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EPSON

EU-T482 series

Specification for Commands

(Standard)

STANDARD	
Rev. No.	A
Notes	

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REVISION SHEET

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Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment	Azegami	Horiuchi	Usui	I	A	16	A	42	A
					II	A	17	A	43	A
					III	A	18	A	44	A
					IV	A	19	A	45	A
					V	A	20	A	46	A
					VI	A	21	A	47	A
					VII	A	22	A	48	A
					VIII	A	23	A	49	A
					IX	A	24	A	50	A
							25	A	51	A
							26	A	52	A
					1	A	27	A	53	A
					2	A	28	A	54	A
					3	A	29	A	55	A
					4	A	30	A	56	A
					5	A	31	A	57	A
					6	A	32	A	58	A
					7	A	33	A	59	A
					8	A	34	A	60	A
					9	A	35	A	61	A
					10	A	36	A	62	A
					11	A	37	A	63	A
					12	A	38	A	64	A
					13	A	39	A	65	A
					14	A	40	A	66	A
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Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				68	A	94	A	120	A
					69	A	95	A	121	A
					70	A	96	A	122	A
					71	A	97	A	123	A
					72	A	98	A	124	A
					73	A	99	A	125	A
					74	A	100	A	126	A
					75	A	101	A	127	A
					76	A	102	A	128	A
					77	A	103	A	129	A
					78	A	104	A	130	A
					79	A	105	A	131	A
					80	A	106	A	132	A
					81	A	107	A	133	A
					82	A	108	A	134	A
					83	A	109	A	135	A
					84	A	110	A	136	A
					85	A	111	A	137	A
					86	A	112	A	138	A
					87	A	113	A	139	A
					88	A	114	A	140	A
					89	A	115	A	141	A
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Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				146	A	175	A	201	A
					147	A	176	A		
					148	A	177	A	App.1	A
					149	A	178	A	App.2	A
					150	A	179	A	App.3	A
					151	A	180	A	App.4	A
					152	A	181	A	App.5	A
					153	A	182	A	App.6	A
					154	A	183	A	App.7	A
					155	A	184	A	App.8	A
					156	A	185	A	App.9	A
					157	A	186	A	App.10	A
					158	A	187	A	App.11	A
					159	A	188	A	App.12	A
					160	A	189	A	App.13	A
					161	A	190	A	App.14	A
					162	A	191	A	App.15	A
					163	A	192	A	App.16	A
					167	A	193	A	App.17	A
					168	A	194	A	App.18	A
					169	A	195	A	App.19	A
					170	A	196	A	App.20	A
					171	A	197	A		
					172	A	198	A		
					173	A	199	A		
					174	A	200	A		

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A	All	Newly enacted

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Points That Must Be Observed To Assure Product Safety

To assure the safe operation of this product, carefully observe the specifications as well as the notes provided below.

Seiko Epson Corporation will not bear any responsibility for any damage or injuries arising from use of this product that is not in accordance with the specifications and the notes provided below.

1) Do not apply voltage or current to any pins in excess of the absolute maximum ratings.

If voltage or current in excess of the absolute maximum ratings is applied, excess current will flow through the device, which may result in heat damage.

Absolute Maximum Ratings

Item	Symbol	Rated value	Unit
Input voltage	V_{IN}	27.0	V
Storage temperature	Tstg	-25 to 70	°C
Storage humidity	Hstg	0 to 90	%

2) Operate the EU-T482 series within the following conditions:

Recommended Operating Conditions

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply voltage to the printer	Vp	21.6	24.0	26.4	V
Operating temperature	Topr	0	--	50	°C
Operating humidity (no condensation)	Hopr	10	--	80	%

3) Do not short-circuit any of the connector pins of the printer or any of the output pins with the power supply.

Short-circuiting an output pin with a low-impedance power supply may cause heat damage due to excess current or may melt the bonding wire.

4) During transport or storage, protect the device by storing it in conductive sponge, aluminum foil, etc.

5) Do not drop conductive material such as a paper clip onto the circuit board.

Short circuiting pins on the board may cause heat damage due to excess current or may melt the bonding wire.

6) Be sure to connect the devices with the specified cables.

Improper connection may cause fire or shock.

7) Never disassemble or modify this product.

Tampering with this product may result in injury, fire, or electric shock.

8) Be sure to set this equipment on a firm, stable, horizontal surface.
Product may break or cause injury if it falls.

9) Do not use in locations subject to high humidity or dust levels.
Excessive humidity and dust may cause equipment damage, fire, or shock.

10) Do not place heavy objects on top of this product. Never stand or lean on this product.
Equipment may fall or collapse, causing breakage and possible injury.

11) To ensure safety, please unplug this product prior to leaving it unused for an extended period.

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TRADEMARKS

GENERAL DESCRIPTION

This specification applies to the control commands of the EU-T482 series, which has the following features:

1) Models

The following models are available for the EU-T482 series.

- Standard model: Supports for ANK characters

2) Application Software

- Command protocol is based on the ESC/POS® standard.
- Various layouts are possible by using page mode.
- Bar code printing is possible using a bar code command. Bar codes can be printed both in the vertical direction (fence bar code) and in the horizontal direction (ladder bar code) (*1).
- Character font size (12 × 24 or 9 × 17) can be selected using a command.
- Bit image print is possible.

NOTE *1: The ladder bar code and smoothing are effective only in the page mode.

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1. GENERAL SPECIFICATIONS

1.1 Printing Specifications

1) Printing method:	Thermal line printing
2) Dot density:	8 dot/mm (203 dpi × 203 dpi) dpi: dots per 25.4 mm (dots per inch)
3) Printing direction:	Unidirectional with friction feed
4) Printing width:	Maximum printing width: 72 mm {2.73"} (576 dot position)
5) Characters per line:	When font A is selected : 48 When font B is selected : 64
6) Character spacing (default):	Font A: 0.25 mm {0.0098"} (2 dots) (default) Font B: 0.25 mm {0.0098"} (2 dots) (default) Programmable by control command (in increments of 0.125 mm {1/203"}).
7) Printing speed:	When media type 4 is selected: Approximately 40 lps (when font A is selected, and line spacing is 30 dots) Approximately 153 mm/s {6.0"/s} when other than media type 4 is selected Approximately 33 lps (when font A is selected, and line spacing is 30 dots) Approximately 126 mm/s {5.0"/s} Approximately 80 mm/s {3.15"/s} when printing ladder bar codes and two-dimensional codes Printing speed may be slower, depending on the data transmission speed and combination of control commands, environmental conditions, supply voltage, or selection of the print density. [lps: lines per second]
8) Paper feed speed:	Approximately 153 mm/s {6.02"/s}
9) Line spacing (default):	30 dots (3.75 mm {0.15"}) (default) Programmable by control command (in increments of 0.125 mm {1/203"}).

1.2 Character Specifications

1) Number of characters:
- Alphanumeric characters: 95
- Extended graphics: 128 × 43 pages (including a user-defined page)
- International characters sets: 18 sets

2) Character structure:
- Font A: 12 × 24 (including 2-dot horizontal spacing)
- Font B: 9 × 17 (including 2-dot horizontal spacing)

Font A is selected as the default.

3) Character size:

Table 1.2.1 Character Size

	Standard	Double-height	Double-width	Double-width/ Double-height
	W × H (mm)	W × H (mm)	W × H (mm)	W × H (mm)
Font A 12 × 24	1.25 × 3.0	1.25 × 6.0	2.5 × 3.0	2.5 × 6.0
Font B 9 × 17	0.88 × 2.13	0.88 × 4.25	1.76 × 2.13	1.76 × 4.25

Space between characters is not included.
Characters can be scaled up to 64 times as large as the standard sizes.

1.3 Parts Name of EU-T482 series

This specification is defined the parts name of EU-T482 series as the following figure 1.3.1.

Figure 1.3.1 is for full-equipped model.

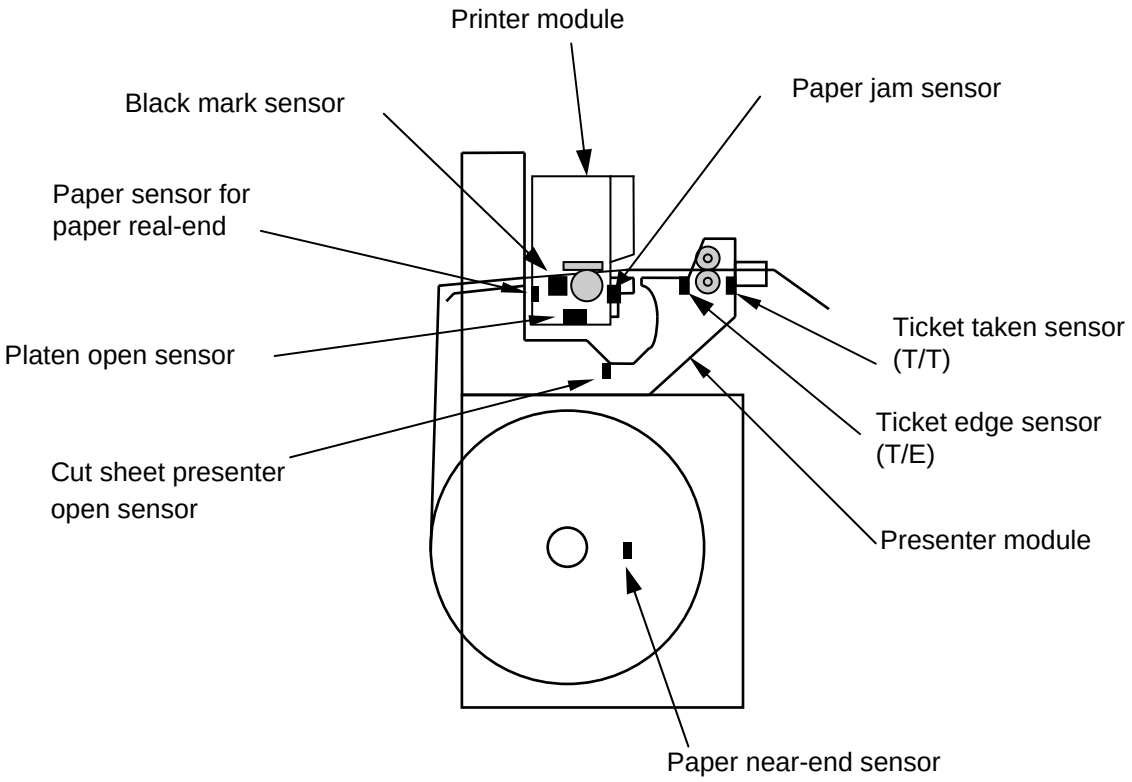


Figure 1.3.1 Parts Name of EU-T482 series

NOTES: The primary paper near-end is defined as when the paper near-end sensor 1 detects the paper roll near-end.
The primary paper near-end and the secondary paper near-end are transmitted when the printer sends the status to the host; however, the printer operation is not affected with these status transmissions.

When the specified paper amount is fed after the primary paper near-end is detected, the printer enters the secondary paper near-end state. (See Table 1.5.8.)

1.4 DIP Switches

One DIP switch is mounted on the control board module as shown in Figure 1.4.1.

Figure 1.4.1 DIP Switch (DSW1) Layout

1.4.1 DIP switch

Table 1.4.1 DIP Switch (DSW1)

SW No.	Function	ON	OFF	Factory setting	Remarks
1	Reserved	-	-	On	Fixed to On
2	Reserved	-	-	Off	Fixed to Off
3	Serial interface baud rate selection	See Table 1.4.2.		Off	Effective with the serial interface type only. Reserved (fixed to Off) with other interface types.
4				Off	
5	DSR reset	Enabled	Disabled	Off	Effective with the serial interface type only. Reserved (fixed to Off) with other interface types.
6	Factory use	-	-	Off	Fixed to Off
7	BM sensor	Enabled	Disabled	Off	
8	Selection of interface class	Printer class	Vendor class	Off	Effective with the USB interface type only. Reserved (fixed to Off) with other interface types.

