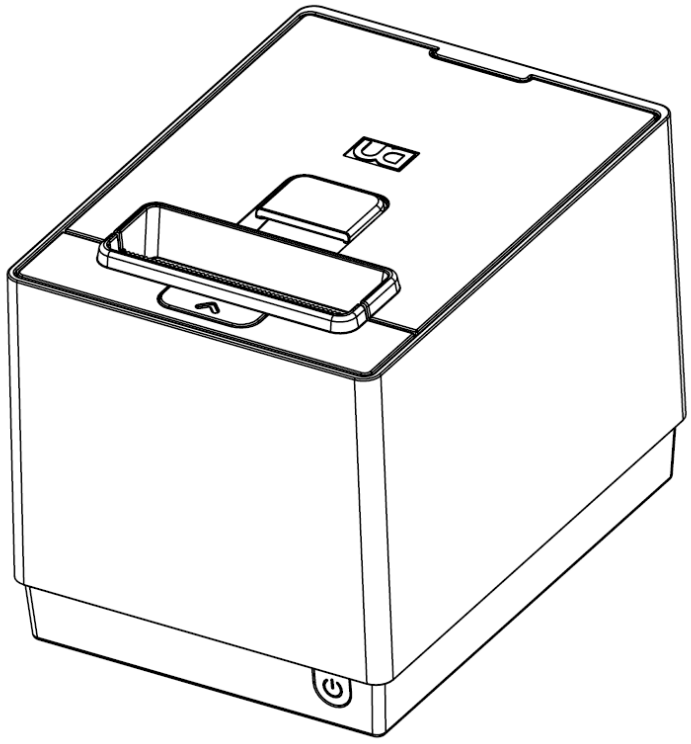
P1200 Standard POS Printer

Programming Manual

01750353820B



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General

1. Printer basic functions

1.1 General

Resolution	203.2 dpi x 203.2 dpi (8 dots/mm)	
Interface (communicate with a system)	USB Type-B 2.0 High Speed / Full Speed Printer class	
Emulation Mode	DN POS receipt ESC/POS	
Character set	SBCS CP437 (DOS USA),CP720(Arabic),CP737(Greek),CP775(Baltic), CP850 (DOS Latin 1), CP852 (DOS Latin 2), CP857(Turkish), CP858 (DOS Latin 1 + Euro), CP860 (DOS Portuguese), CP862 (DOS Israel), CP863 (DOS Fench Canadian), CP864 (DOS Arabic), CP865 (DOS Nordic), CP866 (DOS Russian), CP874 (ISO Thai),CP1250(Windows Central Europe) , CP1251(Windows Cyrillic),CP1252 (Windows Latin 1), CP1253(Windows Greek),CP1254(Windows Turkish),CP1255(Windows Hebrew), CP1256 (Windows Arabic),CP1257(Windows Latin),CP28591(ISO Latin1) CP28592(ISO Latin 2),CP28594(ISO Baltic),CP28596(ISO Arabic),CP28599(ISO Turkish),CP28605(ISO Latin9), Katakana, KZ1048(Kazakh) DBCS 932 (Japanese), 936 (Simplified Chinese), 949 (Korean), 950 (Traditional Chinese), GB18030[1] (Chinese), Unicode support (UTF-16)	
Receipt Printing Speed	Maximum 14 IPS (Inch Per Second) / Minimum 1.5 IPS Printing speed is defined according to print density.	
Character attribute	Double width , Double high ,rotate , under line, scalable, bold, superscript, italic, subscript, inverse image characters	
Character Cell Size **- SBCS Font A** **- SBCS Font B** **- DBCS**	 13(H) X 24(V) dots 10(H) X 24(V) dots 24(H) X 24(V) dots	
Column Width **- SBCS Font A** **- SBCS Font B** **- DBCS**	**80mm Paper width** 44 columns 57 columns 24 columns	**58mm Paper width** 31 columns 40 columns 17 columns
Printable Width **- SBCS Font A** **- SBCS Font B** **- DBCS** **- Graphics**	**80mm Paper width** 572 dots (71.57 mm) 570 dots (71.25 mm) 576 dots (72.07 mm) 576 dots (72.07 mm)	**58mm Paper width** 403 dots (50.37 mm) 400 dots (50.00 mm) 408 dots (51.00 mm) 408 dots (51.00 mm)
Print line height	Minimum 24 dots (8.46 LPI / Standard font mode)	

[1] CP GB18030 (Chinese font):
Double Byte :
80<First Byte<FF, 40<Second Byte<FF.
Four Byte:
If First Byte = 81, Second byte =39, EE<= Third Byte <= FE, 30 <=Fourth Byte <= 39.
If First Byte = 82, 30 <= Second byte <=35, 81<= Third Byte <= FE, 30 <= Fourth Byte <= 39.

1.2 Internal Buffers

1.2.1 RAM (Total Size: IRAM 1.5MB, DRAM 8MB)

Interface Receive Data Buffer	64 KB
Interface Send Data Buffer	1 KB
User-defined Logo Buffer	256 KB
Macro Buffer	2 KB

1.2.2 Flash Memory (Total Size: 8MB)

User-defined Logo area	256 KB
User-defined Character area	64 KB
User-defined Data area	64 KB
Macro area	2 KB

2. Summary of Option Interface

The printer initially has USB type-B interface as the primary interface.
It additionally allows an operator to install either RS232C interface card or Ethernet interface card as an option.
In order to make the option interface card available, the USB interface cable has to be disconnected.
It is because the option interface card is not activated if USB connection is established with a system. If USB interface is disconnected in this condition, the printer is automatically reset and the option interface card becomes available. In addition to this, if USB type-B is connected while the option interface is communicating with a system, the printer is reset and its control is changed to USB.

2.1 RS232C Interface

Protocol	DTR / DSR, XON / XOFF
Data Length	8, 7 bits
Stop Bit	1, 2 bits
Parity	Non, Even, Odd
Baud Rate	9600, 19200, 38400, 57600, 115200 bps

2.2 Ethernet Interface

Application Layer	TCP Socket, UDP Socket, SNMP, DHCP, HTTP
Transport Layer	TCP, UDP
Network Layer	IP, ICMP, ARP
Data Link Layer	CSMA/CD
Physical Layer	10BASE-t, 100BASE-TX (IEEE802.3 Conforming) Auto negotiation 10/100Mbps Full/Half Duplex

2.2.1 TCP Socket

It transfers printing commands and data, several status commands and those responses by direct socket communications.

Port number	9100 (Default)
Maximum simultaneous sessions	1
Maximum simultaneous connections	6
Time out	120 seconds (Default)

2.2.2 UDP Socket

It transfers real time commands and those responses.

Port number	3000 (Default)

2.2.3 SNMP

SNMP is used by SNMP manager to acquire the printer information and status from SNMP agent (Printer).

SNMP version	SNMP v1 (RFC1157) compliant
Transport protocol	UDP/IP
MIB support	Part of MIB-II (RFC1213) Part of HOST Resource MIB Part of Printer MIB
PDU support	Get Request Get Next Request Get Response Trap
Port number of Server	161
Port number for Trap transmit	162

2.2.4 DHCP

DHCP is used by DHCP client (Printer) to acquire IP address, Subnet mask and Gateway address from DHCP server.

Transport protocol	UDP/IP

2.2.5 HTTP

HTTP is used to configure the network setting by WEB Provision.

HTTP version	V1.1
Transport protocol	TCP/IP
Items to be able to configure	IP address Subnet mask Default Gateway DHCP DHCP address TCP max. connection Ethernet Physical LAN Speed LAN Real Time Command Protocol Link Down Timeout TCP idle Timeout TCP Port number UDP Port number SNMP Trap 1 SNMP Trap 2 SNMP Community (R/W) SNMP Trap 1 Community SNMP Trap 2 Community SNMP Trap 1 IP Address SNMP Trap 2 IP Address

Emulation

The printer supports the following commands.

Command sequence		Function	DN	ESC/ POS
Printer Function Commands				
DLE	10H	Clear Printer	Y	Y
EM or ESC i	19H or 1BH 69H	Perform Full Knife Cut	Y	Y
SUB or ESC m	1AH or 1BH 6DH	Perform Partial Knife Cut	Y	Y
ESC BEL	1BH 07H	Generate Tone	Y	Y
ESC @	1BH 40H	Initialize Printer	Y	Y
ESC c 4	1BH 63H 34H	Select Sensors to Stop Printing	Y	Y
ESC c 5	1BH 63H 35H	Enable or Disable Feed Button	Y	Y
ESC p	1BH 70H	Generate Pulse to Open Cash Drawer	Y	Y
GS V	1DH 56H	Select Cut Mode and Cut Paper	Y	Y
US t	1FH 74H	Print Configuration Form	Y	Y
ESC w n 7	1BH 77H 6BH 37H	Receipt shooting flush	Y	Y
ESC w n 8	1BH 77H 6BH 38H	Play melody	Y	Y
ESC w n c	1BH 77H 6BH 63H	Switch the printer into Sleep-Mode.	Y	Y
Vertical Positioning and Print Commands				
LF	0AH	Print and Feed Paper One Line	Y	Y
CR	0DH	Print and Carriage Return	Y	Y
DC4	14H	Feed n Print Lines	Y	Y
NAK	15H	Feed n Dot Rows	Y	Y
SYN	16H	Add n Extra Dot Rows	Y	Y
ETB	17H	Print	Y	Y
ESC 2	1BH 32H	Set Line Spacing to 1/6 Inch	Y	Y
ESC 3	1BH 33H	Set Line Spacing	Y	Y
ESC J	1BH 4AH	Print and Feed Paper	Y	Y
ESC d	1BH 64H	Print and Feed n Lines	Y	Y
GS P	1DH 50H	Set Horizontal and Vertical Minimum Motion Units	Y	Y
Horizontal Positioning Commands				
HT	09H	Horizontal Tab	Y	Y
ESC DC4	1BH 14H	Set Column	Y	N
ESC $	1BH 24H	Set Absolute Starting Position	Y	Y
ESC D	1BH 44H	Set Horizontal Tabs	Y	Y
ESC \	1BH 5CH	Set Relative Print Position	Y	Y
ESC a	1BH 61H	Select Justification	Y	Y
GS L	1DH 4CH	Set Left Margin	Y	Y
GS W	1DH 57H	Set Print Area Width	Y	Y

Command sequence		Function	DN	ESC/ POS
Print Characteristic Commands				
DC2	12H	Select Double-Wide Characters	Y	Y
DC3	13H	Select Single-Wide Characters	Y	Y
ESC DC2	1BH 12H	Select 90 Degrees Counter-Clockwise Rotated Print	Y	N
ESC SYN	1BH 16H	Select Pitch (Column Width)	Y	N
ESC SP	1BH 20H	Set Character Right-Side Spacing	Y	Y
ESC !	1BH 21H	Select Print Modes	Y	Y
ESC %	1BH 25H	Select or Cancel User-defined Character Set	Y	Y
ESC &	1BH 26H	Define User-defined Characters	Y	Y
ESC -	1BH 2DH	Select or Cancel Underline Mode	Y	Y
ESC :	1BH 3AH	Copy Character Set from ROM to RAM	Y	N
ESC ?	1BH 3FH	Cancel User-defined Characters	Y	Y
ESC E	1BH 45H	Select or Cancel Emphasized Mode	Y	Y
ESC G	1BH 47H	Select Double Strike	Y	Y
ESC I	1BH 49H	Select or Cancel Italic Print	Y	Y
ESC R or ESC t	1BH 52H or 1BH 74H	Select International Character Set	Y	Y
ESC V	1BH 56H	Select or Cancel 90 Degrees Clockwise Rotated Print	Y	Y
ESC r	1BH 72H	Select Print Color	Y	N
ESC {	1BH 7BH	Select or Cancel Upside & Down Printing Mode	Y	Y
GS !	1DH 21H	Select Character Size	Y	Y
GS B	1DH 42H	Select or Cancel White/Black Reverse Printing Mode	Y	Y
GS b	1DH 62H	Select or Cancel Font Smoothing	Y	Y
US ENQ	1FH 05H	Selects Superscript or Subscript Modes	Y	N
ESC +	1BH 2BH	Select or Cancel Unicode(UTF-16) Mode	Y	Y
Asian Character Command				
FS !	1CH 21H	Select print modes for Asian characters	Y	Y
FS &	1CH 26H	Select Asian character mode	Y	Y
FS -	1CH 2DH	Turn underline mode ON/OFF in Asian mode	Y	Y
FS .	1CH 2EH	Cancel Asian character mode	Y	Y
FS 2	1CH 32H	Define user-defined Asian characters	Y	Y
FS C	1CH 43H	Select Asian character code system	Y	Y
FS S	1CH 53H	Set Asian character spacing	Y	Y
FS W	1CH 57H	Set quadruple mode ON/OFF in Asian mode	Y	Y

Command sequence		Function	DN	ESC/ POS
Graphics Commands				
DC1 or GS 0x82	11H or 1DH 82H	Print Raster Graphics	Y	N
GS 0x83	1DH 83H	Print Color Raster Graphics	Y	N
ESC “BMP file”	1BH “BMP file”	Define Bitmap File as Logo	Y	N
ESC *	1BH 2AH	Select Bit Image Mode	Y	Y
ESC * 1	1BH 2AH 31H	Select bit-image mode - Line Graphics	Y	N
ESC * b	1BH 2AH 62H	Turn on/off TIFF compression	Y	N
ESC .	1BH 2EH	Print Advanced Raster Graphics	Y	N
ESC K	1BH 4BH	Select Single Density Graphics	Y	N
ESC Y	1BH 59H	Select Double-Density Graphics	Y	N
GS #	1DH 23H	Select the Current Logo	Y	Y
GS *	1DH 2AH	Define Bit Image as Logo	Y	Y
GS /	1DH 2FH	Print Current Logo	Y	Y
FS p	1CH 70H	Print Logo	N	Y
FS q	1CH 71H	Define Logo in Flash Memory	N	Y
US EOT	1FH 04H	Convert 6 Dots/mm Bitmap to 8 Dots/mm	Y	N
GS (L	1DH 28H 4CH	Transmit entire capacity of User-defined logo in Flash Memory	Y	Y
GS (L	1DH 28H 4CH	Transmit Remaining Size for User-defined Logo Area in Flash Memory	Y	Y
GS (L	1DH 28H 4CH	Transmit the key code for User-defined Logo in Flash Memory	Y	Y
GS (L	1DH 28H 4CH	Delete all Logo in Flash Memory	Y	Y
GS (L	1DH 28H 4CH	Delete User-defined Logo in Flash Memory	Y	Y
GS 8L	1DH 38H 4CH	Define Logo in Flash Memory by the key code	Y	Y
GS (L	1DH 28H 4CH	Print User-defined Logo in Flash Memory	Y	Y
GS (L	1DH 28H 4CH	Delete User-defined Logo in RAM	Y	Y
GS 8L	1DH 38H 4CH	Define Logo in RAM by the key code	Y	Y
GS (L	1DH 28H 4CH	Print User-defined Logo in RAM	Y	Y
GS (L	1DH 28H 4CH	Enable Watermark printing	Y	Y
GS (L	1DH 28H 4CH	Transmit Remaining Size for User-defined Logo Area	Y	Y
GS (L	1DH 38H 4CH	Store the graphics data in the print buffer	Y	Y
GS (L	1DH 28H 4CH	Print the graphics data in the print buffer	Y	Y
GS 0x84	1DH 84H	Download logo image	Y	N
FS (E	1CH 28H 45H	Cancel set values for top/bottom logo printing	Y	Y
FS (E	1CH 28H 45H	Transmits set values for top/bottom logo printing	Y	Y
FS (E	1CH 28H 45H	Set top logo printing	Y	Y
FS (E	1CH 28H 45H	Set bottom logo printing	Y	Y
FS (E	1CH 28H 45H	Make extended settings for top/bottom logo printing	Y	Y
FS (E	1CH 28H 45H	Enable/disable top/bottom logo printing	Y	Y
GS D	1DH 44H	Define Windows BMP graphics data in Flash Memory	Y	Y

GS D	1DH 44H	Define Windows BMP graphics data in RAM	Y	Y
Status Commands (Batch Mode)				
ESC u NULL	1BH 75H 00H	Transmit Peripheral Device Status	Y	Y
ESC v	1BH 76H	Transmit Printer Status	Y	Y
GS I	1DH 49H	Transmit Printer ID	Y	Y
GS I @	1DH 49H 40H	**Error! Reference source not found.**	Y	Y
GS g 0	1DH 67H 30H	Initialize maintenance counter	Y	Y
GS g 2	1DH 67H 32H	Transmit maintenance counter	Y	Y
GS r	1DH 72H	Transmit Status	Y	Y
US V	1FH 56H	Send Printer Firmware Version	Y	N
US z	1FH 7AH	Real time commands disabled	Y	N
US SUB 02	1FH 1AH 02H	Execute Head Failure Detection	Y	Y
US SUB 01	1FH 1AH 01H	Get Detail of Head Failure Detection	Y	Y
ESC [! t	1BH 5BH 21H 74H	Set control point	Y	N
Status Commands (Real Time)				
GS EOT or DLE EOT	1DH 04H or 10H 04H	Real Time Status Transmission	Y	Y
GS ETX or DLE ENQ	1DH 03H or 10H 05H	Real Time Request to Printer	Y	Y
DLE DC4	10H 14H	Generate pulse in real-time	N	Y
DLE DC4 or DLE SO	10H 14H or 10H 0EH	Execute power-off sequence	Y	Y
DLE DC4	10H 14H	Control Buzzer (Internal buzzer)	N	Y
ESC =	1BH 3DH	Select peripheral device	Y	Y
DLE DC4	10H 14H	Clear buffer(s)	N	Y
DLE EM	10H 19H	Extended Real-Time Status Transmission	Y	Y
GS ENQ	1DH 05H	Real Time Printer Status Transmission	Y	Y
GS z	1DH 7AH	LED Control Request	Y	Y
GS SUB	1DH 1AH	Real-Time Printer Maintenance	Y	Y

Command sequence		Function	DN	ESC/ POS
ASB				
GS a	1DH 61H	Enable/disable Automatic Status Back (ASB)	Y	Y
Barcode Commands				
GS H	1DH 48H	Select Printing Position of HRI Characters	Y	Y
GS f	1DH 66H	Select Pitch for HRI Characters	Y	Y
GS h	1DH 68H	Select Bar Code Height	Y	Y
GS k	1DH 6BH	Print Bar Code	Y	Y
GS k	1DH 6BH	Print Bar Code (2D)	Y	N
GS w	1DH 77H	**Error! Reference source not found.**	Y	Y
GS (k pL pH 30H 41H	1DH 28H 6BH pL pH 30H 41H	PDF417: Set the number of columns in the data region	Y	Y
GS (k pL pH 30H 42H	1DH 28H 6BH pL pH 30H 42H	PDF417: Set the number of rows	Y	Y
GS (k pL pH 30H 43H	1DH 28H 6BH pL pH 30H 43H	PDF417: Set the width of the module	Y	Y
GS (k pL pH 30H 44H	1DH 28H 6BH pL pH 30H 44H	PDF417: Set the row height	Y	Y
GS (k pL pH 30H 45H	1DH 28H 6BH pL pH 30H 45H	PDF417: Set the error correction level	Y	Y
GS (k pL pH 30H 46H	1DH 28H 6BH pL pH 30H 46H	PDF417: Select the options	Y	Y
GS (k pL pH 30H 50H	1DH 28H 6BH pL pH 30H 50H	PDF417: Print the symbol data in the symbol storage area	Y	Y
GS (k pL pH 30H 51H	1DH 28H 6BH pL pH 30H 51H	PDF417: Transmit the size information of the symbol data in the symbol storage area	Y	Y
GS (k pL pH 31H 41H	1DH 28H 6BH pL pH 31H 41H	QR Code: Select the model	Y	Y
GS (k pL pH 31H 43H	1DH 28H 6BH pL pH 31H 43H	QR Code: Set the size of module	Y	Y
GS (k pL pH 31H 45H	1DH 28H 6BH pL pH 31H 45H	QR Code: Select the error correction level	Y	Y
GS (k pL pH 31H 46H	1DH 28H 6BH pL pH 31H 46H	QR Code : Select encode mode.	Y	Y
GS (k pL pH 31H 50H	1DH 28H 6BH pL pH 31H 50H	QR Code: Store the data in the symbol storage area	Y	Y
GS (k pL pH 31H 51H	1DH 28H 6BH pL pH 31H 51H	QR Code: Print the symbol data in the symbol storage area	Y	Y
GS (k pL pH 31H 52H	1DH 28H 6BH pL pH 31H 52H	QR Code: Transmit the size information of the symbol data in the symbol storage area	Y	Y
GS (k pL pH 33H 43H	1DH 28H 6BH pL pH 33H 43H	2-dimensional GS1 DataBar: Set the width of the module	Y	Y
GS (k pL pH 33H 47H	1DH 28H 6BH pL pH 33H 47H	2-dimensional GS1 DataBar: GS1 DataBar Expanded Stacked maximum width setting	Y	Y
GS (k pL pH 33H 50H	1DH 28H 6BH pL pH 33H 50H	2-dimensional GS1 DataBar: Store data in the symbol storage area	Y	Y
GS (k pL pH 33H 51H	1DH 28H 6BH pL pH 33H 51H	2-dimensional GS1 DataBar: Print the symbol data in the symbol storage area	Y	Y

GS (k pL pH 33H 52H	1DH 28H 6BH pL pH 33H 52H	2-dimensional GS1 DataBar: Transmit the size information of the symbol data in the symbol storage area	Y	Y
GS (k pL pH 36H 42H	1DH 28H 6BH pL pH 36H 42H	DataMatrix: Set the symbol type, number of columns, number of rows	Y	Y
GS (k pL pH 36H 43H	1DH 28H 6BH pL pH 36H 43H	DataMatrix: Set the size of the module	Y	Y
GS (k pL pH 36H 50H	1DH 28H 6BH pL pH 36H 50H	DataMatrix: Store the data in the symbol storage area	Y	Y
GS (k pL pH 36H 51H	1DH 28H 6BH pL pH 36H 51H	DataMatrix: Print the symbol data in the symbol storage area	Y	Y
GS (k pL pH 36H 52H	1DH 28H 6BH pL pH 36H 52H	DataMatrix: Transmit the size information of the symbol data in the symbol storage area	Y	Y
GS p	1DH 70H	Select PDF 417 parameters	Y	N
Page Mode Commands				
FF	0CH	Print and Return to Standard Mode	Y	Y
FF	0CH	Print and feed marked paper to print starting position	Y	Y
CAN	18H	Cancel Print Data in Page Mode	Y	Y
ESC FF	1BH 0CH	Print Data in Page Mode	Y	Y
ESC L	1BH 4CH	Select Page Mode	Y	Y
ESC S	1BH 53H	Select Standard Mode	Y	Y
ESC T	1BH 54H	Select Print Direction in Page Mode	Y	Y
ESC W	1BH 57H	Set Printing Area in Page Mode	Y	Y
GS $	1DH 24H	Set Absolute Vertical Print Position in Page Mode	Y	Y
GS \	1DH 5CH	Set Relative Vertical Print Position in Page Mode	Y	Y
Macro Commands				
GS :	1DH 3AH	Start and Terminate Macro Definition	Y	Y
GS ^	1DH 5EH	Execute Macro	Y	Y

Command sequence		Function	DN	ESC/ POS
User Data Storage Commands				
ESC ‘	1BH 27H	Write User Defined Data	Y	N
ESC 4	1BH 34H	Read User Defined Data	Y	N
GS “	1DH 22H	Select Memory Type for User Defined Data	Y	Y
GS “ U	1DH 22H 55H	Flash Memory Allocation for User-defined Storage Area	Y	Y
GS @	1DH 40H	Erase User-defined storage area in Flash Memory	Y	Y
US 6	1FH 36H	Printer Setting Change	Y	Y
US DC2	1FH 12H	Read Printer Setting	Y	Y
US DC3	1FH 13H	LED Configuration	Y	Y
US DC4	1FH 14H	Read LED Configuration	Y	Y
GS (E	1DH 28H 45H	Change into the user setting mode	Y	Y
GS (E	1DH 28H 45H	End the user setting mode session	Y	Y
GS (E	1DH 28H 45H	Changes the memory switch.	Y	Y
GS (E	1DH 28H 45H	Transmits the host the value for the memory switch.	Y	Y
GS (E	1DH 28H 45H	Changes the customized setting values.	Y	Y
GS (E	1DH 28H 45H	Transmits the customized setting values.	Y	Y
GS (E	1DH 28H 45H	Sets communication condition of serial interface.	Y	Y
GS (E	1DH 28H 45H	Transmits communication condition of serial interface.	Y	Y
GS (E	1DH 28H 45H	Set Conditions for USB communication	Y	Y
GS (E	1DH 28H 45H	Transmit conditions for USB communication	Y	Y
GS (E	1DH 28H 45H	Set serial number	Y	Y
GS (E	1DH 28H 45H	Set production date	Y	Y
GS (E	1DH 28H 45H	Sets communication condition of Ethernet interface.	Y	Y
GS (E	1DH 28H 45H	Transmits communication condition of Ethernet interface.	Y	Y
GS (F	1DH 28H 46H	Set adjustment value(s)	Y	Y
GS 0x81	1DH 81H	Set paper type	Y	N
GS 0x8D	1DH 8DH	Text strike-through mode	Y	N
GS 0x9E	1DH 9EH	Download paper type description	Y	N
GS 0x9F	1DH 9FH	Return paper type description	Y	N
GS 0xA0	1DH A0H	Set temporary max target speed	Y	N
Flash Download Commands in IPL				
ESC [}	1BH 5BH 7DH	Switch to Flash Download Mode	Y	Y
GS STX	1DH 02H	Select Flash Memory Sector to Download	Y	Y
GS ACK	1DH 06H	Get Firmware Sector CRC	Y	Y
GS BEL	1DH 07H	Return IPL Firmware CRC	Y	Y
GS SI	1DH 0FH	Return Main Firmware CRC	Y	Y
GS DLE	1DH 10H	Erase Selected Flash Sector	Y	Y
GS DC1	1DH 11H	Download to Active Flash Sector	Y	Y

GS SP	1DH FFH	Reboot the Printer	Y	Y
Flash Download Commands in Main Firmware				
ESC [|	1BH 5BH 7CH	Flash Firmware	Y	Y
ESC [{	1BH 5BH 7BH	Activate Firmware in the alternative area	Y	Y
Diagnostics Commands				
GS d	1DH 64H 01H	**Error! Reference source not found.**	Y	Y
GS d	1DH 64H 05H	Dot Check pattern test	Y	Y
GS d	1DH 64H 15H	Sensor Calibration	Y	Y
GS d	1DH 64H 20H	Retrieve Detail Log	Y	Y

3. Command Descriptions

3.1 Printer Function Command

3.1.1 Clear Printer

ASCII: DLE
Hexadecimal: 10
Decimal: 16

This command is ignored.

3.1.2 Perform Full Knife Cut

ASCII: EM or ESC i
Hexadecimal: 19 or 1B 69
Decimal: 25 or 27 105

It fully cuts receipt paper.

3.1.3 Perform Partial Knife Cut

ASCII: SUB or ESC m
Hexadecimal: 1A or 1B 6D
Decimal: 26 or 27 109

It partially cuts receipt paper.

3.1.4 Generate Tone

ASCII: ESC BEL
Hexadecimal: 1B 07
Decimal: 27 7

It generates an audible tone.

3.1.5 Initialize Printer

ASCII: ESC @
Hexadecimal: 1B 40
Decimal: 27 64
Default:

It clears the print buffer and resets the printer settings to the condition when the printer is turned on. The user-defined logos, characters and data in RAM are cleared by this command. However the defined data in the flash memory is not cleared. The macro is also not cleared.
Real-time command enabled by “GS (D” is disabled
Automatic Status Back (ASB) is switched off.

3.1.6 Select Sensors to Stop Printing

ASCII: ESC c 4 *n*
Hexadecimal: 1B 63 34 *n*
Decimal: 27 99 52 *n*
Value of n:

Bit	Function	Off	On
0	To determine if it suspends printing when it detects paper low.	Ignore	Suspend
1	To determine if it suspends printing when it detects paper low.	Ignore	Suspend
2 - 7	(Reserved)	N/A	N/A

Default: 0

It enables or disables to suspend printing data if the paper low is detected while printing data. Once printing is suspended by this function, it does not resume printing until the certain paper is supplied. The settings of this command are effective until ESC @ is executed, the printer is reset, or the power is turned off.

3.1.7 Enable or Disable Feed Button

ASCII: ESC c 5 *n*
Hexadecimal: 1B 63 35 *n*
Decimal: 27 99 53 *n*
Value of *n*: 0 = Enable
1 = Disable
Default: 0 (Enable)

It enables or disables the paper feed button. If it is disabled, updating status in terms of the feed button pressed information (Real time status, Batch status) is also disabled.

3.1.8 Generate Pulse to Open Cash Drawer

ASCII: ESC p *n* p1 p2
Hexadecimal: 1B 70 *n* p1 p2
Decimal: 27 112 *n* p1 p2
Value of *n*: 0, 48 = Drawer1
1, 49 = Drawer 2
Value of *p1*: It defines the pulse on time. The unit is 2 milliseconds.
Value of *p2*: It defines the pulse off (delay) time before processing the next operation. The unit is 2 milliseconds.
Range of *p1,p2*: 0 - 255

It generates the pulse to open the cash drawer, and defines the pulse off time (delay) after the pulse. During the pulse off time, the printer does not process the next operation.

Formulas:
Pulse ON time = p1 x 2 milliseconds
Pulse OFF (Delay) time = p2 x 2 milliseconds

3.1.9 Select Cut Mode and Cut Paper

ASCII: GS V *m* or GS V *m n*
Hexadecimal: 1D 56 *m* or 1D 56 *m n*
Decimal: 29 86 *m* or 29 86 *m n*
Value of *m*: It defines the cut mode as follows.
Value of *n*: It defines the extra feed amount fed before cutting when *n* is 65 or 66.
Printer perform reverse feed after cut when n is 67.
The vertical motion unit (1/203 inch, 0.125 mm) is used to define the extra feed.

m	Feed and Cut Mode
0,48	Full cut (no extra feed). If the knife supports the partial cut only, it performs the partial cut.
1,49	Partial cut (no extra feed). If the knife supports the full cut only, it performs the full cut.
65	Full cut with extra feed. If the knife supports the partial cut only, it performs the partial cut.
66	Partial cut with extra feed. If the knife supports the full cut only, it performs the full cut.
67	Feeds the Paper forward to the cutting position, executes a full cut and feeds the paper backward to (cutting position – [n * vertical motion unit]).

Range of m: 0, 48; 1, 49;
65, 66,67 (used with *n*)

Range of n: 0 – 255

Exceptions:
If m is out of the specified range, the command is ignored.

3.1.10 Print Configuration Form

ASCII: US t
Hexadecimal: 1F 74
Decimal: 31 116
It prints the current printer configuration on the receipt.

If there are data in the print buffer, it firstly prints those data by force and then starts printing the configuration form. After printing the configuration form, it resets the printer attributes to the same condition as power-on.
Whenever the printer prints this form, it executes the thermal head failure detection, and this result is included in this form.

3.1.11 Receipt shooting flush

ASCII: ESC w n 7 n
Hexadecimal: 1B 77 6E 37 n
Decimal: 27 119 110 55 n
Range: n = 0,1,48,49.

Description : The Receipt shooting spooler is flushed with or without printer synchronization and the printer sends 1 byte back to the host after execution.
n specifies the function.

n	Function
0,48	Receipt shooting flush without printer synchronize
1,49	Receipt shooting flush with printer synchronize

Notes:
• The answer byte is fixed to 0x19.
• If the value of n is out of the specified range, this command is ignored.
• Receipt shooting flushing is executed only if Receipt shooting was enabled by memory switch (command GS (E).
• Printing of barcode PDF417 will stopped the printout for a short time (see GS k) Diebold Nixdorf specific function

3.1.12 Play melody

ASCII: ESC w n 8 **n m**
Hexadecimal: 1B 77 6E 38 **n m**
Decimal: 27 119 110 56 **n m**
Range: 1 <= **n** <= 6
0 <= **m** <= 1

Description : The Printer play the melody from specified with parameter **n**. Parameter **m** is the synchronism flag. In case **m** = 1, printer wait for previous melody finish.

n	Melody	Pattern
1	LOW_MID	1150 Hz / 100 ms 2300 Hz / 100 ms
2	LOW_MID_HIGH	1150 Hz / 100 ms 2300 Hz / 100 ms 3450 Hz / 100 ms
3	LOW_MID_LOW_MID	1150 Hz / 50 ms 2300 Hz / 50 ms

		1150 Hz / 50 ms 2300 Hz / 50 ms
4	SHORT_BEEP	2300 Hz / 40 ms
5	LONG_BEEP	2300 Hz / 150 ms
6	ST_MELODY	1150 Hz / 100 ms 2300 Hz / 100 ms 1150 Hz / 100 ms 2300 Hz / 100 ms 1150 Hz / 100 ms 2300 Hz / 100 ms

Notes: Diebold Nixdorf specific function

3.1.13 Switch the printer into Sleep-Mode

ASCII: ESC w n c
Hexadecimal: 1B 77 6E 63
Decimal: 27 119 110 99

Description : This function immediately starts the Sleep-Mode of the printer when the memory switch is enabled.

Notes: Diebold Nixdorf specific function.

3.2 Vertical Positioning and Print Commands

3.2.1 Print and Feed Paper One Line

ASCII: LF
Hexadecimal: 0A
Decimal: 10

It prints data in the print buffer and performs one line feed. LF command will be ignored after CR(if automatic linefeed enabled)

3.2.2 Print and Carriage Return

ASCII: CR
Hexadecimal: 0D
Decimal: 13

Perform one line feed as LF when “Automatic line feed” is Enable by “GS (E”.
Ignore this command when “Automatic line feed” is Disable.

3.2.3 Feed n Print Lines

ASCII: DC4 *n*
Hexadecimal: 14 *n*
Decimal: 20 *n*
Value of *n*: The number of lines to feed at current line height setting.
Range of n: 0 – 255

It feeds paper *n* lines based on the current line pitch. This command is ignored when the current line buffer is not empty.

3.2.4 Feed n Dot Rows

ASCII: NAK *n*
Hexadecimal: 15 *n*
Decimal: 21 *n*
Value of *n*: *n*/203 inch
Range of n: 0 – 255

It feeds paper *n* dot rows. This command is ignored when the current line buffer is not empty.

3.2.5 Add n Extra Dot Rows

ASCII: SYN *n*
Hexadecimal: 16 *n*
Decimal: 22 *n*
Value of *n*: *n*/203 inch
Range of n: 0 – 16

It adds n extra dot rows based on the character height to change the line space.
The following table indicates lines per inch according to the extra dot rows added by this command.

Extra Rows	Lines Per Inch	Dot Rows
0	8.47	24
1	8.13	25
2	7.81	26
3	**7.52**	**27**
4	7.25	28
5	7.00	29
6	6.77	30
7	6.55	31

8	6.35	32
9	6.16	33
10	5.98	34
11	5.81	35
12	5.64	36
13	5.5	37
14	5.3	38
15	5.2	39
16	5.1	40

3.2.6 Print

ASCII: ETB
Hexadecimal: 17
Decimal: 23

It prints data in the print buffer and performs one line feed. The printer behavior is same as LF (0x0A) command.

3.2.7 Set Line Spacing to 1/6 Inch

ASCII: ESC 2
Hexadecimal: 1B 32
Decimal: 27 50

It defines the default line spacing to 4.25 mm (6 lines per inch).

3.2.8 Set Line Spacing

ASCII: ESC 3 *n*
Hexadecimal: 1B 33 *n*
Decimal: 27 51 *n*
Value of n: *n* / 406 inches
Range of *n*: 0 - 255

It defines the default line spacing to n/406 inches.
The minimum line pitch depends on the font selected.
If the parameter n is less than 48, it is ignored.
If the vertical minimum motion unit is changed by Set Horizontal and Vertical Minimum Motion Units command (1D 50), the parameters of this command is interpreted accordingly.

3.2.9 Print and Feed Paper

ASCII: ESC J *n*
Hexadecimal: 1B 4A *n*
Decimal: 27 74 *n*
Value of *n*: *n* / 203 inches receipt
Range of *n*: 0 - 255

It prints data in the print buffer and feeds paper n dot rows. The minimum feed amount is 0.118 inches, so the valid minimum parameter n is 24. It feeds the minimum feed amount (n=24) by force if parameter n is less than 24 ~~except "0". If parameter n is set to "0", it just prints data in the print buffer without feeding.~~
If the vertical minimum motion unit is changed by Set Horizontal and Vertical Minimum Motion Units command (1D 50), the parameters of this command is interpreted accordingly.

3.2.10 Print and Feed n Lines

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

Value of *n*: Number of lines to be printed and feed.
Range of n: 1 – 255

It prints data in the buffer and feeds paper *n* lines according to the current line spacing.

3.2.11 Set Horizontal and Vertical Minimum Motion Units

ASCII: GS P *x y*
Hexadecimal: 1D 50 *x y*
Decimal: 29 80 *x y*
Value of *x*: Horizontal
Value of *y*: Vertical
Range of *x*: 0 – 255
Range of *y*: 0 – 255
Default: of *x*: 203
Default: of *y*: 203

It sets the horizontal and vertical motion units to 1/*x* inch and 1/*y* inch respectively.
When *x* or *y* is set to 0, the default setting for that motion unit is used.
The default horizontal motion is *x, y* = 203.

3.3 Horizontal Positioning Commands

3.3.1 Horizontal Tab

ASCII: HT
Hexadecimal: 09
Decimal: 9

It moves the print position to the next horizontal tab position set by the Set Horizontal Tab Positions (1B 44 *n1 n2* ... 00) command.

3.3.2 Set Column

ASCII: ESC DC4 *n*
Hexadecimal: 1B 14 *n*
Decimal: 27 20 *n*
Value of *n*: 1 - 44 (Standard, 80mm)
1 - 56 (Compressed, 80mm)
1 - 32 (Standard, 58mm)
1 - 42 (Compressed, 58mm)

It defines number of characters to be printed in the current line. In order to make it valid, it must be defined before the first character in the current line is processed. The definition is valid in the current line only.

3.3.3 Set Absolute Starting Position

ASCII: ESC $ *n1 n2*
Hexadecimal: 1B 24 *n1 n2*
Decimal: 27 36 *n1 n2*
Value of *n*: Number of dots to be moved from the beginning of the line.
Value of *n1*: Remainder after dividing *n* by 256.
Value of *n2*: Integer after dividing *n* by 256.

It moves the print position to the point defined (n1 + n2*256 dots) from the left edge of the print area. The definition is valid in the current line only.

Related Information:
This command is also available for the graphics data.

If the horizontal minimum motion unit is changed by Set Horizontal and Vertical Minimum Motion Units command (1D 50), the parameters of this command is interpreted accordingly.

3.3.4 Set Horizontal Tabs

ASCII: ESC D *n1 n2 ...nk* NUL
Hexadecimal: 1B 44 *n1 n2 ...nk* 00
Decimal: 27 68 *n1 n2 ...nk* 0
Value of *n*: The number of columns from the left edge of the print area
Range of *n*: $1 \le n1 \le n2 \le \ldots \le nk < 255$
Value of *k*: The number the horizontal tab position set by this command
Range of *k*: $0 \le k \le 32$
Default: n = 8, 16, 24, 32, 40, ... , 232, 240, 248

It sets the horizontal tab positions. This command does not move the current print position.
If n is not specified (1B 44 00), it clears all tabs.

3.3.5 Set Relative Print Position

ASCII: ESC \ *n1 n2*
Hexadecimal: 1B 5C *n1 n2*

Decimal: 27 92 *n1 n2*
Range of n: -32768 ≤ *n1* + *n2* x 256 ≤ 32767

It moves the print position to the relative position specified by ((*n1* + *n2* x 256) x (horizontal motion unit)) from the current print position.
The horizontal motion unit follows Set Horizontal and Vertical Minimum Motion Units (1D 50) command.

The positive number moves the print position to the right, the negative number moves to the left.

3.3.6 Select Justification

ASCII: ESC a *n*
Hexadecimal: 1B 61 *n*
Decimal: 27 97 *n*
Value of *n*: 0, 48 = Left Aligned
1, 49 = Center Aligned
2, 50 = Right Aligned
Range of *n*: 0 – 2, 48-50
Default: 0 (Left aligned)

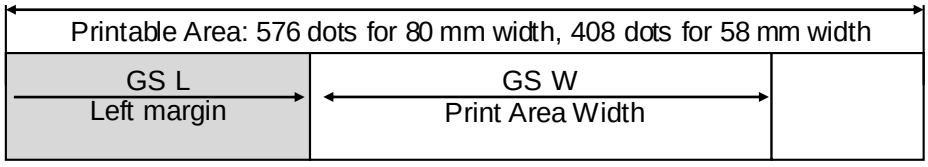
It specifies the alignment of the characters, graphics, logos, and bar codes on the receipt station.
The justification has no effect in page mode. If this command is processed in page mode, an internal flag is activated, and this flag is enabled when the printer returns to standard mode.

Exceptions:
The command is valid only when it is specified at the beginning of a line.

3.3.7 Set Left Margin

ASCII: GS L *nL nH*
Hexadecimal: 1D 4C *nL nH*
Decimal: 29 76 *nL nH*
Range of *nL*: 0 - 255
Range of *nH*: 0 - 255
Default: 80 mm paper width: 576 dots (the maximum printable area)
58 mm paper width: 408 dots (the maximum printable area)

It sets the left margin of the printing area to ((*n*L + *nH* x 256) x (horizontal motion unit)). The horizontal motion unit follows Set Horizontal and Vertical Minimum Motion Units (1D 50) command.
The maximum printable area is 576 dots. See the following diagram. If the left margin specified by this command exceeds the current printable area, it is ignored.



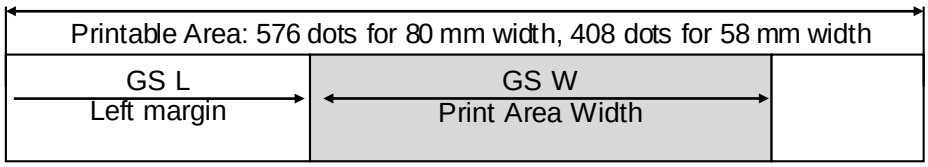
Exceptions:
The command is valid only when it is specified at the beginning of a line.
This command is available for the receipt station only.

3.3.8 Set Print Area Width

ASCII: GS W *nL nH*
Hexadecimal: 1D 57 *nL nH*
Decimal: 29 87 *nL nH*
Range of *nL*: 0 - 255
Range of *nH*: 0 - 255
Default: 80 mm paper width: 576 dots (the maximum printable area)

58 mm paper width: 408 dots (the maximum printable area)

It sets the print area to ((*n*L + *nH* x 256) x (horizontal motion unit)). The horizontal motion unit follows Set Horizontal and Vertical Minimum Motion Units (1D 50) command.
The maximum printable area is 576 dots. See the following diagram. If the left margin specified by this command exceeds the current printable area, the width of the maximum printable area is used.



Exceptions:
The command is valid only when it is specified at the beginning of a line.
This command is available for the receipt station only.

3.4 Print Characteristic Commands

3.4.1 Select Double-Wide Characters

ASCII: DC2
Hexadecimal: 12
Decimal: 18

It prints characters in double width. It automatically comes back to single-wide mode after one line data has been printed or Initialize Printer (1B 40) ~~/ Clear Printer (10) command~~ is received.

3.4.2 Select Single-Wide Characters

ASCII: DC3
Hexadecimal: 13
Decimal: 19

It prints characters in single (normal) width.

3.4.3 Select 90 Degrees Counter-Clockwise Rotated Print

ASCII: ESC DC2
Hexadecimal: 1B 12
Decimal: 27 18

It rotates characters 90 degrees counter-clockwise. The setting specified by this command is reset by the following commands.

- Initialize Printer (1B 40)
- Select or Cancel 90 Degrees Clockwise Rotated Print (1B 56)

3.4.4 Select Pitch (Column Width)

ASCII: ESC SYN *n*
Hexadecimal: 1B 16 *n*
Decimal: 27 22 *n*
Value of *n*: 0 = Standard Pitch
1 = Compressed Pitch
Default: 0 (Standard pitch)

It selects the character pitch.

Formulas:
The following table provides the maximum number of characters printed in one line in each CPI.

Pitch columns	Receipt Columns	CPI
Standard	44 for 80 mm paper	15.6
	31 for 58 mm paper	
Compressed	57 for 80 mm paper	20.3
	40 for 58 mm paper	

3.4.5 Set Character Right-Side Spacing

ASCII: ESC SP *n*
Hexadecimal: 1B 20 *n*
Decimal: 27 32 *n*
Value of *n*: 0 - 32
Default: 0

It sets the right side character spacing to [n x (horizontal or vertical motion units)]. Values for this command are set independently in Standard and Page Mode.
The horizontal and vertical motion unit follows Set Horizontal and Vertical Minimum Motion Units (1D

50) command.

In Standard Mode, the horizontal motion unit is used to specify the character right side spacing.
In Page Mode, either horizontal or vertical motion is used to specify the character right side spacing according to the print direction.

3.4.6 Select Print Modes[1]

ASCII: ESC ! *n*
Hexadecimal: 1B 21 *n*
Decimal: 27 33 *n*
Value of *n*: Print mode

Bit	Function	0	1
Bit0	Pitch	Standard pitch: 15.6 CPI 44 Col/Line (80 mm) 32 Col/Line (58 mm)	Compressed pitch: 20.3 CPI 56 Col/Line (80 mm) 42 Col/Line (58 mm)
Bit1,2	(Reserved)	Fixed to zero	NA
Bit3	Emphasized mode	Canceled	Set
Bit4	Double height	Canceled	Set
Bit5	Double Width	Canceled	Set
Bit6	(Reserved)	Fixed to zero	NA
Bit7	Underline mode	Canceled	Set

Default: 0

It defines the print modes to specify the several character attributes.

3.4.7 Select or Cancel Font Smoothing

ASCII: GS b *n*
Hexadecimal: 1D 62 *n*
Decimal: 29 98 *n*
Value of *n*: 0= Disable Font Smoothing
1= Enable Font Smoothing
Default: 0 (Disable Font Smoothing)

It disables or enables the font smoothing for characters enlarged by the following commands.
Select Double-Wide Characters (DC2)
Select Print Modes (ESC ! *n*)
Select Character Size (GS ! *n*)
Select print modes for Asian characters (FS ! *n*)
Set quadruple mode ON/OFF in Asian (FS W *n*)

[1] This command is supported for single-byte characters when Asian mode setting is "GB18030 ON"

3.4.8 Select or Cancel User-defined Character Set

ASCII: ESC % *n*
Hexadecimal: 1B 25 *n*
Decimal: 27 37 *n*
Value of *n*: 0= Code Page 437 / Code Page GB18030[1]
1= User-defined
Range of *n*: 0 – 1
Default: 0 (Code Page 437/ Code Page GB18030)

It selects or cancels the user-defined character set. If undefined character code is specified when it is in the user-defined character mode (n=1), the same character code of the previous code page will be

selected.

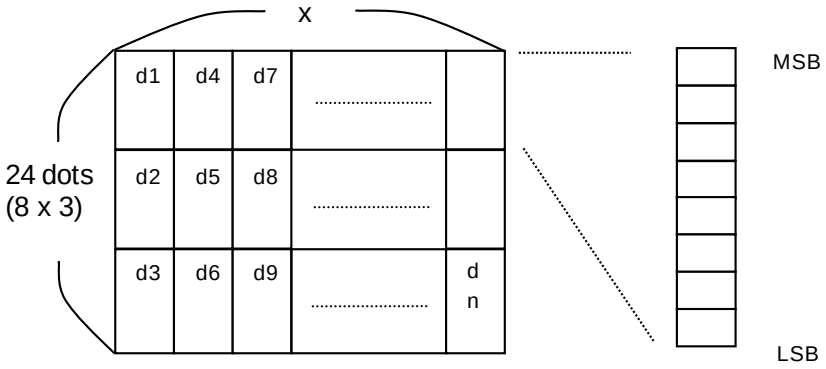
3.4.9 Define User-defined Characters

ASCII: ESC & 3 *c1 c2* [*x1 d1 d2 … d*(*x1* x 3)]…..[*xk d1 d2 … d*(*xk* x 3)]
Hexadecimal: 1B 26 3 *c1 c2* [*x1 d1 d2 … d*(*x1* x 3)]…..[*xk d1 d2 … d*(*xk* x 3)]
Decimal: 27 38 3 *c1 c2* [*x1 d1 d2 … d*(*x1* x 3)]…..[*xk d1 d2 … d*(*xk* x 3)]

c: ASCII character code of the first (c1) and the last (c2) character to define
c1, c2: $32 \le c1 \le c2 \le 255$
x: The number of dots in the horizontal direction of each user-defined character
1 ≤ x ≤ 16 (Font A), 1 ≤ x ≤ 10 (Font B)
d: The defined data of each user-defined character in the following format.
$0 \le d \le 255$
The total number of bytes of defined data for each character cell is (3 x x) bytes.
k: The number of user-defined characters defined by this command at the same time
$k = c2 - c1 + 1$

It defines the user-defined characters into RAM.
Characters defined are no longer available once the printer is turned off or Initialize printer command (1B 40) is processed.

Defining User-defined Characters



[1] Code Page 437 will be selected when Standard DBCS (CP 932, 936, 949, 950) is loaded. Code Page GB18030 will be selected when GB18030 DBCS is loaded

3.4.10 Select or Cancel Underline Mode

ASCII: ESC - *n*
Hexadecimal: 1B 2D *n*
Decimal: 27 45 *n*
Value of *n*: 0, 48 = Cancel underline mode
1, 49 = Select underline mode (1 dot height)
2, 50 = Select underline mode (2 dots height)
Default of *n*: 0 (Cancels underline mode)

It turns the underline mode on or off. Underline is not printed for spaces set by Horizontal Tab, Set Absolute Starting Position and Set Relative Print Position command.
The printer behavior of this command and Select Print Modes (Bit 7) is completely same.

3.4.11 Copy Character Set from ROM to RAM

ASCII: ESC : 0 0 0
Hexadecimal: 1B 3A 30 30 30
Decimal: **27 58 48 48 48**

This command is ignored.

3.4.12 Cancel User-defined Characters

ASCII: ESC ? *n*
Hexadecimal: 1B 3F *n*
Decimal: 27 63 *n*
Value of *n*: Specified character code
Range of *n*: 32 - 255

It cancels a user-defined character specified by *n*.

3.4.13 Select or Cancel Emphasized Mode

ASCII: ESC E *n*
Hexadecimal: 1B 45 *n*
Decimal: 27 69 *n*
Value of *n*: 0 (Bit0): Off
1 (Bit0): On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It turns the emphasize mode on or off. Only the lowest bit of *n* is effective.
The printer behavior of this command and Select Print Modes (Bit 3) is completely same.

Exceptions:
This command is not available for image printing.

3.4.14 Select Double Strike

ASCII: ESC G *n*
Hexadecimal: 1B 47 *n*
Decimal: 27 71 *n*
Value of *n*: 0 (Bit0): Off
1 (Bit0): On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It turns double strike mode on or off. Only the lowest bit of *n* is effective.
The printer behavior of this command is completely same as Select or Cancel Emphasized Mode command.

Exceptions:
This command is not valid for image printing.

3.4.15 Select or Cancel Italic Print

ASCII: ESC I *n*
Hexadecimal: 1B 49 *n*
Decimal: 27 73 *n*
Value of *n*: 0 (Bit0): Off
1 (Bit0): On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It turns the Italic print mode on or off. Only the lowest bit of *n* is effective.
Italic print mode is available for both resident fonts and user-defined characters.

3.4.16 Select International Character Set (DN Emulation)

ASCII: ESC R *n* or ESC t *n*
Hexadecimal: 1B 52 *n* or 1B 74 *n*
Decimal: 27 82 *n* or 27 116 *n*
Value of *n*: 0 = Code Page 437
1 = Code Page 850
2 = Code Page 852
3 = Code Page 860
4 = Code Page 863
5 = Code Page 865
6 = Code Page 858
7 = Code Page 866
8 = Code Page 1252
9 = Code Page 862
10 = Code page 737
11 = Code page 874
12 = Code page 857
13 = Code page 1251
14 = Code page 1255
15 = KZ 1048
16 = Code page 1254
17 = Code page 1250
18 = Code page 28591
19 = Code page 28592
20 = Code page 28599
21 = Code Page 28605
22 = Code page 864
23 = Code page 720
24 = Code page 1256
25 = Code page 28596
26 = KATAKANA
27 = Code page 775
28 = Code page 1257
29 = Code page 28594
30 = Code page 1253

Default: 0 (Code Page 437)

It selects the international character set. See Appendix 1 Character sets for the detail of each character

set.
There are two command codes to select the international character set and the functionality of both commands are completely same.

