects the ideogram code system, based on the following values of n:

n	Ideogram Code System
0, 48	JIS code
1, 49	SHIFT JIS code

[Notes]
- This command is effective only for Japanese model.
- In the JIS code system, the following codes are available:
  - Primary byte: 21h to 7Eh
  - Secondary byte: 21h to 7Eh
- In the SHIFT JIS code system, the following codes are available:
  - Primary byte: 81h to 9Fh and E0h to EFh.
  - Secondary byte: 40h to 7Eh and 80h to FCh.

FS S n1 n2

[Function] Set left- and right-side ideogram spacing.

[Format]

ASCII	FS S n_1 n_2
Hexadecimal	1C 53 n_1 n_2
Decimal	28 83 n_1 n_2

[Range] $0 \leq n_1 \leq 255$
$0 \leq n_2 \leq 255$

[Default] $n_1 = 0$, $n_2 = 0$

[Description] Set left- and right-side ideogram spacing using n1 and n2, respectively.

- When the printer model used supports GS P, the left-side character spacing is [n1 × horizontal motion unit], and the right-side character spacing is [n2 × horizontal motion unit].

[Notes]

- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- Horizontal motion unit can be set by GS P. The previously specified character spacing does not change, even if horizontal motion unit is changed by GS P.
- The value cannot be less than the minimum horizontal movement amount, and must be set in even units of the minimum horizontal movement amount.

[Reference] GS P

FS W n

[Function] Turn quadruple-size mode on/off for ideograms.

[Format]

ASCII	FS W n
Hexadecimal	1C 57 n
Decimal	28 87 n

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

[Default] $n = 0$

[Description] Turn quadruple-size mode on or off for ideograms.

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

[Notes]

- Only the least significant bit of n is used.
- In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.
- When quadruple-size mode is turned off using this command, the next characters are printed in normal size.
- If some of the characters on a single line are different in height, they're baseline aligned.
- FS ! and GS ! can be used to select and cancel quadruple-size mode, selecting double-height and double-width modes.

[References] FS !, GS !

GS F7h EOT NUL ' $g_1 \ldots g_4$

[Function] Set default gateway IP address

[Format]

ASCII	GS F7h EOT NUL ' g1...g4
Hexadecimal	1D F7 04 00 27 g1...g4
Decimal	29 247 4 0 39 g1...g4

[Default] 0.0.0.0

[Description] This command sets the default gateway IP address, where g1..g4 are the IP address octets.

[Notes] Valid only when ethernet or wi-fi interface is being used.

[Example] If you want to set the gateway address to 192.168.1.2 the command must be sent as 1D F7 04 00 27 C0 A8 01 02

GS F9h D m n

[Function] Activate buzzer on cut

[Format]

ASCII	GS F9h D m n
Hexadecimal	1D F9 44 m n
Decimal	29 249 68 m n

[Range] $0 \leq m \leq 2$

$0 \leq n \leq 255$

[Default] $m = 0$

$n = 200$

[Description]
- This command tells the printer to active the buzzer at the same time of a cut is being performed.
- The buzzer to be activated is defined by m as follow:

m	buzzer
0	none (deactivate previous settings)
1	internal
2	external

- (n × 100ms) defines the activation time

GS F9h E n

[Function] Set DHCP usage.

[Format]

ASCII	GS F9h E n
Hexadecimal	1D F9 45 n
Decimal	29 249 69 n

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

[Default] $n = 0$

[Description] If LSB of n is 1, the DHCP is enabled.

GS F9h S m $ip_1..ip_4$ n $c_1..c_n$

[Function] Set SNMP settings

[Format]

ASCII	GS F9h S m ip1..ip4 n c1..cn
Hexadecimal	1D F9 53 m ip1..ip4 n c1..cn
Decimal	29 249 83 m ip1..ip4 n c1..cn

[Range] $0 \leq n \leq 64$

[Default] $m = 0$

$n = 0$

[Description] This command sets SNMP trap parameters.
- When $m = 0$, SNMP traps are disabled.
- When $m \neq 0$, SNMP traps are enabled.
- n defines the SNMP community and is limited to 64 bytes.
- c1..cn define the community name.

[Notes] Valid only when ethernet or wi-fi interface is being used.