Table 1.4.2 Selection of Transmission Speed

Transmission speed [bps]	Switch Number	
	3	4
(*1)	On	On
9600	Off	On
19200	On	Off
38400	Off	Off

[bps: bits per second]

NOTES:
1. The default value of the factory setting of the transmission speed is 38400 bps.
2. (*1) The transmission speed depends on the transmission condition settings of the serial interface. 2400, 4800, 9600, 19200, 38400, 57600, and 115200 are available as setting values. The default value is 19200 bps when DIP switches 3 and 4 are set to on.
3. The setting of the communication condition of the serial interface is performed with GS (E. See **GS (E** for details of setting values.
4. The selection of transmission speed of the serial interface set by GS (E is enabled only when DIP switches 3 and 4 are on. For other settings, the values set to DIP switch 1 are enabled.

NOTE: Changes in DIP switch settings are recognized only when the printer power is turned on or when the printer is reset by using the interface.

1.5 Memory switches

Other settings except DIP switches 1 and 2 are set by the memory switches.

The memory switches are set with **GS (E** command. (See Section 2.4, Control Commands for details.)

Table 1.5.1 Memory Switch 1

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Reserved	--	Fixed to Off	Off (0)	
2	Reserved	--	Fixed to Off	Off (0)	
3	BUSY condition	Receive buffer full	Receive buffer full or offline	Off (0)	
4	Receive error	Ignored	Prints '?'	Off (0)	Off (0) *1
5	Auto line feed	Always enabled	Always disabled	Off (0)	Off (0) *2
6	Reserved	--	Fixed to Off	Off (0)	
7	Reserved	--	Fixed to Off	Off (0)	
8	Reserved	--	Fixed to Off	Off (0)	

*1: Effective only with the serial interface model.
*2: Effective only with the parallel interface model.

Table 1.5.2 Memory Switch 2, 3, 4

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Reserved	--	Fixed to Off	Off (0)	
2	Reserved	--	Fixed to Off	Off (0)	
3	Reserved	--	Fixed to Off	Off (0)	
4	Reserved	--	Fixed to Off	Off (0)	
5	Reserved	--	Fixed to Off	Off (0)	
6	Reserved	--	Fixed to Off	Off (0)	
7	Reserved	--	Fixed to Off	Off (0)	
8	Reserved	--	Fixed to Off	Off (0)	

Table 1.5.3 Memory Switch 5

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Reserved	--	Fixed to Off	Off (0)	
2	Reserved	--	Fixed to Off	Off (0)	
3	Reserved	--	Fixed to Off	Off (0)	
4	Setting of a paper jam detection	Disabled	Enabled	Off (0)	
5	Reserved	--	Fixed to Off	Off (0)	
6	Setting of the USB power saving functions	Disabled	Enabled	Off (0)	*1
7	Paper exit LED output	Enabled	Disabled	Off (0)	
8	Reserved	--	Fixed to Off	Off (0)	

*1: Effective only with the USB interface model.

Table 1.5.4 Memory Switch 6

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Selection of paper loading operation	See Table 1.5.7.		Off (0)	
2	Output of error signal	Disabled	Enabled	Off (0)	(*1)
3	Print speed control	Speed has priority over power consumption	Power consumption has priority over print speed	Off (0)	(*2)
4	Auto eject if the paper out is detected	Disabled	Enabled	Off (0)	(*3)
5	Reserved	--	Fixed to Off	Off (0)	
6	Reserved	--	Fixed to Off	Off (0)	
7	Selection of the paper near-end detection	By a BM sensor	By a near-end sensor	Off (0)	(*4)
8	Selection of the operation by **GS FF**	Disabled	Enabled	Off (0)	

Table 1.5.5 Memory Switch 7

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Reserved	--	Fixed to Off	Off (0)	
2	Setting for the secondary paper near-end detecting position	See Table 1.5.8.		Off (0)	(*5)
3					
4	Operation after cutting	Ejects fully	Clamps	Off (0)	See note below.
5	Paper initializing operation at power on	Forced cut	Detects paper's tip	Off (0)	
6	Affix/Peel-off operation	Enabled	Disabled	Off (0)	
7	Serial DSR Software reset	Enabled	Disabled	On (1)	
8	Reserved	--	Fixed to Off	Off (0)	

NOTE: This function is enabled only when the cut sheet presenter module is installed.

Table 1.5.6 Memory Switch 8

SW No.	Function	ON (Set to "1")	OFF (Set to "0")	Factory setting	Remarks
1	Print control mode	Two-part energization mode	Non-divided energization mode	Off (0)	(*6)
2	Reserved	-	Fixed to Off	Off (0)	
3	Backward paper feeding	Enabled	Disabled	Off (0)	(*7)
4	Autocutter installation	Not installed	Installed	Off (0)	
5	Specific offline operation	Discards receive data	Keeps receive data	Off (0)	(*8)
6	Reserved	-	Fixed to Off	Off (0)	
7	Test print when the paper is loaded	Enabled	Disabled	Off (0)	
8	Initialization for black mark position when the power is turned on.	Does not initialize	Initializes	Off (0)	

Table 1.5.7 Selection of Paper Loading Operation

	ON	OFF
Operation when closing the platen after it is open (for the model with the paper presenter module)	Feeds for approximately 60 mm, then cuts the paper.	Detects to the tip of the paper, but does not cut the paper.
Operation when closing the platen after it is open (for the model without the paper presenter module)	Feeds for approximately 125 mm, then cuts the paper.	Does not feed and does not cut the paper.
Operation in semi-auto loading (for the model with the paper presenter module)	After loading the paper, cuts the paper. (Either On/Off setting does not affect this operation.)	
Operation in semi-auto loading (for the model without the paper presenter module)	After loading the paper, cuts the paper.	After loading the paper, does not cut the paper.

Table 1.5.8 Setting for Paper Near-end Detecting Position

Paper length for the time between detecting the primary paper near-end with the near-end sensor and sending the status of the secondary paper near-end	Memory SW		Remarks
	7-2	7-3	
Approximately 5 m {16.40 ft}	Off	Off	
Approximately 10 m {32.81 ft}	On	Off	
Approximately 20 m {65.62 ft}	Off	On	
Approximately 30 m {98.43 ft}	On	On	

*1: Some host PCs with a parallel interface may not be able to transmit the data to the printer even though the printer does not transmit the BUSY signal if the parallel interface error signal output is On while the printer is in the error status, depending on the operating system. The error terminal of the parallel interface is not ON even though the printer is in the error status while this switch is turned on.

*2: This setting is used for changes in the following modes:

- Power consumption has priority over print speed:
  In this mode, the printer operates with power consumption as low as possible.
- Print speed has priority over power consumption:
  In this mode, the printer prints at the maximum speed.
  If the printer power is supplied with a power source which is less than 100 W, do not turn on this mode.

*3: This setting specifies the printer's operation if a paper out is detected during printing and feeding.

- Enabled: Ejects paper automatically.
- Disabled: Does not eject paper (from the presenter)

*4: Table below (1.5.9) shows settings for detection of a paper near-end and black marks.

Table 1.5.9

Selection of black mark control and near-end Switch number detection	Switch Number	
	DIP SW 7	Memory SW6-7
Black mark control: Enabled Near-end detection: Black mark sensor	On	On
Black mark control: Disabled Near-end detection: Black mark sensor	Off	On
Black mark control: Enabled Near-end detection: Near-end sensor	On	Off
Black mark control: Disabled Near-end detection: Near-end sensor	Off	Off

*5: This setting is enabled only for the model type with the paper roll supply module.

- The printer can send the secondary paper near-end status when the specified amount of the paper is fed after the paper roll near-end sensor detects the remaining paper amount being small.

*6: Default print control mode

- Constantly in non-divided energization mode if other than media type 4

*7: If backward paper feeding is enabled, the following process is executed.

- After cutting the paper with a **GS V** command, backward paper feeding is executed. (when the BM sensor is disabled)
- The print starting position adjustment with the **GS (F** command can be set to the backward direction relative to the cutting position.

In this case, the maximum of the correction value to backward is 88STEP.

*8: • If this switch is turned on, the printer clears the receive buffer when the offline status shown above occurs. Then the printer executes any real-time command (**DLE ENQ**, **DLE EOT**) if it is there, and discards all other data.

Specific offline means the following states:

- Unrecoverable error state
- Platen open
- Presenter cover open
- Paper empty

• Take into considerations the following points, if this switch is On:

- If bit image data that includes the same data strings as the recoverable error (**DLE ENQ *n***) is transmitted when a possibly recoverable error occurs, the printer recovers from the error state. In this case, the printer may print the succeeding bit image data as character data since the printer is set to not ignore data after recovering from the error state.
- Since the printer ignores all data other than the real-time commands, when the printer is in the specific offline operation, the request to send command (such as **GS I**) is not also processed. Therefore, the user must consider it in programming the application software.

• When the receive buffer is cleared, if this switch is turned on, three bytes of data – 37H, 24H, and 00H – are transmitted.

2. COMMANDS

2.1 Command Notation

[Name] The name of the command.

[Format] The code sequence.

[ ]*k* indicates the contents of [ ] should be repeated *k* times.

[Range] Gives the allowable ranges for the arguments.

[Description] Describes the function of the command.

[Details] Describes the usage of the command in detail.

[Notes] Provides important information on setting and using the printer command, if necessary.

[Default] Gives the default values, if any, for the command parameters.

[Reference] Lists related commands.

The numbers denoted by < >H are hexadecimal.

The numbers denoted by < >B are binary.

2.2 Explanation of Terms

1) Receive buffer
   The receive buffer is a buffer that stores, as is, the data received from the host (the reception data). The receive data is stored in the receive buffer temporarily, and is then processed sequentially.
2) Print buffer
   The print buffer is a buffer that stores the image data to be printed.
3) Print buffer full
   This is the state where there is no more room in the print buffer. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the **LF** operation.
4) Start of line
   The start of line state satisfies the following conditions:
   - There is no print data (including spaces and portions of data skipped due to **HT** currently in the print buffer.
   - The print position is not specified by the **ESC $** or **ESC ** command.

5) Printable area
The maximum range within which printing is possible under the printer specifications. The printable area for this printer is as follows:

a) The length of the horizontal direction in standard mode:
approximately 72 mm {576/203.2"}
b) The length of the horizontal direction in page mode:
approximately 72 mm {576/203.2"}
c) The length of the vertical direction in page mode:
approximately 92 mm {738/203.2"}

6) Printing area
Printing range is set by the command. The printing area must be ≤ the printable area.

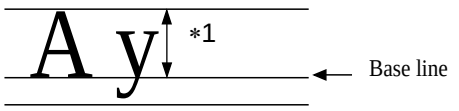
7) Ignore
The state in which all codes, including parameters, are read in and discarded, and nothing happens.

8) Inch
A unit of length. One inch is 25.4 mm.

9) MSB
Most Significant Bit

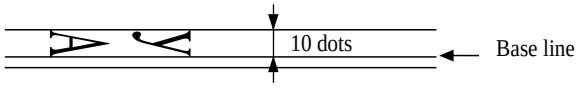
10) LSB
Least Significant Bit

11) Baseline
The standard position for character data stored in the print buffer.
The illustration below shows normal character positions in standard mode and page mode:



*1. When Font A (12 × 24 dots) is selected, this height is 21 dots.
When Font B (9 × 17 dots) is selected, this height is 16 dots.