3.4.17 Select International Character Set.(ESCPOS emulation)

ASCII: ESC R *n*
Hexadecimal: 1B 52 *n*
Decimal: 27 82 *n*
Range: 0 ≤ *n* ≤ 17
Default: *n* = 0

It selects an international character set.
This command affect only specific ASCII code data (23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, 7E).

However, when the default of the international character set is changed with the customized value, <fn=05> **GS (E** <a = 9>, the default value becomes the one specified by the customized.

n	**Character Set**
0	USA
1	France
2	Germany
3	UK
4	Denmark Ⅰ
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark Ⅱ
11	Spain Ⅱ
12	Latin America
13	Republic of Korea
14	Slovenia/ Croatia
15	China
16	Reserved
17	Arabia

	ASCII code (Hex)													
Country	23	24	25	2A	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	%	*	@	[	\	]	^	`	{	|	}	~
France	#	$	%	*	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	%	*	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
U.K.	£	$	%	*	@	[	\	]	^	`	{	|	}	~
Denmark Ⅰ	#	$	%	*	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	%	*	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	%	*	@	°	\	é	^	ù	ä	ò	è	ì
Spain Ⅰ	Pt	$	%	*	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	%	*	@	[	¥	]	^	`	{	|	}	~

Norway	#	¤	%	*	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	%	*	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	%	*	á	¡	Ñ	¿	é	`	Í	ñ	ó	ú
Latin America	#	$	%	*	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	%	*	@	[	\	]	^		{	|	}	~
Slovenia/ Croatia	#	$	%	*	Ž	Š	Đ	Ć	Č	ž	š	đ	ć	č
China	#	$	%	*	@	[	\	]	^		{	|	}	~
Arabia	#	$	%	*	@	[	\	]	^	`	{	|	}	~

3.4.18 Select character code table(ESCPOS emulation)

ASCII: ESC t *n*
Hexadecimal: 1B 74 *n*
Decimal: 27 116 *n*
Value of *n*: 0 ≤ *n* ≤ 255

Default: 0 (Code Page 437)

It selects the international character set.
This command change character code data from 0x80 to0xFF.

n	Character code table
0	[PC437 (USA: Standard Europe)]
1	[Katakana]
2	[PC850 (Multilingual)]
3	[PC860 (Portuguese)]
4	[PC863 (Canadian-French)]
5	[PC865 (Nordic)]
11	Reserved
12	Reserved
13	[PC857(Turkish)]
14	[PC737(Greek)]
15	Reserved
16	[WPC1252]
17	[PC866 (Cyrillic #2)]
18	[PC852 (Latin 2)]
19	[PC858 (Euro)]
20	Reserved
21	Reserved
26	Reserved
30	Reserved
31	Reserved
32	[PC720 (Arabic)]
33	[PC775 (Baltic Rim)]
34	Reserved
35	Reserved
36	[PC862 (Hebrew)]
37	[PC864 (Arabic)]
38	Reserved
39	Reserved
40	Reserved
41	Reserved
42	Reserved

43	Reserved
44	Reserved
45	[WPC1250 (Central Europe)]
46	[WPC1251 (Cyrillic)]
47	[WPC1253 (Greek)]
48	[WPC1254 (Turkish)]
49	[WPC1255 (Hebrew)]
50	[WPC1256(Arabic)]
51	[WPC1257(Baltic)]
52	Reserved
53	[KZ-1048: Kazakhstan]
128	Code Page 932(Japanese)
129	Code Page 936(Simplified Chinese)
130	Code Page 949(Korean)
131	Code Page 950(Traditional Chinese)
255	Page 255 [User-defined page]

3.4.19 Select or Cancel Unicode(UTF-16) Mode

ASCII: ESC + *n*
Hexadecimal: 1B 2B *n*
Decimal: 27 43 *n*
Value of *n*: 0: International character set
1: Uni-code UTF-16)
Default: 0 (International character set)

It turns Unicode mode on or off.

Note: In Unicode mode, a character is specified in two bytes as follows.
<nL> <nH> (0 ≤ nL + nH x 256 ≤ 65535)

Exceptions:
All characters defined by Unicode are not fully supported.
Unicode supported for sigle byte character.

3.4.20 Select or Cancel 90 Degrees Clockwise Rotated Print

ASCII: ESC V *n*
Hexadecimal: 1B 56 *n*
Decimal: 27 86 *n*
Value of *n*: 0, 48 : Off
1, 2, 49, 50 : On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It rotates characters 90 degrees clockwise. Only the lowest bit of *n* is effective.
The setting specified by this command is valid until the printer is reset or the following command is received.

- Initialize Printer (1B 40)
- Select or Cancel Upside & Down Printing Mode (1B 7B)

3.4.21 Select Print Color

ASCII: ESC r *n*
Hexadecimal: 1B 72 *n*
Decimal: 27 114 *n*
Value of *n*: 0: Monochrome

1: Color
Default: 0: Monochrome

It turns the color mode on or off. Color printing is available when the printer is configured to the two color paper mode, and setting the two color thermal paper is required to actualize the color printing.

Limitation:
This command is not available to print multi-tone data.

3.4.22 Select or Cancel Upside & Down Printing Mode

ASCII: ESC { *n*
Hexadecimal: 1B 7B *n*
Decimal: 27 123 *n*
Value of *n*: 0 (Bit0): Off
1 (Bit0): On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It turns upside-down print mode on or off. Only the lowest bit of *n* is effective.
The upside-down print mode is also cancelled by Select 90 Degrees Counter-Clockwise Rotated Print (1B 12) command.

Exceptions:
The command is valid only when it is specified at the beginning of a line.

Summary of Rotated Printing
The following table shows the final output based on the combinations of Select or Cancel Upside & Down Printing Mode (1B 7B), Select or Cancel 90 Degrees Clockwise Rotated Print (1B 56) and Select 90 Degrees Counter-Clockwise Rotated Print (1B 12).

Upside Down (1B 7B)	Rotate Clockwise (1B 56)	Rotate Counter-Clockwise (1B 12)	Output
Off	Off	Off	ABC
Off	On	X	
On	Off	X	
On	On	X	
X	X	On	

3.4.23 Select Character Size

ASCII: GS ! *n*
Hexadecimal: 1D 21 *n*
Decimal: 29 33 *n*
Value of *n*: Bit 0 to 3 = Height magnification (0 – 7)
Bit 4 to 7 = Width magnification (0 – 7)
Range of *n*: 0 ≤ n ≤ 7, 16 ≤ n ≤ 23, 32 ≤ n ≤ 39, 48 ≤ n ≤ 55, 64 ≤ n ≤ 71, 80 ≤ n ≤ 87, 96 ≤ n ≤ 103, 112 ≤ n ≤ 119
Default: 0

It selects the character height by bits 0 to 3 and the character width by bits 4 to 7 as follows;

Character Width Selection

HEX	Decimal	Width
00	0	1 time (normal)
10	16	2 times
20	32	3 times
30	48	4 times
40	64	5 times
50	80	6 times

60	96	7 times
70	112	8 times

Character Height Selection

HEX	Decimal	Height
00	0	1 time (normal)
01	1	2 times
02	2	3 times
03	3	4 times
04	4	5 times
05	5	6 times
06	6	7 times
07	7	8 times

Exceptions:
This command is not effective for bar code HRI characters.

3.4.24 Select or Cancel White/Black Reverse Printing Mode

ASCII: GS B *n*
Hexadecimal: 1D 42 *n*
Decimal: 29 66 *n*
Value of *n*: 0 (Bit0): Off
1 (Bit0): On
Range of *n*: 0 – 255
Default: 0 (Bit0): Off

It turns White/Black reverse print mode on or off. Only the lowest bit of *n* is effective.
In this mode, print dots and non-print dots are reversed. It is also applied to character specified by Set Character Right-Side Spacing command (1B 20).
However, it is not applied to all vertical spacing such as line feed and horizontal spacing created by Horizontal Tab(09), Set Absolute Starting Position command (1B 24) and Set Relative Print Position command (1B 5C). It is also not effective for image data including logo and bar code with HRI characters. While the printer is printing data in white/black reverse print mode, the underline mode is temporarily disabled.

3.4.25 Selects Superscript or Subscript Modes

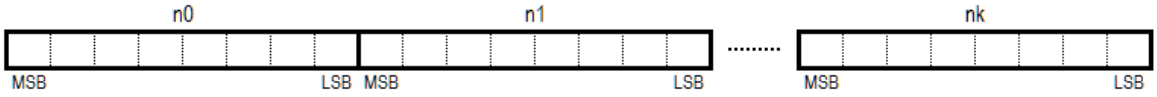
ASCII: US ENQ *n*
Hexadecimal: 1F 05 *n*
Decimal: 31 05 *n*
Value of *n*: 0 = Normal size
1 = Select subscript size
2 = Select superscript size
Default: 0 (normal size)

It turns superscript or subscript modes on or off.

3.5 Graphics Commands

3.5.1 Print Raster Graphics

ASCII: DC1 *n1 … nk* or GS 0x82 *n1 … nk*
Hexadecimal: 11 *n1 … nk* or 1D 82 *n1 … nk*
Decimal: 17 *n1 … nk* or 29 130 *n1 … nk*
Value of *n*: *n* specifies the defined data (Raster image format)
Range of *n*: 0 – 255
Value of *k*: *k* = 72 : 80mm, *k* = 53 : 58mm



It prints one raster image data.

3.5.2 Print Raster Color Graphics

ASCII: GS 0x83 *n1 … nk*
Hexadecimal: 1D 83 n1 … nk
Decimal: 29 131 n1 … nk
Value of *n*: *n* specifies the defined data (Raster image format)
Range of *n*: 0 – 255
Value of *k*: *k* = 144 : 80mm, *k* = 106 : 58mm

Description : For each printed dot row starting at the top left, two-part bit strings are used to define (in the first half), all dots that are of either color (i.e. not white). The second half string defines only the dots where the color is black. Thus all dots which are on in the first half string but not on in the second half string, select the secondary color. The parameter of this command is thus a string of bytes for one dot row with the same structure as defined for the thermal color format file given in the download color logo command. This command is used for printing a single raster of color graphics in real-time. Offsets, page and any other modes or overlays, including watermark, and current color do not apply to this command. A complete rendering of the intended final image has to be done by the application before sending the dot rows.

3.5.3 Define Bitmap File as Logo

ASCII: ESC (+*.BMP file)
Hexadecimal: 1B (+*.BMP file)
Decimal: 27 (+*.BMP file)
Value: Maximum width = 576
Maximum height = 512

It defines the monochrome BMP file as the user-defined logo into the target memory. As for the detail of logo definition sequence, please refer to “Select the Current Logo” command.

Exceptions:
BMP file images must be monochrome image format, otherwise it is ignored. If the logo size of this command is larger than the free space of the user-defined logo area of the flash memory, a logo is tentatively stored into RAM and this status is reflected to bit 3 in Flash memory user sector status (parameter n=4, 52) of Transmit Status(1D 72) command.

When this command is executed, all images stored in the user defined logo area of the flash memory / RAM defined by Define Logo in Flash Memory by the key code command or Define Logo in RAM by the key code command are erased.

3.5.4 Select Bit Image Mode

ASCII: ESC * *m n1 n2 d1 … dn*
Hexadecimal: 1B 2A *m n1 n2 d1 … dn*
Decimal: 27 42 *m n1 n2 d1 … dn*

It prints the bit image data defined by "*d*" according to the mode specified by m as follows.

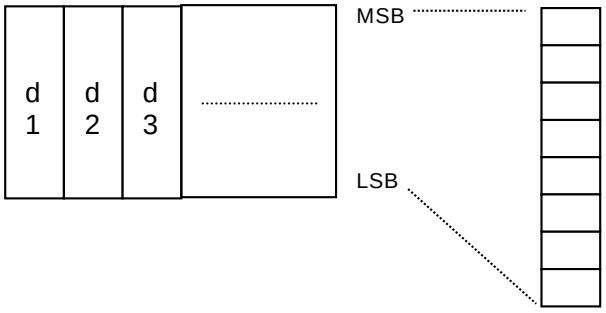
Values:

m	**Mode**	**Vertical direction**	**Horizontal direction**	**No. of Dots/Line**
0	8 Dot Single Density	8 (68DPI)	0-288 (101DPI, 80mm) 0-212 (101DPI, 58mm)	8x288 (80 mm) 8x212 (58 mm)
1	8 Dot Double Density	8 (68DPI)	0-576 (203DPI, 80mm) 0-424 (203DPI, 58mm)	8x576 (80 mm) 8x424 (58 mm)
32	24 Dot Single Density	24 (203DPI)	0-288 (101DPI, 80mm) 0-212 (101DPI, 58mm)	24x288 (80 mm) 24x212 (58 mm)
33	24 Dot Double Density	24 (203DPI)	0-576 (203DPI, 80mm) 0-424 (203DPI, 58mm)	24x576 (80 mm) 24x424 (58 mm)

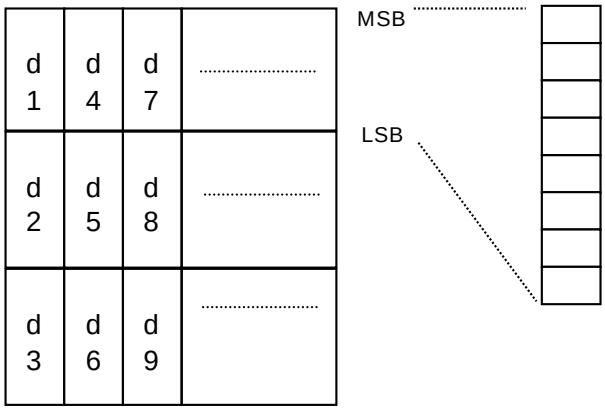
***n* (8 Dot Single Density Mode)**	**n (24 dot Single Density Mode)**	***d***
n1 + (256 x *n2*)	3 x [*n1* + (256 x *n2*)]	Number of Bytes of Data

Formulas:
8 Dot Single Density *n1* + (256 x *n2*)
24 Dot Single Density 3 x [*n1* + (256 x *n2*)]

8 Dot Single Density Mode



24 Dots Single Density Mode – Receipt Only



3.5.5 Select bit-image mode - Line Graphics

ASCII: ESC * 1 *n1 n2 d1 ... dn*
Hexadecimal: 1B 2A 31 *n1 n2 d1 ... dn*
Decimal: 27 42 49 *n1 n2 d1 ... dn*

Description: Selects a bit-image mode for a single line graphics

Notes:

• The command is enabled only when input at the beginning of the line.

• [d] contains nL + 256 * nH data byte and contains the pixel information beginning with the actual position.

• The MSB of the first byte corresponds to the first pixel (on the left side) and the LSB of the last byte corresponds to the last pixel (on the right side).

• If a data bit is set the corresponding pixel is switched on.

• If the number of columns determined in this way is smaller than the printing area, the remaining pixels are filled with zeros.

• If the number of columns determined in this way is larger than the printing area, the extra data bytes have no effect and are ignored.

• After the graphics has been printed, the printer returns to the normal data processing mode.

• After the graphics has been printed, the cursor is at the print starting position.

• The typical data length is 72 bytes (= 576 dots). If the data length is greater than 72 bytes, only 72 bytes are printed but the remaining bytes are read and deleted.

• The driver has to send 148 nullbytes to the printer before the printer is opened by the

application. Thus it is guaranteed that the printer has left the graphics function even if the graphics data stream was interrupted.

• If two-color paper is selected, two lines will be merged to one line. The first line defines the secondary color (i.e. red) and second line defines the primary color (black). is the For each printed dot row starting at the top left, two-part bit strings are used to define (in the first half), all dots that are of either color (i.e. not white). The second half string defines only the dots where the color is black. Caution: If two-color paper is selected, two lines for one line are exepted. Der internal Buffer collects 256 lines. If one line missed, the whole buffer will be restrained until the lost line or another command follows.

• If the compression bit is set by ESC * b m.

• If decompression activated, data bit will be decompressed with TIFF 4.0 Packbits Decompression.

• TIFF 4.0 Compression pseudo code:

```
for (all packed bytes)
{
   n = next byte;
   if (0 ≤ n ≤ 127)
        Take on the next n+1 byte directly;
   else          // -128 ≤ n ≤ -1
        Copy the next byte (-n+1)-times;
}
```

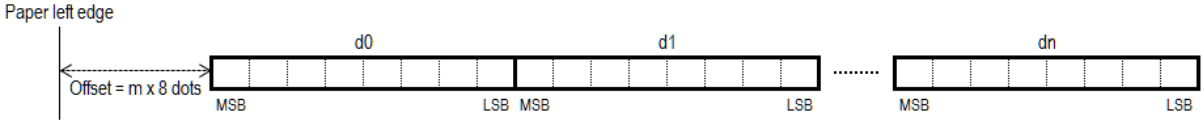
3.5.6 Turn on/off TIFF compression

ASCII: ESC * b m n
Hexadecimal: 1B 2A 62 *m n*
Decimal: 27 42 98 m n
Range: n = 0,2,48,50
Default: n = 0
Description: Turns the TIFF compression on (n = 2, 50) or off. (n = 0, 48).

Note: Decompression is used by ESC * 1
Decompression used TIFF 4.0 Packbits Decompression

3.5.7 Print Advanced Raster Graphics

ASCII: ESC . *m n rl rh d1…dn*
Hexadecimal: 1B 2E *m n rl rh d1…dn*
Decimal: 27 46 *m n rl rh d1…dn*
Value of *m*: Horizontal offset from left margin = 8 x m dots
Value of *n*: Number of data bytes that compose the raster
Value of *r*: Number of raster lines (256 x *rh* + *rl)*
Value of *d*: *d1 … dn*
Range: 0 ≤ *m, n* ≤ 72 (80mm), 0 ≤ *m, n* ≤ 53 (58mm)
0 ≤ *r* ≤ 65536
0 ≤ *d1 … dn* ≤ 255



It prints the raster graphic data specified by *"d"* with the offset value specified by *"m"*.

Exceptions:
Advanced Raster graphics is not available in Page Mode.

3.5.8 Select Single Density Graphics

ASCII: ESC K *n1 n2 d1 … dn*
Hexadecimal: 1B 4B *n1 n2 d1 … dn*
Decimal: 27 75 *n1 n2 d1 … dn*
Values:

n	***d***
[*n1* + (256 x *n2*)]	Number of Bytes of Data

It prints the bit image data defined by "*d*" in 8 dots single density mode. The usage of this command is completely same as 8 Dot Single Density Mode (*m*=0) of Select Bit Image Mode (1B 2A *m n1 n2 d1 … dn*) command.

3.5.9 Select Double-Density Graphics

ASCII: ESC Y *n1 n2 d1 … dn*
Hexadecimal: 1B 59 *n1 n2 d1 … dn*
Decimal: 27 89 *n1 n2 d1 … dn*
Values:

n	***d***
[*n1* + (256 x *n2*)]	Number of Bytes of Data

It prints the bit image data defined by "*d*" in 8 dots double density mode. The usage of this command is completely same as 8 Dot Double Density Mode (*m*=1) of Select Bit Image Mode (1B 2A *m n1 n2 d1 … dn*) command.

3.5.10 Print raster bit image

ASCII: GS v 0 m xL xH yL yH d1…dk
Hexadecimal: 1D 76 30 m xL xH yL yH d1…dk
Decimal: 29 118 48 m xL xH yL yH d1…dk
Value of *xL, xH*: xL, xH specify the number of bytes in the horizontal direction as (xL + xH x 256)
Value of *yL, yH*: yL, yH specify the number of dots in the vertical direction as (yL + yH x 256)
Value of d: d specifies the defined data (raster format)
Range: 0 ≤ m ≤ 3, 48 ≤ m ≤ 51
1 ≤ (xL + xH x 256) ≤ 65535 (0 ≤ xL ≤ 255, 0 ≤ xH ≤ 255)
1 ≤ (yL + yH x 256) ≤ 2303 (0 ≤ yL ≤ 255, 0 ≤ yH ≤ 8)
0 ≤ d ≤ 255
k = (xL + xH x 256) x (yL + yH x 256)

Value and Range of m:

m	**Function**
0, 48	Normal
1, 49	Double Width
2, 50	Double Height
3, 51	Quadruple

It prints a raster bit image using the mode specified by m.

3.5.11 Select the Current Logo

ASCII: GS # *n*
Hexadecimal: 1D 23 *n*
Decimal: 29 35 *n*
Value of *n*: Logo ID

Range of *n*: 0 – 255

It selects the current user-defined logo according to ID specified by "*n*" when a user defines a logo or prints a logo.

1. **Logo definition**

Whenever a user defines a logo, first of all, the logo ID has to be specified by this command so that the logo is defined with this ID. The sequence is as follows.

1) Select the current logo with ID by this command
2) Specify the target memory (RAM or Flash memory) to define the current logo by Select Memory Type for User Defined Data(1D 22 n) command
3) Define the current logo by either Define Bitmap File as Logo(1B + BMP file) command or Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command

If there is the existing logo with same ID already, the new logo replaces it, and the old logo is deactivated. The deactivated logo data is not erased from the user-defined logo area.

2. **Logo print**

When a user prints a logo, the logo ID that user wants to print has to be specified by this command. The sequence is as follows.

1) Select the current logo with ID by this command
2) Print the logo by Print Current Logo (1D 2F *m*) command

The current logo selected is not changed either until the different ID is specified by this command or the printer is turned off. The default ID after power on is zero.

Related Information:

Select Memory Type for User Defined Data (1D 22 n)
Print Current Logo (1D 2F m)
Define Bitmap File as Logo (1B + BMP file) command
Define Bit Image as Logo (1D 2A n1 n2 d1 … dn) command
Erase User-defined storage area in Flash Memory (1D 40 n)

3.5.12 Define Bit Image as Logo

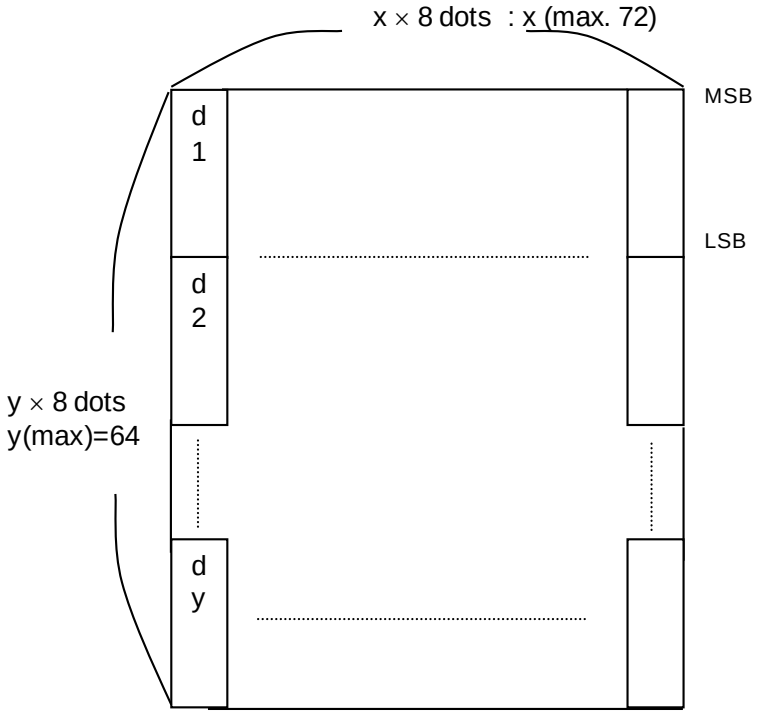
ASCII: GS * *n1 n2 d1 … dn*
Hexadecimal: 1D 2A *n1 n2 d1 … dn*
Decimal: 29 42 *n1 n2 d1 … dn*
Value of *n1*: See the following table.
Value of *n2*: See the following table.
Value of *d*: See the following table.

Value of *n1*	Value of *n2*	Value of *d*
1 – 80 (8 x *n1*: Number of Horizontal dots)	1 – 64 (Number of Vertical Bytes)*	Bytes of Data (Printed down, then across)

The number of bytes sent is calculated by the following formula:
n = 8 x *n1* x *n2 (1* ≤ *n1* x *n2* ≤ 5120).

It defines the user-defined logo into the target memory in the same manner as Define Bitmap File as Logo (1B+BMP file) command. As for the detail of logo definition sequence, please refer to “Select the Current Logo” command.

Format of the downloaded bit image:



Exceptions:
If the logo size of this command is larger than the free space of the user-defined logo area of the flash memory, a logo is tentatively stored into RAM and this status is reflected to bit 3 in Flash memory user sector status (parameter n=4, 52) of Transmit Status(1D 72) command.

When this command is executed, all images stored in the user defined logo area of the flash memory / RAM defined by Define Logo in Flash Memory by the key code command or Define Logo in RAM by the key code command are erased.

In RS232C interface, DSR signal is activated (ON) while writing logo data into the flash memory.

3.5.13 Print Current Logo

ASCII: GS / m
Hexadecimal: 1D 2F m
Decimal: **29 47 m**
Value and Range of m:

Value of *m*	Print Mode	Vertical DPI	Horizontal DPI
0,48	Normal	203	203
1,49	Double Width	203	101
2,50	Double Height	101	203
3,51	Quadruple	101	101

It prints the current logo. As for the detail of logo definition sequence, please refer to “Select the Current Logo” command.

3.5.14 Print Logo

ASCII: FS p *n m*
Hexadecimal: 1C 70 *n m*
Decimal: 28 112 *n m*
Value of n: Logo ID
Range of n: 0 - 255
Value and Range of m:

Value of *m*	Print Mode	Vertical DPI[1]	Horizontal DPI[1]
0, 48	Normal	203	203
1, 49	Double Width	203	101
2, 50	Double Height	101	203
3, 51	Quadruple	101	101

It prints the logo specified by *n* in the density specified by *m*.
As for the detail of logo definition sequence, please refer to “Select the Current Logo” command.

3.5.15 Define Logo in Flash Memory

ASCII: FS q n [xL xH yL yH d1…dk] 1…[xL xH yL yH d1… dk]n
Hexadecimal: 1C 71 n [xL xH yL yH d1…dk] 1…[xL xH yL yH d1… dk]n
Decimal: 28 113 n [xL xH yL yH d1…dk] 1…[xL xH yL yH d1… dk]n
Value of *xL, xH*: xL, xH specify the number of bytes in the horizontal direction as (xL + xH x 256)
Value of *yL, yH*: yL, yH specify the number of dots in the vertical direction as (yL + yH x 256)
Value of d: d specifies the defined data (raster format)
Range: $1 \le n \le 255$
$1 \le (xL + xH \times 256) \le 1023$ $(0 \le xL \le 255, 0 \le xH \le 3)$
$1 \le (yL + yH \times 256) \le 288$ $(0 \le yL \le 255, yH = 0, 1)$
$0 \le d \le 255$
$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
Value of n: Logo number
e.g. n=3, three logo images are defined and each logo number is 1, 2 and 3.

It defines logos images specified by *n* in the flash memory. Logos defined by this command are printed by Print Logo command (1C 70) according to logo number “n”.

[1] Dot density measured in dots per inch

3.5.16 Convert 6 Dots/mm Bitmap to 8 Dots/mm

ASCII: US EOT *n*
Hexadecimal: 1F 04 *n*
Decimal: 31 04 *n*
Value of *n*: 0 = off
1 = on
Default: 0 (Off)

It converts 6 dots/mm image data to 8 Dots/mm. Once it is enabled, all image data such as logos and graphics are expanded horizontally and vertically to emulate its size on a 6 dot/mm printer. It also emulates the horizontal specified by the horizontal positioning commands.

3.5.17 Transmit entire capacity of User-defined logo in Flash Memory

ASCII: GS (L pL pH m fn
Hexadecimal: 1D 28 4C pL pH m fn
Decimal: 29 40 76 pL pH m fn
Range of pL,pH: (pL + pH x 256) = 2 (pL = 2, pH = 0)

ASCII: GS 8 L p1 p2 p3 p4 m fn
Hexadecimal: 1D 38 4C p1 p2 p3 p4 m fn
Decimal: 29 56 76 p1 p2 p3 p4 m fn
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 2 (p1 =2 , p2 = 0, p3 = 0, p4 = 0)

Value of m: m = 48
Value of fn: fn = 0, 48

It transmits the entire capacity of the Flash Memory area (number of bytes)

Response format:
The decimal value is converted to text data and sent starting from the high order end.
(Example: 123456 byte -> 0x37 0x30 0x31 0x32 0x33 0x34 0x35 0x36 0x00)

Response	Hex	Decimal	Data
Header	37 H	55	1 byte
Identifier	30 H	48	1 byte
Data	30 H to 39H	48 to 57	1 to 8 byte
NUL	00 H	0	1 byte

3.5.18 Transmit Remaining Size for User-defined Logo Area in Flash Memory

ASCII: GS (L pL pH m fn
Hexadecimal: 1D 28 4C pL pH m fn
Decimal: 29 40 76 pL pH m fn
Range of pL,pH: (pL + pH x 256) = 2 (pL = 2, pH = 0)

ASCII: GS 8 L p1 p2 p3 p4 m fn
Hexadecimal: 1D 38 4C p1 p2 p3 p4 m fn
Decimal: 29 56 76 p1 p2 p3 p4 m fn
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 2 (p1 =2 , p2 = 0, p3 = 0, p4 = 0)

Value of m: m = 48
Value of fn: fn = 3,51

It transmits the number of bytes of remaining memory (unused area) in the Flash memory area.

Response format:
The decimal value is converted to text data and sent starting from the high order end.
(Example: 123456 byte -> 0x37 0x30 0x31 0x32 0x33 0x34 0x35 0x36 0x00)

Response	Hex	Decimal	Data
Header	37 H	55	1 byte
Identifier	31 H	49	1 byte
Data	30 H to 39H	48 to 57	1 to 8 byte
NUL	00 H	0	1 byte

3.5.19 Transmit Remaining Size for User-defined Logo Area in RAM

ASCII: GS (L pL pH m fn
Hexadecimal: 1D 28 4C pL pH m fn
Decimal: 29 40 76 pL pH m fn
Range of pL, pH:(pL + pH x 256) = 2 (pL = 2, pH = 0)

ASCII: GS 8 L p1 p2 p3 p4 m fn
Hexadecimal: 1D 38 4C p1 p2 p3 p4 m fn
Decimal: 29 56 76 p1 p2 p3 p4 m fn
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 2 (p1 =2 , p2 = 0, p3 = 0, p4 = 0)

Value of m: m = 48
Value of fn: fn = 4, 52

It transmits the number of bytes of remaining memory (unused area) in the RAM.

Response format:
The decimal value is converted to text data and sent starting from the high order end.
(Example: 123456 byte -> 0x37 0x30 0x31 0x32 0x33 0x34 0x35 0x36 0x00)

Response	Hex	Decimal	Data
Header	37 H	55	1 byte
Identifier	32 H	50	1 byte
Data	30 H to 39H	48 to 57	1 to 8 byte
NUL	00 H	0	1 byte

3.5.20 Transmit the key code for User-defined Logo in Flash Memory

ASCII: GS (L pL pH m fn d1 d2
Hexadecimal: 1D 28 4C pL pH m fn d1 d2
Decimal: 29 40 76 pL pH m fn d1 d2
Range of pL, pH:(pL + pH x 256) = 4 (pL = 4, pH = 0)

ASCII: GS 8 L p1 p2 p3 p4 m fn d1 d2
Hexadecimal: 1D 38 4C p1 p2 p3 p4 m fn d1 d2
Decimal: 29 56 76 p1 p2 p3 p4 m fn d1 d2
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 4 (p1 =4 , p2 = 0, p3 = 0, p4 = 0)

Value of m: m = 48
Value of fn: fn = 64
Value of d1: d1 = 75
Value of d2: d2 = 67

It transmits the key code list for defined in Flash Memory.
Transmission data is as follows.

Response	Hex	Decimal	Data
(1) Header	37 H	55	1 byte
(2) Identifier	72 H	114	1 byte
(3) Type	40 H	64	1 byte
(4) Data	30 H to 39H	48 to 57	0 byte ~
(5) NUL	00 H	0	1 byte

Example: When two logo are defined with key code" kc1=0x20, kc2=0x21" and " kc1=0x22, kc2=0x23", command response is "0x37 0x72 0x40 0x20 0x21 0x22 0x23 0x00". If no logo with key code are defined, response is "0x37 0x72 0x40 0x00".

3.5.21 Delete all Logo in Flash Memory

ASCII: GS (L *pL pH m fn d1 d2 d3*
Hexadecimal: 1D 28 4C *pL pH m fn d1 d2 d3*
Range: 29 40 76 *pL pH m fn d1 d2 d3*
Range of pL, pH: (*pL* + *pH* x 256) = 5 (*pL* = 5, *pH* = 0)

ASCII: GS 8 L *p1 p2 p3 p4 m fn d1 d2 d3*
Hexadecimal: 1D 38 4C *p1 p2 p3 p4 m fn d1 d2 d3*
Decimal: 29 56 76 *p1 p2 p3 p4 m fn d1 d2 d3*
Range of *pn*: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 5 (p1 =5 , p2 = 0, p3 = 0, p4 = 0)

Value of *m*: m = 48
Value of *fn*: fn = 65
Value of *d1*: d1 = 67
Value of *d2*: d2 = 76
Value of *d3*: d3 = 82

It deletes all defined logo in Flash Memory.

3.5.22 Delete User-defined Logo in Flash Memory

ASCII: GS (L pL pH m fn kc1 kc2
Hexadecimal: 1D 28 4C pL p m fn kc1 kc2
Decimal: 29 40 76 pL pH m fn kc1 kc2
Range of pL, pH: 0 ≤ (pL + pH × 256) ≤ 65535
It indicates the total number of bytes of subsequent data after pH.
Value of pL, pH: 4 (pL = 4, pH = 0)
Value of m: 48
Value of fn: 66
Range of kc1: 32 ≤ kc1 ≤ 126
Range of kc2: 32 ≤ kc2 ≤ 126

It deletes the logo in the user-defined logo area of the flash memory defined by the key codes (kc1 and kc2) of Define Logo in Flash Memory by the key code command.

Exceptions:
This command is not available for logos defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command.

3.5.23 Define Logo in Flash Memory by the key code

ASCII: GS 8L p1, p2, p3, p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1…dk]b
Hexadecimal: 1D 38 4C p1, p2, p3, p4 m fn a kc1 kc2 b xL xH yL yH [c d1…dk]1...[c d1...dk]b
Decimal: 29 40 76 pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Range of *pn*: 12 ≤ (p1 + p2 × 256 + p3 × 65536 + p4 × 16777216) ≤ 663566
(0 ≤ p1 ≤ 255, 0 ≤ p2 ≤ 255, 0 ≤ p3 ≤ 255, 0 ≤ p4 ≤ 255)
It indicates the total number of bytes of subsequent data after p4.
Value of *m*: m = 48
Value of *fn*: fn = 67
Value of a: a = 48, 52
Range of *kc1:* 32 ≤ kc1 ≤ 126
Range of *kc2:* 32 ≤ kc2 ≤ 126
Range of *b:* b = 1 (when a = 48)

	1 ≤ b ≤ 4 (when a = 52)
Range of *xL, xH:*	1 ≤ (xL + xH × 256) ≤ 576 (0 ≤ xL ≤ 255, 0 ≤ xH ≤ 2)
Range of *yL, yH:*	1 ≤ (yL + yH × 256) ≤ 2304 (0 ≤ yL ≤ 255, 0 ≤ yH ≤ 9)
Range of *c:*	c = 49 (when a = 48)
	49 ≤ c ≤ 52 (when a = 52)
Range of *d:*	0 ≤ d ≤ 255
Value of *k:*	k = (int ((xL + xH × 256) + 7) / 8) × (yL + yH × 256)

It defines the graphics data (raster format) as the logo specified by the key codes (kc1, kc2) in the user-defined logo area of the flash memory.

a: specifies the data format of the defined data.
- 48: Monochrome (digital)
- 52: Multi-tone

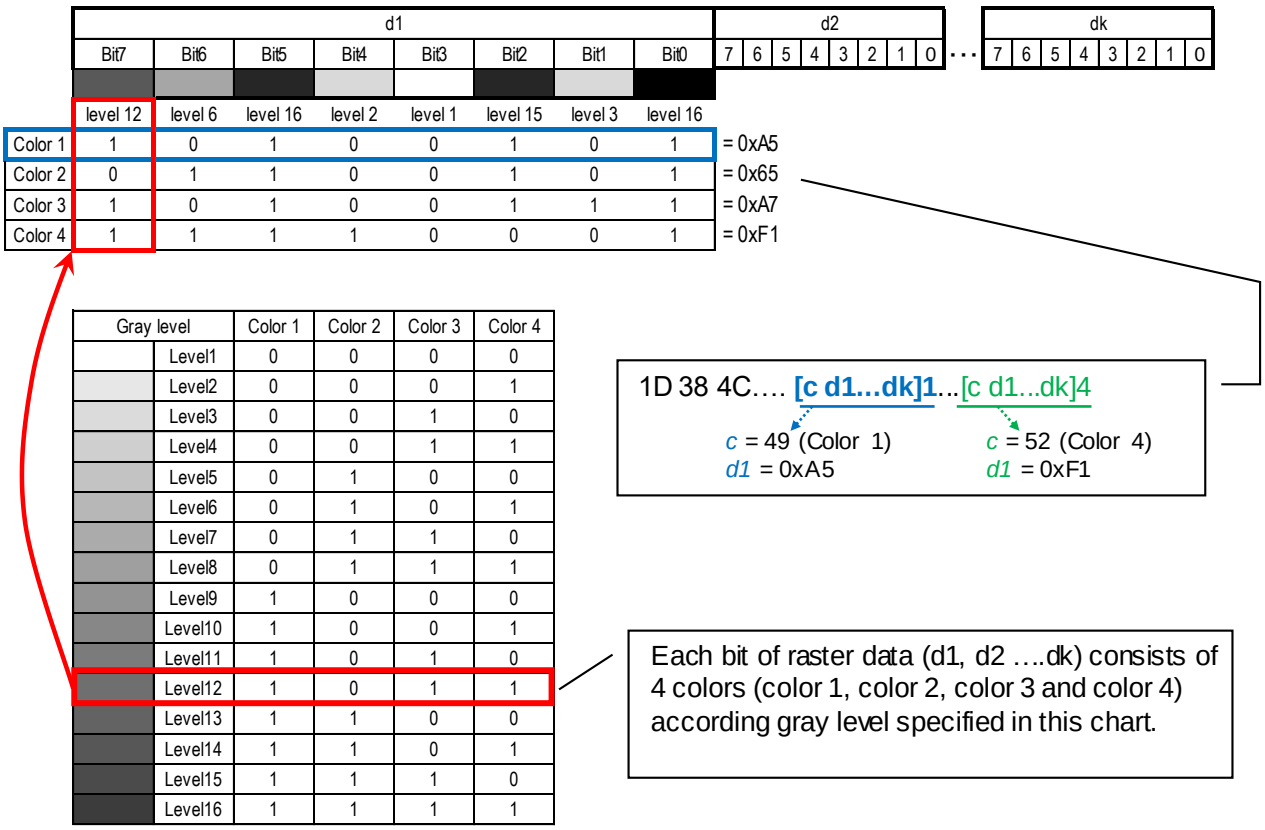
b: specifies the number of the color of the defined data.
- The number of the selectable color (b) is 1 when a = 48 (monochrome).
- The number of the selectable color (b) is 1 ~ 4 when a = 52 (multi-tone).

xL, xH: specify the number of dots in the horizontal direction as (xL + xH × 256).
yL, yH: specify the number of dots in the vertical direction as (yL + yH × 256).
c: specifies the color of the defined data.
- 49: Color 1
- 50: Color 2
- 51: Color 3
- 52: Color 4
- The color of the selectable defined data (c) is Color 1 when a = 48 (monochrome).
- The colors of the selectable defined data (c) are Color 1 ~ Color 4 when a = 52 (multi-tone).

d: specifies the defined data (raster format).

Exceptions:
The maximum width of each logo is 576/203 inches, and the maximum height of each logo is 2304/203 inches. If a logo size is more than this, it is not printed.
If the graphic size defined by this command is larger than the free space of the user defined logo area of the flash memory, it firstly erases all logo data in the user-defined area and defines this new logo data. When this command is executed, all images stored in the user defined logo area of the flash memory defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command are erased.

Graphic data format and Formula



3.5.24 Print User-defined Logo in Flash Memory

ASCII: GS (L pL pH m fn kc1 kc2 x y
Hex: 1D 28 4C pL pH m fn kc1 kc2 x y
Decimal: 29 40 76 pL pH m fn kc1 kc2 x y
Range of pL, pH: 0 ≤ (pL + pH × 256) ≤ 65535
It indicates the total number of bytes of subsequent data after pH.
Value of pL, pH: 6 (pL = 6, pH = 0)
Value of m: 48
Value of fn: fn = 69
Range of Kc1: 32 ≤ kc1 ≤ 126
Range of Kc2: 32 ≤ kc2 ≤ 126
Value of x: 1, 2
Value of y: 1, 2

It prints the user-defined logo defined by the key codes (kc1 and kc2) of Define Logo in Flash Memory by the key code command. The logo image is enlarged by x and y in the horizontal and vertical directions.

Exceptions:
This command is not available for logos defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command.

3.5.25 Transmit the key code for User-defined Logo in RAM

ASCII: GS (L *pL pH m fn d1 d2*
Hexadecimal: 1D 28 4C *pL pH m fn d1 d2*
Decimal: 29 40 76 *pL pH m fn d1 d2*
Range of pL, pH: (*pL* + *pH* x 256) = 4 (*pL* = 4, *pH* = 0)

ASCII: GS 8 L *p1 p2 p3 p4 m fn d1 d2*
Hexadecimal: 1D 38 4C *p1 p2 p3 p4 m fn d1 d2*
Decimal: 29 56 76 *p1 p2 p3 p4 m fn d1 d2*
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 4 (p1 =4 , p2 = 0, p3 = 0, p4 = 0)

Value of *m*: m = 48
Value of *fn*: fn = 80
Value of *d1*: d1 = 75
Value of *d2*: d2 = 67

It transmits the key code list for defined in RAM.
Transmission data is as follows.

Response	Hex	Decimal	Data
(1) Header	37 H	55	1 byte
(2) Identifier	73 H	115	1 byte
(3) Type	40 H	64	1 byte
(4) Data	30 H to 39H	48 to 57	0 byte ~
(5) NUL	00 H	0	1 byte

Example: When two logo are defined with key code" kc1=0x20, kc2=0x21" and " kc1=0x22, kc2=0x23", command response is "0x37 0x73 0x40 0x20 0x21 0x22 0x23 0x00". If no logo with key code are defined, response is "0x37 0x73 0x40 0x00".

3.5.26 Delete all User-defined Logo in RAM

ASCII: GS (L *pL pH m fn d1 d2 d3*
Hexadecimal: 1D 28 4C *pL pH m fn d1 d2 d3*
Decimal: 29 40 76 *pL pH m fn d1 d2 d3*
Range of pL,pH: (*pL* + *pH* x 256) = 5 (*pL* = 5, *pH* = 0)

ASCII: GS 8 L *p1 p2 p3 p4 m fn d1 d2 d3*
Hexadecimal: 1D 38 4C *p1 p2 p3 p4 m fn d1 d2 d3*
Decimal: 29 56 76 *p1 p2 p3 p4 m fn d1 d2 d3*
Range of pn: (p1 + p2 x 256 +p3 x 65536 + p4 x 16777216) = 5 (p1 =5 , p2 = 0, p3 = 0, p4 = 0)

Value of *m*: m = 48
Value of *fn*: fn = 81
Value of *d1*: d1 = 67
Value of *d2*: d2 = 76
Value of *d3*: d2 = 82

It deletes all defined download logo in RAM.

3.5.27 Delete User-defined Logo in RAM

ASCII: GS (L pL pH m fn kc1 kc2
Hexadecimal: 1D 28 4C pL pH m fn kc1 kc2
Decimal: 29 40 76 pL pH m fn kc1 kc2
Range of pL, pH: 0 ≤ (pL + pH × 256) ≤ 65535
It indicates the total number of bytes of subsequent data after pH.
Value of pL, pH: 4 (pL = 4, pH = 0)
Value of m: 48
Value of fn: 82
Range of kc1: 32 ≤ kc1 ≤ 126
Range of kc2: 32 ≤ kc2 ≤ 126

It deletes the logo in the user-defined logo area of RAM defined by the key codes (kc1 and kc2) of Define Logo in RAM by the key code command.

Exceptions:
This command is not available for logos defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command.

3.5.28 Define Logo in RAM by the key code

ASCII: GS 8L p1, p2, p3, p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1…dk]b
Hexadecimal: 1D 38 4C p1, p2, p3, p4 m fn a kc1 kc2 b xL xH yL yH [c d1…dk]1...[c d1...dk]b
Decimal: 29 40 76 pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Value of *pn*: 12 ≤ (p1 + p2 × 256 + p3 × 65536 + p4 × 16777216) ≤ 663566
(0 ≤ p1 ≤ 255, 0 ≤ p2 ≤ 255, 0 ≤ p3 ≤ 255, 0 ≤ p4 ≤ 255)
It indicates the total number of bytes of subsequent data after p4.
Value of *m*: m = 48
Value of *fn*: fn = 83
Value of a: a = 48, 52
Range of *kc1:* 32 ≤ kc1 ≤ 126
Range of *kc2:* 32 ≤ kc2 ≤ 126
Range of *b:* b = 1 (when a = 48)
1 ≤ b ≤ 4 (when a = 52)
Range of *xL, xH:* 1 ≤ (xL + xH × 256) ≤ 576 (0 ≤ xL ≤ 255, 0 ≤ xH ≤ 2)
Range of *yL, yH:* 1 ≤ (yL + yH × 256) ≤ 2304 (0 ≤ yL ≤ 255, 0 ≤ yH ≤ 9)
Range of *c:* c = 49 (when a = 48)
49 ≤ c ≤ 52 (when a = 52)
Range of *d:* 0 ≤ d ≤ 255
Value of *k:* k = (int ((xL + xH × 256) + 7) / 8) × (yL + yH × 256)

It defines the graphics data (raster format) as the logo specified by the key codes (kc1, kc2) in the user-defined logo area of RAM. Graphic data format is completely same as Define Logo in Flash Memory by the key code command (1D 38 4C).

a: specifies the data format of the defined data.
48: Monochrome (digital)
52: Multi-tone
b: specifies the number of the color of the defined data.
The number of the selectable color (b) is 1 when a = 48 (monochrome).
The number of the selectable color (b) is 1 ~ 4 when a = 52 (multi-tone).
xL, xH: specify the number of dots in the horizontal direction as (xL + xH × 256).
yL, yH: specify the number of dots in the vertical direction as (yL + yH × 256).
c: specifies the color of the defined data.
49: Color 1
50: Color 2
51: Color 3
52: Color 4

The color of the selectable defined data (c) is Color 1 when a = 48 (monochrome).
The colors of the selectable defined data (c) are Color 1 ~ Color 4 when a = 52 (multi-tone).

d: specifies the defined data (raster format).

Exceptions:
The maximum width of each logo is 576/203 inches, and the maximum height of each logo is 2304/203 inches. If a logo size is more than this, it is not printed.
If the graphic size defined by this command is larger than the free space of the user defined logo area of the flash memory, it firstly erases all logo data in the user-defined area and defines this new logo data. When this command is executed, all images stored in the user defined logo area of RAM defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 ... dn*) command are erased.

3.5.29 Print User-defined Logo in RAM

ASCII:	GS (L pL pH m fn kc1 kc2 x y
Hex:	1D 28 4C pL pH m fn kc1 kc2 x y
Decimal:	29 40 76 pL pH m fn kc1 kc2 x y
Range of pL, pH:	0 ≤ (pL + pH × 256) ≤ 65535 It indicates the total number of bytes of subsequent data after pH.
Value of pL, pH:	6 (pL = 6, pH = 0)
Value of m:	48
Value of fn:	85
Range of Kc1:	32 ≤ kc1 ≤ 126
Range of Kc2:	32 ≤ kc2 ≤ 126
Value of x:	1, 2
Value of y:	1, 2

It prints the user-defined logo defined by the key codes (kc1 and kc2) of Define Logo in RAM by the key code command. The logo image is enlarged by x and y in the horizontal and vertical directions.

Exceptions:
This command is not available for logos defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command.

3.5.30 Enable Watermark printing

ASCII:	GS (L pL pH m fn kc1 kc2 x y b yL, yH
Hex:	1D 28 4C pL pH m fn kc1 kc2 x y b yL, yH
Decimal:	29 40 76 pL pH m fn kc1 kc2 x y b yL, yH
Range of pL, pH:	0 ≤ (pL + pH × 256) ≤ 65535 It indicates the total number of bytes of subsequent data after pH.
Value of pL, pH:	9 (pL =9, pH = 0)
Value of m:	48
Value of fn:	99
Range of Kc1:	32 ≤ kc1 ≤ 126
Range of Kc2:	32 ≤ kc2 ≤ 126
Value of x:	1, 2
Value of y:	1, 2
Range of b:	0 ≤ b ≤ 5
Range of *yL, yH:*	1 ≤ (yL + yH × 256) ≤ 2304 (0 ≤ yL ≤ 255, 0 ≤ yH ≤ 9)

x, y: It specifies the horizontal / vertical magnification. The watermark is enlarged by x and y in the horizontal and vertical directions.

b: It specifies the alignment of the watermark
0: Left alignment
1: Center alignment
2: Right alignment
3: Roll 1 (Left -> Center -> Right -> Left -> …)

4: Roll 2 (Right -> Center -> Left -> Right -> ...)
5: Twist (Left -> Center -> Right -> Center -> Left -> ...)

yL, yH: It specifies the offset from the bottom of one watermark to the top of the next watermark by the number of dots in the vertical direction as (yL + yH × 256).

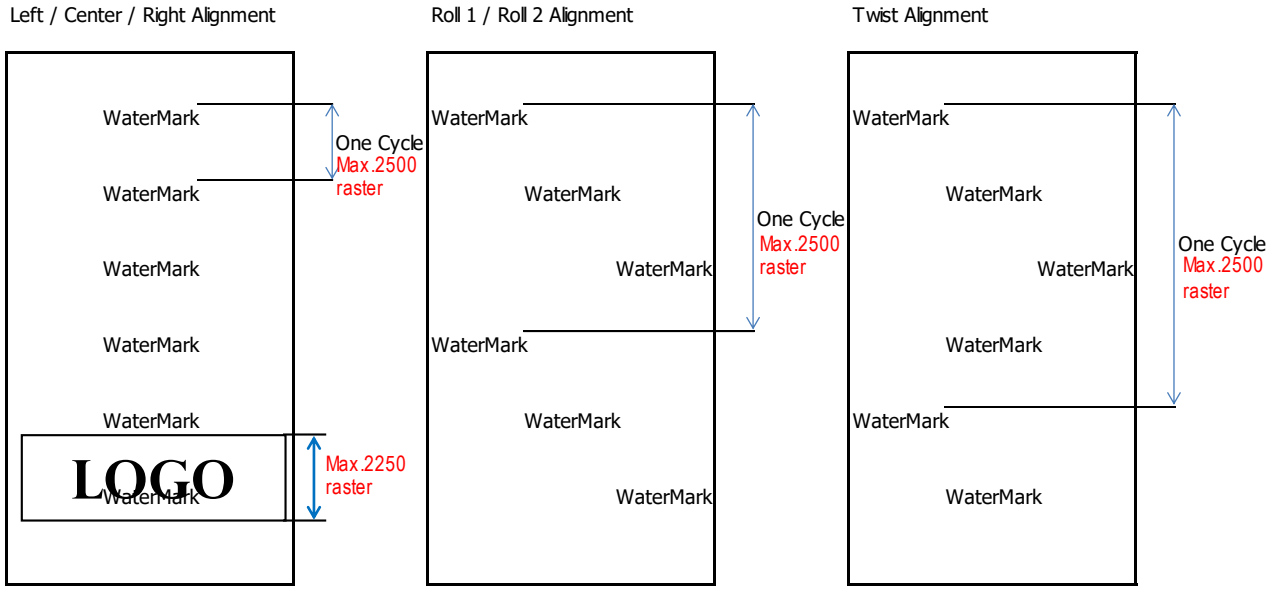
It enables to use the logo defined by either Define Logo in Flash Memory by the key code (kc1 and kc2) command or Define Logo in RAM by the key code (kc1 and kc2) as watermark.
If the key code (kc1 and kc2) is out of the range or there is no logo registered in the specified key code, it disables the watermark.

If there are data in the print buffer when the watermark is enabled by this command, the printer enables the watermark after it forcefully all prints data in the print buffer with one line feed at the end.
It similarly prints all the data in the print buffer when the watermark is disabled by this command.

Watermark will be disable when power off printer.

Exceptions:
This command is not available for logos defined by Define Bitmap File as Logo (1B + BMP file) command and Define Bit Image as Logo (1D 2A *n1 n2 d1 … dn*) command.