GS F9h W a s c m n $e_1..e_m$ $p_1..p_n$

[Function] Set Wi-Fi settings

[Format]

ASCII	GS F9h W a s c m n e1..em p1..pn
Hexadecimal	1D F9 57 a s c m n e1..em p1..pn
Decimal	29 249 87 a s c m n e1..em p1..pn

[Range]
a = 0, 1
s = 0, 1, 2, 3, 4
0 ≤ c ≤ 13
0 ≤ m ≤ 32
0 ≤ n ≤ 63

[Default]
a = 0
s = 0
c = 0
m = 0
n = 0

[Description] This command sets Wi-Fi communication settings.

- a defines the access mode as follow:

a	Access mode
0	Access Point
1	Ad-hoc

- s defines the security mode as follow:

s	Security mode
0	No security
1	WEP 64-bit
2	WEP 128-bit
3	WPA-TKIP personal
4	WPA2-AES personal

- c defines the channel to use. Use c = 0 when a = 0.
- m defines the size of the ESSID.
- n defines the size of the passphrase.
- e1..em define the ESSID.
- p1..pn define the passphrase.

[Notes] Valid only when wi-fi interface is being used.

Appendix I

Tables

Table 1 - Characters Per Line

58 mm

Characters per line	Character per inch	Command (after ESC @)
32	17	default
42	22	ESC SI or SI
16	8	ESC W 1
21	11	ESC SI or SI plus ESC W 1

76 or 80 mm

Characters per line	Character per inch	Command (after ESC @)
48	17	default
64	22	ESC SI or SI
24	8	ESC W 1
32	11	ESC SI or SI plus ESC W 1

Appendix II

Character Tables

ASCII

The codes from 00h up to 7Fh are shown below:

H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL							BEL	BS	HT	LF	VT	FF	CR	SO	SI
1		DC1	DC2	DC3	DC4				CAN			ESC				
2	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	A	b	c	d	e	f	g	h	i	j	k	/	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

Code Page 437

Code	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	|	├	╙	π	≤
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	2
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

Code Page 850

Code Page 850 character set is from 00h up to 7Fh and is the same characters as the ASCII table. Characters between 80h and FFh are available for use for international languages.

Code	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	´	p	Ç	É	á	⣿	└	ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	Đ	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	■
3			#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	É	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
6			&	6	F	V	f	v	ã	û	ª	Â	ã	Ì	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	Þ	¸
8			(	8	H	X	h	x	ê	ÿ	¿	©	╚	ï	þ	°
9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
D			-	=	M	]	m	}	ì	Ø	¡	¢	=	¦	Ý	²
E			.	>	N	^	n	~	Ä	?	«	¥	╬	Ì	—	■
F			/	?	O	_	o		Å	ƒ	»	┐	¤	■	´	

Code Page 858

Code	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	´	p	Ç	É	á	⣿	└	ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	Đ	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	■
3			#	3	C	S	c	s	â	õ	ú	│	├	Ë	Ò	¾
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á	┼	€	Õ	§
6			&	6	F	V	f	v	å	ú	ª	Â	ã	Ì	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	Þ	¸
8			(	8	H	X	h	x	ê	ÿ	¿	©	╚	ï	þ	°
9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
D			-	=	M	]	m	}	ì	Ø	¡	¢	=	¦	Ý	²
E			.	>	N	^	n	~	Ä	?	«	¥	╬	Ì	—	■
F			/	?	O	_	o		Å	ƒ	»	┐	¤	■	´	

Code Page 860

Code	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	ð	α	≡
1			!	1	A	Q	a	q	ü	À	í	▒	┴	Ð	ß	±
2			"	2	B	R	b	r	é	È	ó	▒	┬	Ê	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	│	├	Ë	π	≤
4			$	4	D	T	d	t	ä	õ	ñ	┤	─	È	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	σ	⌡
6			&	6	F	V	f	v	å	Ú	ª	Â	ã	í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	τ	≈
8			(	8	H	X	h	x	ê	Ì	¿	©	╚	ï	Φ	°
9			)	9	I	Y	i	y	ë	Õ	®	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			-	=	M	]	m	}	ì	Ù	¡	¢	═	¦	φ	2
E			.	>	N	^	n	~	Ä	Pts	«	¥	╬	Ì	ε	■
F			/	?	O	_	o		Å	Ó	»	┐	¤	▀	∩	

Code Page 866

Code Page 866 character set is from 00h up to 7Fh and is the same characters as the ASCII table. Characters between 80h and FFh are available for use for cyrillic languages (Russian, Bulgarian, Serbian, etc.).