Rotated characters in standard mode (only when Font A is selected):



2.3 List of Commands

Command	Name	Command classification		Standard mode	Page mode
		Executing	Setting		
HT	Horizontal tab	O		O	O
LF	Print and line feed	O		O	O
FF	a) Print and return to standard mode (in page mode)	O		Ignored	O
	b) Print and feed label to print starting position (*)	O		O	Disabled
CR	Print and carriage return	O		O	O
CAN	Cancel print data in page mode	O		Ignored	O
DLE EOT	Real-time status transmission	O		O	O
DLE ENQ	Real-time request to printer	O		O	O
DLE DC4 7	Transmit specified status in real-time	O		O	O
DLE DC4 8	Clear buffer(s)	O		O	O
ESC FF	Print data in page mode	O		Ignored	O
ESC SP	Set right-side character spacing		O	O	O
ESC !	Select print mode(s)		O	O	O
ESC $	Set absolute print position	O		O	O
ESC %	Select/cancel user-defined character set		O	O	O
ESC &	Define user-defined characters		O	O	O
ESC *	Select bit-image mode	O		O	O
ESC -	Turn underline mode on/off		O	O	O
ESC 2	Select 3.75mm {0.15"} line spacing		O	O	O
ESC 3	Set line spacing		O	O	O
ESC ?	Cancel user-defined characters		O	O	O
ESC @	Initialize printer	O	O	O	O
ESC D	Set horizontal tab positions		O	O	O
ESC E	Turn emphasized mode on/off		O	O	O
ESC G	Turn double-strike mode on/off		O	O	O
ESC J	Print and feed paper	O		O	O
ESC L	Select page mode	O		(O)	Ignored
ESC M	Select character font			O	O
ESC R	Select an international character set		O	O	O
ESC S	Select standard mode	O		Ignored	O
ESC T	Select print direction in page mode		O	▲	O
ESC V	Turn 90° clockwise rotation mode on/off		O	O	▲
ESC W	Set printing area in page mode		O	▲	O
**ESC **	Set relative print position	O		O	O

Command	Name	Command classification		Standard mode	Page mode
		Executing	Setting		
ESC a	Select justification		○	(○)	▲
ESC c 3	Select paper-end sensor(s) to output paper-end Signals		○	○	○
ESC c 4	Select paper sensor(s) to stop printing		○	○	○
ESC c 5	Enable/disable panel buttons		○	○	○
ESC d	Print and feed *n* lines	○		○	○
ESC t	Select character code table		○	○	○
ESC {	Turn upside-down printing mode on/off		○	(○)	▲
FZ (z	Control option device(s)	○	○	○	○
GS FF	Feed marked paper to print starting position	○		○	○
GS !	Select character size		○	○	○
GS $	Set absolute vertical print position in page mode	○		Ignored	○
GS ∗	Define downloaded bit image		○	○	○
GS (A	Execute test print	○		○	Ignored
GS (C	Edit of user NV memory	○	○	(○)	Ignored
GS (E	User setup commands	○	○	(○)	Disabled
GS (F	Set adjustment value(s)		○	○	○
GS (H	Request response transmission		○	○	○
GS (K	Select print control method(s)		○	○	○
GS (L / **GS 8 L**	Select graphics data	○	○	○	○
GS (M	Customize printer control value(s)	○		(○)	Ignored
GS (k	Setup and print symbol	○	○	○	○
GS /	Print downloaded bit image	○		ℓ	○
GS B	Turn white/black reverse printing mode on/off		○	○	○
GS E	Select head control method		○	○	○
GS H	Select printing position of HRI characters		○	○	○
GS I	Transmit printer ID	○		○	○
GS L	Set left margin		○	(○)	▲
GS T	Set print position to the beginning of print line	○		○	Ignored
GS V	Select cut mode and cut paper	○		(○)	○
GS W	Set printing area width		○	(○)	▲
**GS **	Set relative vertical print position in page mode	○		Ignored	○
GS a	Enable/disable Automatic Status Back (ASB)	○	○	○	○
GS b	Turn smoothing mode on/off		○	○	○
GS f	Select font for HRI characters		○	○	○
GS g 0	Initialize maintenance counter	○		(○)	Ignored
GS g 2	Transmit maintenance counter	○		○	○

Command	Name	Command classification		Standard mode	Page mode
		Executing	Setting		
GS h	Set bar code height		○	○	○
GS k	Print bar code	○		ℓ	○
GS r	Transmit status	○		○	○
GS w	Set bar code width		○	○	○

Command classification

Executing: The printer executes the command, which does not then affect the following data.
Setting: The printer uses flags to make settings, and those settings affect the following data.

Standard mode

○: Enabled.
(○): Enabled only when the command is set at the beginning of a line.
ℓ: Enabled only when data is not present in the printer buffer.

Page mode

○: Enabled.
▲: Only a value setting is possible.
Disabled: Parameters are processed as printable data.
Ignored: All command codes, including parameters, are ignored and nothing is executed.

The commands listed below in the first column are defined as “obsolete commands (*)” in the ESC/POS command system. This printer supports both upward-compatible commands and obsolete commands. However, the upward-compatible commands are recommended to use.

	Obsolete commands	Upward-compatible commands
FS p	Print NV bit image	**GS (L** <Function 69>
FS q	Define NV bit image	**GS (L** <Function 67>
GS v 0	Print raster bit image	**GS (L** <Function 112 + 50>

(*): “Obsolete commands” are commands that are supported by legacy models; however it is recommended to replace them with upward-compatible commands, because they will not be supported in the future products.

2.4 Control Commands

HT

[Name] Horizontal tab

[Format] ASCII HT
Hex 09
Decimal 9

[Description] Moves the print position to the next horizontal tab position.

[Details]
- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [printing area width + 1].
- Horizontal tab positions are set with **ESC D**.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.

[Reference] **ESC D**

LF

[Name] Print and line feed

[Format] ASCII LF
Hex 0A
Decimal 10

[Description] Prints the data in the print buffer and feeds one line, based on the current line spacing.

[Details] This command sets the print position to the beginning of the line.

[Reference] **ESC 2**, **ESC 3**, Appendix A.1

FF

[Name] a) Print and return to standard mode in page mode
b) Print and feed marked paper to print starting position

[Format] ASCII FF
Hex 0C
Decimal 12

a) When page mode is selected:

[Description] Prints the data in the print buffer collectively and returns to standard mode.

[Notes]
- This command is enabled only in page mode.
- The buffer data is deleted after being printed.
- The printing area set by **ESC W** is reset to the default setting.
- This command sets the print position to the beginning of the line.

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

b) When BM sensor is effective:

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

[Notes]
- This command is enabled only when the BM sensor is set to be effective using with DIP SW7.
- This command sets the print position to the beginning of the line.
- If this command is executed at the print starting position of the marked paper, the printer feeds the marked paper to the next print starting position.

[Reference] **GS (F, GS FF**, Section 1.4.1, *DIP Switch*

CR

[Name] Print and carriage return

[Format] ASCII CR
Hex 0D
Decimal 13

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

[Details]
- This command is set by Memory Switch 1-5.
- Sets the print starting position to the beginning of the line.
- This command is ignored when the serial interface is connected

[Reference] **LF**

CAN

[Name] Cancel print data in page mode

[Format]

ASCII	CAN
Hex	18
Decimal	24

[Description] In page mode, deletes all the print data in the current printable area.

[Details]
- This command is enabled only in page mode.
- Data in the specified printing area is deleted.

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

DLE EOT *n*

[Name] Real-time status transmission

[Format]

ASCII	DLE	EOT	*n*
Hex	10	04	*n*
Decimal	16	4	*n*

[Range] $1 \leq n \leq 6$

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

n = 1: Transmit printer status
n = 2: Transmit offline status
n = 3: Transmit error status
n = 4: Transmit paper roll sensor status
n = 5: Transmit paper sensors status
n = 6: Transmit reserved status

[Details]

- The printer transmits the current status. Each status item is represented by one-byte of data.
- The printer transmits the status without confirming whether the host computer can receive data.
- This command is executed even when the printer is offline, or there is an error status.
- This command is processed immediately when it is received.
- This command cannot be executed when the printer is busy.
  The printer does not become BUSY even when the printer is offline, when memory switch 1-3 is on.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT *n*** command and the ASB status must be differentiated. (See Appendix B, *TRANSMISSION STATUS IDENTIFICATION.)*

[Notes]

- The status is transmitted whenever the data sequence <10>H<04>H<*n*> ($1 \leq n \leq 6$) is received.

  Example:

  In **ESC ∗ *m nL nH [d1...dk]***, *d1*=<10>H, *d2*=<04>H, *d3*=<01>H
- Do not use this command within another command that consists of 2 or more bytes.

  Example:

  If you attempt to transmit **ESC 3 *n*** to the printer, but DTR (DSR for the host computer) goes to MARK before *n* is transmitted and then **DLE EOT 3** interrupts before *n* is received, the code <10>H for **DLE EOT 3** is processed as the code for **ESC 3 <**10>H.

n = 1: Printer status

Bit	Hex	Decimal	Function
0	00	0	Not used. Fixed to Off.
1	02	2	Not used. Fixed to On.
2	00	0	Cut sheet presenter is closed.
	04	4	Cut sheet presenter is open.
3	00	0	Online.
	08	8	Offline.
4	10	16	Not used. Fixed to On.
5	00	0	Does not wait for online error recovery.
	20	32	Waits for online error recovery.
6	00	0	Panel button is Off.
	40	64	Panel button is On.
7	00	0	Not used. Fixed to Off.

n = 2: Offline status

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

Bit 3: Becomes same as bit 6 of Printer status (*n*=1).

Bit 5: Becomes on when the paper end sensor detects paper end and printing stops.

n = 3: Error status

Bit	Hex	Decimal	Function
0	00	0	Not used. Fixed to Off.
1	02	2	Not used. Fixed to On.
2	00	0	No mechanical error.
	04	4	Mechanical error has occurred.
3	00	0	No autocutter error.
	08	8	Autocutter error occurred.
4	10	16	Not used. Fixed to On.
5	00	0	No unrecoverable error.
	20	32	Unrecoverable error occurred.
6	00	0	No auto-recoverable error.
	40	64	Auto recoverable error occurred.
7	00	0	Not used. Fixed to Off.

Bit 6: Bit 6 is On when printing is stopped due to high print head temperature until the print head temperature drops sufficiently.

n = 4: Continuous paper sensor status

Bit	Hex	Decimal	Function
0	00	0	Not used. Fixed to Off.
1	02	2	Not used. Fixed to On.
2	00	0	Paper jam sensor: paper not present.
	04	4	Paper jam sensor: paper present. (When memory switch 5-4 is off.)
3	00	0	Paper near-end sensor 1: Paper present.
	08	8	Paper near-end sensor 1: Paper not present.
4	10	16	Not used. Fixed to On.
5	--	-	Undefined.
6	00	0	Paper real-end sensor: Paper present.
	40	64	Paper real-end sensor: Paper not present.
7	00	0	Not used. Fixed to Off.

n = 5: Paper sensors status

Bit	Hex	Decimal	Function
0	00	0	Not used. Fixed to Off.
1	02	2	Not used. Fixed to On.
2	00	0	T/E sensor on the presenter module: Paper present.
	04	4	T/E sensor on the presenter module: Paper not present.
3	00	0	T/T sensor on the presenter module: Paper present.
	08	8	T/T sensor on the presenter module: Paper not present.
4	10	16	Not used. Fixed to On.
5	--	-	Undefined.
6	00	0	The secondary paper near-end is detected.
	40	64	The secondary paper near-end is not detected.
7	00	0	Not used. Fixed to Off.

n = 6: Paper sensors status

Bit	Hex	Decimal	Function
0	00	0	Not used. Fixed to Off.
1	02	2	Not used. Fixed to On.
2	--	-	Undefined.
3	--	-	Undefined.
4	10	16	Not used. Fixed to On.
5	--	-	Undefined.
6	--	-	Undefined.
7	00	0	Not used. Fixed to Off.