Due to the memory restriction, one cycle of the watermark which includes offset as follows has to be within 2500 raster (=12.3 inches), and the height of a logo printed in Watermark mode has to be within 2250 raster (=11 inches)..



3.5.31 Transmits set values for Watermark

ASCII: GS (L pL pH m fn
Hexadecimal: 1D 28 4C pL pH m fn
Decimal: 29 40 76 pL pH m fn
Range: (pL + pH x 256) = 2 (pL = 2, pH = 0)
m = 48
fn = 100

Data to be transmitted is as follows:

Data to be transmitted	Hex	Decimal	Data amount
Header	38 H	56	1 byte
Extension	48 H	72	1 byte
Watermark Disable/Enable	30H,31H	48,49	1 byte
Flash graphics key codes	20H to 7EH	32 to 126	0 to 2 bytes
Justification setting	30H to 35 H	48 to 53	0 to1 byte
Magnification X	31H or 32H	49,50	0 to 1 bytes
Magnification Y	31H or 32H	49,50	0 to 1 bytes
Extension	48 H	72	0 to 1 byte
Watermark offset position.	30H to 39H	48 to 57	0 to 4 bytes
NUL	00 H	0	1 byte

3.5.32 Transmit Remaining Size for User-defined Logo Area

ASCII:	GS	(	L	pL	pH	m	fn
Hexadecimal:	1D	28	4C	pL	pH	m	fn
Decimal:	29	40	76	pL	pH	m	fn

Range: (pL + pH x 256) = 2 (pL = 2, pH = 0)
Value of m: 48
Value of fn: 3, 51: Flash memory
4, 52: RAM

It transmits the remaining memory size for user-defined Logo area in either flash memory or RAM.
Note:
Response format is as below.
The decimal value is converted to text data and sent starting from the high order end.
(Example: 123456 byte for RAM size -> 0x37 0x32 0x31 0x32 0x33 0x34 0x35 0x36 0x00)

Response	Hex	Decimal	Data
(1) Header	37 H	55	1 byte
(2) Identifier	31 H (Flash memory) or 32 H (RAM)	49 (Flash memory) or 50 (RAM)	1 byte
(3) Data	30 H to 39H	48 to 57	1 to 8 byte
(4) NUL	00 H	0	1 byte

3.5.33 Store the graphics data in the print buffer

ASCII:	GS 8L p1, p2, p3, p4 m fn a bx by c xL xH yL yH d1 … dk
Hexadecimal:	1D 38 4C p1, p2, p3, p4 m fn a bx by c xL xH yL yH d1 … dk
Decimal:	29 40 76 p1, p2, p3, p4 m fn a bx by c xL xH yL yH d1 … dk
Range of *pn*:	12 ≤ (p1 + p2 × 256 + p3 × 65536 + p4 × 16777216) ≤ 165900 (0 ≤ p1 ≤ 255, 0 ≤ p2 ≤ 255, 0 ≤ p3 ≤ 255, 0 ≤ p4 ≤ 255) It indicates the total number of bytes of subsequent data after p4.
Value of *m*:	m = 48
Value of *fn*:	fn = 112
Value of a:	a = 48, 52
Value of bx:	bx = 1, 2
Value of by:	by = 1, 2
Range of *xL, xH:*	1 ≤ (xL + xH × 256) ≤ 576 (0 ≤ xL ≤ 255, 0 ≤ xH ≤ 2)
Range of *yL, yH:*	1 ≤ (yL + yH × 256) ≤ 2304 (0 ≤ yL ≤ 255, 0 ≤ yH ≤ 9)
Range of *c:*	c = 49 (when a = 48) 49 ≤ c ≤ 52 (when a = 52)
Range of *d:*	0 ≤ d ≤ 255
Value of *k:*	k = (int ((xL + xH × 256) + 7) / 8) × (yL + yH × 256)

It store the graphics data (raster format) in the print buffer

a: specifies the data format of the defined data.
- 48: Monochrome (digital)
- 52: Multi-tone

bx,by: The graphic image is enlarged by bx and by in the horizontal and vertical directions
xL, xH: specify the number of dots in the horizontal direction as (xL + xH × 256).
yL, yH: specify the number of dots in the vertical direction as (yL + yH × 256).
c: specifies the color of the defined data.
- 49: Color 1
- 50: Color 2
- 51: Color 3
- 52: Color 4

The color of the selectable defined data (c) is Color 1 when a = 48 (monochrome).
The colors of the selectable defined data (c) are Color 1 ~ Color 4 when a = 52 (multi-tone).

d: specifies the defined data (raster format).

Note: To print long grayscale image larger than over maximum range of height size (y=2304) with this command, it is recommended to divide image to small image block per height size (y=50) to print smoothly.

3.5.34 Print the graphics data in the print buffer

ASCII:	GS	(	L	pL	pH	m	fn
Hexadecimal:	1D	28	4C	*pL*	*pH*	*m*	*fn*
Decimal:	29	40	76	*pL*	*pH*	*m*	*fn*

Range of *pL, pH*: (*pL* + *pH* x 256) = 2 (*pL* = 2, *pH* = 0)
Value of *m*: m = 48
Value of *fn*: fn = 2, 50

It prints the buffered graphics data stored by “Store the graphics data in the print buffer” command

3.5.35 Download logo image

ASCII: GS 0x84 m *n1 n2 d1 … dn*
Hexadecimal: 1D 84 m *n1 n2 d1 … dn*
Decimal: 29 132 m *n1 n2 d1 … dn*
Value of m : 1 = Monochrome
2 = two-color
Value of *n1*: See the following table.
Value of *n2*: See the following table.
Value of *d*: See the following table.

Value of *n1*	**Value of *n2***	**Value of *d***
1 – 72 (8 x *n1*: Number of Horizontal dots)	1 – 64 (Number of Vertical Bytes)*	Bytes of Data (Printed down, then across)

The number of bytes sent is calculated by the following formula:
$n = 8 \times n1 \times n2 \; (1 \leq n1 \times n2 \leq 4608)$.

Description: The latest value from the set current logo command will be the logo index to be used to store the download graphics.
m identifies whether the image is monochrome (which requires one parameter bit row description) or two-color, which requires a pairing of bit descriptions for each row.
n1 * n2 define the rectangular image n1 byte wide and n2 bytes long, n1 * 8 specifies the number of dot columns, and n2 * 8 the number of dot rows. That is, each row is defined by an integral number of bytes and the number of rows is also is also an integral number of bytes. Note that n2 can be any length, subject of memory space availability.

If 58 mm paper is used, the value of n1 could be bigger than 408/8 bytes but of course, the logo is truncated on the right side while printed.
For each color dot row starting at the top left, a two part parameter byte string is used to define first, all dots that are not white, and the second half defines all dots where the color is black. Thus all dots that are on (=1) in the first half but not on in the second half select the paper color. A sequence of these raster row strings is used to specify the complete logo.
In the monochrome case, only one bit is needed per row. This is the same structure as used for the definitions of print raster monochrome graphics and print raster color graphics. This command is used for storing a logo of n1 by n2 size indexed by the current logo value. After downloading a logo to the printer, wait 100 ms to allow the printer time to write the logo to flash.

3.5.36 Cancel set values for top/bottom logo printing

ASCII: FS (E pL pH fn m c d1 d2 d3
Hexadecimal: 1C 28 45 pL pH fn m c d1 d2 d3
Decimal: 28 40 69 pL pH fn m c d1 d2 d3
Range: (pL + pH x 256) = 6 (pL = 6, pH = 0)
fn = 60
m = 2
c = 48, 49
d1 = 67 (Character “C”)
d2 = 76 (Character “L”)
d3 = 82 (Character “R”)

It cancels set values for top /bottom logo printing by specifying c.

c	Function
48	Cancels setting set values for top logo printing
49	Cancels setting set values for bottom logo printing

3.5.37 Transmits set values for top/bottom logo printing

ASCII: FS (E pL pH fn m c
Hexadecimal: 1C 28 45 pL pH fn m c
Decimal: 28 40 69 pL pH fn m c
Range: (pL + pH x 256) = 3 (pL = 3, pH = 0)
fn = 61
m = 2
c = 48, 49, 50

It transmits set values for top/bottom logo printing by specifying c.

c	Function
48	Transmits set values for top logo printing
49	Transmits set values for bottom logo printing
50	Transmits extended set values for top/bottom logo printing

Data to be transmitted is as follows:

Data to be transmitted	Hex	Decimal	Data amount
Header	37 H	55	1 byte
Extension	48 H	72	1 byte
Set Values for top/bottom logo	See the next page	See the next page	0 to 11 bytes
NUL	00 H	0	1 byte

When c = 48 is specified.

Set values for top logo	Hex	Decimal	Data amount
Fixed value (m)	32H	50	1 byte
Recognition of top logo / bottom logo	30H	48	1 byte
Fixed value	32H	50	0 or 1 byte
Flash graphics key codes	20H to 7EH	32 to 126	0 or 2 bytes
Justification setting	30H to 32 H	48 to 50	0 or 1 byte
Number of lines to be deleted	30H to 39H	48 to 57	0 to 3 bytes

When c = 49 is specified.

Set values for bottom logo	Hex	Decimal	Data amount
Fixed value (m)	32 H	50	1 byte
Recognition of top	31 H	49	1 byte

logo/bottom logo			
Fixed value	32 H	50	0 or 1 byte
Flash graphics key codes	20 H to 7E H	32 to 126	0 or 2 bytes
Justification setting	30 H to 32 H	48 to 50	0 or 1 byte

When c = 50 is specified.

Set values for bottom logo	**Hex**	**Decimal**	**Data amount**
Fixed value (m)	32 H	50	1 byte
Recognition of top logo/ bottom logo	32 H	50	1 byte
Fixed value	32 H	50	1 byte
Prints the top logo while paper feeding to the cutting position	30 H, 31 H	48, 49	1 byte
Prints the top logo at power-on	30 H, 31 H	48,49	1 byte
Prints the top logo when the roll paper cover is closed	30 H, 31 H	48, 49	1 byte
Prints the top logo while clearing the buffer to recover from a recoverable error	30 H, 31 H	48, 49	1 byte
Prints the top logo after paper feeding with the paper Feed button has finished	30H, 31 H	48, 49	1 byte

3.5.38 Set top logo printing

ASCII: FS (E pL pH fn m kc1 kc2 a n
Hexadecimal: 1C 28 45 pL pH fn m kc1 kc2 a n
Decimal: 28 40 69 pL pH fn m kc1 kc2 a n
Range: (pL + pH x 256) = 6 (pL = 6, pH = 0)
fn = 62
m = 2
32 ≤ kc1 ≤ 126
32 ≤ kc2 ≤ 126
48 ≤ a ≤ 50
0 ≤ n ≤ 255

It sets top logo key code, justification, and number of lines to be removed after top logo printing.
It associates key codes (*kc1*, *kc2*) of Flash Memory graphics to be printed as a top logo.
a specifies justification for top logo printing.
n specifies the number of lines to be removed after top logo printing

a	**Function**
48	Specifies left justification
49	Specifies centering
50	Specifies right justification

Settings set by this command are maintained even after power off.

3.5.39 Set bottom logo printing

ASCII: S (E pL pH fn m kc1 kc2 a
Hexadecimal: 1C 28 45 pL pH fn m kc1 kc2 a
Decimal: 28 40 69 pL pH fn m kc1 kc2 a
Range: (pL + pH x 256) = 5 (pL = 5, pH = 0)
fn = 63
m = 2
32 ≤ kc1 ≤ 126
32 ≤ kc2 ≤ 126
48 ≤ a ≤ 50

It sets bottom logo key code, and justification.
When cut command is received, bottom logo is printed.
It associates key codes (*kc1*, *kc2*) of Flash Memory Logo to be printed as a bottom logo.
a specifies justification for bottom logo printing.

a	**Function**
48	Specifies left justification
49	Specifies centering
50	Specifies right justification

Settings set by this command are maintained even after power off.

3.5.40 Make extended settings for top/bottom logo printing

ASCII: FS (E pL pH fn m a1 n1 … [ak nk]
Hexadecimal: 1C 28 45 pL pH fn m a1 n1 … [ak nk]
Decimal: 28 40 69 pL pH fn m a1 n1 … [ak nk]
Range: 4 ≤ (pL +pH x 256) ≤ 12
(However, (pL + pH x 256) = 2 x k + 2: 4 ≤ pL ≤ 12, pH = 0)
fn = 64
m = 2
a = 48, 64 to 67
n = 48, 49
1 ≤ k ≤ 5
Default: n = 49 [when a = 48]
n = 48 [when a = 64]
n = 49 [when a = 65]
n = 49 [when a = 66]
n = 48 [when a = 67]

It makes extended settings for top/bottom logo printing.

a	Function
48	Prints the top logo while paper feeding to the cutting position.
64	Prints the top logo at power-on.
65	Prints the top logo when the roll paper cover is closed.
66	Prints the top logo while clearing the buffer to recover from a recoverable error.
67	Prints the top logo after paper feeding with the paper Feed button has finished.

Extended settings when a = 1 to 3

n	Function
48	Disabled
49	Enabled

Settings set by this command are maintained even after power off.

3.5.41 Enable/disable top/bottom logo printing

ASCII: FS (E pL pH fn m a n
Hexadecimal: 1C 28 45 pL pH fn m a n
Decimal: 28 40 69 pL pH fn m a n
Range: (pL + pH x 256) = 4 (pL = 4, pH = 0)
fn = 65
m = 2
a = 48, 49
n = 48, 49
Default: n = 48 [when a = 48]
n = 48 [when a = 49]

It specifies top/bottom logo printing by *a* and enables or disables top/bottom logo printing by *n*.
Top/bottom logo printing specified by *a* is as follows:

a	Function
48	Specifies top logo printing.
49	Specifies bottom logo printing.

Enabling/disabling setting specified by n is as follows:

n	Function
48	Enables

49	Disables

Settings set by this command are maintained even after power off.

3.5.42 Define Windows BMP graphics data in Flash Memory

ASCII: GS D m fn a kc1 kc2 b c d1…dk
Hexadecimal: 1D 44 m fn a kc1 kc2 b c d1…dk
Decimal: 29 68 m fn a kc1 kc2 b c d1…dk
Range: m = 48
fn = 67
a = 48
32 ≤ kc1 ≤ 126 (20H ≤ kc1 ≤ 7Eh)
32 ≤ kc2 ≤126 (20h ≤ kc2 ≤ 7Eh)
b = 48, 52
c = 49
0 ≤ d ≤ 255
Value of *k:* The value of k depends on the BMP file size.
Default: None

It converts Windows BMP data to the specified tone and defines Flash Memory graphics data (raster format) that corresponds to the key codes (kc1, kc2).

b specifies the tone of data to define.

b	Tone of data to define
48	Monochrome (digital)
52	Multi-tone

c specifies the color of data to define.

c	Color of data to define
49	Color 1

d specifies the defined data (Windows BMP format).
Monochrome BMP (1bpp) and color BMP (24bpp, 8bpp, 4bpp) are supported.

3.5.43 Define Windows BMP graphics data in RAM

ASCII: GS D *m fn a kc1 kc2 b c d1…dk*
Hexadecimal: 1D 44 *m fn a kc1 kc2 b c d1…dk*
Decimal: 29 68 *m fn a kc1 kc2 b c d1…dk*
Range: *m* = 48
fn = 83
a = 48
32 ≤ *kc1* ≤ 126 (20h ≤ *kc1* ≤ 7Eh)
32 ≤ kc2 ≤ 126 (20h ≤ kc2 ≤ 7Eh)
b = 48, 52
c = 49
0 ≤ *d* ≤ 255
Value of *k:* The value of k depends on the BMP file size.
Default: None

It converts Windows BMP data to the specified tone and defines download graphics data (raster format) that corresponds to the key codes (*kc1, kc2*).

b specifies the tone of data to define.

b	Tone of data to define
49	Monochrome (digital)
52	Multi-tone

c specifies the color of data to define.

c	Color of data to define
49	Color 1

d specifies the data to define (Windows BMP format).
Monochrome BMP (1bpp) and color BMP (24bpp, 8bpp, 4bpp) are supported.

3.6 Status Commands

Status Command Introduction
There are three methods to provide an application the printer status, Batch Status Commands, Real Time Status Commands and Auto Status Back Commands as follows.

Batch Status Commands – The batch status command is sent based on the same manner as other commands/data. Therefore it is stored in the printer receiving buffer in order along with other commands/data received and is processed one by one according to order which have been received. Hence, the printer response time for this command is not immediate. It depends on commands / data sent before this command.

Real-Time Status Commands – The printer immediately processes this command and takes a necessary action as the top priority as soon as it is received regardless of the printer condition and data/commands which has received before this command. The way to send the real time status command depends on the interface. In USB and RS232C interface mode, it is sent based on the same manner as other commands/data.
In LAN interface, the data transfer method of this command depends on the printer setting.

Identification of the status
Some status for the batch status command and the real time status command has the identifier as follows so that a system can identify a status.

Batch Status Command	**Status**
1B 75 0	**0 0 0 0 0 0** x x (Binary)
1B 76	**0** x x **0** x x x x (Binary)
1D 49 n	**0** x x **0** x x x x (Binary)
1D 72 n	**0** x x **0** x x x x (Binary)

Batch Status Command	**Status**
1D (or 10) 04 n	**0** x x **1** x x **1 0** (Binary)
1D 05	**1** x x x x x x x (Binary)

3.6.1 Transmit Peripheral Device Status

ASCII: ESC u 0
Hexadecimal: 1B 75 0
Decimal: 27 117 0
Return Value: Bit 0 Bit 1
1 = Drawer1 closed 1 = Drawer 2 closed
0 = Drawer 1 open 0 = Drawer 2 open
(Bits 2-7 are not used, those are fixed to zero)

It transmits the current status of the cash drawers. If a drawer is not connected, this status indicates that the drawer is closed.

3.6.2 Transmit Printer Status

ASCII: ESC v
Hexadecimal: 1B 76
Decimal: 27 118

It transmits the printer status.

Status Byte

Bit	Function	0 Signifies	1 Signifies
0	Receipt Paper	Ok	Low
1	Receipt Cover or Front Cover	Closed	Open
2	Receipt Paper or Receipt Paper Jam	Ok	Out or Jam
3	Knife Position	OK	Jam
4	Not used	Fixed to Zero	Fixed to Zero
5	Temperature	In valid range	Too hot or Too cold
6	Voltage	In valid range	Too high or Too low
7	Not used	Fixed to Zero	Fixed to Zero

Related Information:
Receipt paper low status (Bit 0) is not exactly matched to the paper low sensor status. The set timing of status bit is depending on “Paper Low Detection” setting in the printer configuration.
For example, when “Paper Low Detection” is configured to “Enable”, this status bit is set as soon as the printer confirms that the paper low sensor keeps indicating “LOW”.
if it is configured to “Disable”, this status bit is never set.

3.6.3 Transmit Printer ID

ASCII: GS I *n*
Hexadecimal: 1D 49 *n*
Decimal: 29 73 *n*
Value of *n*:

It transmits the printer ID specified by n as follows:

n	Printer ID	Definition	ID(hex)
1, 49	Printer model ID		Printer model = 0x24
2, 50	Type ID	Installed options	Refer to the following table
3, 51	ROM Version ID	ROM version	1 Byte – FW version in binary format in bit 0…bit 3.
4, 52	Logo Definition	Logo Definition	Refer to the following table
65	Firmware version		String with 6 characters “_xx.xx”
66	Manufacturer		“_DIEBOLD-NIXDORF”
67	Printer model		“P1200”
68	Serial number		Serial number of the printer string
69	ASIA-Character generator name		String with max 17 characters
70	Firmware date		String format “_DDMMYY”

112	ignored		Ignored
128	Manufactured Board Number [1]		"_A"(Fixed)
129	Serial number date (Production date – set by GS (E pL pH fn d1…dn (fn=130))		Production date string "_DDMMYY"
130	Character sets		All built in character sets of the printer (see example below)
131	Character generator name		String with max 17 characters
132	Character generator version		String with 6 characters (_xx.xx)
133	Horizontal resolution		"_203 dpi"
134	Vertical resolution		"_203 dpi"
135	Print line resolution		"_203 dpi"
136	Character generator checksum result		String "_OK" or "_Err"
143	Booter version		String with 6 characters "_xx.xx"
144	Loader version		String with 6 characters "_xx.xx"
145	Poweruptest version		String with 6 characters "_xx.xx"
146	Poweruptest checksum result		"_OK" or "_Err"
148	EEPROM status		"_OK" or "_Err"
149	Loader verified status		"_Verified" or "_Unverified"
157	Print Line Type	Print head type	"_A" (Kyocera thermal print line) or "_B" (other manufacturer)
158	Interface Board Description		String with the name of the interface board. (see example below)
159	Interface Board Type		String with the type of the interface board. For example "_02" or "_10"
160	Number of Colors		String with the number of colors For example "_1" or "_2"
161	ASIA-Character generator name		String with max 17 characters
162	ASIA-Character generator version		String with 6 characters (_xx.xx)
163	ASIA-Character generator checksum result		String "_OK" or "_Err"
254	Sensor Plug Info		String "_xxxxxxx" (See table below)
255	Measured Mark Distance		String with max. 12 characters "_xxxxx steps"

Notes: n = 1, 2, 3: In this case the printer sends 1 byte of data.

n ≥ 65: When send printer information (character string) is specified, the printer sends the "Header to NUL" character string. Notes for the printer information:

• Each printer information is composed of [header + printer information + NUL] (when n ≥ 65).

Send data	Hex	Decimal	Data
Header	0x5F	95	1 byte
Printer information	Depends on the information	Depends on the information	1 to 80 bytes
NUL	0x00	0	1 byte

• If the printer information is not prepared, [Header + NUL] (2 bytes) are sent.

• Be sure to use this function when the host can receive data.

• When using GS I, GS (E or GS g 2 together with Automatic Status Back (ASB status, the status transmitted must be differentiated according to table Transmit Status Identification (see page 71).

[1] P1200 sends the Bare PCB Number ("_A".."_Z")

• When n is out of the specified range, this command is ignored.
• The Firmware version may be changed.
• The firmware version can be confirmed by selftest printing. Self test is executed by panel switch operation when power is turned on.
• Printer information is distinguished from other send data by the header of the block data. When the data sent from printer after printing GS I is [Hex = 0x5F / Decimal = 95], process the data to NUL [Hex = 0x00 / Decimal = 0].
• When communicating with printer by XON/XOFF control, XOFF code might be transmitted into "Header to NUL."

Type ID (n=2)

bit	Off/On	Hex	Decimal	Function	remark
0	Off	00	0	No DBCS font is installed	
	On	01	1	DBCD font is installed	
1	Off	00	0	Cutter is not installed	
	On	02	2	Cutter is installed (Fixed to "On")	
2	Off	00	0	Black mark sensor Disable	
	On	04	4	Black mark sensor Enable	
3	-	-	-	Undefined	
4	Off	00	0	Not used. Fixed to off.	
5	-	-	-	Undefined	
6	-	-	-	Undefined	
7	Off	00	0	Not used. Fixed to off.	

Type ID (n=4)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No logo definition
	On	01	1	Logo is registered
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Type ID (n=130)

Character sets: Example:
"_0:PC437,1:PC850,2:PC852,3:PC860,4:PC863,5:PC865,6:PC858,7:PC866,8:PC1252,9:PC862,10:PC737,11:PC874" NUL

Type ID (n=158)

Interface Board Description: Example: "_USB(High-Speed),RS232,Cash Drawer" NUL

Type ID (n=159)

Interface Board type

Value	Type
"_01"	Standard. (USB , Cash Drawer)
"_02"	RS232 card connected. (USB ,RS232, Cash Drawer)
"_03"	Ethernet card connected. (USB ,Ethernet, Cash Drawer)

"_04"	Powered USB connected. (USB , Cash Drawer)
"_10"	MF interface – USB connected.

Type ID (n=254)

Sensor Plug Info:

Byte# (from left)	Sensor
0	Mark sensor
1	Undefined
2	Undefined
3	Undefined
4	Undefined
5	Undefined
6	Undefined
7	Undefined

Value (ASCII)	Meaning
'0'	Not plugged
'1'	Plugged
'2'	No information available

3.6.4 Transmit Printer ID, Remote Diagnostics Extension

ASCII: GS I @ *n*
Hexadecimal: 1D 49 40 *n*
Decimal: 29 73 64 *n*
Values of *n*: Refer to table
Range of *n*: 32 – 255 (not all defined but reserved)

Performs the remote diagnostic function specified by *n* as described in the following table.
The printer returns all ASCII data. It is conducted by the parameter *n* to identify the diagnostic item and is followed by a Carriage Return (0D) to signify the end of the data.

n (hex)	Remote diagnostic item	Function
20	Serial number (10 digits ASCII)	Write to non-volatile memory
21		(Reserved)
23		Return serial number, Total 12 bytes
24	Model number (16 digits ASCII)	Write to non-volatile memory
25		(Reserved)
27		Return model number, Total 18 bytes
60	DHCP address[1], (15 digits ASCII numeric e.g. "abc.def.knm.xyz")	(Reserved for production purpose)
61		Not used
62		Not used
63		Return DHCP address, Total 17 bytes
64	TCP Port number[1], (5 digits ASCII numeric "00000"~"65535")	Write to non-volatile memory
65		Not used
66		Not used
67		Return TCP Port number, Total 7 bytes
68	UDP Port number[1], (5 digits ASCII numeric	Write to non-volatile memory
69		Not used

[1] It is valid when option Network I/F card is installed.

6A	"00000"~"65535")	Not used
6B		Return UDP Port number, Total 7 bytes
6C	SNMP Community (R/W) [1],	Write to non-volatile memory
6D	(16 digits ASCII numeric + Null	Not used
6E	terminator)	Not used
6F		Return SNMP Community (R/W), Total 19 bytes
70	SNMP Trap 1 Community[1],	Write to non-volatile memory
71	(16 digits ASCII numeric + Null	Not used
72	terminator)	Not used
73		Return SNMP Trap 1 Community, Total 19 bytes
74	SNMP Trap 2 Community[1],	Write to non-volatile memory
75	(16 digits ASCII numeric + Null	Not used
76	terminator)	Not used
77		Return SNMP Trap 2 Community, Total 19 bytes
78	SNMP Trap 1 IP Address[1],	Write to non-volatile memory
79	(15 digits ASCII numeric	Not used
7A	e.g. "abc.def.knm.xyz")	Not used
7B		Return SNMP Trap 1 IP Address, Total 17 bytes
7C	SNMP Trap 2 IP Address[1],	Write to non-volatile memory
7D	(15 digits ASCII numeric	Not used
7E	e.g. "abc.def.knm.xyz")	Not used
7F		Return SNMP Trap 2 IP Address, Total 17 bytes
F0	MAC address[1],	(Reserved for production purpose)
F1	(17 digits ASCII numeric	Not used
F2	e.g. "ab.cd.ef.gh.ww.xy")	Not used
F3		Return MAC address, Total 19 bytes

3.6.5 Enable/disable Automatic Status Back (ASB)

ASCII: GS a n
Hexadecimal: 1D 61 n
Decimal: 29 97 n
Range: 0 ≤ n ≤ 255
Default: n = 0

It enables or disables basic ASB (Automatic Status Back). This setting is not stored into the non-volatile memory.

(*n*) Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector status disabled
	On	01	1	Drawer kick-out connector 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	Roll paper sensor status disabled.
	On	08	8	Roll paper sensor status enabled.
4-7	Off	00	0	Reserved.

While basic ASB status is active, the selected enabled basic ASB status is transmitted whenever the status changes.

The basic ASB status to be transmitted is the four bytes that follow:

- First byte (printer information)

[1] It is valid when option Network I/F card is installed.

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Fixed.
2	Off	00	0	One or both cash drawers open
	On	04	4	Both cash drawers closed
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed with the paper feed button.
	On	40	64	Paper is being fed with the paper Feed button.
7	Off	00	0	Fixed.

- Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0 – 2	-	-	-	Reserved.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	Off	00	0	Fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Fixed.

- Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Roll paper near-end sensor: paper adequate.
	On	03	3	Roll paper near-end sensor: paper near end.
2, 3	Off	00	0	Roll paper end sensor (Paper sensor): paper present. And Roll paper jam sensor: no paper jam
	On	0C	12	Roll paper end sensor (Paper sensor): paper not present Or Roll paper jam sensor: paper jam
4	Off	00	0	Fixed.
5, 6	-	-	-	Reserved.
7	Off	00	0	Fixed.

Bit 2 and 3: While the cover is open, this shows the state when the cover was still closed.

- Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Normal-Mode
	On	01	1	Sleep Mode
1 – 3	-	-	-	Reserved.
4	Off	00	0	Fixed.
5, 6	-	-	-	Reserved.
7	Off	00	0	Fixed.

3.6.6 Initialize maintenance counter

ASCII: GS g 0 *m nL nH*
Hexadecimal: 1D 67 30 *m nL nH*
Decimal: 29 103 48 *m nL nH*
Range: *m* = 0
(*nL* + *nH* x 256) = 20, 21, 22, 50, 70 (*nL* = 20, 21, 22, 50, 70, *nH* = 0)

It sets the resettable maintenance counter specified by (*nL* + *nH* x 256) to 0.

(*nL* + *nH* x 256)		Maintenance counter [Units]
Hex	Decimal	
14, 16	20, 22	Number of lines fed. [Lines]
15	21	Number of head energizations [Times]
32	50	Number of autocutter operations [Times]
34	52	Cutter Errors
35	53	Black Mark Errors
36	54	Thermistor Errors
37	55	Low Voltage Errors
38	56	High Voltage Errors
39	57	Cover Open Counter
3B	59	Maximum Head Temperature
46	70	Duration of printer operation. [Hours]

Note:
"Number of lines fed. [Lines]", "Number of head energizations [Times]" are calculated with "Receipt length tally" value [meter]. If either "Number of lines fed. [Lines]" or "Number of head energizations [Times]" are initialized by the command, all "Number of lines fed. [Lines]", "Number of head energizations [Times]"and "Receipt length tally" are initialized to 0.
"Number of autocutter operations [Times]" is same value as "Knife cut tally". If either "Number of autocutter operations [Times]" or "Knife cut tally" are initialized by the command, both "Number of autocutter operations [Times]" and "Knife cut tally" are initialized to 0.
"Duration of printer operation [Hours]" is same value as "Hours on tally". If either "Duration of printer operation [Hours]" or "Hours on tally" are initialized by the command, both "Duration of printer operation [Hours]" and "Hours on tally" are initialized to 0.
nL + nH x 256 = 59 (Maximum Head Temperature): This resettable counter isn't set to 0 but is set to the actual

temperature of the thermal print head. The maintenance counter value can be used for establishing the time for replacing consumed parts or cleaning.

3.6.7 Transmit maintenance counter

ASCII: GS g 2 *m nL nH*
Hexadecimal: 1D 67 32 *m nL nH*
Decimal: 29 103 50 *m nL nH*
Range: m = 0
(*nL* + *nH* x 256) = 20, 21, 22, 50,52,53,54,55,56,57,59, 70, 148, 149, 150, 178,198 ,200,238,239,240

It transmits the value of the maintenance counter specified by (*nL* + *nH* x 256)

(*nL* + *nH* x 256)		Maintenance Counter[Units]	Type of counter
Hex	Decimal		
14, 16	20, 22	Number of lines fed. [Lines]	Resettable (can be reset)
15	21	Number of head energizations. [Times]	
32	50	Number of autocutter operations [Times].	
34	52	Cutter Errors[Times]	
35	53	Black Mark Errors[Times]	
36	54	Thermistor Errors[Times]	
37	55	Low Voltage Errors[Times]	
38	56	High Voltage Errors[Times]	
39	57	Cover Open Counter[Times]	
3B	59	Maximum Head Temperature[degree]	
46	70	Duration of printer operation [Hours].	
94, 96	148, 150	Number of lines fed [Lines]	Cumulative
95	149	Number of head energizations. [Times]	
B2	178	Number of autocutter opeartions. [Times].	
C6	198	Duration of printer operation. [Hours].	
C7	199	Power on cycles	
C8	200	EEROM update	
EE	238	Paper feeding mechanism changes	
EF	239	Print head changes	
F0	240	Cutter Changes	

Transmission data is as follows.

Data group of maintenance counter	Hex	Decimal	Data
(1) Header	5FH	95	1 byte
(2) Data	30H ~39H	48 ~ 57	1 byte ~
(3) NULL	00H	0	1 byte

Example: When autocut operations is 123 times, “0x1D 0x67 0x32 0x00 0x32 0x00” command response is “0x5F 0x31 0x32 0x33 0x00”

3.6.8 Transmit Status

ASCII: GS r *n*
Hexadecimal: 1D 72 *n*
Decimal: 29 114 *n*
Values of *n*: 1, 49 = printer status
2, 50 = cash drawer status
4, 52 = Flash Memory status

Transmits the status specified by n. This is a batch mode command which transmits the response after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

Printer status (n=1, 49)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low
1	Off	00	0	Cover is closed
	On	02	2	Cover is opened
2	Off	00	0	Receipt paper present
	On	04	1	Receipt paper is exhausted or jammed
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Cash drawer status (n=2, 50)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	One or both cash drawers open
	On	01	1	Both cash drawers closed
1	Off	00	0	One or both cash drawers open
	On	02	2	Both cash drawers closed
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Flash memory user sector status (n=4, 52)

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	Undefined
1	-	-	-	Undefined
2	Off	00	0	User data storage write successful
	On	04	4	Failed to write to User data storage area. User defined area not erased properly.
3	Off	00	0	Flash Logo area is adequate.
	On	08	8	Flash logo area was not adequate for the latest logo registration.[1]
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No user defined characters in flash memory
	On	20	32	User defined characters in flash memory
6	-	-	-	Undefined

[1] This status bit is available only for legacy logo commands (1D 2A, 1B+BMP file).

7	Off	00	0	Not used. Fixed to off.

Range of n: 1 – 4
49 –52

Exceptions:
When n is out of the specified range, the command is ignored.

3.6.9 Send Printer Firmware Version

ASCII: US V
Hexadecimal: 1F 56
Decimal: 31 86

The printer returns 16 bytes containing the boot and Flash Firmware version. The first 8 bytes returned are an ASCII string for the boot version. The second 8 bytes are an ASCII string for the main firmware version.
The current firmware determines printer firmware version from the first 5 byte of the 8 byte ASCII data returned from printer. (The last 3 byte data is always ".00".)
Example: When response is 31.31.2E.33.34.2E.30.30.35.36.2E.37.38.2E.30.30 (16 bytes), the boot version is 12.34.00 and the main firmware version is 56.78.00.

3.6.10 Real time commands disabled

ASCII: US z n
Hexadecimal: 1F 7A n
Decimal: 31 122 n
Range of n: **n = 0** Real time commands enabled
n = 1 Real time commands disabled

Default : n = 0 (Real time commands enabled)

This command is used to disable real time commands. They are disabled prior to sending graphics or other data to the printer that may contain embedded real time commands. The disable command (n = 1) is acted on in real time.
The re-enable command (n = 0) is treated as a batch command and processed in the order received.

Transmit Status Identification Table

The following table shows the Transmit Status Identification: **Command & Function**	**Status Reply**
ESC w n 7	<00011001>B
DLE EOT	<0**1**10>B
GS ENQ	<1*0*****>B
GS I with 1 ≤ n ≤ 3; 49 ≤ n ≤ 51	<0**0****>B
GS I with n >= 65 (1st byte)	<01011111>B
GS g 2 (1st byte)	<01011111>B
GS (E with fn = 4 or 6 (1st byte)	<00110111>B
XON	<00010001>B
XOFF	<00010011>B
ASB (1st byte)	<0**1**00>B
ASB (2nd to 4th byte)	<0**0****>B
Power-on notification	<00111011>B

3.6.11 Execute Head Failure Detection

ASCII: US SUB *02 00*
Hexadecimal: 1F 1A *02 00*
Decimal: 31 26 *02 00*

Response: Result of the Head Failure Detection (3bytes)

Response format table (3bytes)

Description	Byte #1[1]	Byte #2 and #3
No Error	0x06	*0x00, 0x00*
Head Failure	0x15	Counter for number of dots damaged 1st Byte : Lower byte of the counter 2nd Byte : Higher byte of the counter

The printer executes the Head Failure Detection and returns the result (3bytes). The first byte indicates the result (OK/NG) and 2nd and 3rd bytes indicates the number of dots damaged in NG case. In OK case, 2nd byte and 3rd byte are null.

3.6.12 Get Detail of Head Failure Detection

ASCII: US SUB *01 n*
Hexadecimal: 1F 1A *01 n*
Decimal: 31 26 *01 n*
Values of *n*: 00: Front Head
02: (Reserved)

Response: Details of the Head Failure Detection (1+640x2 bytes)

Response format table (3bytes)

Description	Byte #1[2]	Byte #2 to #1281
No Error	0x06	Resistance value of each dot. Each dot is indicated by 2 bytes.
Head Failure	0x15	

The printer returns the details of each dot (1281bytes) of the latest execution of the dot failure detection. The first byte shows the result (OK/NG) and subsequent bytes shows the resistance value of each dot. This command does not execute the dot failure detection. Therefore, the dot failure detection by "Execute Head Failure Detection" command has to be performed before this command, otherwise this command is ignored.

3.6.13 Set control point

ASCII: ESC [! t *nl nh*
Hexadecimal: 1B 5B 21 74 *nl nh*
Decimal: 27 91 33 116 *nl nh*
Range: 0 ≤ (nL + nH * 256) ≤ 0xFFFF
Description: The printer sends the answer to a control point as soon as all mechanical activities are finished
Notes: The answer which is sent to the host consists of the complete escape command (ESC [! t nL nH).
(nL + nH * 256) is a value which is defined by the application program.
Hint: Normally the application or the software driver sends the "set control point"

[1] Bit7 (MSB) of Byte #1 is used to indicate the source of the thermal head vendor as follows.

	Byte #1	
	No Error	Head Failure
Head source: K	0x06	0x15
Head source: R	0x86	0x95

K: First source (existing head) / R: Second source

[2] Same as above

command after linefeed commands. However, if the “set control point” command is sent before the linefeed command, the printer also sends the control point answer before the line is printed completely.
Two examples with (nL + nH * 256) = 0x1234: Correct control point – answer to host is sent after all mechanical activities:
A B C D E 0x0A 0x1B 0x5B 0x21 0x74 0x34 0x12 Wrong control point – answer to host is sent before mechanical activities are finished: A B C D E 0x1B 0x5B 0x21 0x74 0x34 0x12 0x0A.
In Error conditions by opening the cover or switching of the Power can be correct control points send back bad the lines are not printed.

3.7 Real Time Commands

Real Time Commands are immediately processed regardless of the condition of the receiving buffer and the printer status as soon as it's received.
For example, even if the printer is in an error condition, it properly responds to a real time status command sent.
In addition to this, if a real time command is received when there are some data in the receive buffer, it is processed prior than the data in the receiving buffer.

In USB and RS232C interface mode, it is sent based on the same manner as other commands/data. Therefore, there is a risk that the printer might not be able to respond immediately if the printer receiving buffer is full.

The real time commands used in the network interface depends on the "RTC Protocol" setting. When it is configured to TCP, command/status is transferred via TCP port (port number 9100). When it is configured to UDP, command/status is transferred via UDP port (port number 3000).
In UDP protocol, 4 bytes of the sequence number have to be added before real time commands. Otherwise, the printer does not properly process command.
e.g. xxh xxh xxh xxh 1Dh 04h 01h (xxh xxh xxh xxh) is sequence number.

3.7.1 Real Time Status Transmission

	GS Sequence	DLE Sequence
ASCII:	GS EOT *n*	DLE EOT *n*
Hexadecimal:	1D 04 *n*	10 04 *n*
Decimal:	29 4 *n*	16 4 *n*
Values of *n*:	1 – 16	
	1 = Transmit printer status	
	2 = Transmit busy status	
	3 = Transmit error status	
	4 = Transmit receipt paper status	
	5 = (Reserved)	
	6 = Transmit error other status	
	16= All 6 bytes status are returned at the same time	

The printer immediately transmits its status in accordance with the parameter *n* once it receives this command.
This command includes two sequences, GS and DLE. In DLE sequence, an application must send subsequent data (EOT, 0x04) within 100 milliseconds after DLE (0x10). Otherwise the printer will misinterpret the DLE as Clear Printer command. In order to avoid this, using GS sequence (1D 04 n) is recommended.

Exceptions:
The command is ignored if n is out of range.

Transmit printer status (n =1)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined. Fixed to off.
1	On	02	2	Undefined. Fixed to on
2	Off	00	0	One or both cash drawers open
	On	04	4	Both cash drawers closed
3	Off	00	0	On line state
	On	08	8	Off line state
4	On	10	16	Not used. Fixed to on.
5	-	-	-	Undefined

6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Transmit 0ffline status (n=2)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined. Fixed to off.
1	On	02	2	Undefined. Fixed to on
2	Off	00	0	Cover is closed
	On	04	4	Cover is opened
3	Off	00	0	Paper Feed Button is not pressed
	On	08	8	Paper Feed Button is pressed
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	No stop printing due to paper low.
	On	20	32	Printer stopped printing due to paper low[1]
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	Off	00	0	Not used. Fixed to off.

Transmit error status (n=3)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined. Fixed to off.
1	On	02	2	Undefined. Fixed to on
2	Off	00	0	Undefined. Fixed to off.
3	Off	00	0	No Cutter error or No Paper Jam Error
	On	08	8	Cutter Error or Paper Jam Error
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Undefined. Fixed to off.
6	Off	00	0	No unrecoverable error
	On	40	64	Unrecoverable error occurred
7	Off	00	0	Not used. Fixed to off.

Transmit paper roll sensor status (n=4)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined. Fixed to off.
1	On	02	2	Undefined. Fixed to on
2	Off	00	0	No paper low condition
	On	04	4	Paper low
3	Off	00	0	No paper low condition
	On	08	8	Paper low
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Paper present and no paper jam
	On	20	32	Paper exhausted or paper jam
6	Off	00	0	Paper present and no paper jam
	On	40	64	Paper exhausted or paper jam
7	Off	00	0	Not used. Fixed to off.

Transmit error other status (n=6)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined. Fixed to off.
1	On	02	2	Undefined. Fixed to on
2	Off	00	0	No Thermal Head failure dots exist
	On	01	1	Thermal Head failure dots exist

[1] This bit is available only when “Stop Receipt on Receipt Low” is enabled by Select Sensors to Stop Printing command.

3	Off	00	0	Black mark sensor : detect white
	On	08	8	Black mark sensor : detect black
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Not used. Fixed to off.
6	Off	00	0	Not used. Fixed to off.
7	Off	00	0	Not used. Fixed to off.

Thermal Head failure dots status (Bit 2) becomes valid once Execute Head Failure Detection command (1F 1A *02 00)* is processed or
/ **Error! Reference source not found.** is printed.

3.7.2 Real Time Request to Printer

	GS Sequence	DLE Sequence
ASCII:	GS ETX *n*	DLE ENQ *n*
Hexadecimal:	1D 03 *n*	10 05 *n*
Decimal:	29 3 *n*	16 5 *n*
Values of *n*:	1 = Recover and restart 2 = Recover and clear buffers	

The printer immediately takes the recovery action from an error condition in accordance with the parameter *n* once it receives this command. This command is valid when the printer is in an error condition.
This command includes two sequences, GS and DLE. In DLE sequence, an application must send subsequent data (EOT, 0x04) within 100 milliseconds after DLE (0x10). Otherwise the printer will misinterpret the DLE as Clear Printer command. In order to avoid this, using GS sequence (1D 04 n) is recommended.

n = 1:
It clears errors and restarts printing. This command does not affect any attributes and settings specified by previous commands, and it does not clear any data in the printer as well. Even if the error is cleared by this command, it will detect same error again after recovery unless an inducement of the error is eliminated.

n = 2:
It clears errors and buffers. This command does not affect any attributes and settings specified by previous commands. Even if the error is cleared by this command, it will detect same error again after recovery unless an inducement of the error is eliminated.

Exceptions:
The command is ignored if n is out of range.

3.7.3 Enable/disable real-time command

ASCII:	GS (D pL pH m [a1 b1]… [ak bk]
Hexadecimal:	1D 28 44 pL pH m [a1 b1]… [ak bk]
Decimal:	29 40 68 pL pH m [a1 b1]… [ak bk]
Range:	3 ≤ (pL + pH x 256) ≤ 65535 (0 ≤ pL ≤ 255, 0 ≤ pH ≤ 255) m = 20 a = 1, 2 b = 0, 1, 48, 49

It enables or disables the real-time command specified by *a*.

pL,*pH* specify (*pL* + *pH* x 256) as the number of bytes after *pH* (*m* and [*a1 b1*] … [*ak bk*]).

a	b	Function
1	0, 48	**DLE DC4 *fn m t*** (fn = 1): Not processed (disabled).
	1 (Default), 49	**DLE DC4 *fn m t*** (fn = 1): Processed (enabled).
2	0 (Default), 48	**DLE DC4 *fn a b*** (fn = 2): Not Processed (disabled).
	1, 49	**DLE DC4 *fn a b*** (fn = 2): Processed (enabled).

3.7.4 Generate pulse in real-time

ASCII: DLE DC4 *fn m t*
Hexadecimal: 10 14 *fn m t*
Decimal: 16 20 *fn m t*
Value : fn=1,
m=0(Drawer1), 1(Drawer2)
1 ≤ *t* ≤ 8
t specifies the pulse on time or off time as *[t* x 100 ms]

It outputs the signal specified by *t* in real-time to the output pulse specified by *m*.
When the setting of "Enabling/disabling buzzer" is enabled with the customized value, <fn= 05> **GS (E** <a = 119>, the internal buzzer sounds with pulse signal for cash drawer.
Note: For the sound pattern and the buzzer frequency for the internal buzzer, follow the customized value setting, <fn= 05> GS (E <a =123 to 126>.

Note: When DLE DC4 (fn=1) command is set to "Not processed" by GS (D "Enable/disable real-time command" command, this command is ignored.(Default is "Processed")

3.7.5 Execute power-off sequence

ASCII: DLE DC4 *fn a b*
Hexadecimal: 10 14 *fn a b*
Decimal: 16 20 *fn a b*

ASCII: DLE SO *fn a b*
Hexadecimal: 10 0E *fn a b*
Decimal: 16 14 *fn a b*

Value: *fn* = 2
a = 1
b = 8

It executes the printer power-off sequence and transmits the power-off notice.
It stores the values of the maintenance counter.
It sets the interface to BUSY.
It sets the printer to power off mode.

This command does not shut the power off. The operator must turn the power off after receiving the power-off notice.
If this command is executed, the printer will not continue to process anything. To recover the printer to print again, it is necessary to turn the power on again or execute a hardware reset by pressing power button.

Note: When DLE DC4 (fn=2) command is set to "Not processed" by GS (D "Enable/disable real-time command" command, this command is ignored.(Default is "Not processed")

3.7.6 Control Buzzer (Internal buzzer)

ASCII: DLE DC4 *fn a n r t1 t2*
Hexadecimal: 10 14 03 *a n r t1 t2*
Decimal: 16 20 3 *a n r t1 t2*
Value: *fn* = 3
a = 0
n = 0
r = 0
t1 = 1
t2 = 0

It stops sounding the internal buzzer
When the buzzer has stopped sounding by this function, the printer transmits the buzzer sound end response as shown below to the host PC.

Data group of buzzer sound end response	Hex	Decimal	Data
(1) Header	37H	55	1 byte
(2) Identifier	54H	84	1 byte
(3) Data	40H	64	1 byte
(4) NUL	00H	0	1 byte

3.7.7 Select peripheral device

ASCII: ESC = n
Hexadecimal: 1B 3D n
Decimal: 27 61 n
Value of n: 1 (Default), 3 = Enable Printer
2 = Disable Printer

It selects the device to which the host PC transmits data. When the printer is disabled (*n* = 2), all data except this command and the real-time commands are ignored.

n	Function
1,3	Enables Printer
2	Disables Printer

3.7.8 Clear buffer(s)

ASCII: DLE DC4 *fn d1 …d7*
Hexadecimal: 10 14 *fn d1…d7*
Decimal: 16 20 *fn d1…d7*
Value: *fn* = 8
d1 = 1, *d2* = 3, *d3* = 20, *d4* = 1, *d5* = 6, *d6* = 2, *d7* = 8

It clears all data stored in the receive buffer and the print buffer and transmits Clear response.
If a recoverable error occurs, recovers from the error.
Transmission data is as follows.

Data group of Clear buffer response	Hex	Decimal	Data
(1) Header	37H	55	1 byte
(2) Data	25H	37	1 byte
(3) NULL	00H	0	1 byte

3.7.9 Extended Real-Time Status Transmission

ASCII: DLE EM n
Hexadecimal: 10 19 n
Decimal: 16 25 n

Values of n: 0x01 = (Reserved)
0x02 = Error status
0x10 = Detail Cutter Error status
0x11 = Detail Printer Jam Error status
0x12 = Detail Thermal Head 1 Error status
0x14 = Detail Memory Error status
0x15 = (Reserved)
0x16 = Warning status
0x17 = Other Printer status
0x23-0xF3 = Diagnostic information

Error status (n=0x02)

bit	Function	Value	Remarks
0	Undefined	0	
1	Undefined	0	
2	Fixed	0	Fixed to off
3	Fixed	0	Fixed to off
4	Fixed	0	Fixed to off
5	Undefined	0	
6	No Thermal Head Error.	0	
	Thermal Head is disconnected or Abnormal Head is connected.	1	
7	Fixed	1	Fixed to on

Detail Cutter Error status (n=0x10)

bit	Function	Value	Remarks
0	Cutter position is at home	0	It is not an error. Sensor status
	Cutter position is not at home	1	
1	Undefined	0	
2	Fixed	0	Fixed to off
3	Undefined	0	
4	Fixed	0	Fixed to off
5	No Cutter error (It left home position correctly)	0	Cutter HP error
	Cutter error (It did not leave home position)	1	
6	No Cutter error (It came back to home)	0	Cutter HP error
	Cutter error (It didn't come back to home position)	1	
7	Fixed	1	Fixed to on

Bit 5 and Bit 6 of this status are detail error status of Cutter Error which is assigned at Bit3 in Transmit error status (n=3) of Real Time Status Transmission.

Detail Printer Jam Error status (n=0x11)

bit	Function	Value	Remarks
0	No Paper Jam	0	
	Paper Jam	1	
1	Undefined	0	
2	Fixed	0	Fixed to off
3	Jam sensor is OFF. (No paper on jam sensor)	0	It is not an error. Sensor status.
	Jam sensor is ON. (Paper on jam sensor)	1	
4	Fixed	0	Fixed to off
5	Undefined	0	

6	Undefined	0	
7	Fixed	1	Fixed to on

These status bits are detail error status of Jam Error which is assigned at Bit2 in Error status (n=0x02) of Extended Real-Time Status Transmission.

Detail Thermal Head 1 Error status (n=0x12)

bit	Function	Value	Remarks
0	No failure dots in thermal head	0	This is not an error. Warning.
	Some failure dots in thermal head	1	
1	No Thermal head overheat	0	This is not an error. Warning.
	Thermal head overheat (55 - 65 degree C)	1	
2	Fixed	0	Fixed to off
3	No illegal head is installed.	0	
	Illegal head is installed. (All are failure dots)	1	
4	Fixed	0	Fixed to off
5	Thermal head connecter is installed properly.	0	
	Thermal head connecter is disconnected.	1	
6	Thermal head temperature is normal condition.	0	More than 90 degree C
	Thermal head temperature is too high.	1	
7	Fixed	1	Fixed to on

Bit0 is to report the result of thermal head failure detection. Therefore, the thermal head failure detection must be performed before getting the latest status of the failure dots.
Bit3, Bit5 and Bit6 of this status are detail of Thermal Head Error assigned as follows.
1) Bit6 in Transmit error status (n=3) of Real Time Status Transmission
2) Bit6 in Error status (n=2) of Extended Real-Time Status Transmission

Detail Memory Error status (n=0x14)

bit	Function	Value	Remarks
0	(Reserved)	0	
1	(Reserved)	0	
2	Fixed	0	Fixed to off
3	No flash memory error in Diagnostics mode	0	
	Flash memory check error in Diagnostics mode	1	
4	Fixed	0	Fixed to off
5	No RAM check error during boot-up	0	
	RAM check error during boot-up	1	
6	No RAM check error in Diagnostics mode	0	
	RAM check error in Diagnostics mode	1	
7	Fixed	1	Fixed to on

Bit3, Bit5 and Bit6 of this status are detail of Unrecoverable Error which is assigned at Bit5 in Transmit error status (n=3) of Real Time Status Transmission.