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-		☺ 263A	☻ 263B	♥ 2665	♦ 2666	♣ 2663	♠ 2660	• 2022	◘ 25D8	○ 25CB	◙ 25D9	♂ 2642	♀ 2640	♪ 266A	♫ 266B	☼ 263C
1-	► 25BA	◄ 25C4	↕ 2195	‼ 203C	¶ 00B6	§ 00A7	▬ 25AC	↨ 21A8	↑ 2191	↓ 2193	→ 2192	← 2190	∟ 211F	↔ 2194	▲ 25B2	▼ 25BC
2-	0020	! 0021	“ 0022	# 0023	$ 0024	% 0025	& 0026	‘ 0027	(0028	) 0029	* 002A	+ 002B	, 002C	- 002D	. 002E	/ 0021
3-	0 0030	1 0031	2 0032	3 0033	4 0034	5 0035	6 0036	7 0037	8 0038	9 0039	: 003A	; 003B	< 003C	= 003D	> 003E	? 003F
4-	@ 0040	A 0041	B 0042	C 0043	D 0044	E 0045	F 0046	G 0047	H 0048	I 0049	J 004A	K 004B	L 004C	M 004D	N 004E	O 004F
5-	P 0050	Q 0051	R 0052	S 0053	T 0054	U 0055	V 0056	W 0057	X 0058	Y 0059	Z 005A	[005B	\ 005C	] 005D	^ 005E	_ 005F
6-	` 0060	a 0061	b 0062	c 0063	d 0064	e 0065	f 0066	g 0067	h 0068	l 006C	j 006A	k 006B	l 006C	m 006D	n 006E	o 006F
7-	p 0070	q 0071	r 0072	s 0073	t 0074	u 0075	v 0076	w 0077	x 0078	y 0079	z 007A	{ 007B	| 007C	} 007D	~ 007E	⌂ 2302
8-	А 0410	Б 0411	В 0412	Г 0413	Д 0414	Е 0415	Ж 0416	З 0417	И 0418	Й 0419	К 041A	Л 041B	М 041C	Н 041D	О 041E	П 041F
9-	Р 0420	С 0421	Т 0422	У 0423	Ф 0424	Х 0425	Ц 0426	Ч 0427	Ш 0428	Щ 0429	Ъ 042A	Ы 042B	Ь 042C	Э 042D	Ю 042E	Я 042F
A-	а 0430	б 0431	в 0432	г 0433	д 0434	е 0435	ж 0438	з 0437	и 0438	й 0439	к 043A	л 043B	м 043C	н 043D	о 043E	п 043F
B-	░ 2591	▒ 2592	▓ 2593	│ 2502	┤ 2524	╡ 2581	╢ 2582	╖ 2568	╕ 2555	╣ 2563	║ 2551	╗ 2557	╝ 255D	╜ 255C	╛ 255B	┐ 2510
C-	└ 2514	┴ 2534	┬ 252C	├ 251C	─ 2500	┼ 253C	╞ 255E	╟ 255F	╚ 255A	╔ 2554	╩ 2569	╦ 2566	╠ 2560	═ 2550	╬ 256C	╧ 2567
D-	╨ 2568	╤ 2564	╥ 2565	╙ 2559	╘ 2558	╒ 2552	╓ 2553	╫ 256B	╪ 256A	┘ 2516	┌ 250C	█ 2588	▄ 2584	▌ 258C	▐ 2590	▀ 2580
E-	р 0440	с 0441	т 0442	у 0443	ф 0444	х 0445	ц 0446	ч 0447	ш 0448	щ 0449	ъ 044A	ы 044B	ь 044C	э 044D	ю 044E	я 044F
F-	Ё 0401	ё 0451	Є 0404	є 0454	Ї 0407	ї 0457	Ў 040E	ў 045E	° 00B0	∙ 2219	· 00B7	√ 221A	№ 2116	¤ 00A4	■ 25A0	00A0

Appendix III

Transmission Status Identification

Because the specified status bits transmitted from the ESC/POS commands are fixed, the user can confirm the command to which the status belongs, as shown in the following table.

When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB. Otherwise, the status transmitted by using the GS r and the status of the second and following bytes of the ASB cannot be differentiated.

Transmission Status Identification

Command & Function	Status Reply
GS I	<0**0****>B
GS r	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0**1**10>B
ASB (1st byte)	<0**1**00>B
ASB (2nd to 4th bytes)	<0**0****>B

PROGRAMMER`S MANUAL

MP-4200 TH

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