[Reference] **DLE ENQ**, **GS a**, **GS r**, Appendix B

DLE ENQ *n*

[Name] Real-time request to printer

[Format]

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

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

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

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error aft clearing the receive and print buffers

[Details]

- This command is effective only when an autocutter error, a BM detecting error or a platen-open error occurs.
- This command is processed immediately when it is received.
- This command can not be executed when the printer is busy.
  The printer does not become BUSY even when the printer is offline if memory switch 1-3 is on.
- **DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC** @.

[Notes]

- The status is also transmitted whenever the data sequence of <10>H<05>H<*n*> ($1 \leq n \leq 2$) is received.
  Example:
  In **ESC** ✱ ***m nL nH dk***, *d1* = <10>H, *d2* = <05>H, d3 = <01>H
- This command should not be contained within another command that consists of two or more bytes.
  Example:
  If you attempt to transmit **ESC 3** ***n*** to the printer, but DTR (DSR for the host computer) goes to MARK before *n* is transmitted, and **DLE ENQ 2** interrupts before *n* is received, the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3** <10>H.

[Reference] **DLE EOT**

DLE DC4 *7 m*

[Name] Transmit specified status in real-time

[Format]

ASCII	DLE	DC4	*fn*	*m*
Hex	16	14	*07*	*m*
Decimal	16	20	7	*m*

[Range] *m* = 1, 4

[Description] Transmits the status or the response specified with *m* in real-time.

m	Status	Related command
1	ASB status	**GS a**
4	Offline response	**GS (H** <Function 49>

[Details]

- This command is ignored if the setting for *m* is out of range.
- Even if this command is received when the printer is offline, this command is processed.

[Details: ASB status]

- Even if each ASB function is disabled, the ASB status is transmitted when this command is processed.
- This command does not affect whether the ASB function is enabled or disabled.

[Details: Offline response]

- If the offline response is not transmitted from the printer yet when this command is processed, the response is not transmitted with this command.
- If this command is processed and the printer is in a state other than in the offline state, the response is not transmitted with this command.
- When the offline response (*m* = 4) is specified, the offline response added with the offline cause is transmitted regardless of the settings with **GS (H** <Function 49>.
- This command does not affect whether the transmission of the offline response is enabled or disabled.

[Reference] **GS (H**, **GS a**

DLE DC4 *8 d1…d7*

[Name] Clear buffer(s)

[Format]

ASCII	DLE	DC4	*fn*	*d1*	*d2*	*d3*	*d4*	*d5*	*d6*	*d7*
Hex	10	14	*08*	*01*	*03*	*14*	*01*	*06*	*02*	*08*
Decimal	16	20	*8*	*1*	*3*	*20*	*1*	*6*	*2*	*8*

[Range] *d1* = 1, *d2* = 3, *d3* = 20 , *d4* =1, *d5* = 6, *d6* = 2, *d7* = 8

[Description]

- Clears all data stored in the receive and the print buffer.
- Transmits the clear response as follows:

Response	Hexadecimal	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	25H	37	1 byte
③ NUL	00H	0	1 byte

- If another command is being executed while this command is processed, the execution of the other command is stopped.

[Details]

- If this command is processed during printing, the printer performs the buffer clear process at the end of the currently printing line. The following print processes are included in what is considered the currently printing line:
  - Downloaded bit-image printing
  - NV bit image printing
  - Page mode printing
  - Bar code (includes HRI font) printing
- Even if the printer is in an error state when this command is transmitted, this command is processed.
- This command clears all data in the receive buffer and the print buffer; however, this command does not affect the setting values for other commands.
- After the clear process, the printer goes into the following state:
  - Enters the standard mode
  - Sets the print starting position to the beginning of a line
- If this command is processed when a recoverable error occurs, the printer recovers from the error state. This process is the same as with **DLE ENQ 2**.

[Details: Response transmission process]

- If the buffer clear process is executed again even though the previous clear response is not transmitted yet, only one clear response is transmitted.

[Reference] **DLE ENQ**, **GS (H**

ESC FF

[Name] Print data in page mode

[Format]

ASCII	ESC	FF	
Hex	1B	0C	
Decimal	27	12	

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

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

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

ESC SP *n*

[Name] Set right-side character spacing

[Format]

ASCII	ESC	SP	*n*	
Hex	1B	20	*n*	
Decimal	27	32	*n*	

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

[Description] Sets the character spacing for the right side of the character to [$n \times 0.125$ mm {0.0049"}].

[Details]
- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is *n* times normal value.
- This command does not affect the setting of Kanji characters.
- This command sets values independently in each mode (standard and page modes).

[Default] *n* = 0

ESC ! *n*

[Name] Select print mode(s)

[Format]

ASCII	ESC	!	*n*
Hex	1B	21	*n*
Decimal	27	33	*n*

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

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

Bit	Hex	Decimal	Function
0	00	0	Character Font A (12 × 24).
	01	1	Character Font B (9 × 17).
1	-	-	Undefined.
2	-	-	Undefined.
3	00	0	Emphasized mode not selected.
	08	8	Emphasized mode selected.
4	00	0	Double-height mode not selected.
	10	16	Double-height mode selected.
5	00	0	Double-width mode not selected.
	20	32	Double-width mode selected.
6	-	-	Undefined.
7	00	0	Underline mode not selected.
	80	128	Underline mode selected.

[Details]

- When both double-height and double-width modes are selected, quadruple-size characters are printed.
- The printer can underline all characters, but cannot underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC –**, regardless of the character size.
- When some characters in a line are double or more height, all the characters in the line are aligned at the baseline.
- **ESC M** can also select character font type. However, the setting of the last received command is effective.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC –** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.

[Default] *n* = 0

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

ESC $ *nL nH*

[Name] Set absolute print position

[Format]

ASCII	ESC	$	*nL*	*nH*
Hex	1B	24	*nL*	*nH*
Decimal	27	36	*nL*	*nH*

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

$0 \le n_H \le 255$

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

- The distance from the beginning of the line to the print position is $[(n_L + n_H \times 256) \times 0.125$ mm].

[Details]

- Settings outside the specified printable area are ignored.
- In standard mode, the horizontal motion unit (*x*) is used.
- In page mode, horizontal or vertical motion units differ depending on the starting position of the printable area, as follows:
  (a) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (*x*) is used.
  (b) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (*y*) is used.

[Reference] **ESC **, **GS $**, **GS **

ESC % *n*

[Name] Select/cancel user-defined character set

[Format]

ASCII	ESC	%	*n*
Hex	1B	25	*n*
Decimal	27	37	*n*

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

[Description] Selects or cancels the user-defined character set.

- When the LSB of *n* is 0, the user-defined character set is cancelled.
- When the LSB of *n* is 1, the user-defined character set is selected.

[Details]

- *n* is available only for the least significant bit.
- When the user-defined character set is cancelled, the built-in character set is automatically selected.

[Default] *n* = 0

[Reference] **ESC &**, **ESC ?**

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

[Name] Define user-defined characters

[Format]

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

[Range] $y = 3$
$32 \le c1 \le c2 \le 126$
$0 \le x \le 12$ (when Font A (12 × 24) is selected)
$0 \le x \le 9$ (when Font B (9 × 17) is selected)
$0 \le d1 \ldots d(y \times xk) \le 255$

[Description] Defines user-defined characters.

- *y* specifies the number of bytes in the vertical direction.
- *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.
- *x* specifies the number of dots in the horizontal direction.

[Details]

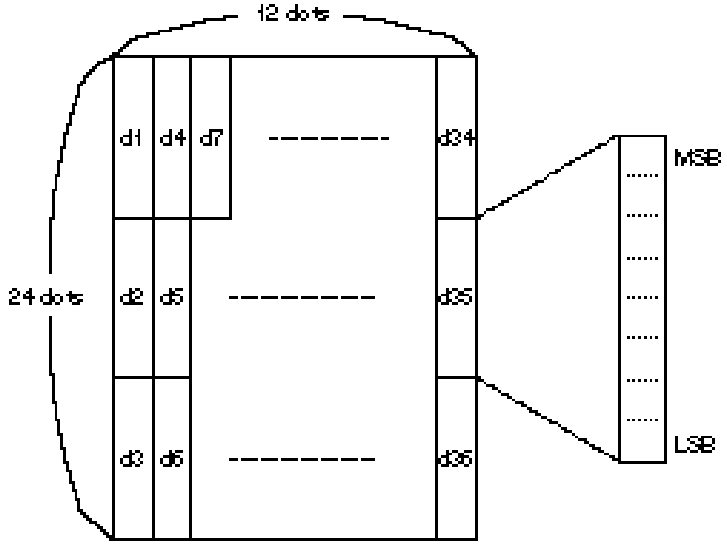
- The allowable character code range is from ASCII code <20>H to <7E>H (95 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use *c1 = c2*.
- *d* is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define user-defined characters is (*y* × *x*) bytes.
- Set a corresponding bit to 1 to print a dot or 0 not to print a dot.
- This command can define different user-defined character patterns for each font. To select a font, use **ESC !** or **ESC M**.
- User-defined characters and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definition is cleared when:
  a) **ESC** @ is executed.
  b) **GS∗** is executed.
  c) **ESC ?** is executed.
  d) The printer is reset or the power is turned off.
- When user-defined characters are defined in Font B (9 × 17), only the most significant bit of the 3rd byte of data in vertical direction is effective.

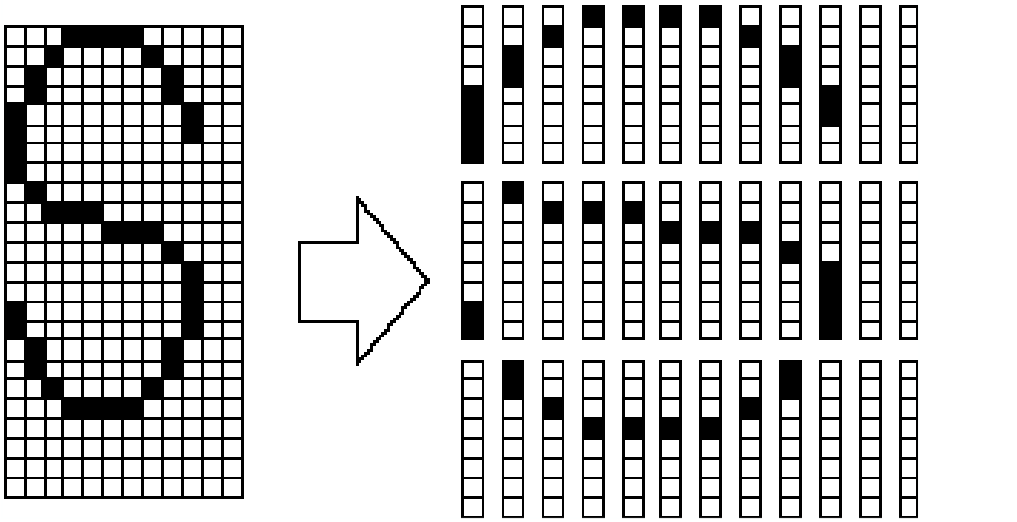
[Default] The internal character set

[Reference] **ESC %**, **ESC ?**

[Example]

• When Font A (12 × 24) is selected.