Warning status (n=0x16)

bit	Function	Value	Remarks
0	Paper Low Sensor is OFF	0	Not warning. Sensor status.
	Paper Low Sensor is ON	1	
1	No abnormal voltage	0	
	Abnormal voltage (24V)	1	
2	Fixed	0	Fixed to off
3	(Reserved)	0	
4	Fixed	0	Fixed to off
5	Sensor calibration has been successfully done.	0	
	Sensor calibration failed or hasn't been conducted yet.	1	
6	(Reserved)	0	

7	Fixed	1	Fixed to on

Bit 0 indicates actual paper low sensor status. Based on this sensor status, the printer firmware detects the paper low according to “Paper Low Detection” setting in the printer configuration.

Other Printer status (n=0x17)

bit	Function	Value	Remarks
0	Printer has no data to be printed.	0	
	Printer has data to be printed.	1	
1	Cover open sensor OFF (Cover is closed)	0	
	Cover open sensor ON (Cover is opened)	1	
2	Fixed	0	Fixed to off
3	PE sensor OFF (Paper exists)	0	
	PE sensor ON (Paper runs out)	1	
4	Fixed	0	Fixed to off
5	Printer is not in the printing stage.	0	
	Printer is in the printing stage.	1	
6	Printer has no data to be processed.	0	
	Printer has data to be processed.	1	
7	Fixed	1	Fixed to on

Bit0, Bit 5 and Bit 6 of this status are to indicate a transaction status that the printer firmware is currently processing. If all bits are zero, the printer is in entirely idle condition.

1) Bit 0 is set when the printer has data to be printed. This bit includes the status which invokes printer mechanical movement such as cash drawer open, paper feed, printer exercise and so on. As soon as all data kept in the printer have been printed, this bit is cleared.
2) Bit 5 is set when the printer is mechanically moving. e.g. feeding paper, cutting paper and controlling the thermal head (Not only printing but also the thermal head failure detection can be considered as controlling the thermal head.)
3) Bit 6 is set when there are some data in the receiving buffer (both real time data and batch data) or in the transmitting buffer. As the first byte of the data is received, this bit is set and it is cleared once the printer completes processing all data in the receiving buffer (No data to process).

Diagnostic information (n=0x23-0xDF)

The printer returns all ASCII data for the information requested. It is preceded by the parameter n to identify the diagnostic item and is followed by a Carriage Return (0D) to signify the end of the data.

n (hex)	Remote diagnostic item	Function
23	Serial number	It returns serial number, Total 12 bytes
27	Class/model number	It returns Class/model number, Total 17 bytes
2F	Boot firmware CRC 4 digit ASCII	It returns boot firmware CRC, Total 6 bytes.
37	Flash firmware CRC 4 digit ASCII	It returns flash firmware CRC, Total 6 bytes.
4B	SBCS Version number	It returns SBCS version number, Total 6 bytes
53	DBCS Version number	It returns DBCS version number, Total 6 bytes
63	DHCP address[1]	It returns DHCP address, Total 17 bytes
67	TCP Port number[1]	It returns TCP Port number, Total 7 bytes
6B	UDP Port number[1]	It returns UDP Port number, Total 7 bytes
6F	SNMP Community (R/W) [1]	It returns SNMP Community (R/W), Total 19 bytes
73	SNMP Trap 1 Community[1]	It returns SNMP Trap 1 Community, Total 19 bytes
77	SNMP Trap 2 Community[1]	It returns SNMP Trap 2 Community, Total 19 bytes
7B	SNMP Trap 1 IP Address[1]	It returns SNMP Trap 1 IP Address, Total 17 bytes
7F	SNMP Trap 2 IP Address[1]	It returns SNMP Trap 2 IP Address, Total 17 bytes

[1] It is valid when option Network I/F card is installed.

83	Receipt length tally (Front)	It returns receipt length tally, Total 10 bytes
87	Knife cut tally	It returns Knife cut tally, Total 10 bytes
93	Hours on tally	It returns Hours on tally, Total 10 bytes
97	Boot firmware version	It returns boot firmware version, Total 6 bytes
9B	Control Table version	It returns Control table version, Total 6 bytes
A3	Flash firmware version	It returns flash firmware version, Total 6 bytes
A7	Flash cycles tally	It returns Flash cycles tally, Total 10 bytes
AB	Knife jams tally	It returns Knife jams tally, Total 10 bytes
AF	Cover openings tally	It returns Cover opening tally, Total 10 bytes
B3	Thermal head over heat tally	It returns Thermal head over heat tally, Total 10 bytes
CB	Printer jam tally	It returns Printer jam tally, Total 10 bytes
D3	Dot Failure info.	It returns number of failure dots, Total 5 bytes
E3	Maintenance tally	It returns Maintenance tally, Total 10 bytes
F3	MAC address[1]	It returns MAC address, Total 19 bytes
F7	IP address[1]	It returns IP address, Total 17 bytes
FB	Subnet mask[1]	It returns Subnet mask, Total 17 bytes
FF	Default Gateway[1]	It returns Default Gateway, Total 17 bytes

3.7.10 Real Time Printer Status Transmission

ASCII: GS ENQ
Hexadecimal: 1D 05
Decimal: 29 5

The printer immediately transmits its status once it receives this command.

Value of Byte:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low
1	Off	00	0	Receipt paper adequate
	On	02	2	Receipt paper low
2	Off	00	0	Cover closed
	On	04	4	Cover open
3	Off	00	0	Interface not busy
	On	08	8	Interface busy
4	Off	00	0	One or both cash drawers open
	On	10	16	Both cash drawers closed
5	Off	00	0	Undefined. Fixed to off.
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	On	80	128	Not used. Fixed to On.

3.7.11 LED Control Request

ASCII: GS z *n*
Hexadecimal: 1d 7A *n*
Decimal: 29 122 *n*
Values of *n*: 1 to 32 (LED Pattern ID)

The printer controls the LED according to a request from the host specified by n when the printer is configured to User mode of LED.
When this command is received, the printer resets (turns off) the current state of all color of LED, and

then it changes the LED state according to the new parameter specified by this command.

Exceptions:
If the printer is in Auto mode of LED, this command is ignored.
The command is ignored if n is out of range.

3.7.12 Real-Time Printer Maintenance

ASCII: GS SUB n
Hexadecimal: 1d 1A n
Decimal: 29 26 n

Values of n: 0x01 = Store firmware detail log into non-volatile memory
0x02 = (Reserved)
0x10 = Return Cutter cycle time
0x11 = Return Cutter cycle time
0x12 = (Reserved)
0x13 = (Reserved)
0x20 = Paper Low sensor ON value (Stored by Sensor Calibration)
0x21 = Paper Low sensor OFF value (Stored by Sensor Calibration)
0x22 = Paper Low sensor Threshold value (Stored by Sensor Calibration)
0x23 = Black Mark sensor ON value (Stored by Sensor Calibration)
0x24 = Black Mark sensor OFF value (Stored by Sensor Calibration)
0x25 = Black Mark sensor Threshold value (Stored by Sensor Calibration)
0x26 to 0x2E : (Reserved)
0x2F = Jam sensor ON value (Stored by Sensor Calibration)
0x30 = Jam sensor OFF value (Stored by Sensor Calibration)
0x31 = Jam sensor Threshold value (Stored by Sensor Calibration)
0x32 to 0x3F : (Reserved)
0x40 = Paper Low sensor ON value (Recent)
0x41 = Paper Low sensor OFF value (Recent)
0x42 – 0x4B : (Reserved)
0x4A = Jam sensor ON value (Recent)
0x4B = Jam sensor OFF value (Recent)
0x4C – 0x4D : (Reserved)

It transmits one byte maintenance related information of the printer.

Store firmware detail log into non-volatile memory (0x01)
It stores the detail firmware log recorded on RAM into the non-volatile memory and transmits the one byte status as soon as it completes storing the log.
Value of Status Byte: 0x06 (Ack): Log was successfully stored into non-volatile memory.
0x15 (Nack): Log was not successfully stored into non-volatile memory.

Return Default Full Cut cycle time (0x10)
It transmits one cycle time of the full cut at the very beginning of the printer.
Value of Status Byte: One cycle full cut time. Unit is 10 msec.

Return Latest Cut cycle time (0x11)
It transmits the latest one cycle time of the knife cut.
Value of Status Byte: One cycle full cut time. Unit is 10 msec.

Return Default Sensor value (0x20 – 0x34)
It transmits the default sensor value calibrated.
Value of Status Byte: Sensor ON/OFF/Threshold value stored when each sensor is calibrated.
If the sensor is not calibrated, zero is returned.

Return Recent Sensor value (0x40 – 0x4D)
It transmits the recent sensor value. The printer keeps monitoring sensor value and returns the highest (OFF) and lowest (ON) value of this power on cycle.

Value of Status Byte: Sensor ON/OFF value which is lowest/highest during this power-on cycle.

3.8 Bar Code Commands

3.8.1 Select Printing Position of HRI Characters

ASCII: GS H *n*
Hexadecimal: 1D 48 *n*
Decimal: 29 72 *n*
Value of *n*: Printing Position of HRI Characters
0, 48 = Not printed
1, 49 = Above the bar code
2, 50 = Below the bar code
3, 51 = Both above and below the bar code
Default: 0 (Not printed)

It specifies the printing position of HRI (Human Readable Interface) characters.

3.8.2 Select Pitch for HRI Characters

ASCII: GS f *n*
Hexadecimal: 1D 66 *n*
Decimal: 29 102 *n*
Value of *n*: Pitch
0, 48 = Standard Pitch at 15.2 CPI on receipt
1, 49 = Compressed Pitch at 19 CPI on receipt
Default: (Standard Pitch at 15.2 CPI)

It specifies the character pitch of HRI characters.

3.8.3 Select Bar Code Height

ASCII: GS h *n*
Hexadecimal: 1D 68 *n*
Decimal: 29 104 *n*
Value of *n*: Number of dots
Range of *n*: 1 – 255
Default: 162

It specifies the bar code height in dots. *n* dots are equal to n/8 mm (n/203 inches).

Exceptions:
This command is not available for GS1 data bar and QR code.

3.8.4 Print Bar Code

	First Variation	Second Variation
ASCII:	GS k *m d1…dk* NUL	GS k *m n d1…dn*
Hexadecimal:	1D 6B *m d1…dk* 0	1D 6B *m n d1…dn*
Decimal:	29 107 *m d1…dk* 0	29 107 *m n d1…dn*
Values:		

It selects the bar code type and prints a bar code for the ASCII characters specified. If the bar code width is more than the printable area, it is not printed.
Bar code horizontal position can be aligned by Select Justification(1B 61) command.

There are two formulas to specify the bar code type by this command. The first formula uses a NULL as a terminator of the string. The second formula has the length parameter of the string instead of a terminator so that it is able to include NULL in the string. Therefore, a bar code which defines NULL as data, e.g. Code 128, can be specified by the second formula.

Check Digit of UPC and JAN (EAN) codes is automatically calculated and processed by the printer if it is

not sent from a system.
Start/Stop characters of Code 39 are automatically added and processed by the printer if they are not sent from a system.

First Formula: String terminated by NULL
m = 0 – 6, 10
d = 32 - 126 (see the table)
n = 1 - 255 (see the table)

First Formula

m	Barcode type	Data	*n*; Length
0	UPC-A	48 – 57 (ASCII numerals)	Fixed Length: 11, 12
1	UPC-E	d1 : 48 (start code) d2~dn : 48 – 57	Fixed Length: 11, 12
2	JAN-13(EAN13)	48 – 57	Fixed Length: 12, 13
3	JAN-8(EAN8)	48 – 57	Fixed Length: 7, 8
4	CODE39	48 – 57, 65 – 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) d1=dk=42 (start/stop code is supplied by printer if necessary)	Variable length
5	Interleaved 2 of 5 (ITF)	48 – 57	Variable length (Even number)
6	CODABAR (NW-7)	Start / stop code : 65 – 68 Data code : 48 – 57,36, 43, 45, 46, 47, 58	Variable length
10	PDF417	1 – 255	Variable length
11	GS1-128	48 - 57	Variable length
12	GS1 DataBar Truncated	48 - 57	Variable length
13	GS1 DataBar Stacked	48 - 57	Variable length
14	GS1 DataBar Stacked Omnidirectional	48 - 57	Variable length
15	GS1 DataBar Limited	48 - 57 [However d1= 48, 49]	Variable length
16	GS1 DataBar Expanded	32 - 34, 37 - 47, 48 - 57, 58 - 63, 65 - 90, 95, 97 - 122, 123 [However d1 = 40, 48 <= d2 <= 57, 48 <= d3 <= 57 when 48 <= d1 <= 57, 48 <= d2 <= 57]	Variable length (2 - 70)

Second Variation: Length of Byte Specified at Beginning of String
m = 65 - 73, 75-82 (see the table)
d = 0 - 127 (see the table)
n = 1 - 255 (see the table)

Second Formula

m	Barcode type	Data	*n*; Length
65	UPC-A	48 – 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	d1 : 48 (start code) d2~dn : 48 – 57	Fixed Length: 11, 12
67	JAN-13(EAN13)	48 – 57	Fixed Length: 12, 13
68	JAN-8(EAN8)	48 – 57	Fixed Length: 7, 8

69	CODE39	48 – 57, 65 – 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) d1=dk=42 (start/stop code is supplied by printer if necessary)	Variable length
70	Interleaved 2 of 5 (ITF)	48 – 57	Variable length (Even number)
71	CODABAR (NW-7)	Start / stop code : 65 – 68 Data code : 48 – 57,36, 43, 45, 46, 47, 58	Variable length
72	Code 93	0 – 127	Variable length
73	Code 128	0 – 105 d1=103 – 105 (must be a start code) d2=0 – 102 (Data bytes) (Stop code is provided by the printer	Variable length
75	PDF417	0 – 255	Variable length
76	GS1 DataBar Omnidirectional	48 - 57	Fixed Length: 13
77	GS1 DataBar Truncated	48 - 57	Fixed Length: 13
78	GS1 DataBar Stacked	48 - 57	Fixed Length: 13
79	GS1 DataBar Stacked Omnidirectional	48 - 57	Fixed Length: 13
80	GS1 DataBar Limited	48 - 57 [However d1= 48, 49]	Fixed Length: 13
81	GS1 DataBar Expanded	32 - 34, 37 - 47, 48 - 57, 58 - 63, 65 - 90, 95, 97 - 122, 123 [However d1 = 40, 48 <= d2 <= 57, 48 <= d3 <= 57 when 48 <= d1 <= 57, 48 <= d2 <= 57]	Variable length (2 - 70)
82	UCC EAN128	0 -105	Variable length

Exceptions:
Illegal data cancels this command.
The command is valid only at the beginning of a line.

Additional information for GS1 DataBar:
In all GS1 DataBar except Expanded and Expanded Stacked, the printer automatically adds Application Identifier (AI), Check Digit (C/D). Hence n (Length) is 13(Fixed Length)

Fig. about the addition of AI & C/D

Type of GS1 DataBar	example	AI & C/D
GS1 DataBar Omnidirectional GS1 DataBar Truncated GS1 DataBar Stacked GS1 DataBar Stacked Omnidirectional GS1 DataBar Limited	Input data: 2001234567890 HRI print: (01)20012345678909	AI & C/D are added automatically. The AI is '(01)'.
GS1 DataBar Expanded GS1 DataBar Expanded Stacked	Input data: {(01{)15012345678907{(30{)23{1{(17{)950827 HRI print: (01)15012345678907(30)23(17)950827	Neither AI nor C/D is added automatically.

In order to express AI in HRI, AI is surrounded by the bracket and printed. Because this parenthesis needs to distinguish from the usual data, it is necessary to use special data.
In the case of Expanded and Expanded stacked, C/D is used for only HRI characters printing. Even if

the input data including wrong C/D is received, the printer prints the data without correction.
In the case of Expanded and Expanded stacked, when attaching the bracket to AI in HRI, it is necessary to transmit data as follows.

Fig. about special data

SpecialData	Transmit data from HOST			use
	ASCII	Hex	Decimal	
(	{ + (	7B + 28	123 + 40	to express AI in HRI
)	{ +)	7B + 29	123 + 41	to express AI in HRI
FNC1	{ + 1	7B + 31	123 + 49	to recognize the end of variable length data

3.8.5 Print Bar Code (ESCPOS Emulation)

	First Variation	Second Variation
ASCII:	GS k *m d1…dk* NUL	GS k *m n d1…dn*
Hexadecimal:	1D 6B *m d1…dk* 0	1D 6B *m n d1…dn*
Decimal:	29 107 *m d1…dk* 0	29 107 *m n d1…dn*
Values:		

It selects the bar code type and prints a bar code for the ASCII characters specified. If the bar code width is more than the printable area, it is not printed.
Bar code horizontal position can be aligned by Select Justification(1B 61) command.

There are two formulas to specify the bar code type by this command. The first formula uses a NULL as a terminator of the string. The second formula has the length parameter of the string instead of a terminator so that it is able to include NULL in the string. Therefore, a bar code which defines NULL as data, e.g. Code 128, can be specified by the second formula.

Check Digit of UPC and JAN (EAN) codes is automatically calculated and processed by the printer if it is not sent from a system.
Start/Stop characters of Code 39 are automatically added and processed by the printer if they are not sent from a system.

First Formula: String terminated by NULL
m = 0 – 6, 10
d = 32 - 126 (see the table)
n = 1 - 255 (see the table)

First Formula

m	Barcode type	Data	*n*; Length
0	UPC-A	48 – 57 (ASCII numerals)	Fixed Length: 11, 12
1	UPC-E	d1 : 48 (start code) d2~dn : 48 – 57	Fixed Length: 11, 12
2	JAN-13(EAN13)	48 – 57	Fixed Length: 12, 13
3	JAN-8(EAN8)	48 – 57	Fixed Length: 7, 8
4	CODE39	48 – 57, 65 – 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) d1=dk=42 (start/stop code is supplied by printer if necessary)	Variable length
5	Interleaved 2 of 5 (ITF)	48 – 57	Variable length (Even number)
6	CODABAR (NW-7)	Start / stop code : 65 – 68 Data code : 48 – 57,36, 43, 45, 46, 47, 58	Variable length

Second Variation: Length of Byte Specified at Beginning of String
m = 65 - 73, 75-82 (see the table)
d = 0 - 127 (see the table)
n = 1 - 255 (see the table)

Second Formula

m	Barcode type	Data	*n*; Length
65	UPC-A	48 – 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	d1 : 48 (start code) d2~dn : 48 – 57	Fixed Length: 11, 12
67	JAN-13(EAN13)	48 – 57	Fixed Length: 12, 13
68	JAN-8(EAN8)	48 – 57	Fixed Length: 7, 8
69	CODE39	48 – 57, 65 – 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) d1=dk=42 (start/stop code is supplied by printer if necessary)	Variable length
70	Interleaved 2 of 5 (ITF)	48 – 57	Variable length (Even number)
71	CODABAR (NW-7)	Start / stop code : 65 – 68 Data code : 48 – 57,36, 43, 45, 46, 47, 58	Variable length
72	Code 93	0 – 127	Variable length
73	Code 128	0 – 105 d1=103 – 105 (must be a start code) d2=0 – 102 (Data bytes) (Stop code is provided by the printer	Variable length
75	GS1 DataBar Omnidirectional	48 - 57	Fixed Length: 13
76	GS1 DataBar Truncated	48 - 57	Fixed Length: 13
77	GS1 DataBar Limited	48 - 57 [However d1= 48, 49]	Fixed Length: 13
78	GS1 DataBar Expanded	32 - 34, 37 - 47, 48 - 57, 58 - 63, 65 - 90, 95, 97 - 122, 123 [However d1 = 40, 48 <= d2 <= 57, 48 <= d3 <= 57 when 48 <= d1 <= 57, 48 <= d2 <= 57]	Variable length (2 - 70)

Exceptions:
Illegal data cancels this command.
The command is valid only at the beginning of a line.

Additional information for GS1 DataBar:
In all GS1 DataBar except Expanded and Expanded Stacked, the printer automatically adds Application Identifier (AI), Check Digit (C/D). Hence n (Length) is 13(Fixed Length)

Fig. about the addition of AI & C/D

Type of GS1 DataBar	example	AI & C/D
GS1 DataBar Omnidirectional	Input data: 2001234567890 HRI print: (01)20012345678909	AI & C/D are added automatically. The AI is '(01)'.
GS1 DataBar Truncated		
GS1 DataBar Stacked		
GS1 DataBar Stacked Omnidirectional		
GS1 DataBar Limited		
GS1 DataBar Expanded	Input data: {(01{)15012345678907{(30{)23{1{(17{)950827	Neither AI nor C/D is added
GS1 DataBar Expanded		

Stacked	HRI print: (01)15012345678907(30)23(17)950827	automatically.

In order to express AI in HRI, AI is surrounded by the bracket and printed. Because this parenthesis needs to distinguish from the usual data, it is necessary to use special data.
In the case of Expanded and Expanded stacked, C/D is used for only HRI characters printing. Even if the input data including wrong C/D is received, the printer prints the data without correction.
In the case of Expanded and Expanded stacked, when attaching the bracket to AI in HRI, it is necessary to transmit data as follows.

Fig. about special data

SpecialData	Transmit data from HOST			use
	ASCII	Hex	Decimal	
(	{ + (	7B + 28	123 + 40	to express AI in HRI
)	{ +)	7B + 29	123 + 41	to express AI in HRI
FNC1	{ + 1	7B + 31	123 + 49	to recognize the end of variable length data

3.8.5 PDF417: Set the row height

ASCII: GS (k *pL pH cn fn n*
Hexadecimal: 1D 28 6B *pL pH cn fn n*
Decimal: 29 40 107 *pL pH cn fn n*
Range: (*pL* + *pH* x 256) =3, (*pL* = 3, *pH* = 0)
cn = 48
fn = 68
2 ≤ *n* ≤ 8
Default: **n** = 3

It sets the row height for PDF417 to [n x (the width of the module)].

3.8.6 PDF417: Set the error correction level

ASCII: GS (k *pL pH cn fn m n*
Hexadecimal: 1D 28 6B *pL pH cn fn m n*
Decimal: 29 40 107 *pL pH cn fn m n*
Range: (*pL* + *pH* x 256) = 4 (*pL* =4, *pH* = 0)
cn = 48
fn = 69
m= 48, 49
48 ≤ *n* ≤ 53 [when *m* = 48]
1 ≤ *n* ≤ 40 [when *m* = 49]
Default: *m* = 49, *n* = 1

It sets the error correction level for PDF417.

When *m* = 48, the error correction level is set by the “Level Setting” and the error correction level set by “Ration Setting” is canceled. The numbers of error correction codewords are as follows:

n	Function	Number of error correction codewords
48	Select error correction level 0	2
49	Select error correction level 1	4
50	Select error correction level 2	8
51	Select error correction level 3	16
52	Select error correction level 4	32
53	Select error correction level 5	64

When *m* = 49, the error correction level is set by the “Ratio Setting” to the level indicated by the number for encoded data, and the error correction level set by the “Level Setting” is canceled. The rate is set to [n x 10%].

The error correction levels in the following table are determined by the calculation [Data codeword x n x 0.1 = (A)] (Fractions of 0.5 and over are rounded up, and others are truncated.)

Result (A)	User the error correction level	Number of error correction codeword
0 to 3	Error correction level 1	4
4 to 10	Error correction level 2	8
11 to 20	Error correction level 3	16
21 to 45	Error correction level 4	32
46 to 100	Error correction level 5	64

3.8.7 PDF417: Select the options

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range: (*pL* + *pH* x 256) = 3 (*pL* = 3, *pH* = 0)
cn = 48
fn = 70
m = 0, 1
Default: *m* =0

It selects the options for PDF417.

m	Function
0	Selects the standard PDF417.
1	Selects the truncated PDF417.

3.8.8 PDF417: Store the data in the symbol storage area

ASCII: GS (k *pL pH cn fn m d1 … dk*
Hexadecimal: 1D 28 6B *pL pH cn fn m d1 … dk*
Decimal: 29 40 107 *pL pH cn fn m d1 … dk*
Range: 4 ≤ (*pL* + *pH* x 256) ≤ 65535 (0 ≤ *pL* ≤ 255, 0 ≤ *pH* ≤ 255)
cn = 48
fn = 80
m = 48
0 ≤ *d* ≤ 255
k = (*pL* + *pH* x 256) – 3

It stores the PDF417 symbol data (*d1…dk*) in the symbol storage area.

3.8.9 PDF417: Print the symbol data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range: (*pL* + *pH* x 256) = 3 (*pL* = 3, *pH* = 0)
cn = 48
fn = 81
m = 48

It encodes and prints the PDF417 symbol data in the symbol storage area with **GS (k** <fn= 080>.

User must secure the quiet zone (left, right, upward, and download space areas defined by the PDF417 symbol specifications) for PDF417 printing.
In standard mode, symbols higher than 831 dots cannot be printed with this printer.

3.8.10 PDF417: Transmit the size information of the symbol data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range: (*pL* + *pH* x 256) = 3 (*pL* = 3, *pH* = 0)
c*n* = 48
f*n* = 82
m = 48

It transmits the size information for the encoded PDF417 symbol data in the symbol storage area with **GS (k** <fn= 080>.

This function does not print.
The size information does not include the quiet zone (left, right, upward, and downward space areas defined by the PDF417 symbol specifications).
Transmission data is as follows.

Description	Hex	Decimal	Data
Header	37	55	1 byte
Identifier	2F	47	1 byte
Horizontal size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Vertical Size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Fixed Value	31	49	1 byte
Separator	1F	31	1 byte
Other information	30 or 31	48 or 49	1 byte
NULL	00	0	1 byte

3.8.11 QR Code: Select the model

ASCII: GS (k *pL pH cn fn n1 n2*
Hexadecimal: 1D 28 6B *pL pH cn fn n1 n2*
Decimal: 29 40 107 *pL pH cn fn n1 n2*
Values of *pL,pH*: *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*cn, fn*, and *[parameters]*). (*pL* + *pH* × 256) = 4 So (*pL* = 4, *pH* = 0)
Value of *cn*: 49
Value of *fn*: 65
Value of *n1*: 49= Selects model 1 Code conversion processing
50= Selects model 2 conversion processing.
200= Select Micro QR Code.
Value of *n2*: 0
Default: *n1* = 50, *n2* = 0

It selects the model for QR Code.

3.8.12 QR Code: Set the size of module

ASCII: GS (k *pL pH cn fn n*
Hex: 1D 28 6B *pL pH cn fn n*
Decimal: 29 40 107 *pL pH cn fn n*
Value of *pL*, *pH*: *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*cn*, *fn*, and *[parameters]*). (*pL* + *pH* × 256) = **3** So (*pL* = **3**, *pH* = 0)
Value of *cn*: 49
Value of *fn*: 67

Range of *n*: 1-16
Default *n* : 3

It sets the size of the module for QR Code as n dots. User must secure the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications) for QR Code printing. Quiet zone is defined as 4 cells in standard and MicroQR code versions.

Notes:
The recommended module size is 4 dots and above. But, if n = 4 is used, this printer cannot print maximum size of barcode data because the barcode width will be over the printable width. So, Default value of n is defined to 3 in this version.

3.8.13 QR Code: Select the error correction level

ASCII: GS (k p_L p_H *cn fn n*
Hex: 1D 28 6B p_L p_H *cn fn n*
Decimal: 29 40 107 p_L p_H *cn fn n*
Value of p_L, p_H: p_L, p_H specify (p_L + p_H × 256) as the number of bytes after p_H (*cn*, *fn*, and *[parameters]*). (p_L + p_H × 256) = 3 So (p_L = 3, p_H = 0)
Value of *cn*: 49
Value of *fn*: 69

Value of *n*: 48 = Select error correction level L 7 %
49 = Select error correction level M 15 %
50 = Select error correction level Q 25 %
51 = Select error correction level H 30 %

When model1 or model2 selected n=48, 49, 50, 51
When microQR selected n=48, 49, 50

Default *n* : 48

It selects the error correction level for QR Code.

Note:
In Micro QR, error correction level='H' is not printed at the time of the choice.
For 'Symbol versionM1' in micro QR, please choose error correction level='L'.

3.8.14 QR Code: Select encode modes.

ASCII: GS (k p_L p_H *cn fn n*
Hex: 1D 28 6B p_L p_H *cn fn n*
Decimal: 29 40 107 p_L p_H *cn fn n*
Value of p_L, p_H: p_L, p_H specify (p_L + p_H × 256) as the number of bytes after p_H (*cn*, *fn*, and *[parameters]*). (p_L + p_H × 256) = 3 So (p_L = 3, p_H = 0)
Value of *cn*: 49
Value of *fn*: 70

Value of *n*: 0,48 = Encode lower-case alphabet characters in 8-bit mode
1,49 = Ignore case distinctions and use only upper case characters
2,50 = Encode lower-case alphabet characters in 8 bit mode.
Assume that the input contains kanji(Shift-Jis)
3,51 = Ignore case distinctions and use only upper case characters
Assume that the input contains kanji(Shift-jis)
4,52 = Encode entire data in 8-bit mode

Default *n* : 0,48

Note: ESC @ set the encoding mode to default

3.8.15 QR Code: Store the data in the symbol storage area

ASCII:	GS (k *pL pH cn fn m d1…dk*
Hex:	1D 28 6B *pL pH cn fn m d1…dk*
Decimal:	29 40 107 *pL pH cn fn m d1…dk*
Range of *pL:*	4 - 255, Here 4 ≤ (*pL* + *pH* × 256) ≤ 7092
Range of *pH:*	0 - 27
Value of *cn:*	49
Value of f*n:*	80
Value of m*:*	48
Range of *d*	0 - 255
Value of k*:*	(*pL* + *pH* × 256) – 3

It stores the QR Code symbol data (d1...dk) into the symbol storage area (RAM).

3.8.16 QR Code: Print the symbol data in the symbol storage area

ASCII:	GS (k *pL pH cn fn m*
Hex	1D 28 6B *pL pH cn fn m*
Decimal	29 40 107 *pL pH cn fn m*
Value of *pL*, *pH*	*pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*cn*, *fn*, and *[parameters]*). (*pL* + *pH* × 256) = 3 So (*pL* = 3, *pH* = 0)
Value of *cn*	49
Value of *fn*	81
Value of *m*	48

It encodes and prints the QR Code symbol data in the symbol storage area with GS (k.

Note: User must secure the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications) for QR Code printing.

3.8.17 QR Code: Transmit the size information of the symbol data in the symbol storage area

ASCII	GS (k *pL pH cn fn m*
Hex	1D 28 6B *pL pH cn fn m*
Decimal	29 40 107 *pL pH cn fn m*
Value of *pL*, *pH*	*pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*cn*, *fn*, and *[parameters]*). (*pL* + *pH* × 256) = 3 So (*pL* = 3, *pH* = 0)
Value of *cn*	49
Value of *fn*	82
Value of *m*	48

Printer transmits the size information for the encoded QR Code symbol data in the symbol storage area.

Description	Hex	Decimal	Data
Header	37	55	1 byte
Identifier	36	54	1 byte
Horizontal size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Vertical Size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Fixed Value	31	49	1 byte
Separator	1F	31	1 byte
Other information	30 or 31	48 or 49	1 byte
NULL	00	0	1 byte

Note:
In the above, “Other information” represents the possibility of printing QR Code.
Other Information: 0x30 - Printing is possible

0x31 - Printing is impossible

Horizontal and vertical sizes are specified as ASCII value of received byte. They can be obtained by following equations.

Horizontal size = Number of cells in Horizontal Direction × Symbol size specified by the command 1D 28 6B *03 00 31 43 n*

Vertical size = Number of cells in Vertical Direction × Symbol size specified by the command 1D 28 6B *03 00 31 43 n*

Example: If Symbol size is specified as 10 by the command 1D 28 6B *03 00 31 43 n* and number of pixels in horizontal direction is 21 then horizontal size will be 10 * 21=210. So the printer's output will be 37 36 32 31 30 1f 32 31 30 1f 31 1f 30 00.

3.8.18 2-dimensional GS1 DataBar: Set the module width

ASCII: GS (k *pL pH cn fn n*
Hexadecimal: 1D 28 6B *pL pH cn fn n*
Decimal: 29 40 107 *pL pH cn fn n*
Range of *pL, pH:* (pL + pH × 256) = 3 (pL = 3, pH = 0)
Value of *cn:* 51
Value of f*n:* 67
Value of n*:* 1 ≤ n ≤ 6

It sets the width of one module of 2-dimensional GS1 DataBar to n dots.

3.8.19 2-dimensional GS1 DataBar: Set the maximum width of GS1 DataBar Expanded Stacked

ASCII: GS (k *pL pH cn fn nL nH*
Hexadecimal: 1D 28 6B *pL pH cn fn nL nH*
Decimal: 29 40 107 *pL pH cn fn nL nH*
Range of *pL, pH:* (pL + pH × 256) = 4 (pL = 4, pH = 0)
Value of *cn:* 51
Value of f*n:* 72
Value of n*:* (nL + nH x 256) = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22
Default of n*:* (nL + nH x 256) = 4 (nL =4, nH = 0)

It sets the maximum width (segment number) of GS1 DataBar Expanded Stacked (2-dimensional GS1 DataBar) .

3.8.20 2-dimensional GS1 DataBar: Store data in the symbol storage area

ASCII: GS (k *pL pH cn fn m n d1,,,dk*
Hexadecimal: 1D 28 6B *pL pH cn fn m n d1,,,dk*
Decimal: 29 40 107 *pL pH cn fn m n d1,,,dk*
Range of *pL, pH*: 6 ≤ (pL + pH × 256) ≤ 259 (0 ≤ pL ≤ 255, pH = 0, 1)
Value of *cn*: 51
Value of f*n*: 80
Value of m*:* 48
Value of n*:* 72 = GS1 DataBar Stacked
73 = GS1 DataBar Stacked Omnidirectional
76 = GS1 DataBar Expanded Stacked
Range of d*:* 0 ≤ d ≤ 255
Range of k*:* k = (pL + pH × 256) - 4

It stores symbol data (d1…dk) in 2-dimensional GS1 DataBar in the symbol storage.

3.8.21 2-dimensional GS1 DataBar: Print data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range of *pL, pH*: (pL + pH × 256) = 3 (pL= 3, pH = 0)
Value of *cn*: 51
Value of f*n*: 81
Value of m*:* 48

It encodes and prints the symbol data stored by GS (k <fn=80>) in the symbol.

Note:
The user must secure the quiet zones (the space at the top, bottom, right, and left of the symbols, which is specified by the 2-dimensional GS1 DataBar standard.)

In standard mode, if the symbol size exceeds the print area, feeds the paper as much as the symbol's height, without printing the symbol.

3.8.22 2-dimensional GS1 DataBar: Transmit size information of the symbol data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range of *pL, pH:* (pL + pH × 256) = 3 (pL= 3, pH = 0)
Value of *cn:* 51
Value of f*n:* 82
Value of m*:* 48

Transmits the size information when printing the symbol data stored by GS (k <fn=80>) in the symbol storage area.
Note:
Printing is excluded from the processing executed by this function.
The size information excludes the quiet zones (the space at the top, bottom, right, and left of the symbols, which is specified by the 2-dimensional GS1 DataBar standard.)
Transmission data is as follows.

Description	Hex	Decimal	Data
Header	37	55	1 byte
Identifier	4F	79	1 byte
Horizontal size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Vertical Size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Fixed Value	31	49	1 byte
Separator	1F	31	1 byte
Other information	30 or 31	48 or 49	1 byte
NULL	00	0	1 byte

3.8.23 Select PDF 417 parameters

ASCII: GS p a b c d e f
Hex 1D 70 a b c d e f
Decimal 29 112 a b c d e f
Default : **a = 1**
b = 2
c = 58
d = 7
e = 3
f = 10

Description : Selects the two-dimensional PDF 417 parameters as follows

value		Range	description	Support
a,b			The ration of bar height to symbol length.	Not supported
	A = height	1 ≤ a ≤ 10		Not supported
	B = width	1 ≤ b ≤ 100		Not supported
c	Rows	3 ≤ c ≤ 90	Number of rows in the matrix of code words.	Not supported
d	Columns	7 ≤ d ≤ 30	Number of columns in the matrix of code words.	Not supported

e	X dimension	1 ≤ e ≤ 7	Width of a single module in dots.	Supported
f	Y dimension	2 ≤ f ≤ 25	Height of the code word in dots.	Not supported

PDF 417 is a multi-row, continuous, variable length symbolism which has high data capacity. Each symbol has between 3 and 90 rows, with each row containing a start pattern, a left row indicator, 1 to 30 data characters, a right row indicator and a stop pattern. The number and length of the rows are selectable, which allows the aspect ratio to be adjusted to particular labeling applications. There are no separator bars between rows.
Each character has four bars and four spaces within 17 modules, and is assigned a value between 0 and 928. For this symbolism, it is common to refer to these character values as “code words”.

There are three mutually exclusive sets of symbol patterns, or clusters, each having 929 distinct patterns. Because different clusters are used for adjacent rows, it is possible for the decoder to tell if the scanning path is crossing row boundaries without the use of separator bars.
All parameter except e ignored, but it have to be transmitted. The height is the double of the width.

3.8.24 DataMatrix: Set the symbol type, number of columns, number of rows

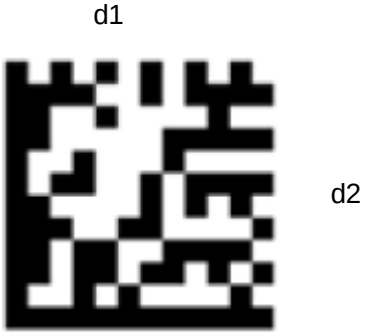
ASCII: GS (k *pL pH cn fn m d1 d2*
Hexadecimal: 1D 28 6B *pL pH cn fn m d1 d2*
Decimal: 29 40 107 *pL pH cn fn m*
Range of *pL, pH:* (pL + pH × 256) = 5 (pL= 5, pH = 0)
Value of *cn:* 54
Value of f*n:* 66
Value of m*:* 0,1,48,49

Value of d1,d2 :

Value	Range
When m= 0, 48 (d1,d2)	(0, 0), (10, 10), (12, 12), (14, 14), (16, 16), (18, 18), (20,20), (22, 22), (24, 24), (26, 26), (32, 32), (36, 36), (40, 40), (44, 44), (48, 48), (52, 52), (64, 64), (72, 72), (80, 80), (88, 88), (96, 96), (104, 104), (120, 120), (132, 132), (144, 144)
When m= 1, 49 (d1,d2)	(8, 0), (8, 18), (8, 32), (12, 0), (12, 26), (12, 36), (16, 0), (16, 36), (16, 48)

Default : m = 0
d1,d2 = (0,0)

Description : This command sets the symbol type, number of rows(d1), and number of columns(d2)



m	d1,d2	Symbol type	Number of Columns, row
0,48	(0,0)	Square(ECC200)	Sets automatic processing for the number of columns and rows of the symbol.
0,48	Other than (0, 0)	Square(ECC200)	Sets the number of columns of the symbol to d1, the number of rows to d2 .
1,49	(8, 0), (12, 0), (16, 0)	Rectangle (ECC200)	Sets the rows of the symbol to d1, the number of columns to automatic processing.
1,49	Other than (8, 0), (12, 0), (16, 0)	Rectangle (ECC200)	Sets the number of rows of the symbol to d1, the number of columns to d2.

Notes :

- This command is ignored if any of m, d1, or d2 is out of range.
- Setting of this command are in effect until 1B 40 is executed, the printer is reset, or the power is turned off.
- Setting of this command affect the encode processing for DataMatrix. Changing the symbol type affects the horizontal and vertical sizes of the symbol.

- DataMatrix is capable of encoding variable length data. For m with automatic processing, the resulting symbol varies according to the amount of data encoded. For m which requires setting d1 and d2, the following table provides a useful guide to estimating size of symbol depending on number of data to be encoded:

Symbol Type	Maximum Data	
	Numeric	Alphanumeric
Square		
10,10	6	3
12,12	10	6
14,14	16	10
16,16	24	16
18,18	36	25
20,20	44	31
22,22	60	43
24,24	72	52
26,26	88	64
32,32	124	91
36,36	172	127
40,40	228	169
44,44	288	214
48,48	348	259
52,52	408	304
64,64	560	418
72,72	736	550
80,80	912	682
88,88	1152	862
96,96	1392	1042
104,104	1632	1222
120,120	2100	1573
132,132	2608	1954
144,144	3116	2335
Rectangle		
8,18	10	6
8,32	20	13
12,26	32	22
12,36	44	31
16,36	64	46
16,48	98	72

3.8.25 DataMatrix: Set the size of the module

ASCII: GS (k *pL pH cn fn n*
Hexadecimal: 1D 28 6B *pL pH cn fn n*
Decimal: 29 40 107 *pL pH cn fn n*
Range of *pL, pH:* (pL + pH × 256) = 3 (pL= 3, pH = 0)
Value of *cn:* 54
Value of f*n:* 67
Value of *n:* 2-16

Default : n = 3

Description : This command sets the width of one module of DataMartix to n dots.

Notes :

- n = width of a module = height of a module (because the DataMatrix modules are square). If n is outside its range, this command is ignored.
- Settings of this command are in effect until 1b 40 is executed, the printer is reset, or the power is turned off.
- Settings of this command affect the encode processing for DataMatrix. Changing the symbol type affects the horizontal and vertical sizes of the symbol.

3.8.26 DataMatrix: Store the data in the symbol storage area

ASCII: GS (k *pL pH cn fn m d1…dk*
Hexadecimal: 1D 28 6B *pL pH cn fn m d1…dk*
Decimal: 29 40 107 *pL pH cn fn m d1…dk*
Range of *pL, pH:* 4 ≤ (pL + pH × 256) ≤ 3119 (0 ≤ pL ≤ 255, 0 ≤ pH ≤ 12)
Value of *cn:* 54
Value of f*n:* 80
Value of *m:* 48
Value of *d:* 0-255
Value of *k:* (pL + pH x 256) - 3

Description : This command stores the DataMatrix symbol data (d1...dk) in the symbol storage area. k bytes of d1…dk are processed as the symbol data.

Notes :

- The symbol data saved in the symbol storage area by this command is encoded by printing and transmission of this command.

- After printing and transmission are executed, the symbol data in the symbol storage area is kept. FNC1 character must be specified as ESC (Hex = 1BH / Decimal = 27) + “1” (Hex = 31H / Decimal = 49). ESC itself must be specified as ESC + ESC..

- The symbol data saved in the symbol storage area by this command is kept until the following processing is performed:.
    - This function is executed
    - 1B 40 is executed
    - The printer is reset or the power is turned off.

3.8.27 DataMatrix: Print the symbol data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range of *pL, pH:* (pL + pH × 256) = 3 (pL= 3, pH = 0)
Value of *cn:* 54
Value of f*n:* 81
Value of *m:* 48

Description : This command encodes and prints the DataMatrix symbol data stored in the symbol storage area.

Notes :

- Use this command when the printer is at the beginning of a line, or there is no data in the print buffer
- If the symbol size exceeds the print area, the printer feeds the paper as much as the symbol's height, without printing the symbol.
- The quiet zone (the space at the top, bottom, right, and left of the symbols, which is specified by the DataMatrix standard) is not included in the printing data. Be sure to include the quiet zone when using this function.
- If there is any of the errors described below in the data of the symbol storage area, the barcode will not be printed.
    - No data
    - When there is a problem with the amount of data saved in the symbol storage area.
    - When the data saved in the symbol storage area includes data outside the domain.
- Printing of symbol is not affected by print mode (emphasized, double-strike, underline, or font size), except for upside-down print mode.
- The following functions are not supported:
    - Structured Append Symbols Macro Character
    - Reader Programming Character
    - ECI: Extended Channel Interpretation
- Error correction version is ECC 200. Versions ECC 000 – 140 cannot be used.
    - For ECC 200, the Reed-Solomon Error Detection and Correction algorithm is used for the error correction codewords.
    - In the Reed-Solomon Error Detection and Correction algorithm, the error correction level (%) is automatically determined based on the symbol size.
- 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. After the symbol printing, the print position is moved to left side of the printable area. Also, the printer is in the status "beginning of the line".
- In Page mode, the printer stores the symbol data in the print buffer without executing actual printing. The printer moves print position to the next dot of the last data of the symbol.

3.8.28 DataMatrix: Transmit the size information of the symbol data in the symbol storage area

ASCII: GS (k *pL pH cn fn m*
Hexadecimal: 1D 28 6B *pL pH cn fn m*
Decimal: 29 40 107 *pL pH cn fn m*
Range of *pL, pH:* (pL + pH × 256) = 3 (pL= 3, pH = 0)
Value of *cn:* 54
Value of f*n:* 82
Value of *m:* 48

Description : Transmits the size information for printing the DataMatrix symbol data stored.

Notes :

- In Standard mode, use this function when the printer is "at the beginning of a line,"or "there is no data in the print buffer."
- The size information for each data is as follows;

Description	Hex	Decimal	Data
Header	37	55	1 byte
Identifier	59	89	1 byte
Horizontal size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Vertical Size	30-39	48-57	1 - 5 bytes
Separator	1F	31	1 byte
Fixed Value	31	49	1 byte
Separator	1F	31	1 byte
Other information	30 or 31	48 or 49	1 byte
Error information	30-39	48-57	4 bytes
NULL	00	0	1 byte

- "Other information" for each data is as follows

Hex	Decimal	Condition
30	48	Printing is possible
31	49	Printing is impossible

- "Error information" indicates mainly detailed information when "Other information" is "Unprintable".

Error information	Error content	Solution
"0000"	No error(Printing is possible)	
"1001"	Encoded data cannot be within one symbol	Check the number of encoded data
"1002"	Encode processing failed.	Check the encoded data.
"2001"	When the Standard mode is selected, there is data in the print buffer.	Print or clear the data in the print buffer
"2002	The symbol size is bigger than the current printing area. ▪ The symbol is bigger than the printing area. ▪ The printing position is at the buffer-full position.	Make the module size smaller. Change the printing layout (printing area, printing position, etc.)

3.9 Page Mode Commands

Standard Mode is the default mode which prints data as soon as one line data in the print buffer is ready to print. One line data is printed once a print command such as LF (0x0A) is processed or one line buffer is full.
Page Mode is the mode which prints all data in the page buffer at a time. In this mode, the printer does not start printing even if the condition printing data in Standard Mode takes place, it queues data into the page buffer until the print command in Page Mode such as ESC FF (0x1B 0x0C) is processed.

The basic flow of page mode printing is as follows.

1) Switch to Page Mode by “Select Page Mode” command (1B 4C).
2) Specify the origin and the size of the printing area by “Set Printing Area in Page Mode” command (1B 57).
3) Specify the starting position and print direction by “Select Print Direction in Page Mode” command (1B 54).
4) Store print data (text, image or barcode…) in the page buffer.
5) Print buffered data in the page buffer by “Print Data in Page Mode” command (1B 0C).
6) Switch to Standard Mode by “Select Standard Mode” command (1B 53).

3.9.1 Print and Return to Standard Mode

ASCII: FF
Hexadecimal: 0C
Decimal: 12

It prints all buffered data in the page buffer on the page area defined and switches to Standard Mode from Page Mode.

Exceptions:
This command is valid in Page Mode.

3.9.2 Print and feed marked paper to print starting position

ASCII: FF
Hexadecimal: 0C
Decimal: 12

Prints the data in the print buffer and feeds marked paper to the print starting position.

Notes: If the BM sensor is enabled by using memory switch 0x80 the printer feeds the marked paper to the next mark position.
If the paper is at the print starting position and there is no data in the print buffer, this command is ignored.
If the BM sensor is enabled by using memory switch 0x80 the minimum foot loss is > 5 mm.
After printing, the printing position moves to the beginning of the line. When a left margin is set, the position of the left margin is the beginning of the line.

3.9.3 Cancel Print Data in Page Mode

ASCII: CAN
Hexadecimal: 18
Decimal: 24

It deletes all buffered data in the page buffer.

Exceptions:
This command is valid in Page Mode.

3.9.4 Print Data in Page Mode

ASCII: ESC FF
Hexadecimal: 1B 0C
Decimal: 27 12

It prints all buffered data in the page buffer on the page area defined.

Exceptions:
This command is valid in Page Mode.

3.9.5 Select Page Mode

ASCII: ESC L
Hexadecimal: 1B 4C
Decimal: 27 76

It switches from Standard Mode to Page Mode.

Exceptions:
The command is valid at the beginning of a line in Standard Mode.

3.9.6 Select Standard Mode

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

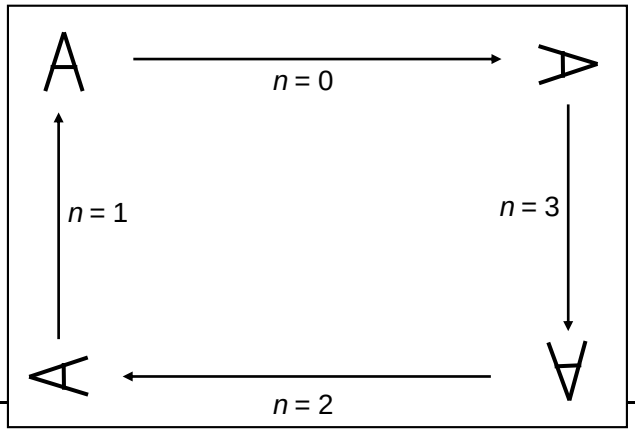
It switches from Page Mode to Standard Mode.
Switching to Standard Mode clears all buffered data in the page buffer and initializes the definition of the page area.

Exceptions:
This command is valid in Page Mode.

3.9.7 Select Print Direction in Page Mode

ASCII: ESC T *n*
Hexadecimal: 1B 54 *n*
Decimal: 27 84 *n*
Value of n: 0, 48 = Upper left corner proceeding across page to the right (A)
1, 49 = Lower left corner proceeding up the page (B)
2, 50 = Lower right corner proceeding across page to the left(upside down) (C)
3, 51 = Upper right corner proceeding down page (D)

It selects the printing direction and start position in Page Mode. The following illustration indicates the direction and the start position of each parameter.
The command can be sent multiple times in one page.



Default: 0 (Upper left corner proceeding across page to the right)

Exceptions:
This command is valid in Page Mode.
This command is ignored if the value of n is out of the range.

3.9.8 Set Printing Area in Page Mode

ASCII: ESC W *n1, n2 …n8*
Hexadecimal: 1B 57 *n1, n2 …n8*
Decimal: 27 87 *n1,n2 …n8*
Range of *n*: 0 – 255
Default: *n1 – n4* = 0
n5 = 64
n6 = 2
n7 = 64
n8 = 2

It sets the logical origin and the size of the printing area in Page Mode.

Formulas:
x0, y0: The logical origin specified by the calculation of parameters n1, n2, n3 and n4 based on the absolute origin which is located at the upper left side of the printing area.
dx, dy: The size of the printing area dx and dy is specified by the calculation of parameters n5, n6, n7 and n8.
The unit of xy direction of each formula are Horizontal Motion Unit and Vertical Motion Unit which are specified by “Set Horizontal and Vertical Minimum Motion Units” command (1D 50).

x0 = n1 + n2 x 256
y0 = n3 + n4 x 256
dx = n5 + n6 x 256
dy = n7 + n8 x 256

The maximum printable area in the x direction is 576/203 inches.
The maximum printable area in the y direction is 2000/203 inches.

Exception:
This command is valid in Page Mode.

3.9.9 Set Absolute Vertical Print Position in Page Mode

ASCII: GS $ *nL nH*
Hexadecimal: 1D 24 *nL nH*
Decimal: **29 36 nL nH**

It moves the vertical print position to the position specified by this command from the starting position specified by “Select Print Direction in Page Mode (1B 54)” command in Page Mode.

Formulas:
0 ≤ (nL + nH X 256) ≤ 65535

The unit of this formula is Vertical or Horizontal Motion Unit which is specified by “Set Horizontal and Vertical Minimum Motion Units” command (1D 50).
When the starting position specified by “Select Print Direction in Page Mode” command (1B 54) is set to the upper left or lower right of the printing area, Vertical Motion Unit is used for this formula.
When the starting position specified by “Select Print Direction in Page Mode” command (1B 54) is set to the upper right or lower left of the printing area, Horizontal Motion Unit is used for this formula.

Exceptions:
This command is valid in Page Mode.
If the position specified exceeds the print area, this command is ignored.

3.9.10 Set Relative Vertical Print Position in Page Mode

ASCII: GS \ *nL nH*
Hexadecimal: 1D 5C *nL nH*
Decimal: 29 92 *nL nH*

It moves the vertical print position to the position specified by this command from the current position in Page Mode.

Formulas:
Downward movement: (nL + nH X 256)
Upward movement: (nL + nH X 256) - 65535

The positive number implies that it moves downward, and the negative number moves the position upward.

The unit of this formula is Vertical or Horizontal Motion Unit which is specified by “Set Horizontal and Vertical Minimum Motion Units” command (1D 50).
When the starting position specified by “Select Print Direction in Page Mode” command (1B 54) is set to the upper left or lower right of the printing area, Vertical Motion Unit is used for this formula.
When the starting position specified by “Select Print Direction in Page Mode” command (1B 54) is set to the upper right or lower left of the printing area, Horizontal Motion Unit is used for this formula.

Exceptions:
This command is valid in Page Mode.
If the position specified exceeds the print area, this command is ignored.

3.10 Macro Commands

3.10.1 Start and Terminate Macro Definition

ASCII: GS :
Hexadecimal: 1D 3A
Decimal: 29 58

It starts and terminates a macro definition to the target memory specified by Select Memory Type for User Defined Data(1D 22 n) command.
Only one macro can be stored in Macro area of each target memory (RAM and Flash memory).
Once this command is processed, the subsequent data is treated as macro data to define, and it continues to define the macro until this command is processed once again.

While the macro is being defined, if "Execute Macro (1D 5E) command" is received, it cancels the macro definition.

If Macro is defined on RAM, it is no longer available once the printer is reset. However, this macro is not cleared by Initialize Printer (1B 40)" command.

Formulas:
A macro can be defined up to 2048 bytes. If the macro definition exceeds 2048 bytes, excess data is not stored.

3.10.2 Execute Macro

ASCII: GS ^ *r t m*
Hexadecimal: 1D 5E *r t m*
Decimal: 29 94 *r t m*
Value of *r*: The number of times to execute the macro.
Value of *t*: The interval time to execute the macro multiple times defined by *"r".*
Interval time = *t* x 100 milliseconds
Value of *m*: Macro execution mode
0 (Bit0): The macro is executed *r* times continuously with the interval specified by *t*.
1 (Bit0): The printer waits for the feed button to be pressed in order to start the macro. Once the button is pressed, it executes the macro with the interval specified by t one time. After that, the printer again waits for the feed button to be pressed. The printer repeats this operation r times.

It executes a macro defined on the target memory specified by Select Memory Type for User Defined Data(1D 22 n) command.
Pressing the feed button to execute the macro (Macro execution mode: m = 1) does not feed paper.

Exceptions:
While the macro is being defined, if this command is received, it cancels its macro definition.
If the macro is not defined on the target memory or if the parameter "*r*" is 0, this command is ignored.

3.11 User Data Storage Commands

3.11.1 Write User Defined Data

ASCII: ESC ‘ m a0 a1 a2 d1 … dm
Hexadecimal: 1B 27 m a0 a1 a2 d1 … dm
Decimal: 27 39 m a0 a1 a2 d1 … dm
Value of *m*: 1 – 255

It writes m bytes data into the user defined data area of the flash memory. a0, a1 and a2 are the offset based on the top address of the user defined data area. If any of the memory address specified by this command are currently used, the command is ignored.

3.11.2 Read User Defined Data

ASCII: ESC 4 *m a0 a1 a2*
Hexadecimal: 1B 34 *m a0 a1 a2*
Value of m: 1 – 255

It reads m bytes data from the user defined data area of the flash memory. a0, a1 and a2 are the offset based on the top address of the user defined data area.

3.11.3 Select Memory Type for User Defined Data

ASCII: GS " *n*
Hexadecimal: 1D 22 *n*
Decimal: 29 34 *n*
Value of *n*: 48-53

n (ASCII)	Target Storage Memory	Data to be registered
0	RAM	User-defined Logo
1	Flash Memory (default)	User-defined Logo
2	RAM	User-defined Character
3	Flash Memory (default)	User-defined Character
4	RAM	Macro
5	Flash Memory (default)	Macro

It specifies the target memory type (RAM or Flash memory) for User defined logos, User defined characters and Macro. The memory type selected by this command is valid until it is changed again by this command or the printer is turned off.

n = 48 (ASCII n = 0)
It specifies RAM as the user defined logo area. The subsequent commands to define logos are stored into RAM. This parameter is available only for the registration. It does not affect the functionality to print logo. Logo is printed according to ID or Key Code irrespective of the storage area.

n = 49 (ASCII n = 1)
It specifies the flash memory as the user defined logo area. The subsequent commands to define logos are stored into the flash memory. This parameter is available only for the registration. It does not affect the functionality to print logo. Logo is printed according to ID or Key Code irrespective of the storage area.

n = 50 (ASCII n = 2)
It specifies RAM as the user defined character area. The subsequent commands to define characters are stored into RAM. This parameter is available only for the registration. It does not affect the functionality to print user defined characters. User defined characters are printed according to the character code irrespective of the storage area.

n = 51 (ASCII n = 3)
It specifies the flash memory as the user defined character area. The subsequent commands to define characters are stored into the flash memory. This parameter is available only for the registration. It does

not affect the functionality to print user defined characters. User defined characters are printed according to the character code irrespective of the storage area.

n = 52 (ASCII n = 4)
It specifies RAM as Macro definition area. The subsequent commands to define Macro are stored into RAM. It also specifies RAM as the target memory to read Macro defined.

n = 53 (ASCII n = 5)
It specifies the flash memory as Macro definition area. The subsequent commands to define user data such as Macro are stored into the flash memory. It also specifies the flash memory as the target memory to read Macro defined.

3.11.4 Flash Memory Allocation for User-defined Storage Area

ASCII: GS " U *n1 n2*
Hexadecimal: 1D 22 55 *n1 n2*
Decimal: 29 34 85 *n1 n2*
Default of *n1*: 4 (n1 is the number of flash memory sectors used for user defined logo.)
Default of *n2*: 1 (n2 is the number of flash memory sectors used for user defined data.)
Value of *n*: n1 + n2 <= 8

This command defines the allocation of the flash memory sectors for the user defined logo area and the user defined data area. (1 sector = 64 Kbytes)
Total flash memory sectors for entire user defined storage area are 8 sectors (512 Kbytes). The allocation for the user defined character area is fixed to 1 sector (64 Kbytes).
Therefore, 5 remaining sectors can be freely allocated for the user defined logo (*n1*) and the user defined data (*n2*) by this command.
This memory allocation specified by this command is valid even after the printer reboot.

n1	n2	User defined character (Fixed to 64K bytes)	User defined logo	User defined data
(Factory Default)		64 Kbytes	256 Kbytes	64 Kbytes
(Examples)				
0	8	64 Kbytes	0 Kbytes	512 Kbytes
1	7	64 Kbytes	64 Kbytes	448 Kbytes
2	6	64 Kbytes	128 Kbytes	384 Kbytes
3	5	64 Kbytes	192 Kbytes	320 Kbytes

Important:
All data of the user defined storage area in the flash memory are erased when the allocation is changed by this command.

3.11.5 Erase User-defined storage area in Flash Memory

ASCII: GS @ *n*
Hexadecimal: 1D 40 *n*
Decimal: 29 64 *n*
Value of *n*: 49-50

It erases all data of the user-defined area located in the flash memory and sends a carriage return when the operation completes.

***n* = 49 (ASCII *n* = 1)**
It erases all data of the user-defined character area and the user-defined logo area in the flash memory.

***n* = 50 (ASCII *n* = 2)**
It erases all data of the user- defined data area in the flash memory.

***n* = 51 (ASCII *n* = 3)**
it erases all data of the user-defined data area in the RAM.

3.11.6 Printer Setting Change

ASCII: US 6 [*m n*], [*m n*] … [*m n*] 0FFH
Hexadecimal: 1F 36 [*m n*], [*m n*] … [*m n*] 0FFH
Decimal: 31 54 [*m n*], [*m n*] … [*m n*] 0FFH
Value of *m*, *n*:

It sets the printer configuration specified by m and n. If m or n is out of range, this command is ignored. However, it continues processing until the terminator code FFh is detected in even such case.

m (Hex)	Function	n (Hex)	Option	Effect[1]
0 - 10	Reserved			
11	Baud rate (RS232C Option)	00 01 02 03 04	115200 bps 57600 bps 38400 bps 19200 bps (Default) 9600 bps	Power off/on
12	Number of data bit (RS232C Option)	00 01	8 data bits (Default) 7 data bits	Power off/on
13	Number of stop bit (RS232C Option)	00 01	1 stop bits (Default) 2 stop bits	Power off/on
14	Parity (RS232C Option)	00 01 02	No parity (Default) Even parity Odd parity	Power off/on
15	Flow control (RS232C Option)	00 01	XON/XOFF DTR/DSR (Default)	Power off/on
16	Data error option (RS232C Option)	00 01	Ignore errors(Default) Print "?"	Power off/on
17	Reserved			
18	DSR signal option (RS232C Option)	00 01	Enable DSR signal (Default) Disable DSR signal	Power off/on
19	Receive Buffer Capacity	00 01	64KB (default) 45 Bytes	Power off/on
1A – 1F	Reserved			
20	Emulation Mode	00 03	TH230 (Default) ESC/POS	Power off/on
21	Default lines per inch	00 01 02	8.13 lines per inch 7.52 lines per inch (Default) 6 lines per inch	Power off/on
22	Auto line feed	00 01	Ignore CR Use CR as Print cmd. (Default)	Immediate
23	Asian mode (Select target DBCS font)	00 01 02 03 04 05	Asian mode 932 Asian mode Off (Default) Asian mode 936 Asian mode 949 Asian mode 950 Asian mode GB18030[2]	Power off/on
24	Black Mark Adjustment	80 –FF 0 -7F	-127 ~ -1 : Reverse offset 0~127 : forward offset (unit : 0.125 mm)	Immediate
25	Auto Recovery	0 1 2	Off (default) Recovery without buffer clear Recovery with buffer clear	Immediate
26	Power on (Sleep mode) to Cash drawer opening delay	0 1-50	No delay Delay value (100ms~5sec) (default 1700ms)	Immediate

[1] Power off/on: Setting is effective after rebooting the printer, Immediate: Setting is effective immediately
[2] SBCS font will show "Not Installed" when configured GB18030.

m (Hex)	Function	n (Hex)	Option	Effect
27	Black mark sensor	0 1	Disable (Default) Enable	Power off/on
28-29	Reserved			
2B	Receipt Shooting	0 1	Disable(Defalut) Enable	Immediate
2C	Receipt Shooting time	0 **01-FF**	Endless(Defalut) **Time out value (250ms~63.75s)**	Immediate
2D	Compatible Top Margin[1]	00 01	Disable (Default) Enable	Power off/on
2E	Compatible top margin time out	00 01-FF	Disable (Default) Time out value (100ms~25.5s)	Power off/on
2F	Reserved			
30	Print density	F6 – 06	-10 : 50% - 9 : 55% - 8 : 60% - 7 : 65 - 6 : 70% - 5 : 75% - 4 : 80% - 3 : 85% - 2 : 90% - 1 : 95% 0 : 100% 1 : 105% 2 : 110% 3 : 115% 4 : 120 5 : 125% 6 :130%	Immediate
31	Paper Low detection	00 01	Disable Enable(Default)	Power off/on
32	Paper width	00 01	80 mm (Default) 58 mm	Power off/on
33	Paper Core diameter – paper low adjustment	00-0F	0 to 15 :(10mm ~ 25mm) Default 13 (23mm)	Power off/on
34	Paper thickness – paper low adjustment	00-05	0 to 5 :(0.05mm ~ 0.1mm) Default 1 (0.06mm)	Power off/on
35	Remaining length adjustment – paper low adjustment	F1 – 0F	-15 ~ 15 : (-7.5m ~ +7.5m) Default 2(+ 1m)	Power off/on
36	Power Supply option	00 01 02 03 04 05	Auto(Defult) 48W 55W 75W 90W 110W	Immediate
37	Color Paper option	00 01	One Color Paper (Default) Two Color Paper	Power off/on
38	Color density	F6 – 06	-10 : 50% - 9 : 55% - 8 : 60% - 7 : 65 - 6 : 70% - 5 : 75%	

[1] The physical distance between the thermal head position and the cut position (12.12mm) becomes the top margin of each receipt when it is disabled. If it is enabled, the top margin of each receipt becomes same length (16.8 mm) as the existing models. When this mode is enabled, the printer always holds 37 raster in the print buffer. The raster images held in the print buffer are pushed out by the cut command.

			- 4 : 80% - 3 : 85% - 2 : 90% - 1 : 95% 0 : 100% 1 : 105% 2 : 110% 3 : 115% 4 : 120 5 : 125% 6 :130%	
39 – 3D	Reserved			
3E	Special Font	00 01	Disable : Original font (Default) Mode 1[1] : Constructed 874	Immediate
3F	Reserved			

[1] Refer Appendix 4 Thai font support

m (Hex)	Function	n (Hex)	Option	Effect
40	Default code page	00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E	437 (Default) 850 852 860 863 865 858 866 1252 862 737 874 857 1251 1255 KZ 1048 1254 1250 28591 28592 28599 28605 864 720 1256 28596 KATAKANA. 755 1257 28594 1253	Immediate
41 - 45	Reserved			
46	Remove Upper Space (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
47	Remove Lower Space (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
48	Line Space Reduction (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
49	Line Feed Reduction (ECO funtionality)	00 01 02 03 04	Disable (Default) Reduce 100% Reduce 25% Reduce 50% Reduce 75%	Power off/on
4A	Barcode Height Reduction (ECO funtionality)	00 01 02 03	Disable (Default) Reduce 25% Reduce 50% Reduce 75%	Power off/on
4B	Registered Logo Removal (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
4C	Force Single High Font (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
4D	Bold Font Removal (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
4E	Force Single Wide Font (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
4F	No White/Black Reverse Printing (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on

50	Reset all setting to Default	00	Default	Power off/on
m (Hex)	Function	n (Hex)	Option	Effect
51 - 56	Reserved			
57	ECO function Disable/Enable[1]	00 01	Disable (Default) Enable	Power off/on
58	Remove lines containing only spaces (ECO funtionality)	00 01	Disable (Default) Enable	Power off/on
59 – 68	Reserved			
69	USB Speed	00 01	Full Speed (Default) High Speed	Power off/on
6A – 77	Reserved			
78	Buzzer tone (frequency)	00 01 02	Low Middle (Default) High	Immediate
79	LED Control Mode	00 01	Auto Mode (Default) User Mode	Power off/on
7A – 80	Reserved			
81	DHCP Mode	00 01	Disable Enable (Default)	Power off/on
82	Sleep mode	00 01	Disable (Default) Enable	Immediate
83	Power off mode	00 01 02 03 04 05	Disable (Default) Enabled 60 mins Enabled 120 mins Enabled 180 mins Enabled 240 mins Enabled 300 mins	Immediate
84	Reserved			
85	Sleep mode Waiting time	0 1-FF	Endless Time in 10 Sec (Defalut 10 sec)	
86	TCP max. connection	00 01 02 03 04 05	1 clients 2 clients 3 clients 4 clients 5 clients 6 clients(Default)	Power off/on
87	Ethernet Physical LAN Speed	00 01 02 03 04	Auto (Default) 100 Mbps Full 100 Mbps Half 10 Mbps Full 10 Mbps Half	Power off/on
88	Link Down Timeout	00 01 to 78	No timeout Timeout value (1 ~ 120 minutes) Default: 0x78 = 120 minutes	Power off/on
89	TCP idle Timeout	00 01 to 78	No timeout Timeout value (1 ~ 120 minutes) Default: 0x02 = 2 minutes	Power off/on
8A	SNMP Trap 1	00 01	Disable (Default) Enable	Power off/on
8B	SNMP Trap 2	00 01	Disable (Default) Enable	Power off/on
8C	SNMP Enable	00 01	Disable Enable (Default)	Power off/on
8D – 9F	Reserved			

[1] If this setting is enabled, all Eco Function settings become available. If it is disabled, Eco Function settings become unavailable except Standby Mode, Power off Mode, Receipt Print Mode and Print Density.

m (Hex)	Function	n (Hex)	Option	Effect
A0	International character set	00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11	U.S.A (Default) France Germany U.K. Denmark I Sweden Italy Spain I Japan Norway Denmark II Spain II Latin America Korea Slovenia/ Croatia China Reserved Arabia	Power off/on
A1	Top logo alignment	00 01 02	Left justification (Default) Centering Right justification	Immediate
A2	Bottom logo alignment	00 01 02	Left justification (Default) Centering Right justification	Immediate
A3	Top logo while paper feeding to the cutting position	00 01	Disable Enable (Default)	Immediate
A4	Top logo at power on	00 01	Disable (Default) Enable	Immediate
A5	Top logo when cover is closed	00 01	Disable Enable (Default)	Immediate
A6	Top logo while clear buffer	00 01	Disable Enable (Default)	Immediate
A7	Top logo after paper Feed button pressed	00 01	Disable (Default) Enable	Immediate
A8	Top logo printing	00 01	Disable (Default) Enable	Immediate
A9	Bottom logo printing	00 01	Disable (Default) Enable	Immediate
AA	Max. Print Speed	00 01 02 03 04, 05 06, 07 08, 09 0A, 0B 0C, 0D, 0E	Ignore 1.5 ips 2 ips 4 ips 6 ips 8 ips 10 ips 12 ips 14 ips (Defaultl)	Immediate
AB	Auto cut after cover close	00 01	Disable Enable (Default)	Immediate
AC	Buzzer sound	00 01	Disable (Default) Enable	Immediate
AD	Power on notice	00 01	Disable(Default) Enable	Power off/on
AE	Paper Near end notice	00 01	Disable Enable(Default)	Power off/on

AF	Listen to Real time	00 01	Always(Default) Buffer not full	Power off/on
B0	Legacy Printer support	00 01	Disable(Default) Enable	Power off/on
B1 – FF	Reserved			

3.11.7 Read Printer Setting

ASCII: US DC2 m
Hexadecimal: 1F 12 m
Decimal: 31 18 m
Value of *m*: 16 (0x10) to 191 (0xBF). Refer to 3.11.6 Printer Setting Change Command in detail.

This command is to read the setting specified by m.

3.11.8 LED Configuration

ASCII: US DC3 k l m n p1 p2 p3 p4 q r s
Hexadecimal: 1F 13 k l m n p1 p2 p3 p4 q r s
Decimal: 31 19 k l m n p1 p2 p3 p4 q r s
Value of k: 0: Auto Mode
1: User Mode
2: Reset pattern to Default (Auto Mode and User Mode)
If k is set to 2, it doesn't require other parameters (l, m, n, p1, p2, p3, p4, q, r, s).

Range of *l*: 1 to 32
Auto Mode: It specifies the state number of the printer as follows.
01: Boot
02: Idle
03: Printing
04 to 06: (Reserved)
07: Online Firmware Update
08: Standby mode
09: (Reserved)
10: Unrecoverable error in PCB block
11: Unrecoverable error in Thermal Head
12 to 19: (Reserved)
20: Recoverable error in Thermal Head (Over Heat)
21: Recoverable error in Printer Cover
22: Recoverable error of Paper related
23: Recoverable error in Print block
24: Recoverable error in Cutter block
25 to 29: (Reserved)
30: Warning for PCB
31: Warning for Paper related
32: (Reserved)

User Mode: It specifies ID to register the blink pattern of LED.

Value of *m*: It specifies the color of LED

Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
NA	NA	NA	NA	NA	Red	Amber	Green

Range of n: 1 to 32
It specifies number of valid bits of blink pattern defined by p1 to p4 below.
For example, if this parameter is set to "5", the first 5 bits of 32 bits pattern are used as blink pattern.

Range of *p1 to p4*: It specifies blink pattern of LED in 32 bits (0: OFF, 1: ON) as follows.

	(LSB) p1						….	p4			(MSB)
Bit number	0	1	2	3	4		….	28	29	30	31

Blink pattern	1	0	1	1	0		….	1	0	0	1
	ON	OFF	ON	ON	OFF	ON		ON	OFF	OFF	ON

Example: LED ON: These parameters are 0xFF 0xFF 0xFF 0xFF
LED OFF: These parameters are 0x00 0x00 0x00 0x00

Range of *q*: 0 to 255
It specifies ON time of bit specified as ON (=1) in blink pattern.
Unit is 100 m sec, so Actual time = Parameter (q) x Unit time (100 ms)

Range of *r:* 0 to 255
It specifies OFF time of bit specified as OFF (=0) in blink pattern.
Unit is 100 m sec, so Actual time = Parameter (r) x Unit time (100 ms)

Range of *s:* 0 to 255
It specifies the pause time between 32 bits blink pattern. During this period of time, LED is OFF. Unit is 100 m sec, so Actual time = Parameter (s) x Unit time (100 ms)
If this parameter is set to zero, the pause is not executed.

Both Auto mode and User mode of LED have the default blink pattern. If LED pattern is not configured by this command, the default LED pattern is used.

Exceptions:
If at least one of those parameters is out of range, this command is ignored.

3.11.9 Read LED Configuration

ASCII: US DC4 k
Hexadecimal: 1F 14 k
Decimal: 31 20 k
Value of k: 0: Auto Mode
1: User Mode

This command is to read the LED configuration. This is a batch mode command which retrieves all the LED configurations (320 bytes) of the mode (Auto mode or User mode) specified by "k".

Data Format Returned (Total 320 bytes = 32(ID) x 10 bytes)

State or ID (1 byte)	LED Color (1 byte)	Mask Bit (1 byte)	Blink Pattern (4 bytes)	ON Time (1 byte)	OFF Time (1 byte)	Pause Time (1 byte)
1	m1	k1	p11,..,p14	q1	r1	s1
2	m2	k2	p21,..,p24	q2	r2	s2
....	**....**	**....**	**....**	**....**	**....**	**....**
32	m32	k32	p321,..,p324	q32	r32	s32

Detail of each item is described in LED Configuration Command.

3.11.10 Change into the user setting mode

ASCII: GS (E *pL pH fn d1 d2*
Hexadecimal: 1D 28 45 *pL pH fn d1 d2*
Decimal: 29 40 69 *pL pH fn d1 d2*
Range: (*pL* + *pH* x 256) = 3 (*pL* = 3, *pH* = 0)
fn = 1
d1 = 73
d2 = 78

It enters the user setting mode and transmits a mode change notice as below.

Data group of Change	Hex	Decimal	Data

use setting mode notice			
(4) Header	37H	55	1 byte
(5) Identifier	20H	32	1 byte
(6) NULL	00H	0	1 byte

3.11.11 End the user setting mode session

ASCII: GS (E *pL pH fn d1 d2 d3*
Hexadecimal: 1D 28 45 *pL pH fn d1 d2 d3*
Decimal: 29 40 69 *pL* pH fn *d1 d2 d3*
Range: (*pL* + *pH* x 256) = 4 (*pL* = 4, *pH* = 0)
fn = 2
d1 = 79
d2 = 85
d3 = 84

It ends the user setting mode and performs a software reset.
It clears the receive and print buffers.
It resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the Flash memory are not reset).

3.11.12 Changes the memory switch.

ASCII: GS (E *pL pH fn [a1 b18…b11]...[ak nk8 nk1]*
Hexadecimal: 1D 28 45 *pL pH fn [a1 b18…b11]...[ak nk8 nk1]*
Decimal: 29 40 69 *pL* pH fn [a1 b18…b11]…[ak nk8 nk1]
Range: **10 ≤** (*pL* + *pH* x 256) ≤65530
fn = 3
b = 48,49,50
a = 1,2,128
Default: All Memory switches are OFF (b = 48) except for Sleep-Mode (128-3)(b = 49).
Description: Changes the memory switch specified by a to the value specified by b.
When a = 1, memory switch 1 is set as follows:

Msw	Setting value(b)	Function
1-1	48	Does not transmit the power-on notification
	49	Transmits the power-on notification
1-2	48	Sets receive buffer to large
	49	Sets receive buffer to small
1-3	50	Reserved
1-4	48	Data processing when occurring receive error: Ignore the data
	49	Data processing when occurring receive error: Replace with “?”
1-5	48	Automatic line feed enabled
	49	Automatic line feed disabled
1-6 to 1-8	50	Reserved

When a = 2, memory switch 1 is set as follows:

Msw	Setting value(b)	Function
2-1	48	Code128 Check Digit is enabled
	49	Code128 Check Digit is disabled
2-2	48	CodeITF Leading 0 is enabled
	49	CodeITF Leading 0 is disabled
2-3	48	Barcode String Term is enabled
	49	Barcode String Term is disabled

2-4 to 2-7	50	Reserved
2-8	48	Listen to Real-Time-Commands – Always
	49	Listen to Real-Time-Commands – Only if Receive-Buffer is not full

When a = 2, memory switch 1 is set as follows:

Msw	Setting value(b)	Function
128-1	48	Power button is enabled
	49	Power button is disabled
128-2	48	In Sleep-Mode is Interface Power On
	49	In Sleep-Mode is Interface Power Off
128-3	48	Sleep-Mode enabled
	49	Sleep-Mode disabled (default)
128-4	48	Legacy printer support disabled*
	49	Legacy printer support enabled*
128-5	48	Receipt shooting is disabled
	49	Receipt shooting is enabled
128-6	48	Paper-Near-End Sensor Notification in ASB and printer status will be send
	49	Paper-Near-End Sensor Notification in ASB and printer status will be suppressed
128-7	48	Black mark sensor is disabled
	49	Black mark sensor is enabled
128-8	48	Original Controller: Yes
	49	Original Controller: No

* The printer must be switched off and on to take effect of changed setting!

Notes:

This function works only in the user setting mode.

• The value of the memory switch is specified from bit 8 to bit 1 by b18…b11. When b = 50, the status of the bit applied is not changed. Example: Transmission data that specifies memory switch 128, “Power button is disabled” and does not change other settings. ASCII: GS (E pL pH fn a b8 b7 b6 b5 b4 b3 b2 b1 Hex: 0x1D 0x28 0x45 0x0A 0x00 0x03 0x80 0x32 0x32 0x32 0x32 0x32 0x32 0x32 0x31

• Explanation for memory switch 1 (a = 1):.

Power-on notification	Hex	Decimal	Data quantity
Header	0x3B	59	1 byte
Identifer	0x31	49	1 byte
NULL	0x00	0	1 byte

The printer transmits the power-on notification for the following processes:

− Initializing by turning on the power by switch (except with Ethernet interface)

− Initializing by hardware reset (except with Ethernet interface)

− Initializing by software reset, such as by transmitting Function 2 (except with Ethernet interface and Ethernet parameter changed)

− Initializing after the service menu functions2 (except with Ethernet interface and Ethernet parameter changed)

• With a serial interface, the printer transmits a 3-byte notification without confirming that the host can receive data.

• With Ethernet interface the power-on notification will be not transmitted after power-on or the command GS 0xFF.

• When communication with the printer uses XON/XOFF control, the XON/XOFF code may interrupt the “Header to NUL” data string.

• When using the power-on notification together with other status messages, the status transmitted must be differentiated according to table Transmit Status Identification

• The printer must be switched off and on to take effect of changed setting for “Legacy printer support” memory switch (Msw 128-4)!

• The value for receipt shooting flush time will be set in the customer value CV 13
The disable of power button is only related to the switch off function.
• Memory switch “Original Controller” (Memory switch 128-8) is used to differentiate between original controller and repaired controller. If the printer is equipped with its first controller (original controller) this Memory switch is 0. After a controller change this Memory switch is set to 1.
• Memory switch “Power Button Delay” (Memory switch 2-7): The delay time is effective when switching off the device. When switching on the power button reacts always with no delay.
• Memory switches 1-2: Small receive buffer is not recommended for normal printer operations! It is not allowed when using a TH230+ fiscal controller interface.

3.11.13 Transmits the host the value for the memory switch

ASCII: GS (E *pL pH fn a*
Hexadecimal: 1D 28 45 *pL pH fn a*
Decimal: 29 40 69 *pL* pH fn a
Range: (pL + pH x 256) = 2 (pL = 2, pH = 0)
fn = 4
a = 1,2,128

Description:
The printer transmits the value for the memory switch specified by parameter a to the host.
Notes:
• This function works both in user setting mode and during normal printer operation.
• The printer transmits the “Header to NUL” data shown below:

Transmit data	Hex	Decimal	Data quantity
Header	0x37	55	1 byte
Identifer	0x21	33	1 byte
Setting value	0x30 to 0x31	48 or 49	8 bytes
NULL	0x00	0	1 byte

The value of the memory switch is transmitted from bit 8 to bit 1. 48 or 49 is transmitted for a bit of Reserved.
• The host can differentiate the data for the memory switch from other transmitted data by the specific information in the transmit data block. When the header transmitted from the printer is 0x37 or 55 decimal, the data up to NUL (0x00 or 0 decimal) is handled as one group and can be identified by the following data:

Transmit data	Hex	Decimal
Header	0x37	55
Identifer	0x21	33

However, consider the following requirement for data processing:
• When communication with the printer uses XON/XOFF control, the XOFF code may interrupt the “Header to NUL” data string.

3.11.14 Set the customized setting values

ASCII: GS (E *pL pH fn [a1 n1L n1H]…[ak nkL nkH]*
Hexadecimal: 1D 28 45 *pL pH fn [a1 n1L n1H]…[ak nkL nkH]*
Decimal: 29 40 69 *pL pH fn [a1 n1L n1H]…[ak nkL nkH]*
Range of pL,pH: 4 ≤ (*pL* + *pH* x 256) ≤ 65533 (0 ≤ p_L ≤ 255, 0 ≤ p_H ≤ 255)
Value of *fn*: fn = 5

It sets the customized value specified by *a* to the values specified by (*nL* + *nH* x 256).

Flash memory is used as the storage area for setting values. (Setting values are maintained even after power off)
This command is processed in user setting mode. (“Change into the user setting mode” command need to be sent before this command, and “End the user setting mode session” need to be sent after this command)

Note: Other configuration can be changed by US DC1 (1Fh 36h) command.

Value of a:

a	Type pf customized value	Parameters in Setting Change Command (1F 36)
3	Roll paper width	1F 36 32 n
5	Print density when printing in monochrome and multi-tone	1F 36 30 n
6	BM adjustment value	
7	Default international character	1F 36 A0 n
9	Maximum power	1F 36 36 n
10	Print speed	1F 36 AA n
11	Reserved	
12	Color density	
13	Receipt shooting flush time	
14	Sleep mode waiting time	
15	Power on to cash drawer opening delay	
16	Default character code table	1F 36 40 n
17	Auto Recovery	
18	Reserved	N/A
100	Paper auto cutting after closing the roll paper cover	1F 36 AB n
101	Enabling /disabling reduction of excessive top margin	1F 36 46 n
102	Enabling/disabling reduction of excessive bottom margin	1F 36 47 n
103	Reduction ratio of line spacing	1F 36 48 n
104	Reduction ratio of line spacing where extra line feeds are included.	1F 36 49 n
105	Reduction ration of bar code height	1F 36 4A n
111	Automatic replacement of Font A to Font B	N/A
112	Automatic replacement of Font B to Font A	N/A
117	Print density when printing in monochrome and multi-tone	1F 36 30 n
119	Buzzer function: Enabling /disabling buzzer	1F 36 AC n
120	Buzzer function: Buzzer frequency for Errors	N/A
121	Buzzer function: Sound pattern for Auto cut	N/A
122	Buzzer function: Buzzer frequency for Auto cut	N/A
123	Buzzer function: Sound pattern for Cash drawer port 1(Pulse 1)	N/A
124	Buzzer function: Buzzer frequency (Pulse 1)	N/A
125	Buzzer function: Sound pattern (Pulse 2)	N/A
126	Buzzer function: Buzzer frequency (Pulse 2)	N/A

*1 The functions are enabled for the internal buzzer.

Roll paper width (when *a* = 3)

(*nL* + *nH* x 256)	Roll paper width
2	58 mm
6	80mm (Default)

Print density setting when printing in monochrome and multi-tone (*a* = 5,117)

(*nL* +*nH* x 256)	Print density	Default
-10	50%	100%
-9	55%	
-8	60%	
-7	65%	
-6	70%	
-5	75%	
-4	80%	
-3	85%	
-2	90%	
-1	95%	
0	100%	
1	105%	
2	110%	

3	115%	
4	120%	
5	125%	
6	130%	

BM adjustment value offset (*a* = 6)

(*nL* +*nH* x 256)	BM offset	Default
0….127	Offset value with forward direction in 0.125 mm	0
128…255	Offset value with backward direction in 0.125 mm (two's complement)	

Default international character (When *a* = 7)
See *(n)* of the **ESC R** command to select international character.

Power supply output (*a* = 9)

(*nL* +*nH* x 256)	Power Supply Output	Default
0	Auto(default)	Auto
48…110	48W…110W	

Print speed setting (*a* = 10)

(*nL* + *nH* x 256)	Print speed	
1	Print speed level 1	Maximum 1.5 ips
2	Print speed level 2	Maximum 2 ips
3	Print speed level 3	Maximum 4 ips
4	Print speed level 4	Maximum 6 ips
5	Print speed level 5	Maximum 6 ips
6	Print speed level 6	Maximum 8 ips
7	Print speed level 7	Maximum 8 ips
8	Print speed level 8	Maximum 10 ips
9	Print speed level 9	Maximum 10 ips
10	Print speed level 10	Maximum 12 ips
11	Print speed level 11	Maximum 12 ips
12	Print speed level 12	Maximum 14 ips
13	Print speed level 13	Maximum 14 ips
14	Print speed level 14	Maximum 14 ips (Default)

Color density settings (*a* = 12)

(*nL* +*nH* x 256)	Print density	Default
-10	50%	100%
-9	55%	
-8	60%	
-7	65%	
-6	70%	
-5	75%	
-4	80%	
-3	85%	
-2	90%	
-1	95%	
0	100%	

1	105%	
2	110%	
3	115%	
4	120%	
5	125%	
6	130%	

Receipt shooting flush time (*a* = 13)

(*nL* +*nH* x 256)	Flush time	Default
0	Endless	0
1…255	Time in 0.25 Sec	

This value sets the time how long the printer is waiting for print commands from the host before the receipt is printed out. The value must be multiplied by 250 milliseconds (i.e. CV13 = 8 -> Receipt shooting flush time = 2 sec).
The range is from 1 to 255 (250 ms to 63,75 seconds) or 0 for endless (default).
If the Memory Switch for receipt shooting (128-5 / see page 123) is disabled the printer ignores this time.
If the host sends a cut or graphics command the receipt is printed out (Logo's are buffered). The buffered data can also be printed out by the sequence ESC w n 7 (see page 15). After this the host have to wait for the answer of ESC w n 7.

NOTE:

If both Receipt shooting and Sleep-Mode are enabled and the Sleep-Mode time is equal or smaller than the shooting time the buffered Receipt is not printed out in Sleep-Mode.

NOTE:

The Receipt shooting spooler is flushed if the command "Set control point" is used.

Sleep-Mode waiting time (a=14)

(*nL* +*nH* x 256)	Waiting time	Default
0	Endless	10 sec
10…2550	Time in Sec	

This value sets the time how long the printer is waiting before Sleep-Mode starts. The value corresponds to the waiting time in seconds (i.e. CV14 = 30 -> Sleep-Mode starts after 30 seconds). The range is from 10 to 2550 with step of 10 (10 seconds to 42,5 minutes). The default value is 10 seconds. When the printer receives a value that is e.g. between 11 and 19 then the stored result is 10 (rounded down). If the Memory Switch for Sleep-Mode (128-3 / see page 123) is disabled the printer ignores this time. The power consumption of the Sleep-Mode is lower than in normal standby. The operator panel LED's are switched off but the power LED is flashing with short on-time and long off-time. The power pin of the customer display connector is also switched to off. The Power consumption of a RS232-Interface is a little bit higher compared to an USB-Interface. The printer leaves the Sleep-Mode by every transmitted data on the host interface, by pressing the feed button or power button or when the cover sensor is changed.

NOTE:

• If both Receipt shooting and Sleep-Mode are enabled and the Sleep-Mode time is equal or smaller than the shooting time the buffered receipt is not printed out in Sleep-Mode.
• If a macro running, Sleep mode is inactive
• If an error occurred, Sleep mode is inactive
• If no paper inserted, Sleep mode is inactive

Power on (Sleep mode) to Cash drawer opening delay (a=15)

(*nL* +*nH* x 256)	Delay time	Default
0… 5000	Time in msec	1700msec

This value sets the time how long the printer is waiting after Sleep-Mode ends before Cash Drawer can be opened. The value corresponds to the delay time in msec (i.e. CV15 = 1700 -> Cash Drawer opening after 1,7 seconds). The range is from 0 to 5000 with step of 100 (0 seconds to 5 seconds). The default value is 1,7 seconds. When the printer receives a value that is e.g. between 1 and 99 then the stored result is 0 (rounded down). If the Memory Switch for Sleep-Mode (128-3) is disabled the printer ignores this time.

Default character code table (When *a* = 16)

See *(n)* of the **ESC t** command to select character code table.

Auto Recovery (a=17)

(*nL* +*nH* x 256)	Auto Recovery Mode	Default
0	off	0(Off)
1,2	Equal to DLE ENQ n	

This value sets the Auto Recovery Mode that is executed in error condition by closing the Cover. The Mode is the same like DLE ENQ n and mines 0: No Recover 1: Recover without clearing 2: Recover with clearing

Paper auto-cut after closing the roll paper cover (when *a* = 100)

(*nL* + *nH* x 256)	Paper auto-cut after closing the roll paper cover
0	Disabled
1	Enabled (Default)

Enabling/disabling reduction of excessive top margin (when *a* = 101)

(*nL* + *nH* x 256)	Reduction of excessive top margin
0	Disabled (Default)
1	Enabled

Enabling/disabling reduction of excessive bottom margin (when *a* = 102)

(*nL* + *nH* x 256)	Reduction of excessive bottom margin
0	Disabled (Default)
1	Enabled

Reduction ration of line spacing (when *a* = 103)

(*nL* + *nH* x 256)	Reduction ration of line spacing
0	None (Default)
1	100% reduction
2	100% reduction
3	100% reduction

Reduction ration of line spacing where extra line feeds are included (when *a* = 104)

(*nL* + *nH* x 256)	Reduction ration of line spacing where extra line feeds are included
0	None (Default)
1	25 % reduction
2	50 % reduction
3	75% reduction
4	100% reduction

Reduction ratio of bar code height (when *a* = 105)

(*nL* + *nH* x 256)	Reduction ration of bar code height
0	None (Default)
1	25 % reduction
2	50 % reduction
3	75% reduction

Automatic replacement of Font A (when *a* = 111)

(*nL* + *nH* x 256)	Automatic replacement of Font A
0, 48	Font A (Same as no replacement) (Default)
1, 49	Font B

Automatic replacement oHIDf Font B (when *a* = 112)

(*nL* + *nH* x 256)	Automatic replacement of Font B

0, 48	Font A
1, 49	Font B (Same as no replacement) (Default)

Buzzer function: Enabling/disabling internal buzzer (when *a* = 119)

(*nL* + *nH* x 256)	Enabling/disabling internal buzzer
0	Disabled (Default)
1	Enabled

Buzzer function: Buzzer frequency for Errors (when *a* = 120)

(*nL* + *nH* x 256)	Buzzer frequency
0	No sound
1	1 time
65535	Continuous (Default)

Buzzer function: Sound Pattern (when *a* = 121,123, 125)

(*nL* + *nH* x 256)	Sound pattern
1	Pattern A (Default)
2	Pattern B
3	Pattern C
4	Pattern D
5	Pattern E

Buzzer function: Buzzer frequency (when *a* = 122, 124, 126)

(*nL* + *nH* x 256)	Buzzer frequency
0	No sound (Default)
1	1 time

3.11.15 Transmit the customized setting values

ASCII: GS (E *pL pH fn a*
Hexadecimal: 1D 28 45 *pL pH fn a*
Decimal: 29 40 69 *pL pH fn a*
Range: (*pL* + *pH* x 256) = 2 (*pL* = 2, *pH* = 0)
fn = 6
a = 3, 5, 6, 8 ≤ *a* ≤ 10, 97 ≤ *a* ≤98, 100 ≤ *a* ≤105, 111 ≤ *a* ≤ 112, 117, 119 ≤ *a* ≤ 126

It transmits the customized value specified by a.

A	Type of customized value
3	Roll paper width
5	Print density when printing in monochrome and multi-tone
6	BM adjustment value
7	Sensor value(DN Emulation)
7	Default international character(ESCPOS Emulation)
9	Maximum power
10	Print speed
11	Reserved
12	Color density
13	Receipt shooting flush time
14	Sleep mode waiting time
15	Power on to cash drawer opening delay
16	Default character code table
17	Auto Recovery
18	Reserved
100	Paper auto cutting after closing the roll paper cover
101	Enabling /disabling reduction of excessive top margin
102	Enabling/disabling reduction of excessive bottom margin
103	Reduction ratio of line spacing
104	Reduction ratio of line spacing where extra line feeds are included.
105	Reduction ration of bar code height
111	Automatic replacement of Font A to Font B
112	Automatic replacement of Font B to Font A
117	Print density when printing in monochrome and multi-tone
119	Buzzer function: Enabling /disabling buzzer
120	Buzzer function: Buzzer frequency for Errors
121	Buzzer function: Sound pattern for Auto cut
122	Buzzer function: Buzzer frequency for Auto cut
123	Buzzer function: Sound pattern for Cash drawer port 1(Pulse 1)
124	Buzzer function: Buzzer frequency (Pulse 1)
125	Buzzer function: Sound pattern (Pulse 2)
126	Buzzer function: Buzzer frequency (Pulse 2)

*1 The functions are enabled for the internal buzzer, and available in 180 dpi only.

Transmission data is as follows.

Data group of Transmit customized setting value	Hex	Decimal	Data
(1) Header	37H	55	1 byte
(2) Identifier	27H	39	1 byte
(3) Config type (value of a) (ASCII format)	30H ~39H	48 ~ 57	1byte ~3byte
(4) Identifier	1FH	31	1 byte
(5) Current value	30H ~39H	48 ~ 57	1byte ~10byte

(ASCII format)			
(6) NULL	00H	0	1 byte

Example: When “Roll paper width” setting is 82.5mm, command “0x1D 0x28 0x45 0x02 0x00 0x06 0x03” response is “0x37 0x27 0x33 0x1F 0x36 0x00”.

Print density Settings (a = 5,a = 12)

	Hexadecimal				
Print Density	D1	D2	D3	D4	D5
50%	0x36	0x35	0x35	0x32	0x36
55%	0x36	0x35	0x35	0x32	0x37
60%	0x36	0x35	0x35	0x32	0x38
65%	0x36	0x35	0x35	0x32	0x39
70%	0x36	0x35	0x35	0x33	0x30
75%	0x36	0x35	0x35	0x33	0x31
80%	0x36	0x35	0x35	0x33	0x32
85%	0x36	0x35	0x35	0x33	0x33
90%	0x36	0x35	0x35	0x33	0x34
95%	0x36	0x35	0x35	0x33	0x35
100%	0x30	-	-	-	-
105%	0x31	-	-	-	-
110%	0x32	-	-	-	-
115%	0x33	-	-	-	-
120%	0x34	-	-	-	-
125%	0x35	-	-	-	-
130%	0x36	-	-	-	-

Sensor value (a = 7 in DN Emulation)

Sensor	Value
BM sensor	0…255

Maximum power (a = 9)

Power value setting		String	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
n	Meaning											
0	Auto	Example : “Auto 55” or ID-Fail48”	0x41 0x49	0x75 0x44	0x74 0x2D	0x6F 0x46	0x20 0x61	0x35 0x69	0x35 0x6C	- 0x20	- 0x34	- 0x38
48	48W	“48”	0x34	0x38	-	-	-	-	-	-	-	-
…	..	…	…	…	-	-	-	-	-	-	-	-
75	75W	“75”	0x37	0x37	-	-	-	-	-	-	-	-
…	…	…	…	…	-	-	-	-	-	-	-	-
110	110W	“110”	0x31	0x31	0x30	-	-	-	-	-	-	-

3.11.16 Set the configuration item for the serial interface

ASCII: GS (E *pL pH fn a d1 … dk*
Hexadecimal: 1D 28 45 *pL pH fn a d1 … dk*
Decimal: 29 40 69 *pL pH fn a d1 … dk*
Range: 3 ≤ (p_L + p_H x256) ≤ 65535 (0 ≤ p_L ≤ 255, 0 ≤ p_H ≤ 255)
fn = 11
a = 1
48 ≤ *d* ≤ 57
[Default (upon shipment)]
d1 … dk = *19200* (ASCII format data)

It sets the configuration item for the serial interface specified by *a* to the values specified by d.
Flash memory is used as the storage area for setting values. (Setting values are maintained even after power off)
This command is processed in user setting mode. (“Change into the user setting mode” command need to be sent before this command, and “End the user setting mode session” need to be sent after this command)

a	Configuration item
1	Baud rate
2	Parity
3	Flow control
4	Bit length

Baud rate settings (a = 1) (ASCII format data)
Example: To set 9600, d1=0x39, d2=0x36, d3=0x30, d4=0x30

d1 … dk	Baud rate
9600	9600 bps
19200	19200 bps (Default)
38400	38400 bps
57600	57600 bps
115200	115200 bps

Parity settings (a = 2) (ASCII format data)

d	Function
48	No parity
49	Odd parity
50	Even parity

Flow control settings (a = 3) (ASCII format data)

d	Function
48	DTR / DSR
49	XON/XOFF

Bit length settings (a = 4) (ASCII format data)

d	Function
55	7 bits length
56	8 bits length

The configuration item set by this function is enabled by executing **GS (E** <fn= 2> or restarting the printer. Note that the host PC must be set to enable the printer to communicate with the host PC.

3.11.17 Transmit the configuration item for the serial interface

ASCII: GS (E *pL pH fn a*
Hexadecimal: 1D 28 45 *pL pH fn a*
Decimal: 29 40 69 *pL pH fn a*
Range: (*pL* + *pH* x 256) = 2 (*pL* = 2, *pH* = 0)
fn = 12
a = 1

It transmits the configuration item for the serial interface specified by a.

a	Configuration item
1	Baud rate
2	Parity
3	Flow control
4	Bit length

Transmission data is as follows:

Data group of Transmit serial configuration	Hex	Decimal	Data
(1) Header	37H	55	1 byte
(2) Identifier	33H	51	1 byte
(3) Type of configuration	31H ~ 34H	49 ~ 52	1byte
(4) Separater	1FH	31	1 byte
(5) Current value (ASCII format)	30H ~39H	48 ~ 57	1byte ~6byte
(6) NULL	00H	0	1 byte

Example: When serial interface configuration setting is 19200, command response is "0x37 0x33 0x31 0x1F 0x31 0x39 0x32 0x30 0x30 0x00"

3.11.18 Set Conditions for USB communication

ASCII: GS (E *pL pH fn a d1 … dk*
Hexadecimal: 1D 28 45 *pL pH fn a d1 … dk*
Decimal: 29 40 69 *pL pH fn a d1 … dk*
Range: (*pL* + *pH* x 256) = 3 (*pL* = 3, *pH* = 0)
fn = 15
a = 1
48 ≤ *d* ≤ 50

It transmits the set value of USB communication specified by *a.*
Flash memory is used as the storage area for setting values. (Setting values are maintained even after power off)
This command is processed in user setting mode. ("Change into the user setting mode" command need to be sent before this command, and "End the user setting mode session" command need to be sent after this command)

a	Configuration item
1	Class

Class settings (a = 1)

d1	Class
49	Printer class

The configuration item set by this function is enabled by executing <fn= 2> **GS (E** or restarting the printer. Note that the host PC must be set to enable the printer to communicate with the host PC.

3.11.19 Transmit conditions for USB communication

ASCII: GS (E *pL pH fn a*
Hexadecimal: 1D 28 45 *pL pH fn a*
Decimal: 29 40 69 *pL pH fn a*
Range: (*pL* + *pH* x 256) = 2 (*pL* =2, *pH* = 0)
fn = 16
a = 1

It transmits the set values for USB communication specified by *a*.

a	Configuration item
1	Class

Transmission data is as follows:

Transmission data	Hex	Decimal	Data
(1) Header	37 H	55	1 byte
(2) Identifier	52 H	82	1 byte
(3) Type of configuration item	30 H ~ 39 H	48 ~ 57	1 ~ 2 bytes
Separator	1F H	31	1 byte
(4) Set value	30 H ~ 39 H	48 ~ 57	1 byte
(5) NUL	00 H	0	1 byte

3.11.20 Set Serial number

ASCII: GS (E *pL pH fn d1 … dk*
Hexadecimal: 1D 28 45 *pL pH fn d1 … dk*
Decimal: 29 40 69 *pL pH fn d1 … dk*
Range: 2 ≤ (p_L + p_H x256) ≤ 11
fn = 129
32 ≤ d ≤ 255
1 ≤ n ≤ 10

Description:
Set the serial number in the Flash ROM. Parameter d1 … dn specifies the serial number in ASCII character's as a string without zero at the end. The max size of the string is 10 characters.
Notes:
• This command can be used only once!
• This function code (fn = 129) is enabled only in the user setting mode.
• If the value of (pL + pH * 256) is out of the specified range, this command is ignored.

3.11.21 Set Production date

ASCII: GS (E *pL pH fn d1 … dk*
Hexadecimal: 1D 28 45 *pL pH fn d1 … dk*
Decimal: 29 40 69 *pL pH fn d1 … dk*
Range: (p_L + p_H x256) = 7
fn = 130
48 ≤ d ≤ 57
n = 6
01 ≤ DD ≤ 31
01 ≤ MM ≤ 12
00 ≤ YY ≤ 99

Description:
Set the production date in the Flash ROM. Parameter d1…dn specifies the production date in ASCII character's as a string without zero at the end. The format is DDMMYY.
Notes:
• This command can be used only once!
• This function code (fn = 130) is enabled only in the user setting mode.
• If the value of (pL + pH * 256) is out of the specified range, this command is ignored.
• If the value of Day (DD), Month (MM) or Year (YY) is out of the specified range, this command is ignored.

3.11.22 Sets communication condition of Ethernet interface.

ASCII: GS (E *pL pH fn a d1 … dk*
Hexadecimal: 1D 28 45 *pL pH fn a d1 … dk*
Decimal: 29 40 69 *pL pH fn a d1 … dk*
Range: 3 ≤ (p_L + p_H x256) ≤ 65535
fn = 131
2 ≤ a ≤ 6
d = 48, 49 [a = 2,6]
d = 46,48…57 [a=3,4,5]
1 ≤ k ≤ 65535
Default : d = 49 [a=2]
d1…dk = "192..0.0.192" [a = 3]
d1…dk = "0.0.0.0" [a = 4]
d1…dk = "0.0.0.0" [a = 5]
d1…dk = 48 [a = 6]
Description : Change the communication settings

a	Communcication conndition
2	DHCP

3	IP Address
4	Net Mask
5	Gateway
6	Reserved.

- DHCP(a = 2) is specified by d as flollows:

d	Function
48	DHCP disabled
49	DHCP Enabled

Enabling DHCP will set the IP and gateway address to “0.0.0.0” and the net mask to “255.255.255.0” automatically!
IP address, Net Mask and Gateway (a = 3,4,5) have a dotted-decimal notation format. Setting the IP address, will disable the DHCP automatically! Examples: “192.0.0.5”, “138.17.000.13”

Notes:
• This function works only, if an Ethernet interface card is installed!
• If the communication control between host and printer does not correspond, the printer cannot process data from the host normally, and the host cannot receive data from the printer normally.
• This function works in user setting mode.

3.11.23 Transmit communication condition of Ethernet interface.

ASCII: GS (E *pL pH fn a*
Hexadecimal: 1D 28 45 *pL pH fn a*
Decimal: 29 40 69 *pL pH fn a*
Range: (*pL* + *pH* x 256) = 2 (*pL* =2, *pH* = 0)
fn = 132
1 ≤ a ≤ 6

Description : Transmit the setting value of the Ethernet interface communication condition defined by a.

a	Communication condition
1	MAC Address(fixed)
2	DHCP
3	IP Address
4	Net Mask
5	Gateway
6	Reserved

Notes : • This function works in user setting mode and during normal operation, but only, if an Ethernet interface card is installed!
• This function transmits “Header to NUL” as follows:

Field	Value	Data quantity
Header	0x37	1 byte
Identifier	0x33	1 byte
Communication condition[1]	0x31-0x35	1 byte
Separator	0x1F	1 byte
Setting value[2]	ASCII	1-15 bytes
NULL	0x00	1 byte

“Setting value” is set by Function 131. It might differ from the current communication condition before executing Function 2.
• This function is used to confirm whether Function 131 ends normally before executing

[1] Communication condition is specified by a
[2] Setting value is set by Function 131.

Function 2.
• The host can differentiate the setting value of the customize value from other transmit data by the specific data in the transmit data block. When the header transmitted from the printer is [hex = 0x37, decimal = 55], the data up to NUL [hex = 00H, decimal = 0] is handled as one group and can be identified by the following data:

Transmit data	Hex	Decimal
1st byte(header)	0x37	55
2nd byte(identifier)	0x33	51

3.11.24 Set adjustment value(s).

ASCII: GS (F *pL pH a fn nl nh*
Hexadecimal: 1D 28 46 *pL pH a fn nl nh*
Decimal: 29 40 70 *pL pH a fn nl nh*
Range: (*pL* + *pH* x 256) = 4 (*pL* =4, *pH* = 0)
a = 1
fn = 0,48 or 1,49
0 ≤ (nL + nH × 256) ≤ 65535 (where 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255)

Default:All adjustment values are set to “0”. (At the factory setting, the print starting position and the cutting position are set to the head position and the cutter position respectively when the BM sensor detects the BM.)