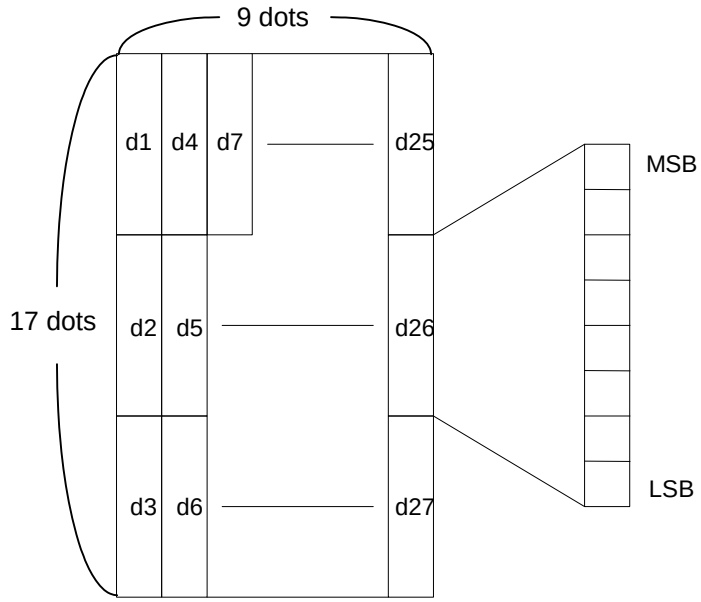


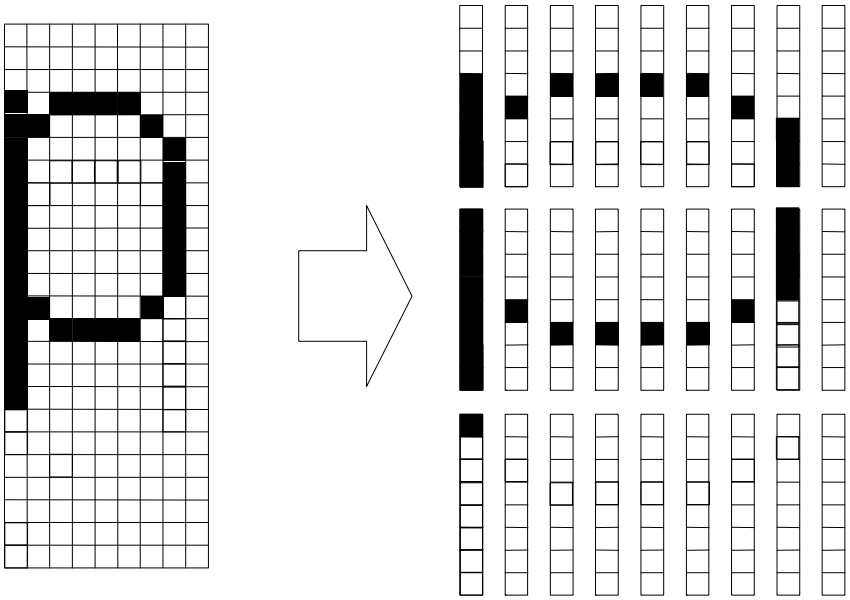
d1= <0F>H d4 = <30>H d7 = <40>H . . . .

d2 = <03>H d5 = <80>H d8 = <40>H . . . .

d3 = <00>H d6 = <00>H d9 = <20>H . . . .

• When font B (9 × 17) is selected.





d1 = <1F>H d4 = <08>H d7 = <10>H...
d2 = <FF>H d5 = <08>H d8 = <04>H...
d3 = <80>H d6 = <00>H d9 = <00>H...

*ESC * m nL nH [d1...dk]*

[Name] Select bit-image mode

[Format]

ASCII	ESC	*	*m*	*nL*	*nH*	*d1...dk*
Hex	1B	2A	*m*	*nL*	*nH*	*d1...dk*
Decimal	27	42	*m*	*nL*	*nH*	*d1...dk*

[Range] $m = 0, 1, 32, 33$

$0 \le n_L \le 255$

$0 \le n_H \le 3$

$0 \le d \le 255$

[Description] Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

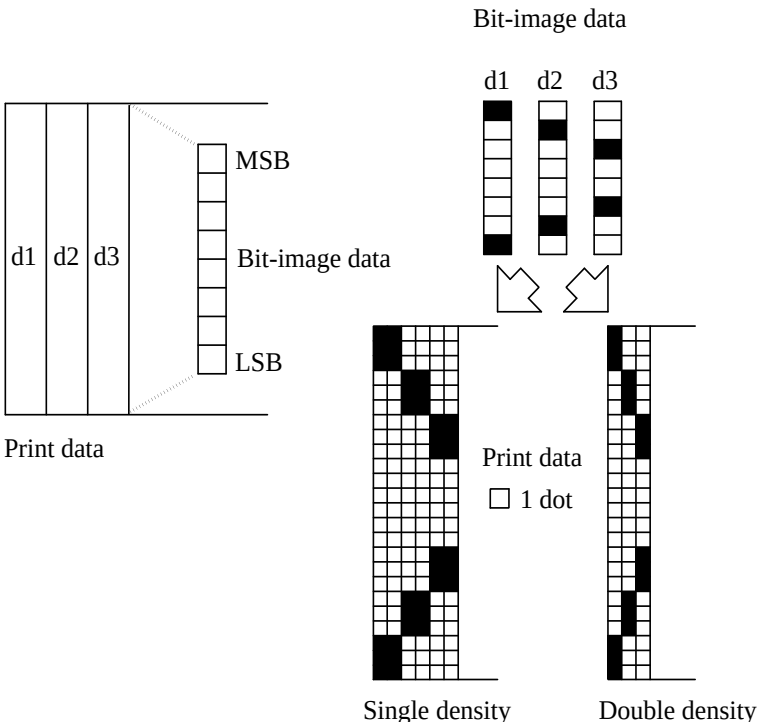
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (*k*)
0	8-dot single-density	8	67dpi	101dpi	$n_L + n_H \times 256$
1	8-dot double-density	8	67dpi	203dpi	$n_L + n_H \times 256$
32	24-dot single-density	24	203dpi	101dpi	$(n_L + n_H \times 256) \times 3$
33	24-dot double-density	24	203dpi	203dpi	$(n_L + n_H \times 256) \times 3$

[dpi: dots per inch (number of dots per 25.4 mm)]

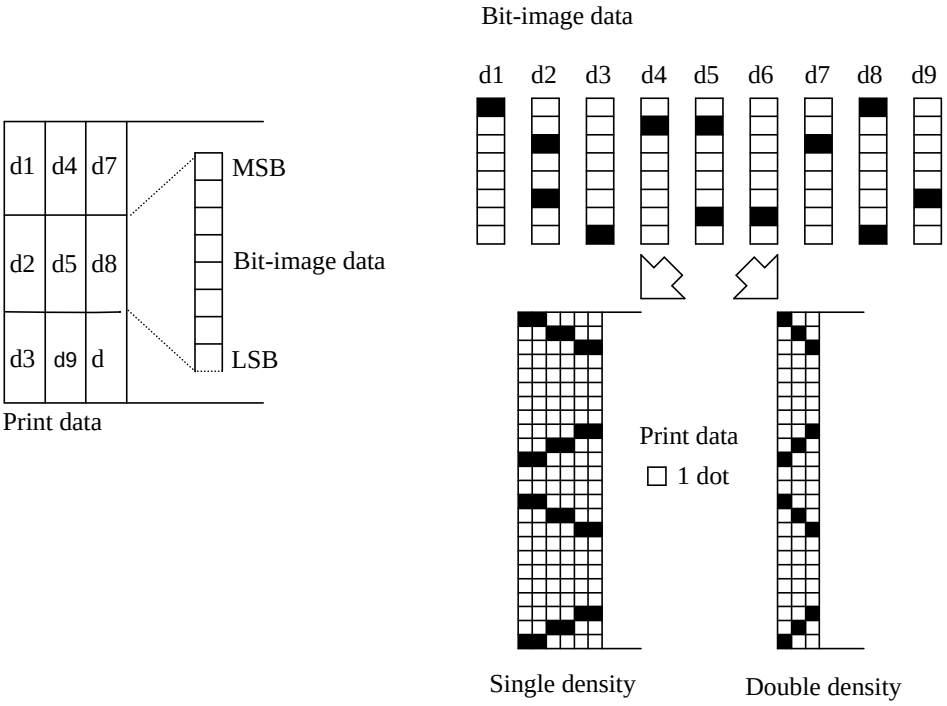
[Notes]
- When the bit image printing is performed, it is recommended to use the raster bit image printing command (**GS v 0**).
  The printing speed of the **ESC ***, is slower to the raster bit image command.
- If the value of *m* is out of the specified range, *nL* and the data following are processed as normal data.
- The *nL* and *nH* indicate the number of dots in the bit image in the horizontal direction. The number of dots is calculated by (nL + nH × 256).
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- d indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 not to print a dot.

- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC** * command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
  a) The width of the printing area is extended to the right to accommodate the amount of data.
  b) If step a) does not provide sufficient width for the data, the left margin is reduced to accommodate the data.

  For each bit of data in single-density mode (m = 0, 32), the printer prints two dots: for each bit of data in double-density mode (m = 1, 33), the printer prints one dot. This must be considered in calculating the amount of data that can be printed in one line.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except upside-down printing mode.
- The relationship between the image data and the dots to be printed is described in Figure 4.2.3.
- When 8-dot bit image is selected:



- When 24-dot bit image is selected:



ESC - *n*

[Name] Turn underline mode on/off

[Format]

ASCII	ESC	-	*n*
Hex	1B	2D	*n*
Decimal	27	45	*n*

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

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

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

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

[Default] *n* = 0

[Reference] **ESC !**

ESC 2

[Name] Select default line spacing (3.75 mm)

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Selects 3.75 mm (30 × 0.125 mm) line spacing.

[Notes]
- The line spacing can be set independently in standard mode and in page mode.

[Reference] **ESC 3**

ESC 3 *n*

[Name] Set line spacing

[Format]

ASCII	ESC	3	*n*
Hex	1B	33	*n*
Decimal	27	51	*n*

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

[Description] Sets the line spacing to [$n \times 0.125$ mm].

[Notes]
- The line spacing can be set independently in standard mode and in page mode.
- In standard mode, the vertical motion unit (y) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  a) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
  b) When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (*x*) is used.

[Default] *n* = 30

[Reference] **ESC 2**

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	*n*
Hex	1B	3F	*n*
Decimal	27	63	*n*

[Range] $32 \leq n \leq 126$

[Description] Cancels user-defined characters.

[Notes]
- This command cancels the patterns defined for the character codes specified by *n*. After the user-defined characters are cancelled, the corresponding patterns for the internal characters are printed.
- This command deletes the pattern defined for the specified code in the font selected by **ESC !**.
- If a user-defined characters have not been defined, the printer ignores this command.

[Reference] **ESC &**, **ESC %**

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@	
Hex	1B	40	
Decimal	27	64	

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

[Notes]
- The DIP switch and memory switch settings are not checked again.
- The data in the receive buffer is not cleared.

ESC D *[n1...nk] NUL*

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

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

$0 \leq k \leq 32$

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

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

[Default] The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for Font A (12 × 24).

[Reference] **HT**

ESC E *n*

[Name] Turn emphasized mode on/off

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

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

[Description] Turns emphasized mode on or off

When the LSB of *n* is 0, emphasized mode is turned off.

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

[Notes]
- Only the least significant bit of *n* is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

[Default] *n* = 0

[Reference] **ESC !**

ESC G *n*

[Name] Turn on/off double-strike mode

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

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

[Description] Turns double-strike mode on or off.
- When the LSB of *n* is 0, double-strike mode is turned off.
- When the LSB of *n* is 1, double-strike mode is turned on.

[Notes]
- Only the lowest bit of *n* is enabled.
- Printer output is the same in double-strike mode and in emphasized mode.

[Default] *n* = 0

[Reference] **ESC E**

ESC J *n*

[Name] Print and feed paper

[Format]

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

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

[Description] Prints the data in the print buffer and feeds the paper [$n \times 0.125$ mm {0.0049"}].

[Notes]

- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- In standard mode, the printer uses the vertical motion unit (*y*).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  a) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
  b) When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (*x*) is used.
- Even when the set value exceeds the maximum with the BM sensor enabled in standard mode, this command is effective. (BM =black mark.)

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description] Switches from standard mode to page mode.

[Notes]

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command has no effect in page mode.
- After printing by **FF** is completed or by using **ESC S**, the printer returns to standard mode.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:
  a) Set right-side character spacing: **ESC SP**
  b) Select default line spacing: **ESC 2, ESC 3**
- Only valve settings is possible for the following commands in page mode; these commands are not executed.
  a) Turn 90° clockwise rotation mode on/off: **ESC V**
  b) Select justification: **ESC a**
  c) Turn upside-down printing mode on/off: **ESC {**
  d) Set left margin: **GS L**
  e) Set printable area width: **GS W**
- The printer returns to standard mode when power is turned on, the printer is reset, or **ESC** @ is used.

[Reference] **FF**, **CAN**, **ESC FF**, **ESC S**, **ESC T**, **ESC W**, **GS $**, **GS **

ESC M *n*

[Name] Select character font

[Format]

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

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

[Description] Selects the character font.

n	Function
0, 48	Character Font A (12 × 24) selected.
1, 49	Character Font B (9 × 17) selected.

[Details]
- **ESC !** can also select character font types. However the setting of the last received command is effective.

[Reference] **ESC !**

ESC R *n*

[Name] Select an international character set

[Format]

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

[Range] 0 ≤ *n* ≤ 17

[Description] Selects international character set *n* from the following table:

n	Character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea
14	Slovenia/Croatia
15	China
16	Vietna
17	Arabia

[Default] *n* = 0
However, if the default of international characters is changed by **GS (E** <Function 05> <a=9>, the value specified by **GS (E** is used as the default.

[Reference] Section 3.1.45 *International Character Sets*

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] Switches from page mode to standard mode.

[Notes]

- This command is effective only in page mode.
- Data buffered in page mode is cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **ESC W** is initialized.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:
  a) Set right-side character spacing: **ESC SP**
  b) Select default line spacing: **ESC 2, ESC 3**

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

ESC T *n*

[Name] Select print direction in page mode

[Format]

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

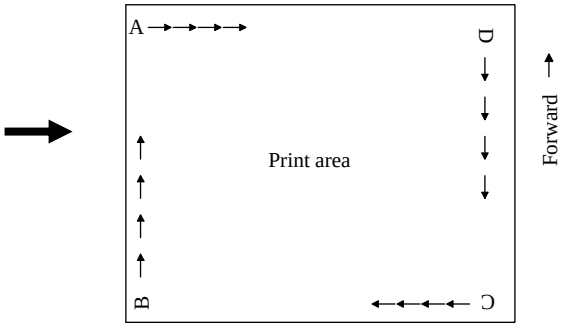
[Range] $0 \le n \le 3$

$48 \le n \le 51$

[Description] Selects the print direction and starting position in page mode.

n specifies the print direction and starting position as follows:

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



[Notes]
- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing area set by **ESC W**.

[Default] *n* = 0

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

ESC V *n*

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

[Format]

ASCII	ESC	V	*n*
Hex	1B	56	*n*
Decimal	27	86	*n*

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

[Description] Turns 90° clockwise rotation mode on/off

n is used as follows:

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

[Notes]

- When underline mode is turned on, the printer does not underline 90° clockwise-rotated characters.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.
- This command does affects printing in page mode.
- If this command is input in page mode, the printer performs only internal flag operations.

[Default] *n* = 0

[Reference] **ESC !, ESC** –

ESC W *xL xH yL yH dxL dxH dyL dyH*

[Name] Set printing area in page mode

[Format]

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

[Range] 0 ≤ *xL, xH*, *yL, yH*, *dxL*, *dxH*, *dyL*, *dyH* ≤ 255 (except *dxL*=*dxH*=0 or *dyL*=*dyH*=0)

[Description]

- The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as *x*0, *y*0, *dx* (inch), *dy* (inch), respectively.

  Each setting for the printing area is calculated as follows:

  *x*0 = [(*xL* + *xH* × 256) × 0.125 mm]

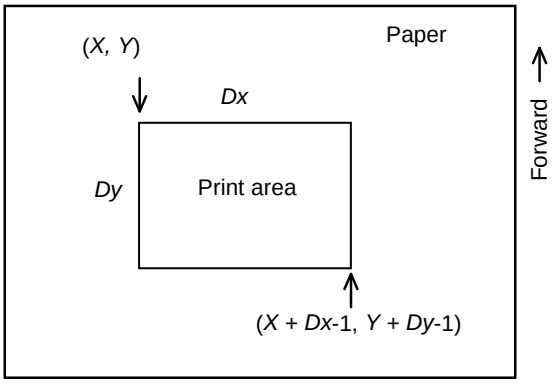
  *y*0 = [(*yL* + *yH* × 256) × 0.125 mm]

  dx = [(*dxL* + *dxH* × 256) × 0.125 mm]

  dy = [(*dyL* + *dyH* × 256) × 0.125 mm]

[Notes]

- If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area - horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting position).
- Use 0.125 mm {0.0049"} pitch for setting the horizontal starting position and printing area width, and use 0.125 mm pitch for setting the vertical starting position and printing area height.
- When the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as *X*, *Y*, *Dx*, and *Dy* respectively, the printing area is set as shown in the figure below.



- See Section 2.2, *Explanation of Terms* in Detail for the Printable Area.

[Default] $x_L = x_H = y_L = y_H = 0$

dx_L, dx_H, dy_L, and dy_H are as follows: (The default setting is the maximum area for each model.)

Number of dots in horizontal	Default value
576 dots	$dx_L = 64$, $dx_H = 2$, $dy_L = 226$, $dy_H = 2$

[Reference] **CAN**, **ESC L**, **ESC T**

ESC \ *nL nH*

[Name] Set relative print position

[Format]

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

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

$0 \le n_H \le 255$

[Description] Sets the print starting position based on the current position using horizontal or vertical motion units.

- This command sets the distance from the current position to [$(n_L + n_H \times 256) \times 0.125$ mm]

[Notes]

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

  $n_L + n_H \times 256 = N$

  When pitch *N* is specified to the left (the negative direction), use the complement of 65536.

  When pitch *N* is specified to the left:

  $n_L + n_H \times 256 = 65536 - N$
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
  1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (*x*) is used.
  2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (*y*) is used.

[Reference] **ESC $**

ESC a *n*

[Name] Select justification

[Format]

ASCII	ESC	a	*n*
Hex	1B	61	*n*
Decimal	27	97	*n*

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

[Description] Aligns all the data in one line to the specified position.

n selects the justification as follows:

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

[Notes]

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command has no effect in page mode.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT, ESC $** or **ESC **.

[Default] *n* = 0

[Example]

Left justification

```
ABC
ABCD
ABCDE
```

Centering

```
 ABC
ABCD
ABCDE
```

Right justification

```
  ABC
 ABCD
ABCDE
```

ESC c 3 *n*

[Name] Select paper-end sensor(s) to output paper-end signals

[Format]

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

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

[Description] Selects whether the specified paper sensor(s) to output paper end signals when a paper end is detected.

Bit	Hex	Decimal	Function
0	—	—	Undefined
1	00	0	Disables roll paper near-end sensor.
	02	2	Enables roll paper near-end sensor.
2	—	—	Undefined
3	00	0	Disables roll paper end sensor.
	08	8	Enables roll paper end sensor.
4 - 7	—	—	Undefined

[Notes]
- Multiple paper sensors can be selected. If multiple paper sensors are made valid, a paper-end signal is output when one of them detects a paper-out.
- This command is enabled only with the parallel interface type.

[Default] *n* = 0

ESC c 4 *n*

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

[Format]

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

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

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

Bit	Hex	Decimal	Function
0	—	—	Undefined.
1	00	0	Roll paper near-end sensor disabled.
	02	2	Roll paper near-end sensor enabled.
2-7	—	—	Undefined.

[Notes]
- When a paper sensor is enabled with this command, printing stops after printing of the current line and paper feeding has finished.
- When a paper-end is detected by the roll paper sensor, the printer goes offline after printing stops.
- When either bit 1 is on, the printer selects the roll paper near-end sensor for the paper sensor to stop printing.

[Default] *n* = 0

ESC c 5 *n*

[Name]	Enable/disable panel buttons				
[Format]	ASCII	ESC	c	5	*n*
	Hex	1B	63	35	*n*
	Decimal	27	99	53	*n*
[Range]	0 ≤ *n* ≤ 255				

[Description] Enables or disables the panel buttons.

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

[Notes]
- Only the lowest bit of *n* is valid.
- When the panel buttons are disabled, none of them are usable when the printer cover is closed.
- In this printer, the only panel buttons is the FEED button.

[Default] *n* = 0

ESC d *n*

[Name]	Print and feed *n* lines			
[Format]	ASCII	ESC	d	*n*
	Hex	1B	64	*n*
	Decimal	27	100	*n*
[Range]	0 ≤ *n* ≤ 255			

[Description] Prints the data in the print buffer and feeds *n* lines.

[Notes]
- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 1015 mm {40"}. If the paper feed amount (n × line spacing) of more than 1015 mm {40"} is specified, the printer feeds the paper only 1015 mm {40"}.
- Even when the set value exceeds the maximum with the BM sensor enabled in standard mode, this command is effective. (BM = black mark.)

[Reference] **ESC 2**, **ESC 3**

ESC t *n*

[Name] Select character code table

[Format]

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

[Range] $0 \le n \le 5$, $11 \le n \le 21$, $n = 26$, $30 \le n \le 53$, $n = 255$

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

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

n	Specified page [Font type]
0	Page 0 [PC437 (USA: Standard Europe)]
1	Page 1 [Katkana]
2	Page 2 [PC850 (Multilingual)]
3	Page 3 [PC860 (Portuguese)]
4	Page 4 [PC863 (Canadian-French)]
5	Page 5 [PC865 (Nordic)]
11	Page 11 [PC851(Greek)]
12	Page 12 [PC853(Turkish)]
13	Page 13 [PC857(Turkish)]
14	Page 14 [PC737(Greek)]
15	Page 15 [ISO8859-7(Greek)]
16	Page 16 [WPC1252]
17	Page 17 [PC866 (Cyrillic #2)]
18	Page 18 [PC852 (Latin2)]
19	Page 19 [PC858 (Euro)]
20	Page 20 [KU42]
21	Page 21 [TIS11(Thai)]
26	Page 26 [TIS18(Thai)]
30	Page 30 [TCVN-3(Vietnamese)]
31	Page 31 [TCVN-3(Vietnamese)]
32	Page 32 [PC720]
33	Page 33 [WPC775]
34	Page 34 [PC855(Cylillic)]
35	Page 35 [PC861(Icelandic)]
36	Page 36 [PC862(Hebrew)]
37	Page 37 [PC864(Arabic)]
38	Page 38 [PC869(Greek)]
39	Page 39 [ISO8859-2(Latin2)]
40	Page 40 [ISO8859-9(Latin9)]
41	Page 41 [PC1098(Farsi)]
42	Page 42 [724(Lithuanian)]
43	Page 43 [722(Lithuanian)]

n	Specified page [Font type]
44	Page 44 [PC1125(Ukrainian)]
45	Page 45 [WPC1250]
46	Page 46 [WPC1251]
47	Page 47 [WPC1253]
48	Page 48 [WPC1254]
49	Page 49 [WPC1255]
51	Page 51 [WPC1257]
52	Page 52 [WPC1258]
53	Page 53 [KZ1048(Kazakhstan)]
255	Page 255 [User-defined page]

[Default] *n* = 0

However, if the default of character code page is changed by **GS (E** <Function 05> <*a*=8>, the value specified by **GS (E** is used as the default.