Description:This command is effective only when the BM sensor is enabled with memory switch 0x80. Sets adjustment values(s) for the printer operations specified by a.
• pL, pH specifies (pL + (pH ×256)) for the number of bytes after pH (a, fn, nL and nH).
• a specifies setting values for the positions to start printing.

a	Function
1	Setting value for the positions to start the printing.

The parameter is a dummy for further extensions. That’s why, printer accept other values too, but don’t use anyone of them.
• fn specifies the direction of the adjustment..

fn	Function
0,48	Specifies a forward paper feeding direction
1,49	Specifies a backward paper feeding direction.

• nL and nH specifies the setting value to [(nL + nH × 256) x 0.125 mm]. Please note that the maximum setting value is 210 mm.
• The adjustment value for the print starting position (a = 1) is affected by the command FF
• (See command FF). The value “0” means cut below of the mark position.
• The print start position is relative to the lower edge of the detected mark.
• This command is stored in the receive buffer first from the host, and then executed in the execution process of other normal commands. Therefore, there may occur time delay for the execution of this command after the printer receives this command. The delay time depends on the status of the receive buffer.
If the adjustment value greater than the paper mark distance, printer feed only the remainder between adjustment value and mark distance + mark width (separator value modulo (mark distance + mark width)). For example, if the separator value is 180 mm and the mark distance 70, the feed after the mark will be 30 mm.

Notes : • Please note that the maximum paper feeding amount can not be greater than the distance between two black marks

3.11.25 Set Paper type

ASCII: GS 0x81 *m n*
Hexadecimal: 1D 81 m n
Decimal: 29 129 m n
Range: 0 ≤ m ≤ 255
0 ≤ n ≤ 255

Default : m = 0 (monochrome paper)

Description : Sets the paper type specified by m, as follows

m	Mode
0	Monochrome (Black) paper
1	Two-color papers

This command will set the optimum parameter values in the thermal print engine control hardware for defined monochrome or two-color paper chemistry. The m n parameters select paper category and formulation version respectively.
(m n = 0 0) defines the default monochrome (black category, initial version) paper, out-of-box printers will also have factory preset descriptions for customer selected color types: (m n = 1 0) red/black paper.
When issuing this command a value of n = 0xFF can always be use: that is interpreted as requested the setting of the highest version defined in the printer of that category. This is a save way for an application to always select the latest of a manufacturer's paper category, thus choosing "latest standard red/black".
An incorrect setting of m n for a two-color paper or non-standard monochrome paper, or failure to set m n when a color paper is inserted will result in poor print quality.
The last set paper type choice is stored in non-volatile memory and is retained after a power loss and across reset commands. The initial value at first boot after firmware load (or reload) is m n = 0 0.

Notes: For better printing results of the two-color paper use emphasized printing mode.

3.11.26 Text strike-through mode

ASCII: GS 0x8D n m
Hexadecimal: 1D 8D n m
Decimal: 29 129 n m
Range: m = 0 = retain same color as the character itself
m = 1 = black
m = 2 = paper color
n = standard cell height
Default : n = 0(off)
Description:
This command prints a strike-through over characters. If the strike-through is as wide as the cell height, this will produce a cell that will be printed as a solid current color.
When characters are greater than normal size, such as double-high, the number of character rows claimed by n also increases proportionally, such as doubling for double-high cells. Location of the strike-through on a cell is on a cell-by-cell basis, so mixing cell sizes on the same print row will give uneven results.

3.11.27 Download paper type description

ASCII: GS 0x9E nl nh d1…dn
Hexadecimal: 1D 9E nl nh d1…dn
Decimal: 29 158 nl nh d1…dn
Description: This command will store in flash memory a paper type description identified by the structure in d1..dn, adding the uniquely (by type category and version) identified structure for subsequent use by the set paper type command. nL+ nH *256 define the number of bytes x that follow.

Target paper area is defined by 1D 81 command. Paper mode 0~3 for pre-defined. Not avalialbe to define by this command.

3.11.28 Return paper type description

ASCII: GS 0x9F m
Hexadecimal: 1D 9F m
Decimal: 29 159 m
Description: This command will return from flash memory a paper type description indexed by m, sending back the data sequence used in the download paper type description command, i.e. the return is 0x1D 0x9F m nL nH (d1…dn) which was stored in slot m; or a value of n = 0 if slot m does not have a description stored. m = 0xff asks for a return of the current paper type.
For all valid descriptions, the last two bytes will be a CRC value and the first 48 bytes will be as follows:

Item			offset	size	note
Paper category			0	1	
Version in type category			1	1	
Print head type			2	1	Target print head type. Valid for pre-load parameter.
structure format type			3	1	Fixed 1
Structure data	Density adjustment	Monochrome density	4	1	Density offset. Same as GS (E -10 ~ 6 : 50% ~ 130%
		Color density	5	1	Density offset. Same as GS (E -10 ~ 6 : 50% ~ 130%
		Speed density Graphic	6	8	Density offset for speed. -50 ~ 30 : 50% ~ 130%
		Speed density Text	14	8	
	Paper low Adjustment	Paper thickness	18	1	Adjustment parameter for paper low detection
		Core diameter	19	1	
		Remaining length	20	1	
	Speed adjustment	Max speed	21	1	Maximum speed limitation. Same as GS (E
		Print quality text	22	1	Change print speed threshold to improve print quality 0~50 : Reduce duty threshold for speed
		Print quality Graphic	23	1	
	Target power		24	1	Available for Pre-load parameter.
	Reserved		25	22	Null

- Monochrome density : this parameter will update monochrome strobe time offset when selected paper. The parameter is same as GS (E command.
- Color density : this parameter will update monochrome strobe time offset when selected

paper. The parameter is same as GS (E command.

- Speed density (Graphic) : this area defined strobe time offset for each speed, it will apply text line. 8 bytes area format is below.

BYTE	Target speed	note
1	14 IPS	The parameters adjust strobe time for each speed. 50%~130%. (ex : 10 = 110%, -20 = 80%)
2	12 IPS	
3	10 IPS	
4	8 IPS	
5	6 IPS	
6	4 IPS	
7	2.2 IPS	
8	1.5 IPS	

- Speed density (Text) : this area defined strobe time offset for each speed, it will apply Text line.
- Paper thickness : This area defined paper thickness for paper low detection.

Value	note
00-0F	0 to 15 :(10mm ~ 25mm)

- Paper core diameter : This area defined paper core diameter for paper low detection.

Value	note
00-05	0 to 5 :(0.05mm ~ 0.1mm)

- Remaining length adjustment : This area defined paper remaining length adjustment for paper low detection.

Value	note
F1-0F	-15 ~ 15 : (-7.5m ~ +7.5m)

- Max speed : set max speed adjustment this area is same as GS (E fn=5,a = 10 or 1F 36 AA

- Print quality adjustment(txt) : This area able to adjust print speed for txt print

Value	note
00-30	0 ~ 50 : reduce duty threshold for print speed.

- Print quality adjustment(Graphic) : This area able to adjust print speed for graphic print

Value	note
00-30	0 ~ 50 : reduce duty threshold for print speed.

- Target power : This area is available for Pre-defined paper parameter.
  This area is ignored for user-defined parameter.

3.11.29 Set temporary max target speed

ASCII: GS 0xA0 nl nh
Hexadecimal: 1D A0 nl nh
Decimal: 29 160 nl nh
Range: 0x15 ≤ (nL + nH * 256) ≤ 0x162 monochrome
0x15 ≤ (nL + nH * 256) ≤ 0x6E color
Default : (nL + nH * 256) = 0 = normal speed
Description:
This command sets a specific speed for an operation, allowing the user more control of the print environment.
The speed is maintained as long as it is less than the speed automatically set by power management. A parameter of zero (0) restores the normal max speed..

The value converted to speed as below table.

n (Hex)	*n (Dec)*	*Speed*
0	0	normal
0x15 ~ 0x32	21 ~ 50	2 IPS
0x33 ~ 0x65	51 ~ 101	4 IPS
0x66 ~ 0x98	102 ~ 152	6 IPS
0x99 ~ 0xCB	153 ~ 203	8 IPS
0xCC ~ 0xFE	204 ~ 254	10 IPS
0xFF ~ 0x130	255 ~ 304	12 IPS
0x131 ~ 0x162	305 ~ 354	14 IPS

3.12 Asian character command

3.12.1 Select print modes for Asian characters

ASCII: FS ! *n*
Hexadecimal: 1C 21 *n*
Decimal: 28 33 *n*
Value of *n*: The character attribute for Asian character

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Undefined
1	Off	00	0	Undefined
2	Off	00	0	Double width mode is not selected
	On	01	1	Double width mode is selected
3	Off	00	0	Double height mode is not selected
	On	01	1	Double height mode is selected
4	-	-	-	Undefined
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Underline mode is not selected
	On	01	1	Underline mode is selected

Default of *n*: 0

Selects character attribute for Asian character.
The underline mode can be turned on or off by using FS – or ESC – also.
The thickness of underline is defined by FS – or ESC -, it does not relate to character size.

3.12.2 Select Asian character mode

ASCII: FS &
Hexadecimal: 1C 26
Decimal: 28 38

It selects Kanji character mode.

3.12.3 Turn underline mode ON/OFF in Asian mode

ASCII: FS - *n*
Hexadecimal: 1C 2D *n*
Decimal: 28 45 *n*
Value of *n*: 0, 48 = cancel
1, 49 = 1 dot height underline
2, 50 = 2 dots height underline
Default *n*: 0 (Cancel)

Turn underline mode on or off for Asian character.
All characters can be underlined, including character right side spacing.
Underline can be selected by FS ! and ESC – also, the last received command is effective.

3.12.4 Cancel Asian character mode

ASCII: FS .
Hexadecimal: 1C 2E
Decimal: 28 46

It cancels Kanji character mode.

3.12.5 Define user-defined Asian characters

ASCII: FS 2 *c1 c2 d1 … dn*
Hexadecimal: 1C 32 *c1 c2 d1 … dn*
Decimal: 28 50 *c1 c2 d1 … dn*
Value of *c1*: Specified the first Asian character code
Value of *c2*: Specified the second Asian character code
Value of *d*: Image data
Value of n: Size of image data
n = 72 bytes

Range of *c1, c2*:

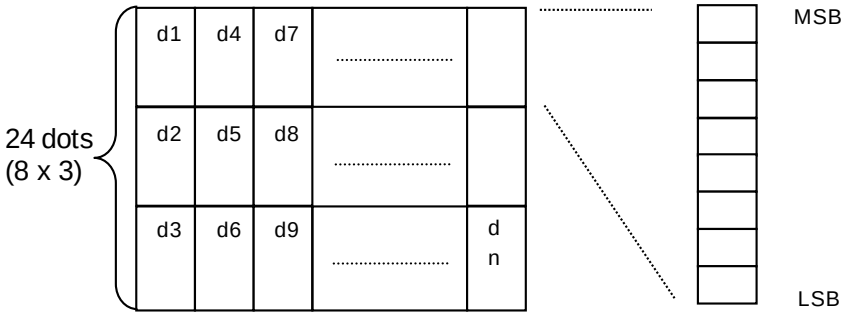
Japanese (Shift-JIS)	c1 = EC and 40 ≤ c2 ≤ 7E or 80 ≤ c2 ≤ 9E
Japanese(JIS)	c1 = 77 and 21 ≤ c2 ≤ 7E
Simplified Chinese (CP936)	A1 ≤ c1 ≤ A7 and 40 ≤ c2 ≤ 7E or 80 ≤ c2 ≤ A0, AA ≤ c1 ≤ AF and A1 ≤ c2 ≤ FE, F8 ≤ c1 ≤ FE and A1 ≤ c2 ≤ FE
Korean (CP949)	c1 = C9 or c1 = FE and A1 ≤ c2 ≤ FE
Traditional Chinese (CP950)	81 ≤ c1 ≤ A0 or FA ≤ c1 ≤ FE and 40 ≤ c2 ≤ 7E or 80 ≤ c2 ≤ FE, C7 ≤ c1 ≤ C8 and A1 ≤ c2 ≤ FE
Chinese (CP GB18030)	A1 ≤ c1 ≤ A7 and 40 ≤ c2 ≤ 7E or 80 ≤ c2 ≤ A0, AA ≤ c1 ≤ AF and A1 ≤ c2 ≤ FE, F8 ≤ c1 ≤ FE and A1 ≤ c2 ≤ FE

(Note: 4 bytes user-defined characters are not supported in GB18030)

Defines and enters downloaded characters into RAM. The user-defined character will be cleared by ESC @ or power off of printer. For each type of character pitch, the maximum number of user-defined character is 100.

Defining User-Defined Asian Characters

Receipt Characters



Related Information:
It is required to send 1B 63 30 1 or 1E command before defining Asian characters for Receipt Station. It is also required to send 1C 21 0/1 command before defining Asian standard/compressed characters for Receipt Station.

3.12.6 Select Asian character code system

ASCII: FS C *n*
Hexadecimal: 1C 43 *n*
Decimal: 28 67 *n*
Range: *n* = 0, 1, 48, 49
Default: *n* = 0

It selects a Kanji character code system for the Japanese model.

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

3.12.7 Set Asian character spacing

ASCII: FS S *n1 n2*
Hexadecimal: 1C 53 *n1 n2*
Decimal: 28 83 *n1 n2*
Value of *n1*: Ignored (0)
Value of *n2*: Character right side spacing dots (1/203 inch)
Default of *n2*:

Receipt:

	936, 949, 950, GB18030		932	
	80mm	**58mm**	**80mm**	**58mm**
Standard 1byte	1	1	1	0
Standard 2byte	2	2	2	0

Sets the character right side spacing for characters in Asian character.
The underline is valid on the space set by this command. ESC SP command is not valid for Asian character code pages. Therefore, this command is used to set the character right side spacing for characters in Asian code page.

3.12.8 Set quadruple mode ON/OFF in Asian mode

ASCII: FS W *n*
Hexadecimal: 1C 57 *n*
Decimal: 28 87 *n*
Value of *n*: The quadruple mode for Asian characters.
0 (Bit 0) = Quadruple mode off
1 (Bit 0) = Quadruple mode on
Default of *n*: 0 (Quadruple mode off)

It selects or cancels the quadruple mode for Asian characters.
FS ! and GS ! also have control over character size.

3.13 IPL(Initial Program Loader) Command

There are two ways to update the firmware in online.
1) Update the firmware in IPL mode
2) Update the firmware in Main firmware mode

Following commands are to update the firmware in IPL mode provided for the serious malfunction such as the corruption of the main firmware. If those commands are wrongly used, the printer may be seriously damaged. Hence, it is recommended not to use those commands.

3.13.1 Switch to Flash Download Mode

ASCII: ESC [}
Hexadecimal: 1B 5B 7D
Decimal: 27 91 125

Response: ACK (0x06): The mode is successfully changed to IPL.
NACK (0x15): The mode is already in IPL.

It switches mode to IPL (Initial Program Loader).
When the printer receives this command in Main firmware mode, it returns Ack and resets the printer automatically, and it goes to IPL mode.

If this command is received in IPL mode, it just returns Nack and nothing happens. In order to go back to Main Firmware mode from IPL mode, the printer has to be manually reset or be reset by Printer Reboot command (1D FF).

3.13.2 Select Flash Memory Sector to Download

ASCII: GS STX *n*
Hexadecimal: 1D 02 *n*
Decimal: 29 2 *n*
Value of *n*: the Flash sector to which the next download operation applies
Range of n: 1 – 93 (Sector number). This range depends of the flash memory specification.

Response: ACK (0x06): Sector number specified is available.
NACK (0x15): Sector number specified is not available.

It specifies the sector number of flash memory which writes the firmware program data sent subsequently. This command is available only in IPL mode.

3.13.3 Get Firmware Sector CRC

ASCII: GS ACK
Hexadecimal: 1D 06
Decimal: 29 6

Response: ACK (0x06) + 2 bytes CRC (<low byte> <high byte>)
NACK (0x15): It failed to calculate CRC.

It calculates and returns CRC of the flash memory sector specified by “Select Flash Memory Sector to Download” command (1D 02 n). If CRC is successfully calculated, it returns ACK and 2bytes CRC consecutively. If CRC calculation is not successful or it is abnormal CRC, it returns NACK.
This command is available only in IPL mode.

3.13.4 Return IPL Firmware CRC

ASCII: GS BEL
Hexadecimal: 1D 07
Decimal: 29 7

Response: ACK (0x06) + 2 bytes CRC (<low byte> <high byte>)

It calculates and returns CRC of IPL firmware. This command is available only in IPL mode.

3.13.5 Erase all Flash Memory

ASCII: GS SO
Hexadecimal: 1D 0E
Decimal: 29 14

Response: ACK (0x06)

This command is not used in the sequence of the firmware flashing in IPL. Therefore, it does not do anything except returning the acknowledgement. This command is available only in IPL mode.

3.13.6 Return Main Firmware CRC

ASCII: GS SI
Hexadecimal: 1D 0F
Decimal: 29 15

Response: ACK (0x06) + 2 bytes CRC (<low byte> <high byte>)

It calculates and returns CRC of Main firmware. This command is available only in IPL mode.

3.13.7 Erase Selected Flash Sector

ASCII: GS D LE n
Hexadecimal: 1D 10 *n*
Decimal: 29 16 *n*
Range of n: 1 – 93 (Sector number). This range depends of the flash memory specification.

Response: ACK (0x06): The sector specified is successfully erased.
NACK (0x15): The sector specified is not successfully erased.

It erases the flash memory sector specified. If the sector specified is successfully erased, it returns ACK. If it failed to erase, it returns NACK. This command is available only in IPL mode.

3.13.8 Download to Active Flash Sector

ASCII: GS DC1 *al ah cl ch d1…dn*
Hexadecimal: 1D 11 *al ah cl ch d1…dn*
Decimal: 29 17 *al ah cl ch d1…dn*
Value of *al, ah*: 0 (Fixed)
Value of *cl, ch*: Total number of bytes of the subsequent data = ((ch * 256) + cl)
Range of *cl, ch*: 1 ≤ ((ch * 256) + cl) ≤ 64K
Range of *n*: 1 ≤ n ≤ 64K

Response: ACK (0x06): The firmware data is successfully written in the sector specified.
NACK (0x15): It failed to write the firmware data.

It writes the firmware data into the flash memory sector specified by “Select Flash Memory Sector to Download” command (1D 02 n). If the data is successfully written, it returns ACK. If it failed to write, it returns NACK. This command is available only in IPL mode.

3.13.9 Reboot the Printer

ASCII: GS (SPACE)
Hexadecimal: 1D FF
Decimal: 29 255

It resets the printer. If the printer is in IPL mode and receives this command, it goes to Main mode after the reset. If it is in Main mode, it's still in Main mode even after the reset.
This command is available in both IPL and Main mode.

3.14 Flash Download Commands in Main Firmware

These commands are used to download the firmware in online. Since it does not switch to IPL mode, the flashing firmware is performed without disconnecting the interface.
Those are not allowed to use in an application. Otherwise, it may cause the printer failure, or it may become not operational in worst case.

3.14.1 Flash Firmware

ASCII: ESC [| *m pL0 pL1 pH0 pH1 d1…dn*
Hexadecimal: 1B 5B 7C *m pL0 pL1 pH0 pH1 d1…dn*
Decimal: 27 91 124 *m pL0 pL1 pH0 pH1 d1…dn*
Value of *m*: 00H: IPL
01H: Main F/W
02H: SBCS
03H: DBCS
04H: TABLE
05H: PRINTER CONFIGRATION TABLE
10H: Combined File1 (IPL+Main FW) Reserved for future enhancement
20H: Combined File 2 (All in one file) Reserved for future enhancement
Values of *pL0, pL1,pH0, pH1:*
(*pL0* + *pL1* × 256 + *pH0* × 65536 + *pH1* × 16777216) as the size of firmware file
d1….dn: Firmware file data
Response: ACK (0x06) + 2 bytes CRC (<low byte> <high byte>)
NACK (0x15) + 1byte Error Code

It flashes the entire firmware data file into the flash memory. If the data is successfully written, it returns ACK with CRC of the target firmware specified by *m*.
If flashing firmware fails, it returns NACK with the error code as follows.

Error Code: 01H: Illegal Parameter (*n* and *p*)
02H: File size mismatch
03H: Wrong firmware file
04H: Fail writing into flash memory
05H: CRC mismatch

While the printer is updating the firmware, LED blinks in Green. While LED is blinking, either disconnecting USB cable or turning off the printer is not allowed. Otherwise, the printer becomes malfunction after that.

3.14.2 Activate Firmware in the alternative area

ASCII: ESC [{ *n*
Hexadecimal: 1B 5B 7B n
Decimal: 27 91 123 n
Value of n: 00H: IPL
01H: Main F/W
02H: SBCS
03H: DBCS
04H: TABLE
05H: PRINTER CONFIGRATION TABLE
Response: ACK (0x06) + 2 bytes CRC (<low byte> <high byte>)
NACK (0x15) + 1byte Error Code

This command is to activate the firmware flashed into the deactivated area and automatically resets the printer. If the firmware is successfully activated, it returns ACK with CRC of the target firmware and automatically resets the printer. The firmware which does not support the swap download functionality just returns ACK with CRC and resets the printer.
If it fails, it returns NACK with the error code as follows.

Error Code: 00H: Unknown error
01H: Illegal Parameter (*n* and *p*)
05H: No firmware in alternative area
06H: Fail to activate

This command is not available in IPL mode.

3.15 Diagnostic Commands

All diagnostic commands are supported for the printer production. Those are not allowed to use in an application. Otherwise, it may cause the printer failure, or it may become not operational in worst case.

3.15.1 Execute test print

ASCII: GS (A pL pH n m
Hexadecimal: 1D 28 41 pL pH n m
Decimal: 29 40 65 pL pH n m
Range: (pL + pH x 256) = 2 (pL = 2, pH = 0)
0 ≤ n ≤ 2, 48, ≤ n ≤ 50
1 ≤ m ≤ 3, 49 ≤ m ≤ 51

It executes a specified test point.
pL, *pH* specify (*pL* + *pH* x 256) as the number of bytes after *pH* (*n* and *m*).

n specifies the paper used for the test point.

n	Paper source
0, 48 1, 49 2, 50	Roll paper

m specifies a test pattern.

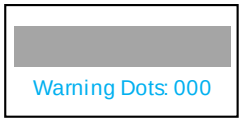
m	Test pattern
1, 49	Reserved
2, 50	Extended self test print (DN Emulation)
	Printer status print (ESC/POS Emulation)
3, 51	Rolling pattern print
6	

“Printer status print” print the current configuration setting which are stored in Flash memory and customized with <fn=05> GS (E: “Set the customized setting values” and FS (E “top/bottom logo printing” commands.
“Rolling pattern print” print specific ASCII rolling pattern.

The printer executes a software reset after processing this command.
Clears the receive and print buffers.
Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the Flash memory is not reset.)

3.15.2 Dot check pattern test

ASCII: GS d 05H
Hexadecimal: 1D 64 05
Decimal: 29 100 05



The command is to print Dot check pattern to check if there are any damaged heads along with the result of the latest thermal head failure check.

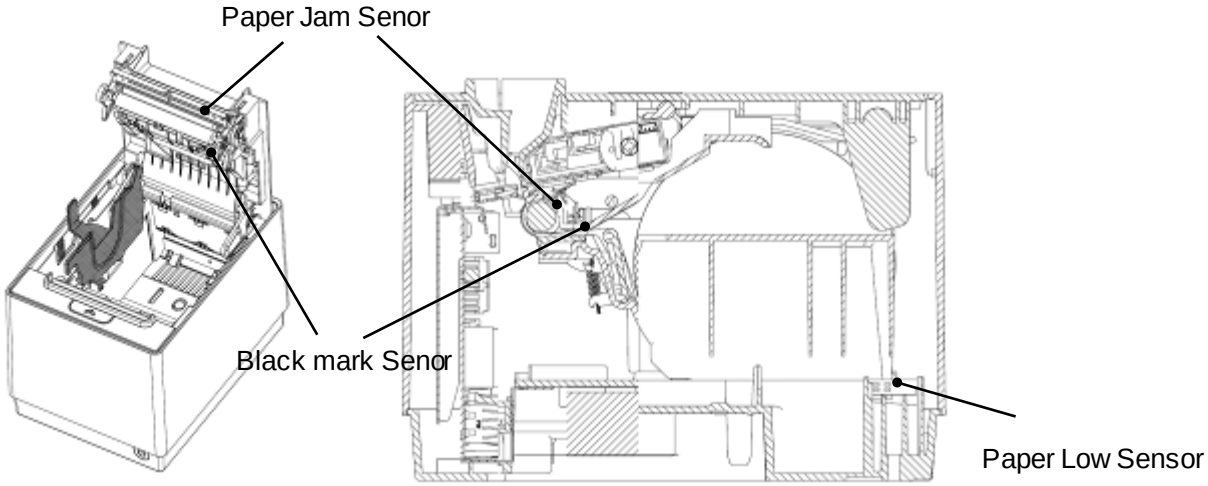
3.15.3 Sensor Calibration

ASCII: GS d 15H n
Hexadecimal: 1D 64 15 n
Decimal: 29 100 21 n
Range of n:
n = 01H: execute sensor calibration
n = 02H: (Reserved)
Response: ACK (0x06) + AA + EE + GG

Index	Sensor	Value	
		01	00
AA	Jam Sensor	If the respective sensor calibration is successful or already if calibration is done after power up	If the respective sensor calibration is not done or if the calibration is failed after power up
EE	Paper Low Sensor		
GG	Black mark sensor		

This command is to calibrate the following sensors.
- Jam Sensor
- Paper Low Sensor
- Black mark Sensor

Steps to calibrate sensors:
1) Send Sensor Calibration command (1D 64 15 01)
2) Printer beeps to indicate the printer is in sensor calibration mode.
3) Place a piece of paper on the jam sensor to makes it ON.
4) Supply a small paper roll (less than 36mm of paper diameter) to paper low sensor covered (ON).
5) Press key and printer beeps to indicate it is starting to calibrate.
   ➔ The printer beeps twice as soon as it completes the calibration of sensor for both sensors.
6) Remove all the paper low sensor not covered (OFF).
7) Remove all the paper on the jam sensor to make if OFF.
8) Press key and printer beeps to indicate it is starting to calibrate.
   ➔ The printer beeps twice as soon as it completes the sensor calibration.
9) Close cover without paper
10) Press key and printer beeps to indicate it is starting to black mark sensor calibrate.
    ➔ The printer beeps twice as soon as it completed black mark sensor data capture.
11) Replace paper roll which have Black mark
12) Press key and printer beeps to indicate it is starting to calibrate and feed paper to get actual black mark data.
    ➔ The printer beeps twice as soon as it completes the sensor calibration.



Note: In terms of the Jam sensor, there is the risk that it detects a paper jam wrongly due to paper dust on the platen generated by long usage. Therefore, in order to prevent this risk, the printer keeps

monitoring OFF value of the Jam sensor and it disables the paper jam detection automatically when OFF value is abnormal.

Exceptions:
While the printer is performing the calibration, it does not process any subsequence data.

3.15.4 Retrieve Detail Log

ASCII: GS d 20H m
Hexadecimal: 1D 64 20 m
Decimal: 29 100 32 m
Value of *m*: 0: Reserved
1: Historical Error Log
2: Maintenance Information

Historical Error Log (m=01)
Printer returns 64K bytes of historical error log data. 64K bytes = 128 bytes (one error log) x 512 errors
Error log are stored when the firmware detects following errors/warning.

1) Unrecoverable Error
   Memory Error
   Thermal Head Disconnected
   Thermal Head Abnormal Temperature
2) Recoverable Error (operator intervention is required)
   Cutter Error
   Recoverable Error (operator intervention is not required)
   Thermal head over heat
   Black mark error
3) Warning (This will not affect any printer behavior)

Maintenance Information (m=02)
It transmits 1556 bytes detail maintenance information.
The content of this information is exactly same information as two QR barcode.

4. Appendix 1 Character sets

4.1 Character code table page 0 (PC437 : USA,Standard Europe)

4.2 Character code table Page 1 (PC850: Multilingual Latin I):

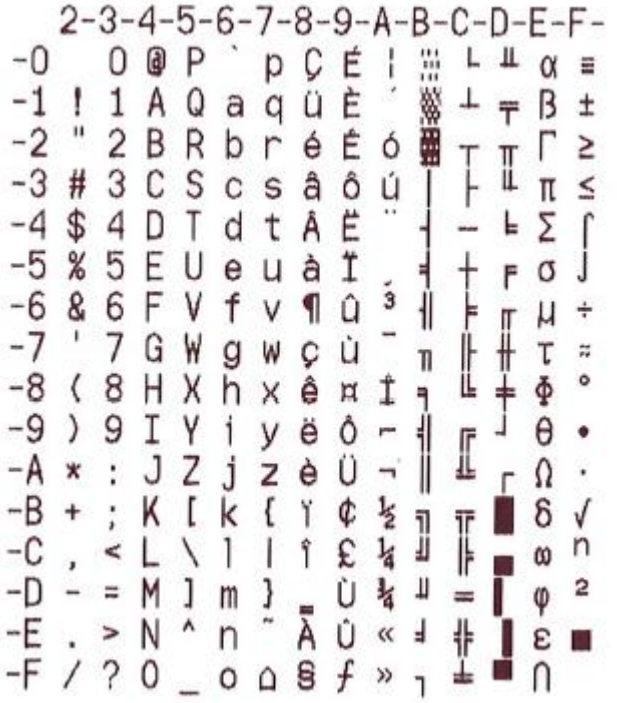
4.3 Character code table Page 2 (PC852: Latin II):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	Ç	É	á	▒	└	đ	Ó	-
-1	!	1	A	Q	a	q	ü	Ĺ	í	▓	┴	Đ	ß	˝
-2	"	2	B	R	b	r	é	ĺ	ó	▓	┬	Ď	Ô	˛
-3	#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ń	ˇ
-4	$	4	D	T	d	t	ä	ö	Ą	┤	─	ď	ń	˘
-5	%	5	E	U	e	u	ů	Ľ	ą	Á	┼	Ň	ň	§
-6	&	6	F	V	f	v	ć	ľ	Ž	Â	Ă	Í	Š	÷
-7	'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	š	¸
-8	(	8	H	X	h	x	ł	ś	Ę	Ş	╚	ě	Ŕ	°
-9	)	9	I	Y	i	y	ë	Ö	ę	╣	╔	┘	Ú	¨
-A	*	:	J	Z	j	z	ő	Ü	¬	║	╩	┌	ŕ	·
-B	+	;	K	[	k	{	ő	ť	ź	╗	╦	▉	Ű	ű
-C	,	<	L	\	l	|	î	ť	Č	╝	╠	▄	ý	Ř
-D	-	=	M	]	m	}	ź	Ł	ş	Ż	═	Ţ	Ý	ř
-E	.	>	N	^	n	~	Ä	×	«	ż	╬	Ů	ţ	▀
-F	/	?	O	_	o	▫	Ć	č	»	┐	¤	▀	´	

4.4 Character code table Page 3 (PC860: Portuguese):

	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	À	í	▓	┴	╤	ß	±
-2	"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
-3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
-4	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
-5	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
-6	&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
-7	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
-8	(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°
-9	)	9	I	Y	i	y	Ê	õ	Ò	╣	╔	┘	Θ	•
-A	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
-B	+	;	K	[	k	{	Í	¢	½	╗	╦	▉	δ	√
-C	,	<	L	\	l	|	ô	£	¼	╝	╠	▄	∞	n
-D	-	=	M	]	m	}	ì	Ù	¡	╜	═	▌	φ	²
-E	.	>	N	^	n	~	Ã	₧	«	╛	╬	▐	ε	▀
-F	/	?	O	_	o	▫	Â	Ó	»	┐	╧	▀	∩	

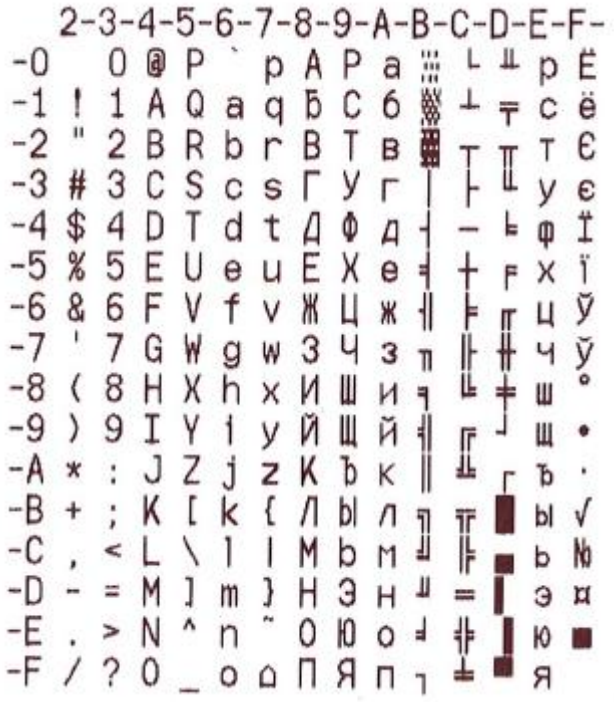
4.5 Character code table Page 4 (PC863: Canadian French):



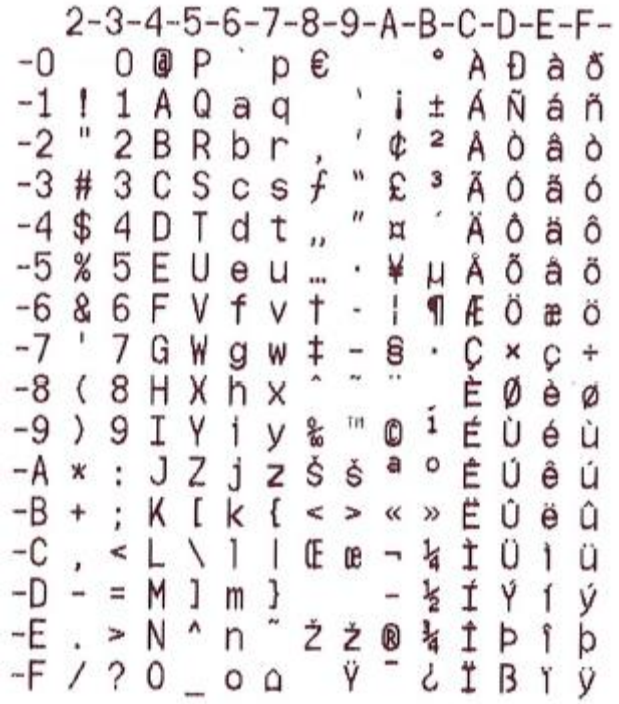
4.6 Character code table Page 5 (PC865: Nordic):

4.7 Character code table Page 6 (PC858: Multilingual I + Euro):

4.8 Character code table Page 7 (PC866: Russian):

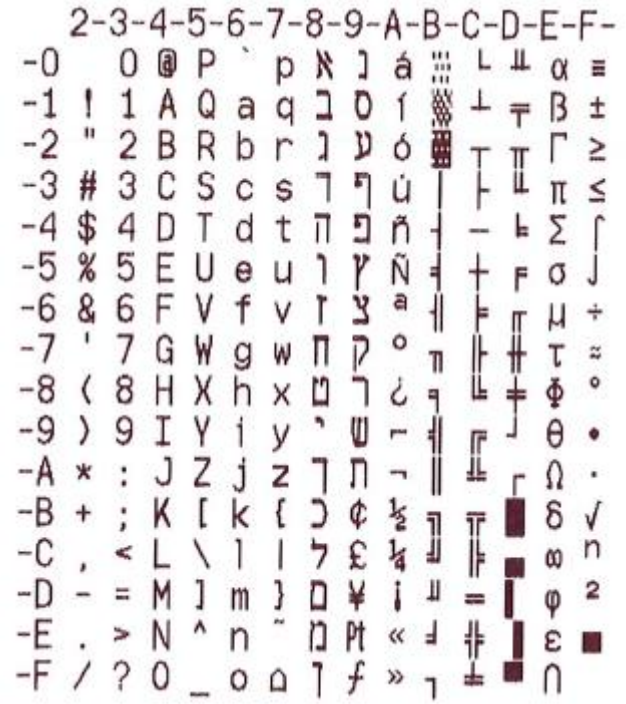


4.9 Character code table Page 8 (WPC1252: Latin I):



	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	€			°	À	Đ	à	ð
-1	!	1	A	Q	a	q		‘	¡	±	Á	Ñ	á	ñ
-2	"	2	B	R	b	r	‚	’	¢	²	Â	Ò	â	ò
-3	#	3	C	S	c	s	ƒ	“	£	³	Ã	Ó	ã	ó
-4	$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u	…	•	¥	µ	Å	Õ	å	õ
-6	&	6	F	V	f	v	†	-	¦	¶	Æ	Ö	æ	ö
-7	'	7	G	W	g	w	‡	–	§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x	ˆ	˜	¨		È	Ø	è	ø
-9	)	9	I	Y	i	y	‰	™	©	¹	É	Ù	é	ù
-A	*	:	J	Z	j	z	Š	š	ª	º	Ê	Ú	ê	ú
-B	+	;	K	[	k	{	<	>	«	»	Ë	Û	ë	û
-C	,	<	L	\	l	|	Œ	œ	¬	¼	Ì	Ü	ì	ü
-D	-	=	M	]	m	}			-	½	Í	Ý	í	ý
-E	.	>	N	^	n	~	Ž	ž	®	¾	Î	Þ	î	þ
-F	/	?	O	_	o			Ÿ	¯	¿	Ï	ß	ï	ÿ

4.10 Character code table Page 9 (PC862: Hebrew):



	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	א	ן	á	▒	└	╨	α	≡
-1	!	1	A	Q	a	q	ב	ס	í	▓	┴	╤	ß	±
-2	"	2	B	R	b	r	ג	ע	ó	▓	┬	╥	Γ	≥
-3	#	3	C	S	c	s	ד	ף	ú	│	├	╙	π	≤
-4	$	4	D	T	d	t	ה	פ	ñ	┤	─	╘	Σ	⌠
-5	%	5	E	U	e	u	ו	ץ	Ñ	╡	┼	╒	σ	⌡
-6	&	6	F	V	f	v	ז	צ	ª	╢	╞	╓	µ	÷
-7	'	7	G	W	g	w	ח	ק	º	╖	╟	╫	τ	≈
-8	(	8	H	X	h	x	ט	ר	¿	╕	╚	╪	Φ	°
-9	)	9	I	Y	i	y	י	ש	⌐	╣	╔	┘	Θ	∙
-A	*	:	J	Z	j	z	ך	ת	¬	║	╩	┌	Ω	·
-B	+	;	K	[	k	{	כ	¢	½	╗	╦	■	δ	√
-C	,	<	L	\	l	|	ל	£	¼	╝	╠	▪	∞	n
-D	-	=	M	]	m	}	ם	¥	¡	╜	═	▌	φ	²
-E	.	>	N	^	n	~	מ	₧	«	╛	╬	▐	ε	■
-F	/	?	O	_	o	⌂	ן	ƒ	»	┐	╧	▀	∩	

4.11 Character code table Page 10 (PC737: Greek):

4.12 Character code table Page 11 (PC874: Thai):

4.13 Character code table Page 12 (PC857: Turkish):

4.14 Character code table Page 13 (WPC1251: Cyrillic):

4.15 Character code table Page 14 (WPC1255: Hebrew):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	€			°	ֹ	׀	א	ן
-1	!	1	A	Q	a	q		‘	¡	±	ֻ	ׁ	ב	ס
-2	"	2	B	R	b	r	‚	’	¢	²	ּ	ׂ	ג	ע
-3	#	3	C	S	c	s	ƒ	“	£	³	ֽ	׃	ד	ף
-4	$	4	D	T	d	t	„	”	₪	´	־	ׄ	ה	פ
-5	%	5	E	U	e	u	…	•	¥	µ	ֿ	ׅ	ו	ץ
-6	&	6	F	V	f	v	†	–	¦	¶	׀	׆	ז	צ
-7	'	7	G	W	g	w	‡	—	§	·	־	ׇ	ח	ק
-8	(	8	H	X	h	x	ˆ	˜	¨	ֹ	ֿ	״	ט	ר
-9	)	9	I	Y	i	y	‰	™	©	¹	׀	׳	י	ש
-A	*	:	J	Z	j	z			×	÷			ך	ת
-B	+	;	K	[	k	{	<	>	«	»	ֻ		כ	
-C	,	<	L	\	l	|			¬	¼	ּ		ל	
-D	-	=	M	]	m	}				½	ׁ		ם	׳
-E	.	>	N	^	n	~			®	¾	ׂ		מ	׀
-F	/	?	O	_	o	⌂			¯	¿	׃		ן	

4.16 Character code table Page 15 ((KZ_1048: Kazakh):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	Ђ	ђ		°	А	Р	а	р
-1	!	1	A	Q	a	q	Ѓ	‘	¥	±	Б	С	б	с
-2	"	2	B	R	b	r	‚	’	¥	І	В	Т	в	т
-3	#	3	C	S	c	s	ѓ	“	Ə	і	Г	У	г	у
-4	$	4	D	T	d	t	„	”	¤	ө	Д	Ф	д	ф
-5	%	5	E	U	e	u	…	•	Ө	µ	Е	Х	е	х
-6	&	6	F	V	f	v	†	–	¦	¶	Ж	Ц	ж	ц
-7	'	7	G	W	g	w	‡	—	§	·	З	Ч	з	ч
-8	(	8	H	X	h	x	€		Ё	ё	И	Ш	и	ш
-9	)	9	I	Y	i	y	‰	™	©	№	Й	Щ	й	щ
-A	*	:	J	Z	j	z	Љ	љ	Ғ	ғ	К	Ъ	к	ъ
-B	+	;	K	[	k	{	‹	›	«	»	Л	Ы	л	ы
-C	,	<	L	\	l	|	Њ	њ	¬	ə	М	Ь	м	ь
-D	-	=	M	]	m	}	Ќ	ќ		Ң	Н	Э	н	э
-E	.	>	N	^	n	~	Ћ	ћ	®	ң	О	Ю	о	ю
-F	/	?	O	_	o	⌂	Џ	џ	Ү	ү	П	Я	п	я

4.17 Character code table Page 16 (WPC1254: Turkish):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	€			°	À	Ğ	à	ğ
-1	!	1	A	Q	a	q		‘	¡	±	Á	Ñ	á	ñ
-2	"	2	B	R	b	r	,	’	¢	²	Â	Ò	â	ò
-3	#	3	C	S	c	s	ƒ	“	£	³	Ã	Ó	ã	ó
-4	$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u	…	·	¥	µ	Å	Õ	å	õ
-6	&	6	F	V	f	v	†	-	¦	¶	Æ	Ö	æ	ö
-7	'	7	G	W	g	w	‡	–	§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x	ˆ	˜	¨	¸	È	Ø	è	ø
-9	)	9	I	Y	i	y	‰	™	©	¹	É	Ù	é	ù
-A	*	:	J	Z	j	z	Š	š	ª	º	Ê	Ú	ê	ú
-B	+	;	K	[	k	{	<	>	«	»	Ë	Û	ë	û
-C	,	<	L	\	l	|	Œ	œ	¬	¼	Ì	Ü	ì	ü
-D	-	=	M	]	m	}				½	Í	İ	í	ı
-E	.	>	N	^	n	~			®	¾	Î	Ş	î	ş
-F	/	?	O	_	o	⌂		Ÿ	¯	¿	Ï	ß	ï	ÿ

4.18 Character code table Page 17 (WPC1250: Central Europe):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	€			°	Ŕ	Đ	ŕ	đ
-1	!	1	A	Q	a	q		‘	ˇ	±	Á	Ń	á	ń
-2	"	2	B	R	b	r	,	’	˘	˛	Â	Ň	â	ň
-3	#	3	C	S	c	s		“	Ł	ł	Ă	Ó	ă	ó
-4	$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u	…	·	Ą	µ	Ĺ	ő	í	ő
-6	&	6	F	V	f	v	†	-	¦	¶	Ć	Ö	ć	ö
-7	'	7	G	W	g	w	‡	–	§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x			¨	¸	Č	Ř	č	ř
-9	)	9	I	Y	i	y	‰	™	©	ą	É	Ů	é	ů
-A	*	:	J	Z	j	z	Š	š	Ş	ş	Ę	Ú	ę	ú
-B	+	;	K	[	k	{	<	>	«	»	Ë	Ű	ë	ű
-C	,	<	L	\	l	|	Ś	ś	¬	Ľ	Ė	Ü	ė	ü
-D	-	=	M	]	m	}	ť	t	-	˝	Í	Ý	í	ý
-E	.	>	N	^	n	~	Ž	ž	®	ľ	Î	Ţ	î	ţ
-F	/	?	O	_	o	⌂	Ź	ź	Ż	ż	Đ	ß	đ	˙

4.19 Character code table Page 18 (WPC28591: Latin 1):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p				°	À	Ð	à	ð
-1	!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
-2	"	2	B	R	b	r			¢	²	Â	Ò	â	ò
-3	#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
-4	$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
-6	&	6	F	V	f	v			¦	¶	Æ	Ö	æ	ö
-7	'	7	G	W	g	w			§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x			¨	¸	È	Ø	è	ø
-9	)	9	I	Y	i	y			©	¹	É	Ù	é	ù
-A	*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
-B	+	;	K	[	k	{			«	»	Ë	Û	ë	û
-C	,	<	L	\	l	|			¬	¼	Ì	Ü	ì	ü
-D	-	=	M	]	m	}				½	Í	Ý	í	ý
-E	.	>	N	^	n	~			®	¾	Î	Þ	î	þ
-F	/	?	O	_	o	⌂			¯	¿	Ï	ß	ï	ÿ

4.20 Character code table Page 19 (WPC28592: Latin 2):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p				°	Ŕ	Đ	ŕ	đ
-1	!	1	A	Q	a	q			Ą	ą	Á	Ń	á	ń
-2	"	2	B	R	b	r			˘	˛	Â	Ň	â	ň
-3	#	3	C	S	c	s			Ł	ł	Ă	Ó	ă	ó
-4	$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u			Ľ	ľ	Ĺ	ő	í	ő
-6	&	6	F	V	f	v			Ś	ś	Ć	Ö	ć	ö
-7	'	7	G	W	g	w			§	ˇ	Ç	×	ç	÷
-8	(	8	H	X	h	x			¨	¸	Č	Ř	č	ř
-9	)	9	I	Y	i	y			Š	ś	É	Ů	é	ů
-A	*	:	J	Z	j	z			Ş	ş	Ę	Ú	ę	ú
-B	+	;	K	[	k	{			Ť	ť	Ë	Ű	ë	ű
-C	,	<	L	\	l	|		Ź	ź	Ě	Ü	ě	ü
-D	-	=	M	]	m	}				˝	Í	Ý	í	ý
-E	.	>	N	^	n	~			Ž	ž	Î	Ţ	î	ţ
-F	/	?	O	_	o	⌂			Ż	ż	Ď	ß	ď	˙

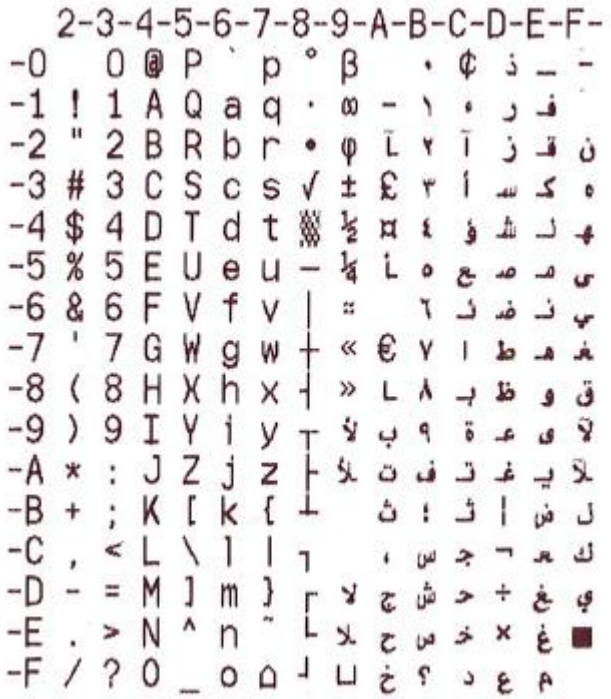
4.21 Character code table Page 20 (WPC28599: Turkish):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
-0		0	@	P	`	p				°	À	Ğ	à	ğ
-1	!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
-2	"	2	B	R	b	r			¢	²	Â	Ò	â	ò
-3	#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
-4	$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
-6	&	6	F	V	f	v			¦	¶	Æ	Ö	æ	ö
-7	'	7	G	W	g	w			§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x			¨	¸	È	Ø	è	ø
-9	)	9	I	Y	i	y			©	¹	É	Ù	é	ù
-A	*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
-B	+	;	K	[	k	{			«	»	Ë	Û	ë	û
-C	,	<	L	\	l	|			¬	¼	İ	Ü	ì	ü
-D	-	=	M	]	m	}				½	Í	Ì	í	ı
-E	.	>	N	^	n	~			®	¾	Î	Ş	î	ş
-F	/	?	O	_	o	⌂			¯	¿	Ï	ß	ï	ÿ

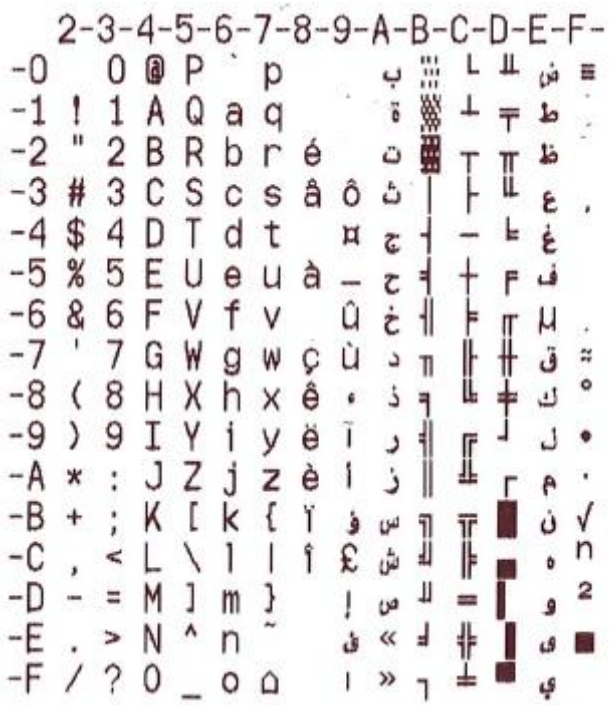
4.22 Character code table Page 21 (WPC28605: Latin 9):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
-0		0	@	P	`	p				°	À	Đ	à	ð
-1	!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
-2	"	2	B	R	b	r			¢	²	Â	Ò	â	ò
-3	#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
-4	$	4	D	T	d	t			€	Ž	Ä	Ô	ä	ô
-5	%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
-6	&	6	F	V	f	v			Š	¶	Æ	Ö	æ	ö
-7	'	7	G	W	g	w			§	·	Ç	×	ç	÷
-8	(	8	H	X	h	x			š	ž	È	Ø	è	ø
-9	)	9	I	Y	i	y			©	¹	É	Ù	é	ù
-A	*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
-B	+	;	K	[	k	{			«	»	Ë	Û	ë	û
-C	,	<	L	\	l	|			¬	Œ	İ	Ü	ì	ü
-D	-	=	M	]	m	}				œ	Í	Ý	í	ý
-E	.	>	N	^	n	~			®	Ÿ	Î	Þ	î	þ
-F	/	?	O	_	o	⌂			¯	¿	Ï	ß	ï	ÿ