[Reference] Section 3.1 *Character Code Tables*

ESC { *n*

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

[Format]

ASCII	ESC	{	*n*
Hex	1B	7B	*n*
Decimal	27	123	*n*

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

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

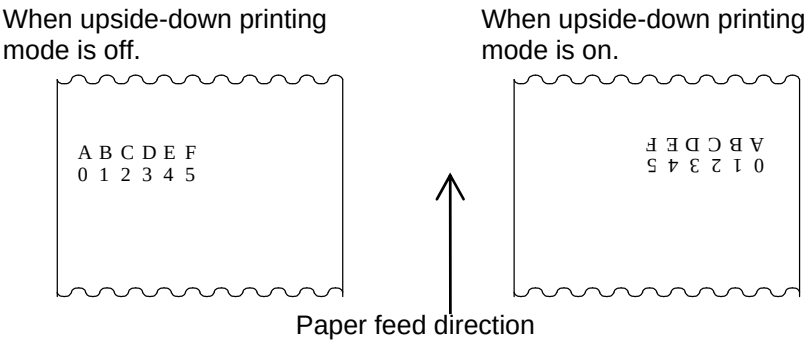
- When the LSB of *n* is 0, upside-down printing mode is turned off.
- When the LSB of *n* is 1, upside-down printing mode is turned on.

[Notes]

- Only the lowest bit of *n* is valid.
- This command is enabled only when processed at the beginning of a line in standard mode.
- This command does not affect printing in page mode.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

[Default] *n* = 0

[Example]



FS (z *pL pH fn [parameter]*

[Name] Control option device(s)

[Format]

ASCII	FS	(	z	*pL*	*pH*	*fn*	*[parameter]*
Hex	1C	28	7A	*pL*	*pH*	*fn*	*[parameter]*
Decimal	28	40	122	*pL*	*pH*	*fn*	*[parameter]*

[Range] $1 \le pL + pH \times 256 \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
$1 \le fn \le 255$
As the parameter value is function-dependent, see the description of each function for details.

[Default] Depends on function

[Description]
- Executes the process related to the control option device, depending on the specified function code *m*.

m	Format	Function No.	Description
1	**FS (z *pL pH fn n***	1	Sets the operating mode (slip/continuous feed) of the presenter
3	**FS (z *pL pH fn n***	3	Executes paper transport (Reject) of fed paper
4	**FS (z *pL pH fn n***	4	Selects designation or cancellation of notification transmission
100	**FS (z *pL pH fn n***	100	Executes preparation to change paper roll

[Details]
- Function code m determines the command function and appropriate parameter. See the description of each function for details.
- When ($pL + pH \times 256$) exceeds the data size specified for a particular function, the byte specified after pH is treated as a parameter, so after reading the specified data size, the next [($pL + pH \times 256$) – (specified data size)] bytes are read and discarded.
- When ($pL + pH \times 256$) exceeds the valid processing unit for a function, the processing unit data following pH is treated as a parameter, so after reading the required data size, the number of bytes that do not correspond to the processing unit and equal to the remaining ($pL + pH \times 256$) bytes are read and discarded.
- This command is ignored when any of the following parameter conditions are encountered:
  a) If ($pL + pH \times 256$) is smaller than the specified value for each function
  b) If the function *fn* is not defined
  c) If function code *m* is not present
  d) If any *parameter* is outside of the specified range
- Function processing begins when all parameters are determined to have valid values.
- This command cannot execute when offline, because data in the receive buffer is not processed.

<Function 1> **FS (z *pL pH fn n*** (when ***fn* =1**)

[Format]

ASCII	FS	(	z	*pL*	*pH*	*fn*	*n*
Hex	1C	28	7A	*02*	*00*	*01*	*n*
Decimal	28	40	122	*2*	*0*	*1*	*n*

[Range] ($pL + pH \times 256$) = 2 (*pL* = 2, *pH* = 0)
fn = 1
n = 0, 1, 48, 49

[Default] *n* = 0

[Description]
- The operating mode of the presenter is set by *n*.

n	Function
0, 48	Specifies the slip issuing mode
1, 49	Specifies the continuous paper issuing mode

[Details]
- Each operation mode of the presenter differs as follows:
  - Slip issuing mode:
    Does not present the paper outside from the presenter while printing.
  - Continuous paper issuing mode:
    Feeds the paper outside from the presenter while printing.

<Function 3> **FS (z *pL pH m n*** (when ***fn* = 3**)

[Format]

ASCII	FS	(	z	*pL*	*pH*	*fn*	*n*
Hex	1C	28	7A	*02*	*00*	*03*	*n*
Decimal	28	40	122	*2*	*0*	*3*	*n*

[Range] ($pL + pH \times 256$) = 2 (*pL* = 2, *pH* = 0)
fn = 3
n = 0, 48

[Default] none

[Description]
- The process specified by *n* is executed upon the paper being transported.

n	Function
0, 48	Eject the paper

[Details]
- The settings for this function affect the handling of fed papers in both Slip and Continuous feed modes.
- This command is ignored when no paper is being transported at the output slot.
- When this function is executed, the machine does not wait for paper to be removed.

<Function 4> **FS (z *pL pH fn n m*** (when ***fn* = 4**)

[Format]

ASCII	FS	(	z	*pL*	*pH*	*fn*	*n*	*m*
Hex	1C	28	7A	*03*	*00*	*04*	*n*	*m*
Decimal	28	40	122	3	*0*	*4*	*n*	*m*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
fn = 4
n = 49
m = 0, 1, 48, 49

[Default] Disable notification sending (n = 49, m = 0)

[Description] Set n to select whether or not notification is to be sent.
m determines the state of notification

m	Function
0, 48	Disable notification sending
1, 49	Enable notification sending

[Details] The data structure of “Paper Transport Results” notification is as follows:

Result Notification	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	2DH	45	1 byte
c) Process Result	20H - 7EH	32 - 126	1 byte
d) NUL	00H	0	1 byte

Process results are as follows:

Identifier	Meaning	Remarks
20H	Paper has been removed	
23H	Command succeeded to eject	
24H	Command failed to eject	
25H	No paper to transport	
26H	Command succeeded to eject backward	Corresponds to Function100
27H	Command failed to eject backward	

[Important Note]
If the command is issued to disable notification when a notification condition has occurred, the unsent notification is not sent, but is discarded.

<Function 100> **FS (z *pL pH fn n*** (when ***fn* = 100**)

[Format]	ASCII	FS	(	z	*pL*	*pH*	*fn*	*n*
	Hex	1C	28	7A	*02*	*00*	*64*	*n*
	Decimal	28	40	122	*2*	*0*	*100*	*n*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 100
n = 48

[Default] none

[Description] Execute preparation to change paper roll.
In this product, the paper is output backward.

GS FF

[Name] Feed marked paper to print starting position

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

[Description] Feeds the marked paper to the print starting position.

[Notes]
- This command is enabled only when the BM sensor is set to be effective using with DIP SW 7.
- This command sets the next print position to the beginning of the line.
- Even if this command is executed at the print starting position of the marked paper, the printer does not feed the marked paper to the next print starting position.

[Reference] **GS (F, FF**, Section 1.4.1, DIP switch, 1.5. Memory switches

GS ! n

[Name] Select character size

[Format]

ASCII	GS	!	*n*
Hex	1D	21	*n*
Decimal	29	33	*n*

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

($1 \le$ vertical number of times ≤ 8, $1 \le$ horizontal number of times ≤ 8)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

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

Table 1 Character Width Selection

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

Table 2 Character Height Selection

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

[Notes]

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

[Default] *n* = 0

[Reference] **ESC !**

GS $ *nL nH*

[Name] Set absolute vertical print position in page mode

[Format]

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

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

[Description]
- Sets the absolute vertical print starting position to buffer character data in page mode.
- This command sets the absolute print position to [$(n_L + n_H \times 256) \times 0.125$ mm].

[Notes]
- This command is effective only in page mode.
- If the [$(n_L + n_H \times 256) \times$ (vertical or horizontal motion units)] exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move.
- The reference starting position is that specified by **ESC T**.
- This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:
  a) When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.
  b) When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.

[Reference] **ESC $**, **ESC T**, **ESC W, ESC **, **GS **, Section 4.2, *Page Mode*

GS ∗ *x y [d1...d(x × y × 8)]*

[Name] Define downloaded bit image

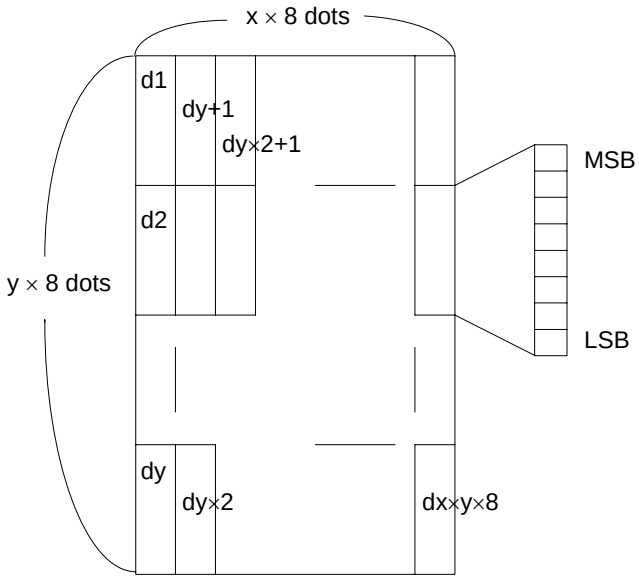
[Format]

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

[Range] $1 \le x \le 255$
$1 \le y \le 48$ (where $x \times y \le 1536$)
$0 \le d \le 255$

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

[Notes]
- The number of dots in the horizontal direction is $x \times 8$; in the vertical direction it is $y \times 8$.
- If $x \times y$ is out of the specified range, this command is disabled.
- The *d* indicates bit-image data. Data (*d*) specifies a bit printed as 1 and not printed as 0.
- The downloaded bit image definition is cleared when:
  a) **ESC** @ is executed.
  b) **ESC &** is executed.
  c) Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **GS *I***

GS (A *pL pH n m*

[Name] Execute test print

[Format]

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

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

[Description]
- Executes a test print with a specified test pattern on a specified paper.
- p_L, p_H specifies (p_L + (p_H ×256)) for the number of bytes after p_H (*n and m*).

n specifies the paper to be tested.

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

m specifies a test pattern.

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

[Details]
- This command has enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- After the test print is finished, the printer resets itself automatically. Therefore, data already defined before this command is executed, such as user-defined characters, and downloaded bit image, becomes undefined; the receive buffer and print buffer are cleared; and each setting returns to the default value. The printer also re-reads the DIP switch settings.
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is executed.

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

[Name] Edit user NV memory

[Format]

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

[Range] $3 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
$m = 0$
$0 \le fn \le 255$
$b = 0$
$32 \le c1 \le 126$ (20H $\le c1 \le$ 7EH)
$32 \le c2 \le 126$ (20H $\le c2 \le$ 7EH)
$32 \le d \le 254$ (20H $\le d \le$ FEH)
$k = (pL + pH \times 256) - 5$

[Default] All memory space free (default)

[Description]
- Executes the user NV memory editing procedure specified by function code *fn*.

fn	Format	Function No.	Function
0, 48	**GS (C *pL pH m fn b c1 c2***	0	Deletes the specified record
1, 49	**GS (C *pL pH m fn b c1 c2 d1...dk***	1	Stores data in the specified record
2, 50	**GS (C *pL pH m fn b c1 c2***	2	Sends the data in the specified record
3, 51	**GS (C *pL pH m fn b***	3	Sends the size of used space (bytes in use)
4, 52	**GS (C *pL pH m fn b***	4	Sends the size of free space (bytes not used)
5, 53	**GS (C *pL pH m fn b***	5	Sends the keycode list indexing the stored data
6, 54	**GS (C *pL pH m fn b d1 d2 d3***	6	Clears all NV memory

[Details]
- When ($pL + pH \times 256$) exceeds the data size specified for a particular function, the byte specified after *pH* is treated as a parameter, so after reading the specified data size, the next [($pL + pH \times 256$) – (specified data size)] bytes are read and discarded.
- This command Is ignored when any of the following parameter conditions are encountered:
  - If ($pL + pH \times 256$) is smaller than the value specified for the function
  - If ($pL + pH \times 256$) is larger than the value specified for the function, and (pL + ($pH \times 256$)) is specified as a variable
  - If *m* is out of range
  - If *fn* is not a defined function code
  - If *b* is out of range
  - If the keycode (*c1, c2*) is out of range
- See the specification of each function for handling of other parameters when out of range.