4.23 Character code table Page 22 (PC864: Arabic):



4.24 Character code table Page 23 (PC720: Arabic):



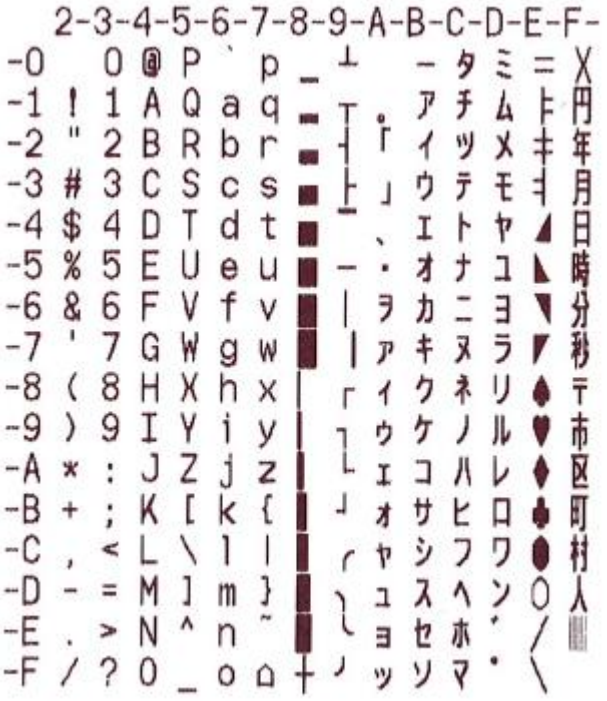
4.25 Character code table Page 24 (WPC1256: Arabic):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		0	@	P	`	p	€	گ		°	ه	ذ	à	
1	!	1	A	Q	a	q	پ	'	،	±	ء	ر	ل	
2	"	2	B	R	b	r	‚	'	¢	²	آ	ز	â	
3	#	3	C	S	c	s	ƒ	"	£	³	أ	س	م	
4	$	4	D	T	d	t	„	"	¤	´	ؤ	ش	ن	ô
5	%	5	E	U	e	u	…	·	¥	µ	إ	ص	ه	
6	&	6	F	V	f	v	†	-	¦	¶	ئ	ض	و	
7	'	7	G	W	g	w	‡	-	§	·	ا	×	ç	÷
8	(	8	H	X	h	x	ˆ	ک	¨		ب	ط	è	
9	)	9	I	Y	i	y	‰	™	©	¹	ة	ظ	é	ù
A	*	:	J	Z	j	z	ث	ژ	ه	؛	ت	ع	ê	
B	+	;	K	[	k	{	<	>	«	»	ث	غ	ë	û
C	,	<	L	\	l	|	Œ	œ	¬	¼	ج	ـ	ى	ü
D	-	=	M	]	m	}	ۀ	|	-	½	ح	ف	ي	
E	.	>	N	^	n	~	ژ	ٔ	®	¾	خ	ق	أ	٦
F	/	?	O	_	o	۵	ؤ	ں	¯	؟	د	ك	آ	ے

4.26 Character code table Page 25 (WPC28596: Arabic):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		0	@	P	`	p						ذ	ـ	
1	!	1	A	Q	a	q					ء	ر	ف	
2	"	2	B	R	b	r					آ	ز	ق	
3	#	3	C	S	c	s					أ	س	ك	
4	$	4	D	T	d	t					ؤ	ش	ل	
5	%	5	E	U	e	u					إ	ص	م	
6	&	6	F	V	f	v					ئ	ض	ن	
7	'	7	G	W	g	w					ا	ط	ه	
8	(	8	H	X	h	x					ب	ظ	و	
9	)	9	I	Y	i	y					ة	ع	ى	
A	*	:	J	Z	j	z					ت	غ	ي	
B	+	;	K	[	k	{				؛	ث			
C	,	<	L	\	l	|			،		ج			
D	-	=	M	]	m	}			-		ح		،	
E	.	>	N	^	n	~					خ			
F	/	?	O	_	o	۵				؟	د			

4.27 Character code table Page 26 (KATAKANA: Asia):



4.28 Character code table Page 27 (PC775: Baltic):

4.29 Character code table Page 28 (WPC1257: Baltic):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
-0		0	@	P	`	p	€			°	Ą	Š	ą	š
-1	!	1	A	Q	a	q		‘		±	Į	Ń	į	ń
-2	"	2	B	R	b	r	‚	’	¢	²	Ā	Ņ	ā	ņ
-3	#	3	C	S	c	s		“	£	³	Ć	Ó	ć	ó
-4	$	4	D	T	d	t	„	”	¤	´	Ä	Ō	ä	ō
-5	%	5	E	U	e	u	…	•		µ	Å	Õ	å	õ
-6	&	6	F	V	f	v	†	-	¦	¶	Ę	Ö	ę	ö
-7	'	7	G	W	g	w	‡	–	§	·	Ē	×	ē	÷
-8	(	8	H	X	h	x			Ø	ø	Č	Ų	č	ų
-9	)	9	I	Y	i	y	‰	™	©	¹	É	Ł	é	ł
-A	*	:	J	Z	j	z			Ŗ	ŗ	Ź	Ś	ź	ś
-B	+	;	K	[	k	{	<	>	«	»	Ė	Ū	ė	ū
-C	,	<	L	\	l	|			¬	¼	Ģ	Ü	ģ	ü
-D	-	=	M	]	m	}	¨	¯	-	½	Ķ	Ż	ķ	ż
-E	.	>	N	^	n	~	˙	˛	®	¾	Ī	Ż	ī	ž
-F	/	?	O	_	o	˙		ˇ	Æ	æ	Ļ	ß	ļ	˙

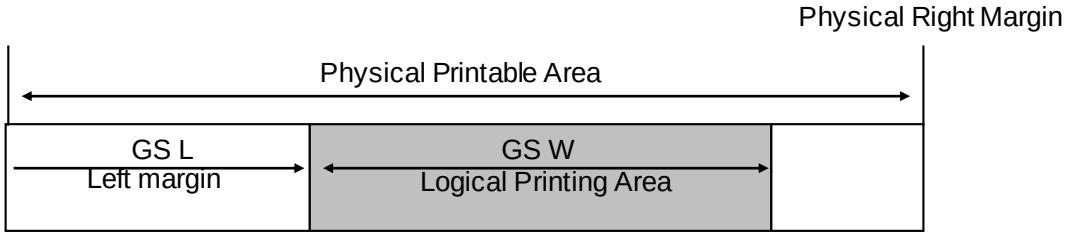
4.30 Character code table Page 29 (WPC28594: Baltic):

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
-0		0	@	P	`	p				°	Ā	Đ	ā	đ
-1	!	1	A	Q	a	q			Ą	ą	Á	Ņ	á	ņ
-2	"	2	B	R	b	r			ĸ	˛	Â	Õ	â	õ
-3	#	3	C	S	c	s			Ŗ	ŗ	Ã	Ķ	ã	ķ
-4	$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
-5	%	5	E	U	e	u			Ī	ī	Å	Õ	å	õ
-6	&	6	F	V	f	v			Ļ	ļ	Æ	Ö	æ	ö
-7	'	7	G	W	g	w			§	ˇ	Į	×	į	÷
-8	(	8	H	X	h	x			¨		Č	Ø	č	ø
-9	)	9	I	Y	i	y			Š	š	É	Ų	é	ų
-A	*	:	J	Z	j	z			Ē	ē	Ę	Ú	ę	ú
-B	+	;	K	[	k	{			Ģ	ģ	Ë	Û	ë	û
-C	,	<	L	\	l	|			Ŧ	ŧ	Ė	Ü	ė	ü
-D	-	=	M	]	m	}			-	Ŋ	Í	Ũ	í	ũ
-E	.	>	N	^	n	~			Ž	ž	Î	Ū	î	ū
-F	/	?	O	_	o	˙				ŋ	Ï	ß	ï	˙

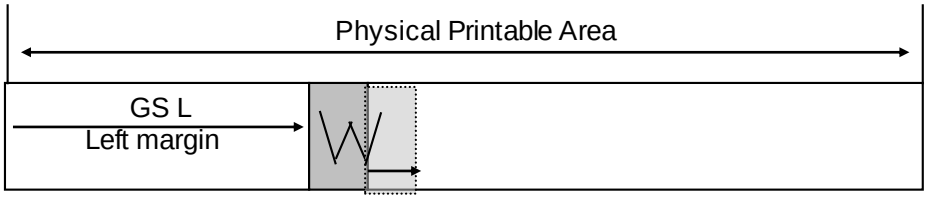
4.31 Character code table Page 30 (WPC1253: Greek):

	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		0	@	P	`	p	€			°	ΐ	Π	ΰ	π
-1	!	1	A	Q	a	q		‘	¨	±	Α	Ρ	α	ρ
-2	"	2	B	R	b	r	‚	’	Ά	²	Β		β	ς
-3	#	3	C	S	c	s	ƒ	“	£	³	Γ	Σ	γ	σ
-4	$	4	D	T	d	t	„	”	¤	΄	Δ	Τ	δ	τ
-5	%	5	E	U	e	u	…	·	¥	µ	Ε	Υ	ε	υ
-6	&	6	F	V	f	v	†	-	¦	¶	Ζ	Φ	ζ	φ
-7	'	7	G	W	g	w	‡	–	§	·	Η	Χ	η	χ
-8	(	8	H	X	h	x			¨	Έ	Θ	Ψ	θ	ψ
-9	)	9	I	Y	i	y	‰	™	©	Ή	Ι	Ω	ι	ω
-A	*	:	J	Z	j	z				Ί	Κ	Ϊ	κ	ϊ
-B	+	;	K	[	k	{	<	>	«	»	Λ	Ϋ	λ	ü
-C	,	<	L	\	l	|			¬	Ό	Μ	ά	μ	ό
-D	-	=	M	]	m	}			-	½	Ν	έ	ν	ύ
-E	.	>	N	^	n	~			®	Ύ	Ξ	ή	ξ	ώ
-F	/	?	O	_	o	⌂			-	Ώ	Ο	ί	ο	

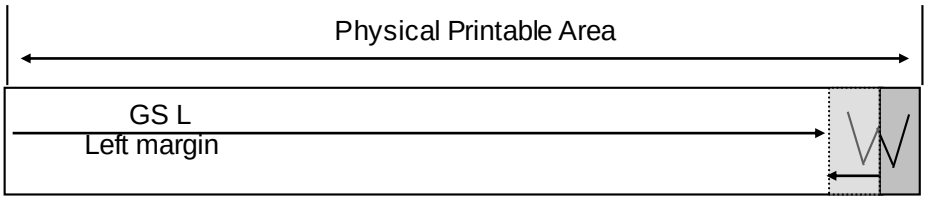
5. Appendix 2 Printable area



- The left margin can be set using GS L command.
- While printing area width is set by GS W command.
- These commands are ignored in page mode.



- If the printing area width is less than the width of 1 character, the right margin is shifted towards right to accommodate the width of 1 character. (This processing is only performed on the line of question.)
- If bitimage or download bitimage is developed, the right margin is shifted towards right to accommodate one line in vertical for that bitimage. (1 dot for double density bitimage and 2 dots for single density bitimage)



- If right margin reaches the physical limit, left margin is shifted towards left to accommodate the width of 1 character. (This processing is only performed on the line of question.)
- If both left and right margins have reach the physical limits, the character right side spacing is reduced to accommodate the character on that line.
- If bitimage or download bitimage is developed, the left margin is shifted towards left to accommodate one line in vertical for that bitimage. (1 dot for double density bitimage and 2 dots for single density bitimage)

6. Appendix 3 Eco function

Please refer the specification of Utility(T.B.D) for the detail of each Eco function.

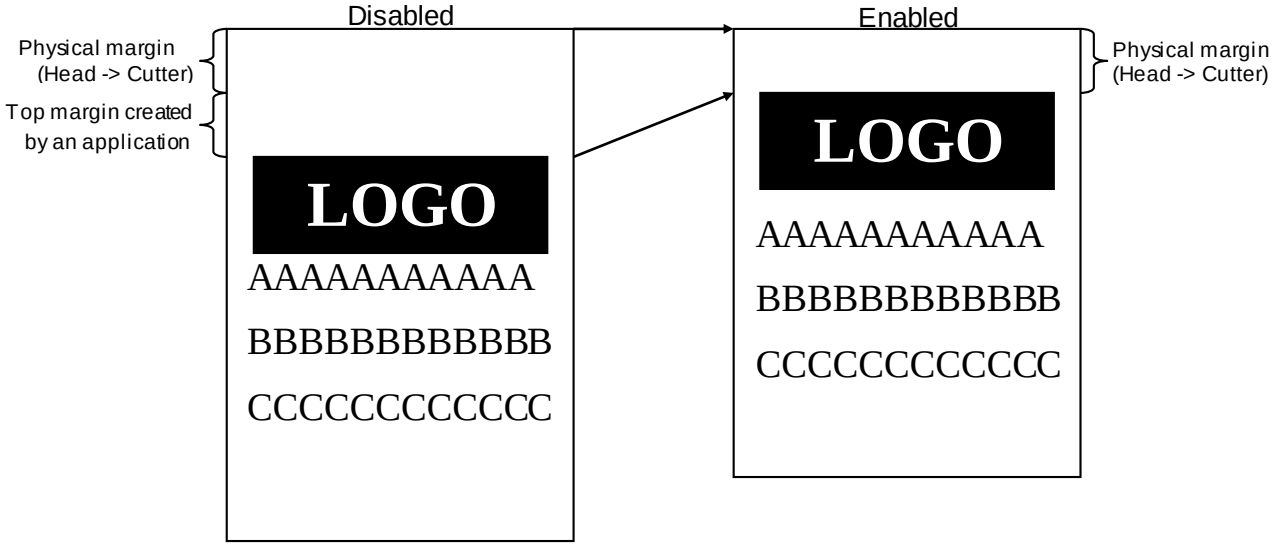
6.1 General

- Eco settings configured are stored into the non-volatile memory. Therefore, even if the printer is powered off, the settings remain.
- Eco functions are not available in page mode.
- It essentially has two functionalities. One is the functionality to reduce the paper consumption. Another is functionality to reduce the power consumption.
- “ECO function disable/enable” is enables / disables all of Eco function. Unless this setting is enabled, each function is not valid irrespective of its individual setting.

6.2 Paper reduction

6.2.1 Remove Upper Space

It eliminates the extra upper space created by an application.
Upper space implies the area from the top edge of the paper until the top edge of the first printable data.

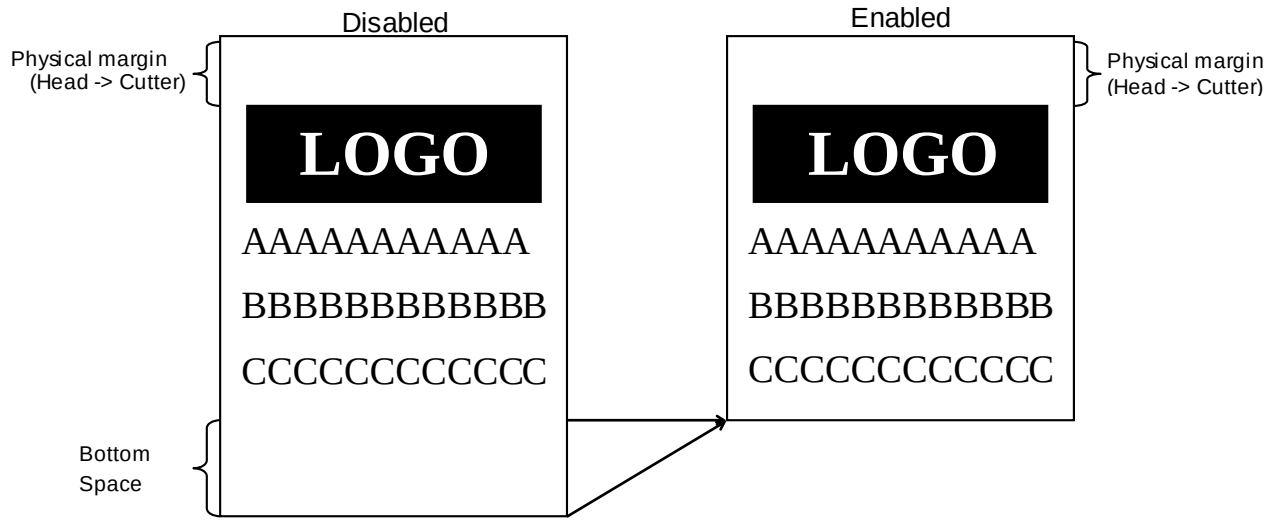


This setting does not affect the physical margin created by the mechanical distance between the thermal head position and the cutter position.

This setting is ignored when the compatible top margin mode is enabled.

6.2.2 Remove Lower Space

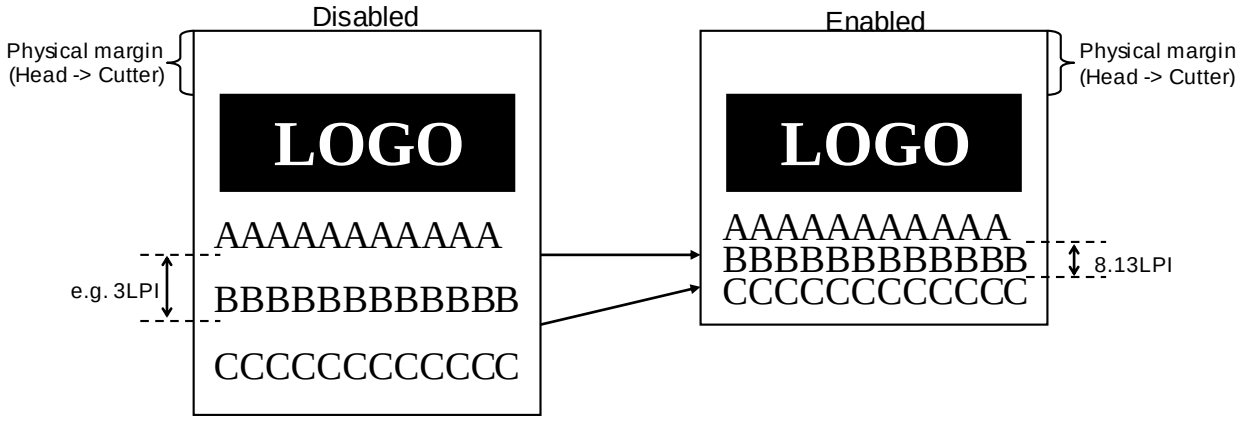
It eliminates the extra lower space and rectifies the cutting position at the end of print data regardless of the original cutting position.
Lower space implies the area from the end edge of the last printable data until the cutting position.



This setting is ignored when the compatible top margin mode is enabled.

6.2.3 Line Space Reduction

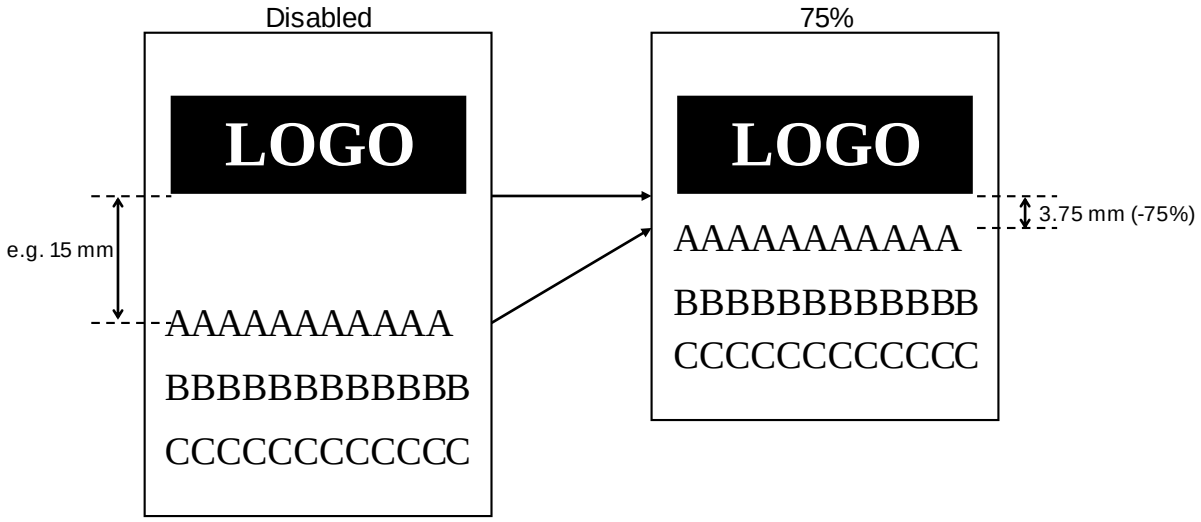
It changes the line pitch of each text printing line to the minimum line pitch.
The text print line which consists of ANK characters is changed to 8.13 LPI.
The text print line which includes of DBCS characters is changed to 7.52 LPI.



6.2.4 Line Feed Reduction

It reduces the height of space created by the vertical feed command without printable data according to the ratio setting (Disable* / 25% / 50% / 75% / 100%).

e.g. If it is configured to 50%, space height becomes half of the original height.
If it is 100%, the space is completely removed.

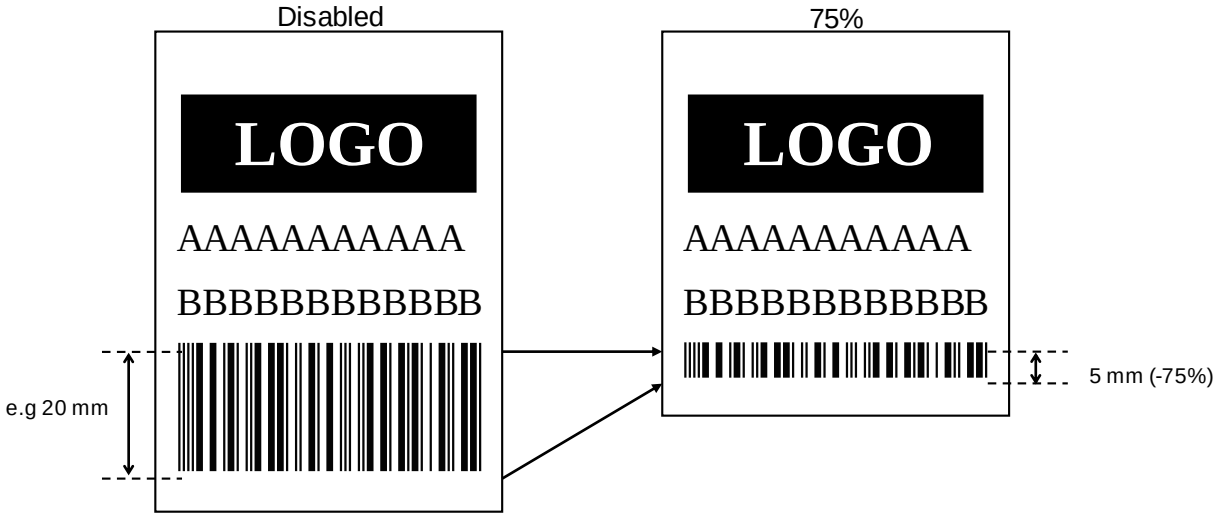


Line Feed spaces which exist in either the top space or the bottom space are not affected by this setting.

6.2.5 Barcode Height Reduction

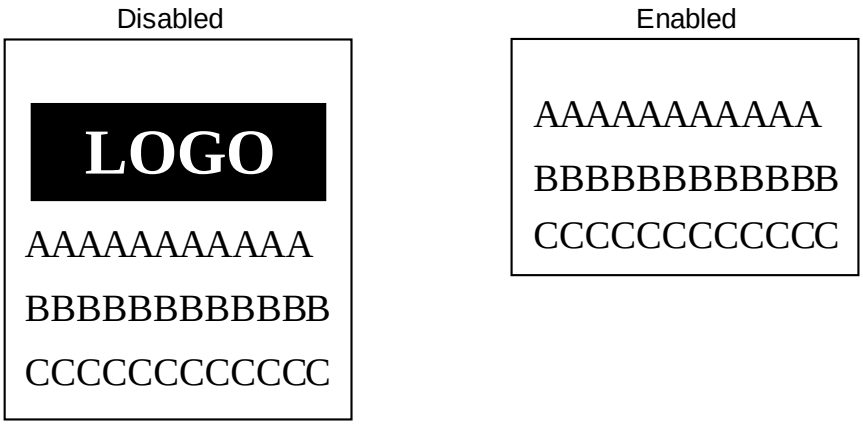
It reduces the barcode height according to the ratio setting (Disable* / 25% / 50% / 75%).

e.g. If it is configured to 50%, barcode height becomes half of the original height.



6.2.6 Registered Logo Removal

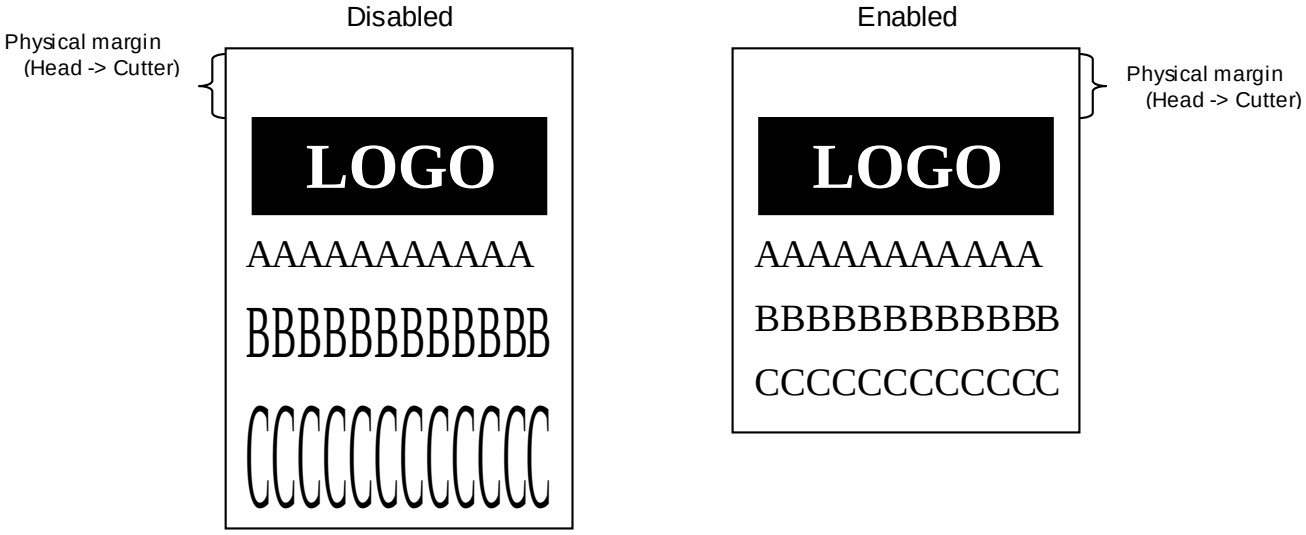
It ignores the registered Logo print command.



This setting is ignored when the compatible top margin mode is enabled.

6.2.7 Force Single High Font

It ignores the attribute commands which make character's height higher.



6.2.8 Remove lines containing only spaces

If this setting is enabled, space (0x20) is not considered as printable data. Therefore a line which consists of only spaces (0x20) is treated as target to reduce by Eco feature.
This setting affects to the following Eco functions.

1. Remove Upper Space
2. Remove Lower Space
3. Line Feed Reduction

If it is disabled, space (0x20) is considered as printable character.

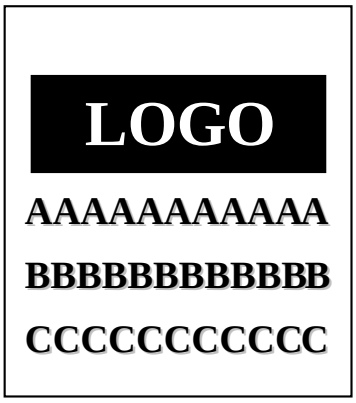
This setting is to specify how other Eco functions treat the space character (0x20). This function itself does not remove any spaces.

6.3 Power reduction

6.3.1 Bold Font Removal

It ignores the Bold Font attribute settings.

Disabled

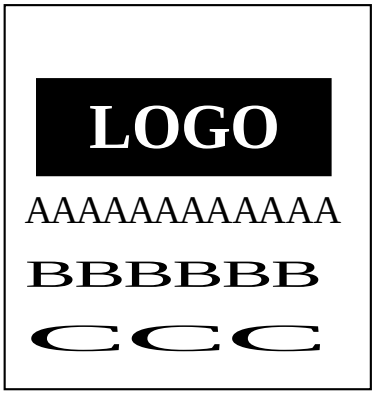


Enabled

6.3.2 Force Single Wide Font

It ignores the Double Width and wider Font attribute settings.

Disabled

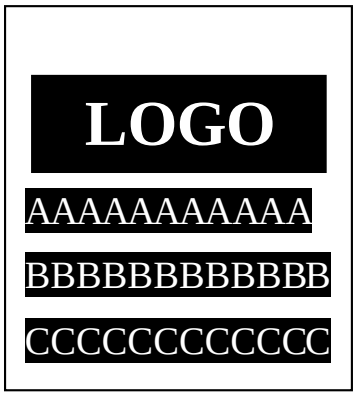


Enabled

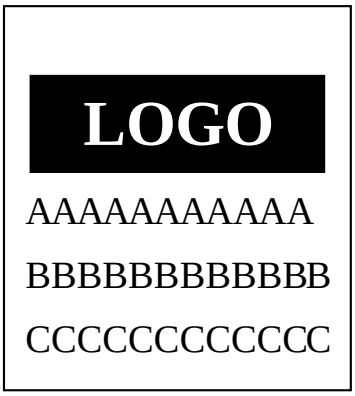
6.3.3 No White/Black Reverse Printing

It ignores the White/Black Reverse Printing attribute setting.

Disabled



Enabled



6.3.4 Stand-by Mode

It disables / enables the stand-by mode.

6.3.5 Power Off Mode

It disables / enables the power off mode. The power off mode is enabled by selecting the duration (60min, 120min, 180min, 240min and 300min) of idle time which triggers going in to the power off mode.

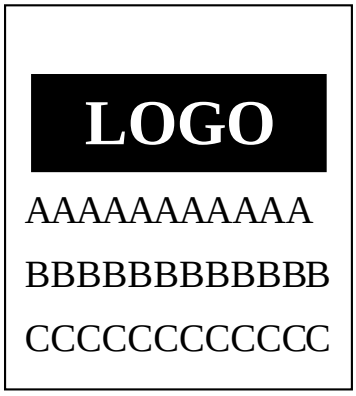
6.3.6 Speed Reduction

It switches the print mode (High Speed Mode / High Quality Mode). Switching to “High Quality Mode” reduces the maximum speed which is expected to reduce the power consumption.

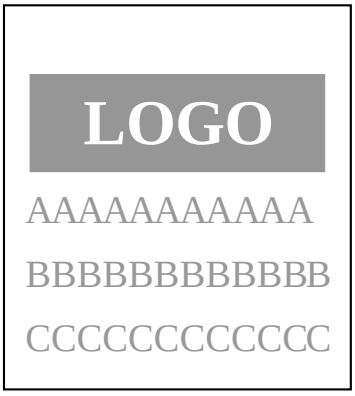
6.3.7 Density Reduction

It changes the print darkness according to the setting
Option : 0 (default) / -1 / -2 / -3 / -4 / -5 / -6 / -7 / -8 / -9 / -10 / -11 / -12 / -13 / -14 / -15

Disabled



-10 (example)



6.4 Affected commands

Below commands are affected by each eco functions

Command		Eco functions	Paper Reduction							Power Reduction		
			Remove Upper Space	Remove Lower Space	Line Space Reduction	Line Feed Reduction	Barcode Height Reduction	Registered Logo Removal	Force Single High Font	Bold Font Removal	Force Single Wide Font	No White /Black Reverse Printing
LF	0A		*	*		*						
DC4	14		*	*		*						
NAK	15		*	*		*						
SYN	16		*	*		*						
ESC !	1B 21								*	*	*	
ESC 2	1B 32		*	*	*	*						
ESC 3	1B 33		*	*	*	*						
ESC E	1B 45									*		
ESC G	1B 47									*		
ESC J	1B 4A		*	*		*						
ESC d	1B 64		*	*		*						
FS !	1C 21								*		*	
FS W	1C 57								*		*	
GS !	1D 21								*		*	
GS /	1D 2F							*				
GS B	1D 42											*
GS V	1D 56		*	*		*						
GS k	1D 6B						*					
AX 6	1F 36	*	*	*	*	*	*	*	*	*	*	*

7. Appendix 4 Thai font support

7.1 Outline

The printer supports Thai font (Code Page 874). It prints each character one by one according to the code number specified. However, Thai character basically consists of the combination of multiple characters. The printer provides the functionality to automatically construct Thai character according to the order of specified Thai character.

In order to enable this functionality, the printer has to be configured to the following condition.

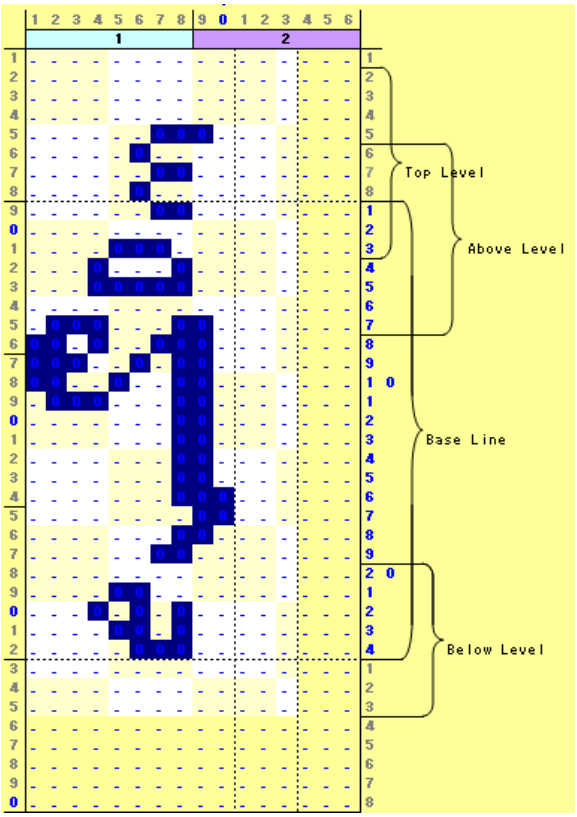
- Code Page = 874
- Special Font = Mode 1 (Constructed 874)

Based on this setting, characters of code page 874 are constructed according to the character order sent.

7.2 Thai character configuration

Thai character consists of maximum 4 levels. (Top level, Above level, Base Line and Below level.)

Top level: Only top/above level characters are allowed to be placed on Top level which is the highest layer.
Above level: Only top/above level characters are allowed to be placed on Above level which exists between Top level and Base line.
Base line: Only base line characters are allowed to be placed on Base line which exists between Above level and Below level.
Below level: Only below level characters are allowed to be placed on Below level which is the lowest layer.



Each character type is explained below.

Baseline characters

1) Circled by Red, Purple and pink characters are baseline characters.
2) The characters circled by purple will not have below level characters, but they rarely use.
3) The characters circled by pink will not have top level and above level, but only ฬ rarely use.
4) Every character in red and purple must have a top and below level.

Top level/Above level characters

1) Circled by blue are Top level/Above level characters.
2) Red, purple circle and ฬ can be both top and above level
3) The characters circled by blue in 5th line can be top level when above level character exists. So it means 4th line characters circled in blue can be above level only. Whereas 5th line characters circled in blue can be both top and above level.

Below level characters

1) Circled by green are Below level characters.
2) Top, Above and Below characters cannot be in the same character.

7.3 Thai character data procedure

- Thai character data string format is;
  Base character, <Below character >, <Above character>, <Top character>, Base character, …….
- Printer checks whether the received character is the Base character. If the Top, Above, Below characters are sent before Base character, these characters are ignored.
- After receiving Base character, printer checks next character until receiving next Base character. If next character is the Below character, the Above character or Top character, the printer checks whether these Thai characters are valid for current Base character. If they are valid, it merges these characters' image on Base character's image. If it is invalid character, it will be ignored.

7.4 The notes for this function

- This function support standard pitch font and compressed pitch font.
- Thai character's height is 34 dots.
- The below command function which change is different from other code pages.

SYN	Add n Extra Dot Rows
ESC 2	Set Line Spacing to 1/6 Inch
ESC 3	Set Line Spacing

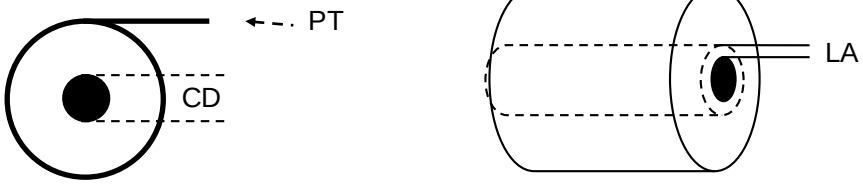
- The line pitch is changed by below commands because the code page is changed by below commands.

ESC R	Select international character set
ESC t	Select character code table (same as ESC R)
ESC %	Set/cancel user defined character set
ESC L	Select page mode
ESC S	Select standard mode
FF	Form Feed in page mode

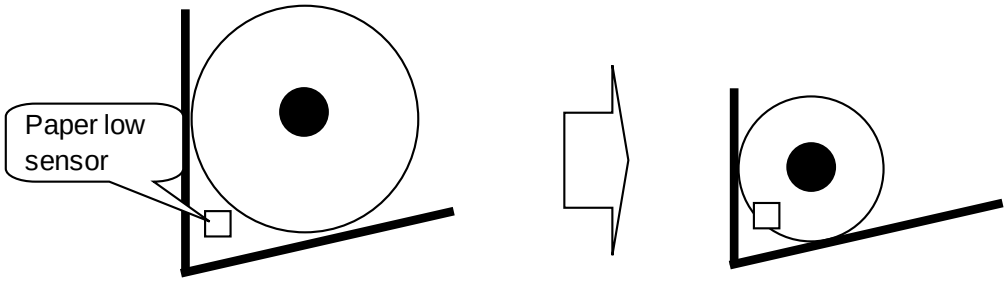
8. Appendix 5 Paper low detection

Paper low sensor is located in receipt station to detect the paper roll when there is certain amount of paper remaining. Depend on diagnostic setting FW will calculate remaining paper length.
There are three parameters to calculate paper remaining length.

CD[1] : Paper core diameter
PT[2] : Paper thickness
LA[3] : Length Adjustment.



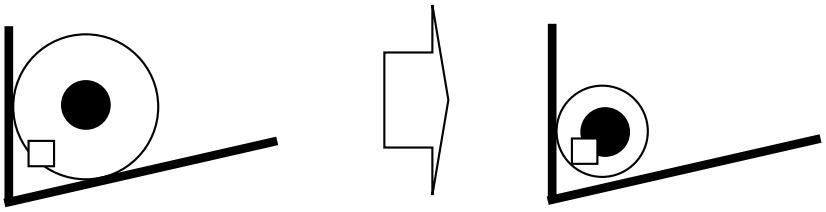
Paper low sensor status: This status is updated based on the paper low sensor detection



Receipt paper Adequate

Receipt paper low

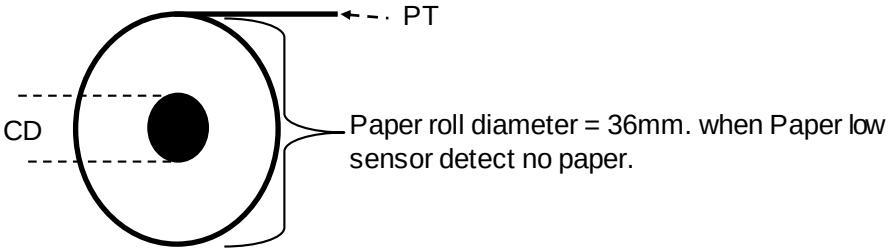
Paper low warning status: This status is updated based on the "Paper Low Detection" setting in the Diagnostic form.



LA more than 1m

LA less than 1m

Printer calculates paper length to detect paper low warring when sensor detect no paper.

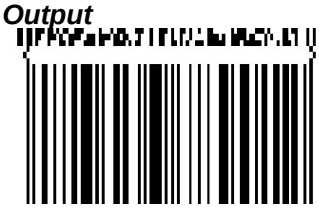


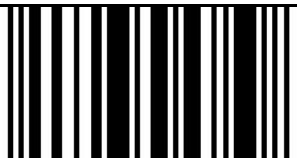
Print feed length to detect paper low warning.

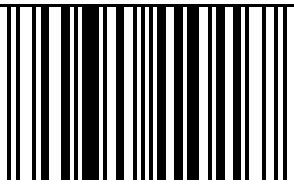
[1] Paper Core diameter able to adjust by 1F 36 command. Adjustment unit is 1mm.
[2] Paper Thickness able to adjust by 1F 36 command. Adjustment unit is 0.01mm.
[3] Paper Length Adjustment able to adjust by 1F 36 command. Adjustment unit is 0.5m.

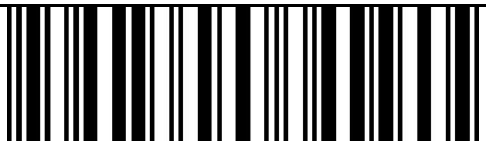
9. Appendix 6 Barcode Information

9.1 GS k Print Barcode

UPC-A (m = 0, 65) process:	• Modular check character is processed as following: - Automatically added when processing data is 11 byte. - The 12th byte data is processed as a modular check character when processing data is 12 byte. In this case, modular check character is not checked. • Left guard bar/center bar/right guard bar are added automatically. Example: ***Data*** (01234567890) ***Command*** 0x1D 0x6B 0x00 0x30 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39 0x00 0x00 ***Output*** 
UPC-A Composite (m = 65) process:	• Barcode is combination of UPC-A and the composite codes CC-A and CC-B • Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC) • Barcode can be printed without composite part • Barcode will not be printed if the separator is given without composite code Example: ***Data*** (0123456789012|Composite) ***Command*** 0x1D 0x6B 0x41 0x15 "12345678901|Composite" ***Output*** 
UPC-E (m = 1, 66) process:	• The first data (d1) is processed as number system character (NSC) so 0 must be specified. • Modular check character is processed as following: - Automatically added when processing data is 11 byte. - The 12th byte data is processed as a modular check character when processing data is 12 byte. In this case, modular check character is not checked. • Simplified code with 6 digits is printed. Left guard bar/right guard bar are added automatically. Example: ***Data*** (0123456) ***Command*** 0x1D 0x6B 0x01 "01234500006" 0x00 ***Output***

	 ***Data*** (0331230|Composite) ***Command*** 0x1D 0x6B 0x42 0x0C "012345600007|Composite" ***Output*** 
JAN13/EAN 13 (m = 2, 67) process:	• Modular check character is processed as follows: - Automatically added when processing data is 13 byte. - The 13th byte data is processed as a modular check character when processing data is 13 byte. In this case, modular check character is not checked. • Left guard bar/center bar/right guard bar are added automatically. ***Data*** (4902011615029) ***Command*** 0x1D 0x6B 0x02 "4902011615029" 0x00 ***Output***  ***Data*** (123456789012|Composite1234567890) ***Command*** 0x1D 0x6B 0x43 0x20 "123456789012|Composite1234567890" ***Output*** 
JAN8/EAN8 (m = 3, 68) process:	• Modular check character is processed as follows: - Automatically added when processing data is 7 byte. - The 8th byte data is processed as a modular check character when processing data is 8 byte. In this case, modular check character is not checked. • Left guard bar/center bar/right guard bar are added automatically. ***Data*** (9031101) ***Command*** 0x1D 0x6B 0x03 "9031101" 0x00 ***Output***

	 ***Data*** (1234567|CompositeAbcdefghij) ***Command*** 0x1D 0x6B 0x44 0x1B "1234567|CompositeAbcdefghij" ***Output*** 
CODE39 (m = 4, 69) process:	• The printer processes the start code (ASCII = */Hex = 2Ah/Decimal = 42) as follows: - When the first bar code (d1) is "*", the printer processes the data as a first character. - If the first bar code (d1) is not "*", the printer adds a start character (*) automatically. • The printer processes the stop code (ASCII = */Hex = 2Ah/Decimal = 42) as follows: - When the last bar code (dk or dn) is "*", the printer processes the data as a last character. - If the last bar code (dk or dn) is not "*", the printer adds a last character (*) automatically. - When "*" is processed during bar code data processing, the printer processes "*" as a stop character. - The printer prints data preceding "*" and finishes command processing. Therefore, data following "*" are processed as normal data. • Check digits are not calculated and added. Example: ***Data*** (ABC-1234) ***Command*** 0x1D 0x6B 0x04 "ABC-1234" 0x00 0x1D 0x6B 0x45 0x08 "ABC-1234" ***Output*** 
ITF (Interleaved 2 of 5) (m = 5, 70) process:	• Start code and stop code are added automatically. • Check digits are not calculated and added. • Note: ITF request an even count of digits. In case of odd digits, a leading 0 will be inserted if the memory switch "CodeITF Leading 0" is enabled (see GS (E). In this case, last digit will be discarded. • If n is out of the specified range or if n is an odd number when ITF bar code system (m = 70) is selected, this command is canceled and the following data is processed as normal data. Example: ***Data*** (1234567890) ***Command*** 0x1D 0x6B 0x05 "1234567890" 0x00 0x1D 0x6B 0x46 0x0A "1234567890" ***Output***

	
CODABAR (m = 6, 71) process:	• Start code and stop code are not added automatically. Transmit data including the codes. • Check digits are not calculated and added. Example: ***Data*** (0123456789 ***Command*** 0x1D 0x6B 0x06 "A0123456789A" 0x00 0x1D 0x6B 0x47 0x0C "A0123456789A" ***Output*** 
PDF417 (m = 10, 75) process:	• Parameter is set with command GS p Example: ***Data*** (This is a PDF417) ***Command*** 0x1D 0x6B 0x0A "This is a PDF417" 0x00 0x1D 0x6B 0x4B 0x10 "This is a PDF417" ***Output*** 
CODE93 (m = 72) process:	• Start code and stop code are added automatically. • Check digits (2 character) are calculated and added automatically. • Special character HRI is processed as follows: • The printer prints an HRI character " " as start and stop character. • The printer prints an HRI character " + an alphabetic character" as a control character (unprinted character). Example: ***Data*** (ABC-1234-/+) ***Command*** 0x1D 0x6B 0x48 0x0B "ABC-1234-/+" ***Output*** 
CODE128 (m = 73) process:	• Make sure to specify the start character. The start character must be a code set selection character (any of CODE A, CODE B, or CODE C) which selects the first code set (see Table 9.1). If no start code is given, the CODE_C is default. • Table 9.1 list the allowed values and code 128 – code table conversion. Specific characters are in ***bold-italic.*** • CODE C values are coded BCD like. Range goes from 00 – 99 and encode two digits, e.g. 0 – '0' and '0', 21 – '2' and '1' … (See table 9.1).

<table>
<tr><td></td><td>
• Stop character is added automatically.
• Check digit is calculated and added automatically.
• Special character HRI is processed as follows:
• The printer does not print HRI characters that correspond to the shift character or code set selection character (CODE A, CODE B, or CODE C).
• HRI characters of the function characters (FNC1, FNC2, FNC3, or FNC4) and control characters (0x00 to 0x1F and 0x7F) are printed as spaces.
• Not printable characters (< 32) are printed as '.'.
• The following example should be helpful generating code 128:

<table>
<tr><th>Values</th><th>Code128 Conversion</th><th>Command</th></tr>
<tr><td>105 66 0 20 0 1 0 4 55</td><td>START_C 66 00 20 00 01 00 04 55</td><td>0x1D 0x6B 0x49 0x08 0x69 0x42 0x00 0x01 0x00 0x04 0x37 0x00</td></tr>
<tr><td>104 34 99 40 3 79 61 13 8 100 16</td><td>START_B B CODE C 40 03 79 61 08 CODE B 0</td><td>0x1D 0x6B 0x49 0x0B 0x68 0x22 0x63 0x28 0x03 0x4F 0x3D 0x0D 0x08 0x64 0x10</td></tr>
<tr><td>103 65 98 65 65 99 20 0 1 0 4 55</td><td>START_A . SHIFT a . CODE C 20 00 01 00 04 55</td><td>0x1D 0x6B 0x49 0x0C 0x67 0x41 0x62 0x41 0x41 0x63 0x14 0x00 0x01 0x00 0x04 0x37</td></tr>
</table>
</td></tr>
<tr><td>GS1–Composite (m=11, 76) process:</td><td>
• Barcode is a combination of GS1 and the composite codes CC-A and CC-B
• Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC)
• Barcode can be print without composite part
• Barcode will not be printed if the separator is given without composite code
• If encoding of composite code failed, barcode will not be printed

Data
(2001234567890|Composite)
Command
0x1D 0x6B 0x4C 0x17 "2001234567890|Composite"
Output

</td></tr>
<tr><td>GS1-Truncated–Composite (m=12, 77) process:</td><td>
• Barcode is a combination of GS1 Truncated and the composite codes CC A and CC-B
• Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC)
• Barcode can be printed without the composite part
• Barcode will not be printed if the separator is given without composite code
• If encoding of composite code failed, barcode will not be printed

Data
(2001234567890|Composite)
Command
0x1D 0x6B 0x4D 0x17 "2001234567890|Composite"
Output

</td></tr>
</table>

GS1-Stacked–Composite (m=13, 78) process:	• Barcode is combination of GS1 Stacked and the composite codes CC-A and CC-B • Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC) • Barcode can be printed without the composite part • Barcode will not be printed if the separator is given without composite code • If encoding of composite code failed, barcode will not be printed ***Data*** (2001234567890|Composite) ***Command*** 0x1D 0x6B 0x4E 0x17 "2001234567890|Composite" ***Output*** 
GS1-Stacked Omni–Composite (m=14, 79) process:	• Barcode is combination of GS1 Stacked Omni and the composite codes CC-A and CC-B • Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC) • Barcode can be printed without the composite part • Barcode will not be printed if the separator is given without composite code • If encoding of composite code failed, barcode will not be print ***Data*** (2001234567890|Composite) ***Command*** 0x1D 0x6B 0x4F 0x17 "2001234567890|Composite" ***Output*** 
GS1-Limited Composite (m=15, 80) process:	• Barcode is combination of GS1 Limited and the composite codes CC-A and CC-B • Separator to composite code is '|' (ASCII), 7C (HEX), 124 (DEC) • Barcode can be printed without the composite part • Barcode will not be printed if the separator is given without composite code • Numeric limit is 1999999999999. All barcodes greater this value will not be printed. The barcode information is not printed as normal text. • If encoding of composite code failed, barcode will not be printed ***Data*** (2001234567890|Composite) ***Command*** 0x1D 0x6B 0x50 0x17 "0040941991026|Composite" ***Output***

<table>
<tr><td></td><td>  </td></tr>
<tr><td>GS1-Expand Composite (m=16, 81) process:</td><td>• Barcode can be print out over more than 1 row by setting the segments per row (see ESC w n b Barcode is combination of GS1 Expand and the composite codes CC-A and CC-B
• Separator to composite code is ‘|’ (ASCII), 7C (HEX), 124 (DEC)
• Barcode can be printed without the composite part
• Barcode will not be printed if the separator is given without composite code
• If encoding of composite code failed, barcode will not be printed
• Example (2001234567890|Composite):
• Caution: Barcode has a determine structure. This encoding function works for all combinations but it is not sure that the decoder (scanner) interprets the barcode like the data which was encoded.
• ‘#’ is FNC1 control char. Please refer to ESC w n b.

Data
(2001234567890|Composite)
Command
0x1D 0x6B 0x51 0x17 "2001234567890|Composite"
Output
  </td></tr>
<tr><td>UCC EAN128 (m=82,m=83) process:</td><td>• Barcode is combination of code 128 and the composite codes CC-A, CC-B (m=82) and CC-C (m=83)
• Barcode can be printed without the composite part
• Barcode will not be printed if the separator is given without composite code
• UCC EAN is an Code 128 with follow structure:
<table>
<tr><th rowspan="2">Start Character (START_A, START_B, START_C)</th><th rowspan="2">Function Code 1 (FNC_1)</th><th colspan="2">Element String</th><th rowspan="2">Checksum</th><th rowspan="2">Stop Character</th></tr>
<tr><th>Application Identifier (AI)</th><th>Data Filed(s)</th></tr>
</table>
• START_C is default
• FNC_1 have to be set by user
• AI and Data Field(s) is set by user and not is not checked of validation according to GS1-128 specification (http://www.gs1-128.info/)
• Separator to composite code is ‘|’ (ASCII), 7C (HEX), 124 (DEC)
• If encoding of composite code failed, barcode will not be printed</td></tr>
<tr><td>CC_A</td><td>• Composite Code is only usable with a composite Barcode
• The maximum of encoded data depends from the parts of characters and digits.
<table>
<tr><th>Columns</th><th>Max Digits</th><th>Max Chars</th></tr>
<tr><td>2</td><td>47</td><td>26</td></tr>
<tr><td>3</td><td>47</td><td>26</td></tr>
<tr><td>4</td><td>56</td><td>31</td></tr>
</table>
• Input-Buffer (255 chars) limits the maximum
• If the maximum reached CC_B is chosen</td></tr>
<tr><td>CC_B</td><td>• Composite Code is only usable with an composite Barcode
• The maximum of encoded data depends from the parts of characters and digits.
<table>
<tr><th>Columns</th><th>Max Digits</th><th>Max Chars</th></tr>
<tr><td>2</td><td>95</td><td>55</td></tr>
<tr><td>3</td><td>219</td><td>127</td></tr>
<tr><td>4</td><td>338</td><td>196</td></tr>
</table>
• Input-Buffer (255 chars) limits the maximum</td></tr>
</table>

CC_C

• Composite Code is only usable with an composite Barcode (UCC EAN 128 CC_C)

• The following example should be helpful generating UCC 128:

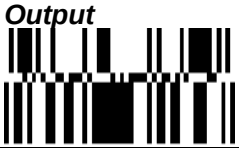
Values	Code128 Conversion	Command
105 66 0 20 0 1 0 4 55	***START_C*** 66 00 20 00 01 00 04 55	0x1D 0x6B 0x53 0x1D 0x69 0x42 0x00 0x14 0x00 0x01 0x00 0x04 0x37 "|1234567890123456789"
104 34 99 40 3 79 61 13 8 100 16	***START_B*** B ***CODE C*** 40 03 79 61 08 ***CODE B*** 0	0x1D 0x6B 0x52 0x15 0x68 0x22 0x63 0x28 0x03 0x4F 0x3D 0x0D 0x08 0x64 0x10 0x7C 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39
103 65 98 65 65 99 20 0 1 0 4 55	***START_A*** . ***SHIFT*** a . ***CODE C*** 20 00 01 00 04 55	0x1D 0x6B 0x52 0x16 0x67 0x41 0x62 0x41 0x41 0x63 0x14 0x00 0x01 0x00 0x04 0x37 0x7C 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39

Table 9.1 Code 128 – Code table conversion

Value (decimal)	Value (hex)	Code A	Code B	Code C
0	00	Space	Space	“00“
1	01	!	!	“01“
2	02	“	“	“02“
3	03	#	#	“03“
4	04	$	$	“04“
5	05	%	%	“05“
6	06	&	&	“06“
7	07	‘	‘	“07“
8	08	(	(	“08“
9	09	)	)	“09“
10	0A	*	*	“10“
11	0B	+	+	“11“
12	0C	,	,	“12“
13	0D	-	-	“13“
14	0E	.	.	“14“
15	0F	/	/	“15“
16	10	0	0	“16“
17	11	1	1	“17“
18	12	2	2	“18“
19	13	3	3	“19“
20	14	4	4	“20“
21	15	5	5	“21“
22	16	6	6	“22“
23	17	7	7	“23“
24	18	8	8	“24“
25	19	9	9	“25“
26	1A	:	:	“26“
27	1B	;	;	“27“
28	1C	<	<	“28“
29	1D	=	=	“29“
30	1E	>	>	“30“
31	1F	?	?	“31“
32	20	@	@	“32“
33	21	A	A	“33“
34	22	B	B	“34“
35	23	C	C	“35“
36	24	D	D	“36“
37	25	E	E	“37“
38	26	F	F	“38“
39	27	G	G	“39“
40	28	H	H	“40
41	29	I	I	“41
42	2A	J	J	“42“
43	2B	K	K	“43“
44	2C	L	L	“44“
45	2D	M	M	“45“
46	2E	N	N	“46“
47	2F	O	O	“47“
48	30	P	P	“48“
49	31	Q	Q	“49“
50	32	R	R	“50“
51	33	S	S	“51“
52	34	T	T	“52“
53	35	U	U	“53“
54	36	V	V	“54“

55	37	W	W	“55“
56	38	X	X	“56“
57	39	Y	Y	“57“
58	3A	Z	Z	“58“
59	3B	[	[	“59“
60	3C	\	\	“60“
61	3D	]	]	“61“
62	3E	^	^	“62“
63	3F	_	_	“63“
64	40	NUL	`	“64“
65	41	SOH	a	“65“
66	42	STX	b	“66“
67	43	ETX	c	“67“
68	44	EOT	d	“68“
69	45	ENQ	e	“69“
70	46	ACK	f	“70“
71	47	BEL	g	“71“
72	48	BS	h	“72“
73	49	HT	i	“73“
74	4A	LF	j	“74“
75	4B	VT	k	“75“
76	4C	FF	l	“76“
77	4D	CR	m	“77“
78	4E	SO	n	“78“
79	4F	SI	o	“79“
80	50	DLE	p	“80“
81	51	DC1	q	“81“
82	52	DC2	r	“82“
83	53	DC3	s	“83“
84	54	DC4	t	“84“
85	55	NAK	u	“85“
86	56	SYN	v	“86“
87	57	ETB	w	“87“
88	58	CAN	x	“88“
89	59	EM	y	“89“
90	5A	SUB	z	“90“
91	5B	ESC	{	“91“
92	5C	FS	|	“92“
93	5D	GS	}	“93“
94	5E	RS	~	“94“
95	5F	US	DEL	“95“
96	60	***FNC 3***	***FNC 3***	“96“
97	61	***FNC 2***	***FNC 2***	“97“
98	62	***SHIFT***	***SHIFT***	“98“
99	63	***CODE C***	***CODE C***	“99”
100	64	***CODE B***	***FNC 4***	***CODE B***
101	65	***FNC 4***	***CODE A***	***CODE A***
102	66	***FNC 1***	***FNC 1***	***FNC 1***
103	67	***START_A***		
104	68	***START_B***		
105	69	***START_C***		

9.2 GS (k Print 2-dimensional Barcode

PDF417 **cn = 48**	• PDF417: Print the symbol data in the symbol storage area ***Data*** (0123456789) ***Command*** 0x1D 0x28 0x6B 0x0D 0x00 0x30 0x50 0x30 0x30 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39 *; Store the data in the symbol storage area* 0x1D 0x28 0x6B 0x03 0x00 0x30 0x51 0x30 *; Print the symbol data in the symbol storage area* ***Output*** 
QR Code **cn = 49**	• QR Code: Print the symbol data in the symbol storage area ***Data*** (QR code sample) ***Command*** 0x1d 0x28 0x6b 0x04 0x00 0x31 0x41 0x32 0x00 *; Select model 2 conversion processing* 0x1d 0x28 0x6b 0x03 0x00 0x31 0x43 0x06 *; Set the size of module to 6* 0x1d 0x28 0x6b 0x03 0x00 0x31 0x45 0x32 *; Select the error correction level Q = 50* 0x1d 0x28 0x6b 0x11 0x00 0x31 0x50 0x30 0x51 0x52 0x20 0x63 0x6f 0x64 0x65 0x20 0x73 0x61 0x6d 0x70 0x6c 0x65 *; Store the data in the symbol storage area* 0x1d 0x28 0x6b 0x03 0x00 0x31 0x51 0x30 *; Print the symbol data in the symbol storage area* ***Output*** 
GS1 DataBar **cn = 51**	• 2-dimensional GS1 DataBar: Print the symbol data in the symbol storage area ***Data*** (1234567890123) ***Command*** 0x1d 0x28 0x6B 0x03 0x00 0x33 0x43 0x03 *; Set the size of module to 3* 0x1d 0x28 0x6b 0x11 0x00 0x33 0x50 0x30 0x48 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39 0x30 0x31 0x32 0x33 *; Store data in the symbol storage area* 0x1d 0x28 0x6b 0x03 0x00 0x33 0x51 0x30 *; Print data in the symbol storage area* ***Output*** 

DataMatrix **cn = 54**	• DataMatrix: Print the symbol data in the symbol storage area ***Data*** (12345678901234567890123456789O) ***Command*** 0x1D 0x28 0x6B 0x05 0x00 0x36 0x42 0x00 0x16 0x16 *; Set the symbol type, number of columns, number of rows* 0x1D 0x28 0x6B 0x03 0x00 0x36 0x43 0x04 *; Set the size of the module* 0x1D 0x28 0x6B 0x21 0x00 0x36 0x50 0x30 *; Store the data in the symbol storage area* "12345678901234567890123456789O" 0x1D 0x28 0x6B 0x03 0x00 0x36 0x51 0x30 *; Print the symbol data in the symbol storage area* 0x1D 0x28 0x6B 0x03 0x00 0x36 0x52 0x30 *; Transmit the size information of the symbol data in the symbol storage area* ***Output*** 

Diagnostics

10. Offline Diagnostic

10.1 Offline Printer Configuration

It configures the printer by Feed Key operation in offline mode.
When the printer is turned on while Feed Key is pressed down, it enters Offline Printer Configuration mode. In this mode, all the interfaces are not available.

Service Menu Structure – Main Menu

Main Menu	
1	Exit/save
2	Print Self test
3	Diagnostic
4	Configuration
5	Information

Exit menu

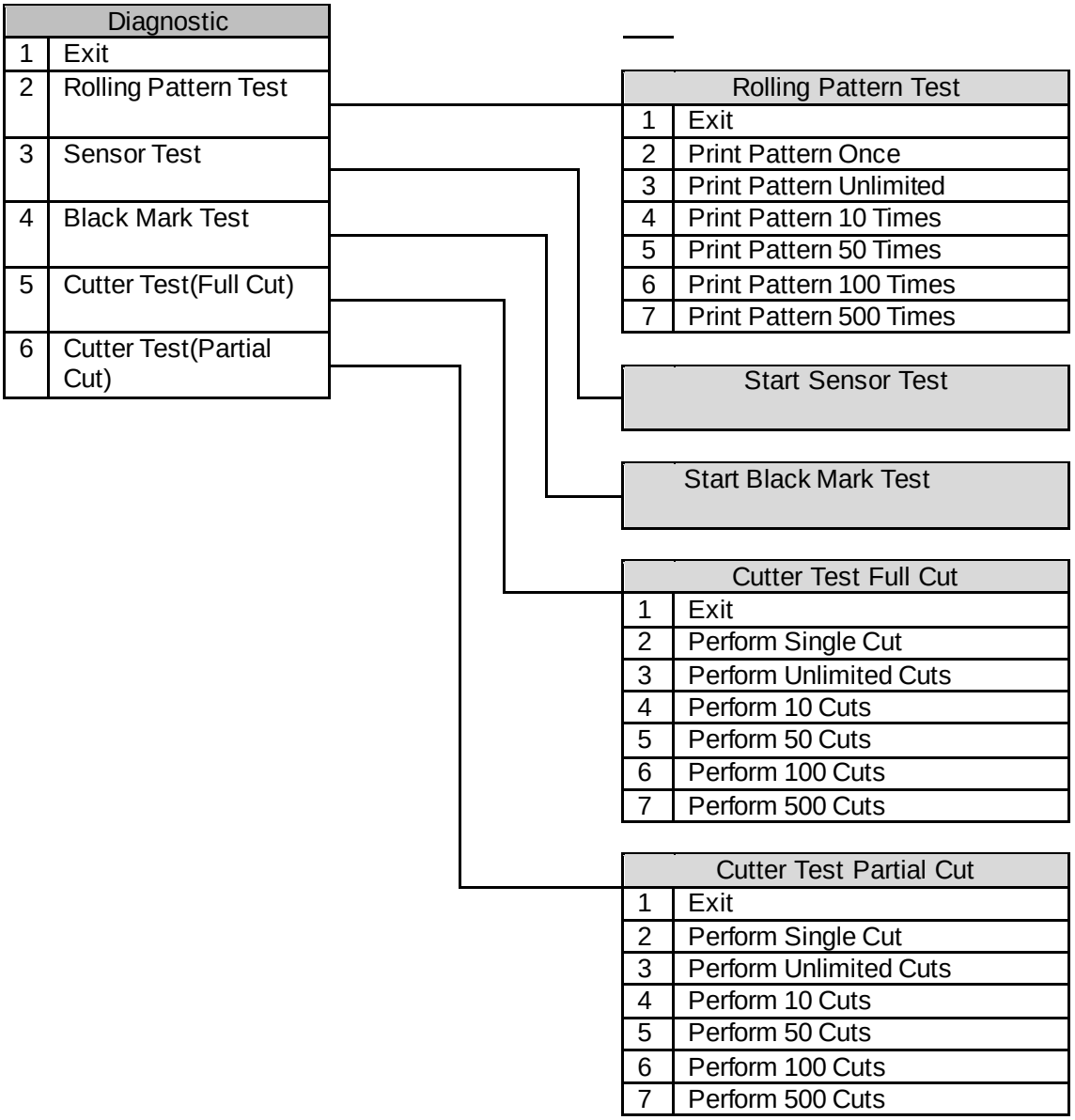
Printout Selftest,
Return to Main Menu

Diagnostic	
1	Exit
2	Rolling Pattern Test
3	Sensor Test
4	Black Mark Test
5	Cutter Test (Full Cut)
6	Cutter Test (Partial Cut)

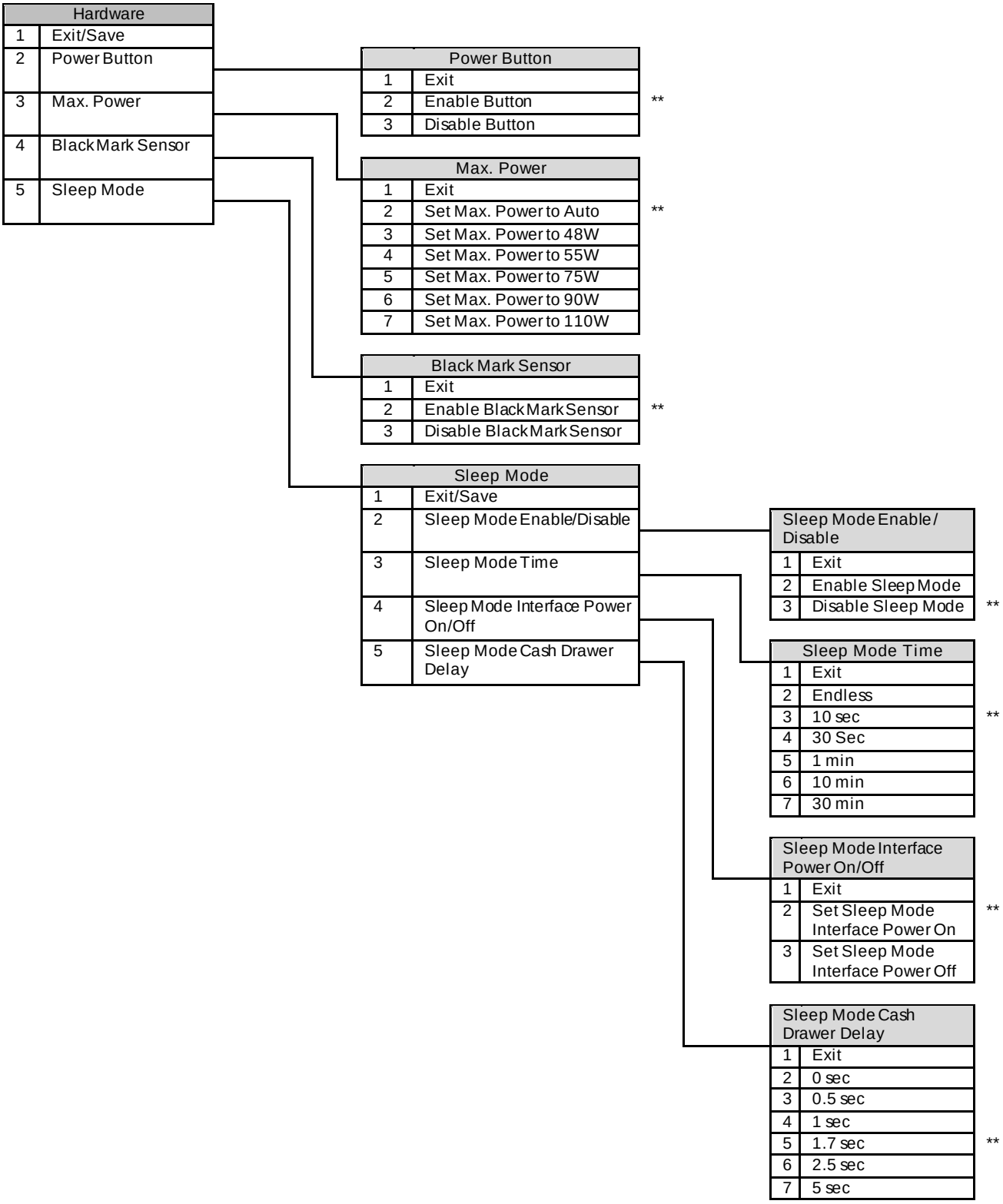
Configuration	
1	Exit/Save
2	Hardware
3	Software
4	Print Options
5	Configuration & Counters
6	RS232 Communication / Ethernet Settings

Information	
1	Exit
2	Print Installed Code page
3	Print Code Pages
4	Print Statistic Report
5	Print Extended Self Test

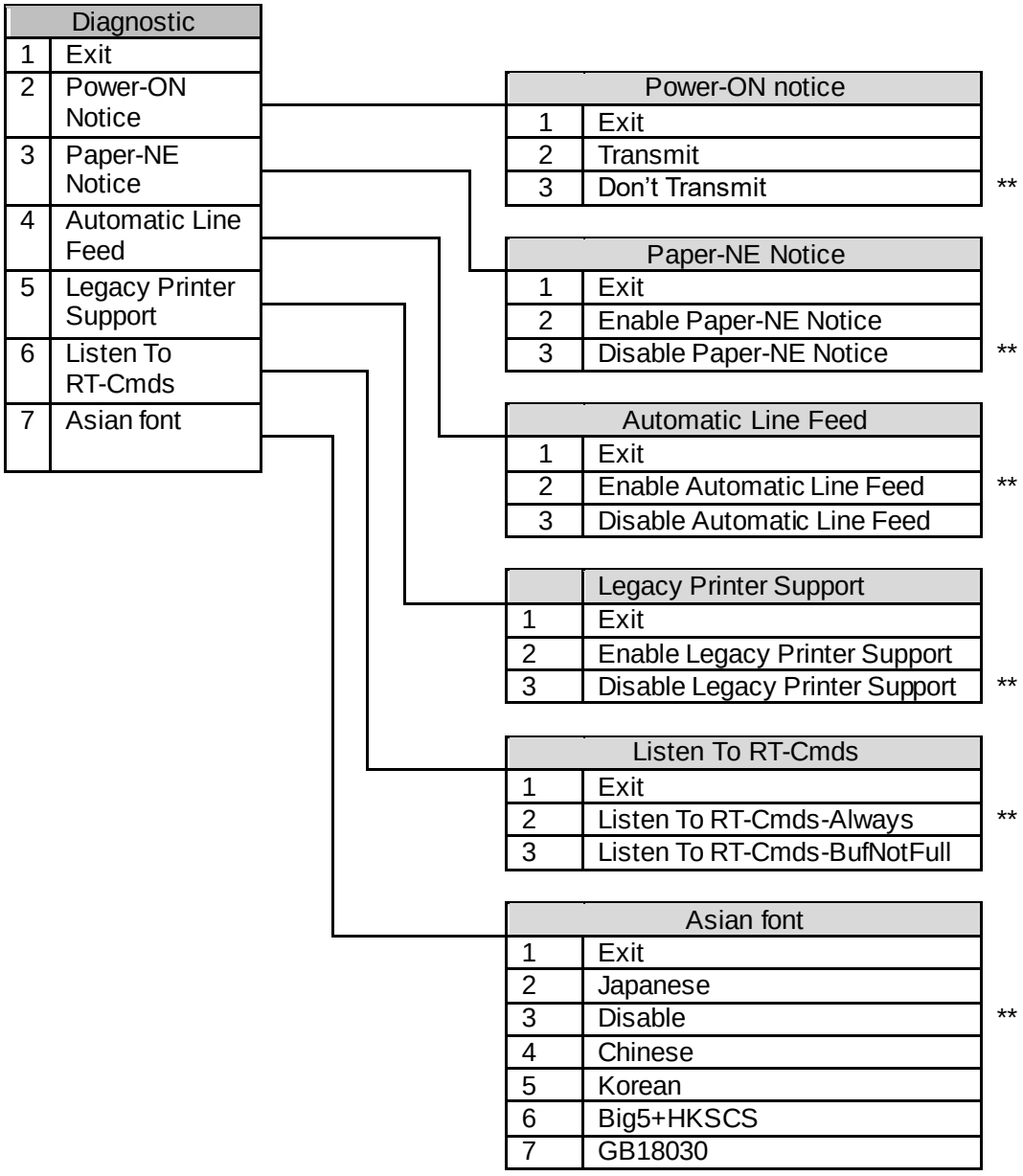
Main Menu / Diagnostic



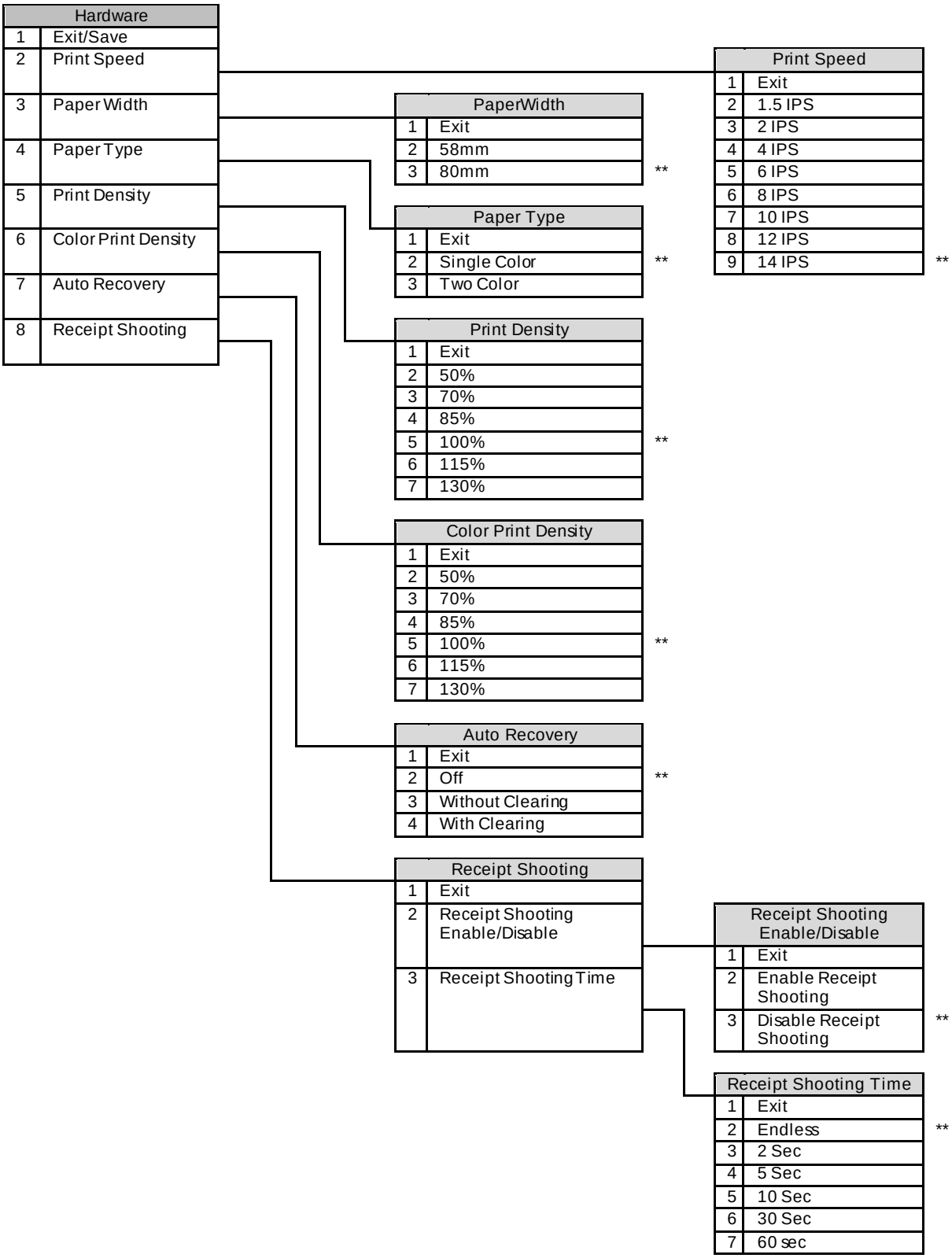
Main Menu / Configuration / Hardware



Main Menu / Configuration / Software



Main Menu / Configuration / Print Options



Main Menu / Configuration / Print Options

Configuration & Counters	
1	Exit
2	Set Configuration to Default

Main Menu / Configuration / RS232

Diagnostic	
1	Exit
2	Baud Rate
3	Parity
4	Flow Control
5	Bit Length
6	Receive Buffer Capacity
7	Receive Error Handling
8	Print Settings

Baud Rate		
1	Exit	
2	9600 bps	
3	19200 bps	**
4	38400 bps	
5	57800 bps	
6	115200 bps	

Parity		
1	Exit	
2	No Parity	**
3	Even Parity	
4	Odd Parity	

Flow Control		
1	Exit	
2	DTR/DSR	**
3	XON/XOFF	

Bit Length		
1	Eixt	
2	7 Bits	
3	8 Bits	**

Receive Buffer Capacity		
1	Exit	
2	Set Capacity to 64KB	**
3	Set Capacity to 45 Byte	

Data Reception Error		
1	Exit	
2	Replace Data with ‘?’	**
3	Ignore Data	

Print out RS232 Settings

Main Menu / Configuration / Ethernet Settings

Diagnostic	
1	Exit
2	DHCP

DHCP	
1	Exit
2	Enable DHCP
3	Disable DHCP

**

Diagnostic - Menu

Every diagnostic function will be explained in the table below.

Menu NO.	Description	Available Options
3.1	Exit/Save	
3.2	**Rolling Pattern Test** The rolling pattern menu allows you to print out a rolling pattern in numerous ways. You can print it out once, endless, which will be interrupted by a long click of the LF button, and a predefined number of times	1, 10, 50, 100, 500, endless
3.3	**Sensor Test** This function shows the sensor changes The Sensor Test can be stopped by pushing the Linefeed button once for a long time (> 1 second). Afterwards a SW reset is executed.	
3.4	**Black Mark Test** In this menu the black mark test can be choose	
3.5	**Cutter Test(Full Cut)** The cutter test performs some cutter operations for a predefined number of times. In endless mode, the test will be interrupted by a long click of the LF button. For every cut there will be a notice on the generated ticket which gives information about the current number of cuts and the total number of cuts.	1, 10, 50, 100, 500, endless
3.6	**Cutter Test(Partial Cut)** This test is the same like the cutter test (full cut), but the printer performs a series of partial cuts.	1, 10, 50, 100, 500, endless

Configuration - Menu

In this menu section is it possible to change some printer parameter. It is very important to know what effects the change of a value. The procedure to save settings should be read to leave this menu, choose “Exit/Save”.

Hardware

Menu NO.	Description	Available Options
4.2.1	Exit/Save	
4.2.2	Power Button Select the function of the power button. If the power button is disabled, the printer can’t shut off by the user.	Enable Button, Disable Button
4.2.3	Max. Power Select the maximum of power what the printer consume.	Auto, 48 W, 55 W, 75 W, 90 W, 110 W
4.2.4	Black Mark Sensor Select the usage of the black mark sensor. Be sure that there is black marked paper inside. Otherwise, a black mark error will occur. In this case is the only way to set all Configuration Data to default.	Enable Black Mark Sensor, Disable Black Mark Sensor
4.2.5	Sleep Mode	
4.2.5	Sleep Mode Enable/Disable Enable or disable the Sleep Mode	Enable Sleep Mode, Disable Sleep Mode

4.2.5.2	Sleep Mode Time The minimum time to switch automatically in Sleep Mode	Endless, 10 sec, 30 sec, 1 min, 10 min, 30 min
4.2.5.3	Sleep Mode Interface Power On/Off The state on power for cash drawer during Sleep Mode	Set Sleep Mode Interface Power On, Set Sleep Mode Interface Power Off
4.2.5.4	Sleep Mode Cash Drawer Delay The minimum time between leaving Sleep Mode and opening cash drawer	0 sec, 0.5 sec, 1 sec, 1.7 sec, 2.5 sec, 5 sec
4.2.5.5		

Software

Menu Nr.	Description	Available Options
4.3.1	Exit Exit this menu level and give a save request, if there are unsaved changes.	
4.3.2	Power-ON Notice Select a power up notification on the communication interface	Transmit, Don't Transmit
4.3.3	Paper-NE Notice Select the usage of the Paper-Near-End Sensor. If Paper-NE notification is disabled, the printer doesn't transmit the PNE state by ASB or state request (ESC v)	Enable Paper-NE Notice, Disable Paper-NE Notice
4.3.4	Automatic Line Feed Generate a line feed after receiving <CR>.	Enable Automatic Line Feed, Disable Automatic Line Feed
4.3.5	Legacy Printer Support Enable this to fully support Windows printer support driver (e. g. Usbprint.sys). Following changes in the printer behavior will be made: - printer doesn't accept data while receive buffer is full (none data loss) - in case of USB interface a fixed (virtual) serial number is exposed to the host to avoid multiple printer installations	Enable Legacy Printer Support, Disable Legacy Printer Support
4.3.6	Listen To RT-Cmds Behavior of the printer regarding Real Time Commands. When set to always to printer listen always to Real Time Commands. When set to BufNotFull the printer listen only to Real Time Commands when the receive buffer is not full.	Listen To RT-Cmds – Always, Listen To RT-Cmds – BufNotFull
4.3.7	Asian font Select Asian font type for double byte character code when select Asian character mode <FS &>.	Japanese Disable Chinese Korean Big5+HKSCS GB18030

Print Options

In this menu section is it possible to change some printer parameter. It is very important to know what effects a change of a value. The procedure to save settings should be read.
To leave this menu, choose “Exit/Save”.

Menu Nr.	Description	Available Options
4.4.1	Exit Exit this menu level and give a save request, if there are unsaved changes.	
4.4.2	Print Speed Set the maximum of print speed for power consumption and print quality.	2 IPS 4 IPS 6 IPS 8 IPS 10 IPS 12 IPS 14 IPS
4.4.3	Paper Width Set the used paper width.	58mm 80mm
4.4.4	Paper Type Set the used paper type. This value will be valid without a software reset.	Single Color, Two Color
4.4.5	Print Density Set the print density for different paper types	50%, 70%, 85%, 100%, 115%, 130%
4.4.6	Color Print Density Set the color print density for the second color if used a two color paper.	50%, 70%, 85%, 100%, 115%, 130%
4.4.7	Auto Recovery Selects if and how the printer automatic recovers from an error.	Off, Without Clearing, With Clearing
4.4.8	Receipt Shooting Select the usage of the P1200 Receipt Shooting.	
4.4.8.1	Receipt Shooting Enable/Disable Enable or disable Receipt Shooting.	Enable Receipt Shooting, Disable Receipt Shooting
4.4.8.2	Receipt Shooting Time Defines the flush time for the Receipt Shooting memory.	Endless, 2 sec, 5 sec, 10 sec, 30 sec, 60 sec

Configuration & Counters

Menu Nr.	Description	Available Options
4.5.1	Exit Exit this menu level and give a save request, if there are unsaved changes.	
4.5.2	Set Configuration to Default.	

RS232 Configuration
In this configuration menu, you can configure the parameters for use with one RS232 communications Interface. This interfaces boards are available with different options.

This menu is available with RS232 option card.

Menu Nr.	Description	Available Options
4.6.1	Exit Exit this menu level and gives a save request, if there are unsaved changes.	
4.6.2	Baud Rate Select the baud rate for serial communication.	[9600, 19200, 38400, 57600, 115200] bps
4.6.3	Parity Select the data parity for serial communication.	No Parity, Even Parity, Odd Parity
4.6.4	Flow Control Select the flow control for serial communication.	DTR/DSR, XON/XOFF
4.6.5	Bit Length Select data bit length for serial communication.	7 Bits, 8 Bits
4.6.6	Receive Buffer Capacity Select the receive buffer capacity	Set Capacity to 64 KB, Set Capacity to 45 Byte
4.6.7	Receive Error Handling Select how the printer will react to a receive error.	Replace Data with '?', Ignore Data
4.6.8	Print Settings Prints the actual (in Non-Volatile memory stored) settings for the serial communications interface (RS232)	

Ethernet Configuration
In this configuration menu, you can configure the parameters for use with a Ethernet communication interface.

Menu Nr.	Description	Available Options
4.6.1	Exit Exit this menu level and gives a save request, if there are unsaved changes.	
4.6.2	DHCP Enable the "Dynamic Host Configuration Protocol" to use a automatically assign of IP address and other configuration information.	Enable DHCP, Disable DHCP

Information - Menu

Menu Nr.	Description	Available Options
5.1	**Exit** Exit this menu level.	
5.2	**Print Installed Code Pages** That prints a printout with printer data and an overview of installed codepages.	
5.3	**Print Code Pages** That prints a collection of printouts of all chars of installed codepages.	
5.4	**Print Statistic Report** That prints a printout with printer data and statistic data.	
5.5	**Print Extended Self Test** That prints the extended self test with all printer data.	
5.6	**Print Example** That prints a small demo printout with capabilities of the P1200.	
5.7	**Help** Prints a short instruction for use the service menu.	

10.2 P1200 Diagnostic Functions

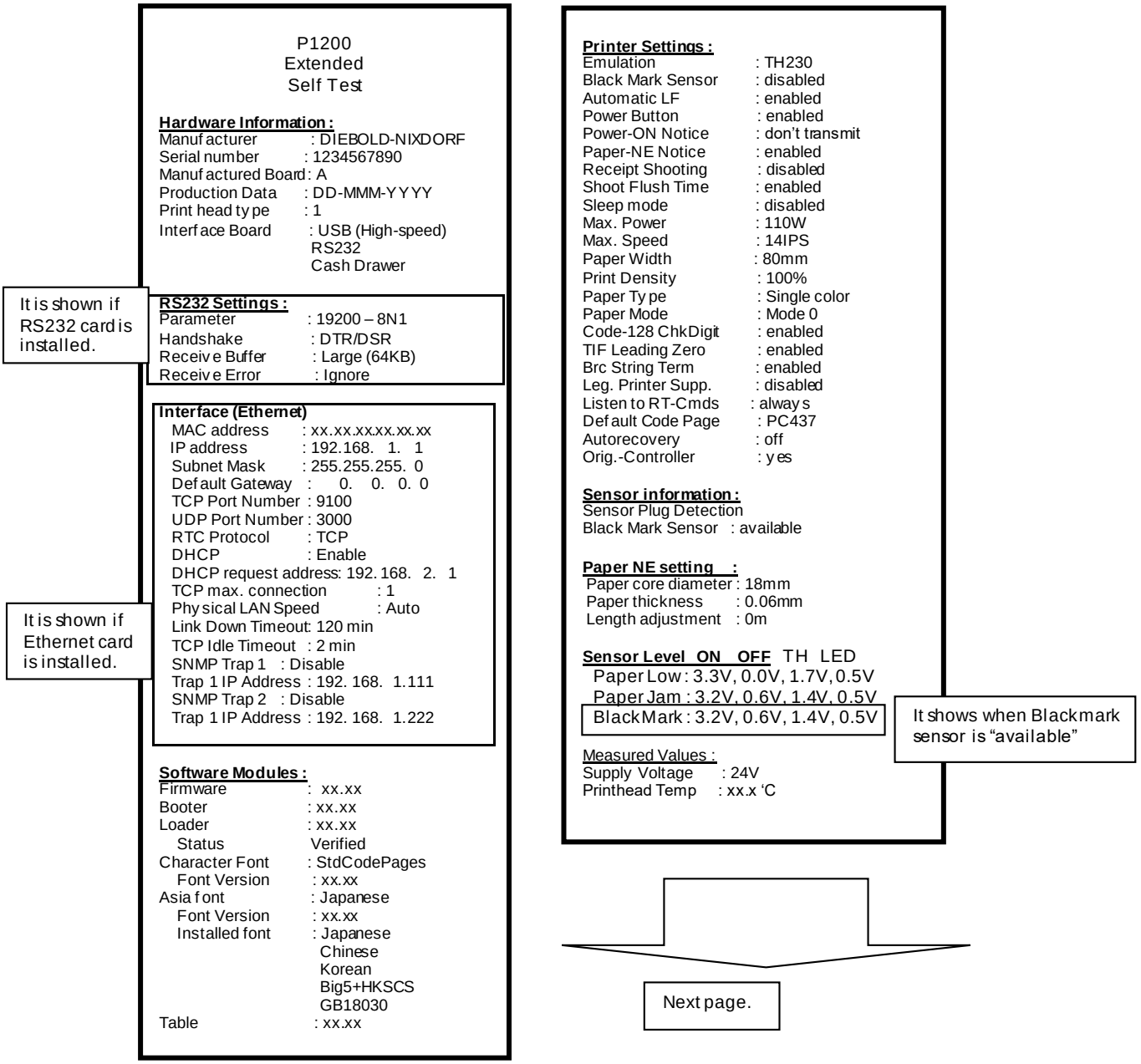
Diagnostic Function	Description	Selection
Selftest	Printout printer info, settings and statistic data.	• Entering diagnostic mode
Sensor test	Allow to test sensor functions.	• Diagnostic mode menu • LED diagnostic menu
Configuration to default	Set some settings in EEPROM to default.	• Diagnostic mode menu • LED diagnostic menu
Black Mark Test	Test the function of black mark control.	Diagnostic mode menu

10.2.1 Selftest Printout

	Short self test	Extended self test	Statistic report	Installed codepages
Availability	Service menu 2	Service menu 5.5	Service menu 5.4	Service menu 5.2
Hardware Information's	X	X	X	X
RS232 settings	(X)*	(X)*		
Ethernet settings	(X)*	(X)*		
Software Modules	X	X		
Asia Font	(X)	(X)		
Printer settings	X	X		
Sensor Information's	(X)**	(X)**		
Measured values	X	X		
Installed codepages		X		X
Statistic report		X	X	
Pixel Test	X	X		

Remarks : (X)* - available only with selected interface board
(X)** - advanced information's available only if black mark sensor enabled

Printer Configuration form indicates the printer individual information and configurations.



Installed Code Pages :

0	: PC437
1	: PC850
2	: PC852
3	: PC860
4	: PC863
5	: PC865
6	: PC858
7	: PC866
8	: WPC1252
9	: PC862
10	: PC737
11	: PC874
12	: PC857
13	: WPC1251
14	: WPC1255
15	: KZ 1048
16	: WPC1254
17	: WPC1250
18	: WPC28591
19	: WPC28592
20	: WPC28599
21	: WPC28605
22	: PC864
23	: PC720
24	: WPC1256
25	: WPC28596
26	: KATAKANA
27	: PC775
28	: WPC1257
29	: WPC28594
30	: WPC1253

Statistic Report :

Dots Total	: 0
Dots Actual	: 0
Printhead Changes	: 0
Linefeeds Total	: 0
Linefeeds Actual	: 0
Mechanic Changes	: 0
Cuts Total	: 0
Cuts Actual	: 0
Cutter Changes	: 0
Cutter Errors	: 0
Max. Head Temp.	: 35℃
Black Mark Error	: 0
Thermistor Error	: 0
Low Volt. Error	: 0
High Volt. Error	: 0
Cover Open	: 0
FW Starts	: 1
Power On (Hours)	: 1
EEPROM Updates	: 5
EEPROM Status	: OK

Pixel Test :

There are three ways to print Printer Configuration Form in 8.13 LPI.

1) If the cover is closed while Feed Key is pressed down, it prints this form.
2) If “Print Printer Config.” is selected at Top Menu of the offline diagnostics, it prints this form.
3) If “Print Printer Configuration Form” command (0x1F 0x74) is received, it prints this form.

Before it prints Printer Configuration Form, it performs the dot failure detection in order to update the latest dot status.

10.2.2 Sensor Test

This function shows the sensor changes. If at least one sensor status is changing, the green and red LED toggles.
The sensor test can be stopped by pushing the linefeed button once for a long time (> 1 second). Afterwards a software reset is executed.

10.2.3 Black Mark test

The printer moves the paper to the next black mark, prints three lines, moves the paper until the next black mark is underneath the cutter (one Form Feed) and cuts the paper. After this operation, the paper is moved backwards to the first print position (top of form).
This test is repeated continuously and can be stopped by pushing the Linefeed button once.

Printer Errors

11. Error Detection

The followings are errors and warnings detected in this printer.

1) Unrecoverable Error

Those are very critical errors that the printer may not be functional at all and may require the repair. Once those errors are detected, it is not able to recover from an error condition unless the printer is reset. Even if the printer is reset, it will probably detect the same error.

2) Recoverable Error

There are two types of the recoverable errors. One is to require the operator intervention to recover it. Once an operator takes a proper action, it will be recovered go to online.

Another one is that it automatically recovers from the error condition. It does not require any operator intervention.

This error is internally cleared by force regardless of the printer condition when the cover is opened and closed or when Error Recovery command (Real Time Request to Printer) is received. However, it will be detected once again if no proper action was taken.

3) Warning

It does not affect any printer functionality. Once some of those are detected, the printer just indicates this by status and LED. It behaves as usual even if a warning is detected.

Error/Warning	Boot Up	Idle	Print	Online Diag.
Unrecoverable Error				
Memory Error	O			O
Thermal Head Abnormal Temperature[1]		O	O	
Recoverable Error (operator intervention is required)				
Paper Jam		O	O	
Cutter Error	O	O	O	O
Cover Open		O	O	O
Paper End		O	O	
Black Mark			O	
Recoverable Error (operator intervention is not required)				
Thermal Head Disconnected			O	O
Thermal head over heat[2]			O	O
Warning (This will not affect any printer functionality.)				
Paper low		O	O	
24V anomaly		O	O	
Sensor Calibration fail				O

Memory Error

RAM Error: If there is a failure in terms of iRAM / DRAM access during the power up or during the memory test of the online diagnostics, it is detected as Memory Error.

ROM Error: If there is a failure in terms of the flash memory access during the power up or during the memory test of the online diagnostics, it is detected this as Memory Error.

The printer is not able to recover from this error condition unless the printer is turned off. Even if it is rebooted, there is a high possibility that same error is detected because this is the fatal error.

Thermal Head Abnormal Temperature Error

When the printer observes that the thermal head temperature is too high, it is detected as Thermal Head Abnormal Temperature Error. If this error is detected while printing data, it immediately stops

[1] If the thermal head temperature is more than 90 degree C, this error is detected.

[2] If the thermal head temperature is more than 65 degree C, it suspends printing data to cool down the head, and it resumes printing once it becomes less than 55 degree C.

printing.
The printer is not able to recover from this error condition unless the printer is turned off. Even if it is rebooted, there is a high possibility that same error is detected because this is the fatal error.

Paper Jam Error

When the printer recognizes that the paper is rolled up into the platen, it is detected as Paper Jam Error. If this error is detected while printing data, it immediately stops printing.
Once the paper rolled up into the platen is taken away and the cover is closed properly then, this error is cleared.

Cutter Error

While performing the cut, if one of the following abnormal behaviors is observed, the printer immediately executes the cutter exercise..

- Cutter did not leave the home position even if the certain period has passed.
- Cutter did not return to the home position within the certain period.

In addition, the cutter exercise is executed during the printer power up if the cutter is not at the home position. It is also conducted if the cover is closed in the cutter error condition.

During the exercise, if s the following unexpected behavior is observed, it indicates the cutter error.

1) **Cutter does not leave the home position:** If it recognizes that the cutter is still at the home after the certain period, it is detected as the cutter error.
2) **Cutter does not return to the home position:** If it recognizes that the cutter is not able to retum to the home position within the certain period, it is detected as the cutter error.

Once the cover is opened and closed during cutter error status, the cutter error will clear and then perform cutter exercise. However, the same error may occur in the cutter exercise triggered by closing the cover unless the inducement of the cutter error is eliminated.

Note:
Even if the cutter overshoots (cannot stop at) the home position while performing cut, it is not considered as the abnormal condition as long as returning to the home position is recognized.

Cover Open Error

When the printer recognizes that the cover sensor implies the cover open, it is detected as Cover Open Error. If this error is detected while printing data, it immediately stops printing.
Once the cover is closed properly, this error is cleared.

Paper End Error

When the printer recognizes that the paper end sensor implies the paper end, it is detected as Paper End Error. If this error is detected while printing data, it immediately stops printing.
Once a paper roll is supplied and the cover is closed properly, this error is cleared.

Thermal Head Disconnected Error

When the printer observes that the thermal head temperature is too low, it is detected as Thermal Head Disconnected Error. This error is checked whenever the printer starts printing data.
Once this error is detected, the printer does not start printing until the thermal head temperature becomes the normal condition. Once it is recovered, this error is automatically cleared and it restarts printing. This error is cleared by opening/closing the cover. However it may detect the same error before printing data if the error condition is not recovered.

Thermal head over heat

When the printer observes that the thermal head temperature is higher than the certain temperature, it is detected as Thermal head over heat. This error is checked whenever the printer starts printing data.
Once this error is detected, the printer does not start printing until the thermal head temperature becomes lower than the certain temperature. Once it is cooled down and reaches the certain temperature, this error is automatically cleared and it restarts printing. This error is cleared by opening/closing the cover. However it may detect the same error before printing data if the error condition is not recovered.

12. LED Indication

11.1 LED Pattern in Auto Mode

This is the default LED pattern in “Auto Mode” which printer itself controls LED according to the printer status. This pattern can be changed by LED configuration command.

Stage	Printer Status	Cycle	Color	Control
1	Boot Up	NA	ALL	RED -> AMBER -> GREEN
2	Idle	NA	GREEN	ON
3	Printing[1]	NA	GREEN	ON
4	(Reserved)	-	-	-
5	(Reserved)	-	-	-
6	(Reserved)	-	-	-
7	Online Firmware Update	5 Hz	GREEN	BLINK
8	Standby mode	NA	GREEN	ON
9	(Reserved)	-	-	-
10	Unrecoverable error in PCB block	2 Hz	RED	1 Blink Pause 5 seconds
11	Unrecoverable error in Thermal Head	2 Hz	RED	2 Blink Pause 5 seconds
12	(Reserved)	-	-	-
13	(Reserved)	-	-	-
14	(Reserved)	-	-	-
15	(Reserved)	-	-	-
16	(Reserved)	-	-	-
17	(Reserved)	-	-	-
18	(Reserved)	-	-	-
19	(Reserved)	-	-	-
20	Recoverable error in Thermal Head (Cool Down, Disconnected)	2 Hz	AMBER	2 Blink Pause 5 seconds
21	Recoverable error in Printer Cover	2 Hz	AMBER	3 Blink Pause 5 seconds
22	Recoverable error of Paper related	2 Hz	AMBER	4 Blink Pause 5 seconds
23	Recoverable error in Print block	2 Hz	AMBER	5 Blink Pause 5 seconds
24	Recoverable error in Cutter block	2 Hz	AMBER	6 Blink Pause 5 seconds
25	(Reserved)	-	-	-
26	(Reserved)	-	-	-
27	(Reserved)	-	-	-
28	(Reserved)	-	-	-
29	(Reserved)	-	-	-
30	Warning for PCB	2 Hz	GREEN	1 Blink Pause 5 seconds
31	Warning for Paper related	2 Hz	GREEN	4 Blink Pause 5 seconds
32	Warning for not DN power supply	2 Hz	GREEN	5 Blink Pause 5 seconds

Basic policy of the default blinking pattern for errors/warnings in Auto Mode is as follows.
1) Red color is used for an unrecoverable error
2) Amber color is used for a recoverable error
3) Green color is used for warning
4) Blink cycle for errors/warnings is 2Hz
5) Number of blink of one cycle depends on the block where an error occurs.
   - PCB 1 Blink
   - Thermal Head 2 Blink
   - Cover 3 Blink
   - Paper block 4 Blink
   - Print block 5 blink
   - Cutter block 6 Blink

While updating the firmware in IPL mode, LED indication is as follows regardless of the mode.
   a) While writing data into the flash memory: Green fast blink
   b) While verifying data written into the flash memory: Red fast blink
It repeats the above sequence in each sector.

[1] This LED pattern is valid with no Warning , In case printer have Warnning LED indicastion follow Warning.

11.2 LED Pattern in User Mode

When the printer is configured to "User Mode", a system controls LED by "LED Control Request" command according to the printer status. The printer itself does not control the LED at all.

For example, if a system recognizes that the cover is opened, it may send LED Control Request command (1D 7A ***25***) so that LED starts blinking RED in 3Hz.
Once it recognizes that the cover is closed, it may send LED Control Request command (1d 7A ***07***) to turn off the red blinking and to turn on the green to indicate that the printer is in online.

LED blinking pattern of each ID can be changed by LED configuration command if there are no blinking patterns in the default blinking pattern which a system expects.

ID	Color	Pattern	Cycle (Hz)	Control
1	Green	Blink	3 Hz	1 Blink Pause 3 seconds
2	Green	Blink	3 Hz	2 Blink Pause 3 seconds
3	Green	Blink	3 Hz	3 Blink Pause 3 seconds
4	Green	Blink	3 Hz	4 Blink Pause 3 seconds
5	Green	Blink	3 Hz	5 Blink Pause 3 seconds
6	Green	Blink	3 Hz	6 Blink Pause 3 seconds
7	Green	ON	NA	Keep ON
8	Green	Blink	1 Hz	Blink continuously
9	Green	Blink	3 Hz	Blink continuously
10	Green	Blink	5 Hz	Blink continuously
11	NA	OFF	NA	OFF
12	Amber	ON	NA	Keep ON
13	Amber	Blink	1 Hz	Blink continuously
14	Amber	Blink	3 Hz	Blink continuously
15	Amber	Blink	5 Hz	Blink continuously
16	Amber	Blink	3 Hz	1 Blink Pause 3 seconds
17	Amber	Blink	3 Hz	2 Blink Pause 3 seconds
18	Amber	Blink	3 Hz	3 Blink Pause 3 seconds
19	Amber	Blink	3 Hz	4 Blink Pause 3 seconds
20	Amber	Blink	3 Hz	5 Blink Pause 3 seconds
21	Amber	Blink	3 Hz	6 Blink Pause 3 seconds
22	NA	OFF	NA	OFF
23	Red	ON	NA	Keep ON
24	Red	Blink	1 Hz	Blink continuously
25	Red	Blink	3 Hz	Blink continuously
26	Red	Blink	5 Hz	Blink continuously
27	Red	Blink	3 Hz	1 Blink Pause 3 seconds
28	Red	Blink	3 Hz	2 Blink Pause 3 seconds
29	Red	Blink	3 Hz	3 Blink Pause 3 seconds
30	Red	Blink	3 Hz	4 Blink Pause 3 seconds
31	Red	Blink	3 Hz	5 Blink Pause 3 seconds
32	Red	Blink	3 Hz	6 Blink Pause 3 seconds

Ethernet

Ethernet interface is available when Ethernet option card is connected to printer.

13. Web setting page

Printer supports setting change via web page.
It requires “User name” and “Password” to login web setting page.
(default value is “admin” for both User name and password)

[IP]		
IP Address	192 168 1 99	Value(0-255): Valid address
Subnet Mask	255 255 255 0	Value(0-255): Valid Mask
Default Gateway	0 0 0 0	Value(0-255): Valid address
DHCP	Enabled	Select option
DHCP Request IP Address	0 0 0 0	Value(0-255): Valid address
Host Name		Maximum 16 character

- IP Address : IP address for DHCP “Disable”
- Subnet mask : Subnet mask setting
- Default gateway : default gateway setting
- DHCP : DHCP enable/disable option
- DHCP request IP : IP address request for DHCP
- Host name : Printer host name.

[TCP/UDP]		
Number of TCP Connections	6	Value(1-6)
Time of Time-out (for Link Down)	120	Value(1-120 minutes) : 0=No timeout
Time of Time-out (for Idle)	2	Value(1-120 minutes) : 0=No timeout
TCP port	9100	Value(1024-65535)
UDP port	3000	Value(1024-65535)

- Number of TCP connection : Maximum number of TCP connection
- Time out. (link down) : Time out for TCP port close by Link down. (1-120 minutes)
- Time out. (Idle) : Time out for TCP port close by idle. (1-120 minutes)
- TCP port : Port number for TCP communication.
- UDP port : Port number for UDP communication.

[Ethernet]		
MAC Address	00-80-91-e1-00-00	Unchangeable
Physical Layer	Auto	Select option

- MAC address : MAC address.
- Physical layer : Auto / 100Mbps full / 100Mbps Half / 10Mbps full / 10Mbps Half

[User/Password]		
User	admin	Maximum 16 character
Password	•••••	Maximum 16 character

- User : User name to login web setting page.
- Password : Password to login web setting page.

SNMP – Configuration

[Community]		
SNMP	Enabled	Select option
Read Only	public	Unchangeable
Read/Write		Maximum 16 character

[SNMP Trap1]		
TRAP	Disabled	Select option
IP Address	0 0 0 0	Value(0-255): Valid address
Community Name		Maximum 16 character

[SNMP Trap2]		
TRAP	Disabled	Select option
IP Address	0 0 0 0	Value(0-255): Valid address
Community Name		Maximum 16 character

- SNMP : “Enable”, “Disable” SNMP functionality.
- Read/Write : Community name for SNMP.
- TRAP 1 : “Enable” “Disable” for TRAP 1.
- IP address : IP address for Trap 1
- Community name : Community name for Trap1
- TRAP 1 : Enable” “Disable” for TRAP 2.
- IP address : IP address for Trap 2
- Community name : Community name for Trap2

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