- A function is processed after all parameters are determined to be valid.
- If this command is ignored, memory contents are left unchanged and data is not transferred.
- This command cannot execute when offline, because data in the receive buffer is not processed.
- Once this command has been stored in the receive buffer, it is executed as valid commands are processed sequentially. So depending on the status of the buffer, some delay can be expected from the time it is received until it executes.

[Details: Deleting and writing data in NV memory]

- Before deleting or writing data in NV memory, the status of the printer interface is forced to BUSY (overriding settings even in models that allow BUSY status setting by DIP switch).
- Real-time commands are ignored.
- The printer does not transmit the ASB status even when the ASB function is enabled. If the ASB status changes while writing to NV memory, it is sent after writing is finished.

[Details: Data transfer processing]

- While [Header ~ NUL] data is being transferred, the following processes are affected:
  - Mechanical operations such as head initialization by opening the platen or manual paper feed by button are disabled. Required mechanical operations can be done after data has been transferred.
  - Real-time commands are ignored.
  - The printer does not transmit the ASB status even if the ASB function is enabled. If the ASB status changes while writing to NV memory, it is sent after writing is finished.
  - Handshaking control is performed for data transfers of Functions 2 and 5.

[Details: Handshaking control for data transfers]

- Handshaking control is performed during the some of the data transfer functions of this command, so that after data is transferred subsequent processes can be executed upon response from the host.

  The structure of the data blocks are as follows when handshaking is performed.

Transfer Data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	70H or 71H	112 or 113	1 byte
c) Status	see below	see below	1 byte
d) Data	(*)	(*)	1 - 80 bytes
e) NUL	00H	0	1 byte

(*) “Data” consists of the data based on the specification of each function.

The structure of c) Status is as follows:

bit	Function	Value	
		0	1
0	Another data block to follow	End of data	Continued
1 - 5	(undefined)	0 (fixed)	
6	Fixed	1 (fixed)	
7	Fixed	0 (fixed)	

Bit0: When data is transferred in multiple blocks, bit 0 = 0 only in the last block. For all other blocks, bit 0 = 1. Also, bit 0 = 0 when all data is transferred in one block.

- The handshake control procedure is as follows:
  1) READY→BUSY processing is performed. If the status is already BUSY, no change occurs.
  2) Header ~ NUL data is transferred. (Header ~ NUL data details are described elsewhere)
  3) BUSY→READY processing is performed. If the status is already BUSY due to another condition, the READY status is enabled when that condition clears.
  4) Wait for a response code from the host.

Response Code			Request Contents
ASCII	Hex	Decimal	
ACK	06H	6	Request to send next data
NAK	15H	21	Request to resend previous data
CAN	18H	24	Request to stop transfer process
Other			Same request as CAN

  5) The processing in response to each Response Code is as follows. (Status details are described elsewhere)

Response	Status	Request Contents
ACK	Continue	Start sending the next data block
	Done	Finish processing this command
NAK	Continue	Resend previous data block
	Done	Resend previous data block
CAN	Continue	Finish processing this command Any unsent data is not sent
	Done	Finish processing this command
Other	Continue	Same as CAN processing
	Done	Same as CAN processing

  - Continue (Status: bit 0 = 1) / Done (Status: bit 0 = 0)
- When data is sent in multiple blocks, after the first block has been sent, items 1) – 5) are sent again until the last block has been transferred (Status: bit 0 = 0).
- When all data is transferred in one block, or when the last data block is transferred, items 1) – 5) provide handshake processing.
- The usual processes (real-time command processing, ASB processing, mechanical control, etc.) are performed while awaiting response from the host. However, the code of real-time commands processed at this time is treated as response from the host, causing processing of this command to be stopped.

[Notes]

- Frequent write command executions by a NV memory write command (**FS q**, **GS (C**, **GS (E**, **GS (F**, or **GS (M**) may damage the NV memory. Therefore, it is recommended to limit writing data with the write command into the NV memory to 10 times or less a day.
- When the printer becomes BUSY during processing of this command, it is prohibited to transmit data.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

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

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1 c2*
Hex	1D	28	43	*05*	*00*	*00*	*fn*	*00*	*c1 c2*
Decimal	29	40	67	*5*	*0*	*0*	*fn*	*0*	*c1 c2*

[Range]

($pL + pH \times 256$) = 5 (pL = 5, pH = 0)
m = 0
fn = 0, 48
b = 0
$32 \leq c1 \leq 126$ (20H ≤ $c1$ ≤ 7EH)
$32 \leq c2 \leq 126$ (20H ≤ $c2$ ≤ 7EH)

[Description]

- Erases the specified record from user NV memory
- The cleared memory space is returned to the unused area.
- If an error occurs during the erasure process, Memory Error processing is performed.

[Details]

- When Standard mode is selected, this command is valid only when at the beginning of a line. This command is ignored if it appears anywhere other than at the beginning of a line.
- This command is ignored when the Page mode is selected.
- For details of NV memory data deletion processing, see “Deleting or writing data in NV memory.”

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

[Format]	ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1 c2 d1...dk*
	Hex	1D	28	43	*pL*	*pH*	*00*	*fn*	*00*	*c1 c2 d1...dk*
	Decimal	29	40	67	*pL*	*pH*	*0*	*fn*	*0*	*c1 c2 d1...dk*

[Range] $6 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
$m = 0$
$fn = 1, 49$
$b = 0$
$32 \le c1 \le 126$ (20H $\le c1 \le$ 7EH)
$32 \le c2 \le 126$ (20H $\le c2 \le$ 7EH)
$32 \le d \le 254$ (20H $\le d \le$ FEH)
$k = (pL + (pH \times 256)) - 5$

[Description]
- Writes data *d1...dk* into the record specified by *c1, c2*.
  - If the specified record is already present, overwrite processing is performed.
  - If the specified record is not present, new storage processing is performed.
  - The writing data size processed is ($pL + (pH \times 256)) - 5$ bytes.
    A terminator (FFH) is appended automatically when data is stored.
- The writing data format is [keycode (*c1, c2*) + data to store (*d1...dk*) + terminator (FFH)].
  If an error occurs during the write process, Memory Error processing is performed.

[Details]
- This command is ignored if [Write Data Size (($pL + pH \times 256) - 5$ byte) + 3 (*c1*, *c2*, FFH)] exceeds available NV memory.
- If any of the processing data is outside of the defined range for any of the data to be stored (*d1...dk*), processing of this command is aborted, and the remaining (($pL + pH \times 256$) – total finished process data size) bytes are read and discarded.
  At this point, data that has already been processed is stored in memory.
- When Standard mode is selected, this command is valid only when at the beginning of a line. This command is ignored if it appears anywhere other than at the beginning of a line.
- This command is ignored when the Page mode is selected.
- This command stores data by overwriting, so if a record that has already been written is specified again, all of the data that was stored in that record in NV memory is erased and replaced with the new data.
- The size of the NV memory used by this function is equal to [keycode (2 bytes) + write data (($pL + pH \times 256) - 5$ bytes) + terminator (1 byte).
- The data [keycode (*c1, c2*) + character string + terminator (FFH)] is processed as a single record. Keycodes are searched in order from the beginning of NV memory (addresses 00H, 01H, 02H...etc.), and the data between the first matching keycode to the terminator (FFH) is added as a stored record.
- If the data to be stored matches existing memory data, the write process is not performed.
- For details of The NV memory data write process, see “Deleting or writing data in NV memory.”

<Function 2> **GS (C *pL pH m fn b c1 c2*** (when *fn* = 2, 50)

[Format]	ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1 c2*
	Hex	1D	28	43	*05*	*00*	*00*	*fn*	*00*	*c1 c2*
	Decimal	29	40	67	*5*	*0*	*0*	*fn*	*0*	*c1 c2*

[Description] Transfers the data stored in the specified record.

[Range] ($pL + pH \times 256$) = 5 (pL = 5, pH = 0)
m = 0
fn = 2, 50
b = 0
$32 \leq c1 \leq 126$ (20H ≤ *c1* ≤ 7EH)
$32 \leq c2 \leq 126$ (20H ≤ *c2* ≤ 7EH)

[Description]
- Data stored in the record specified by *c1, c2* is sent.
  - The following data is sent when the specified record is found:

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	70H	112	1 byte
c) Status	40H or 41H	64 or 65	1 byte
d) Data	(see below)	(see below)	1 - 80 bytes
e) NUL	00H	0	1 byte

  - If the specified record is found but a data fault occurs, the following is sent:

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	70H	112	1 byte
c) Status	40H	64	1 byte
d) Data	FFH	255	1 byte
e) NUL	00H	0	1 byte

Data faults:

a) No data was stored.

b) Invalid data found in the record.
(Invalid data=Hex 00H - 1FH / Decimal 0 - 31)

- If a problem is encountered accessing memory data, the following is sent:

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	70H	112	1 byte
c) Status	40H	64	1 byte
d) NUL	00H	0	1 byte

Memory data access problems:

a) The specified keycode (*c1, c2*) cannot be found.

b) Terminator (FFH) cannot be found.

- This function uses handshaking control when transferring data.

[Details]

- The data [keycode (*c1, c2*) + character string + terminator (FFH)] is processed as a single record. Keycodes are searched in order from beginning of NV memory (addresses 00H, 01H, 02H...etc.), and the data from the first matching keycode to the terminator (FFH) is recognized as the data to be sent.
- This function does not change or erase memory contents.
- Item d) Data does not include the keycode (*c1, c2*) or terminator (FFH). If the data length is greater than 80 bytes, it is send by multiple block transfers.
  - When a block transfer is to be continued, item c) Status is 41H (bit 0 = 1).
  - When the last block is transferred, item c) Status is 40H (bit 0 = 0).
- See “Data transfer processing” and “Handshaking control for data transfers” for data transfer processing details.

<Function 3> **GS (C *pL pH m fn b*** (when *fn* = 3, 51)

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*03*	*00*	*00*	*fn*	*00*
Decimal	29	40	67	*3*	*0*	*0*	*fn*	*0*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
m = 0
fn = 3, 51
b = 0

[Description]
- Requests the size of used memory (number of bytes occupied) be sent.
  - Structure of transferred data block

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	28H	40	1 byte
c) Used Memory	(*)	(*)	1 - 8 bytes
d) NUL	00H	0	1 byte

(*) Definition of Used Memory

- Used memory is the size of stored data, in bytes.
- The size of used memory is indicated by an ASCII-coded decimal value sent MSD first.
- Byte values are 30H - 39H, and the number of bytes is variable.

[Details]
- The stored data size value includes keycodes and terminators. Also, when the stored data is not contiguous, the space between the data records is included.
  Example: If the memory contents are [$ 1 abcdef FFH FFH FFH $ 2 abcd$3efg FFH FFH FFH FFH FFH FFH], the used memory size is 23 bytes.
- The decimal value is ASCII coded as follows:
  Example1: If the used memory is 120 bytes, three bytes are used to encode "120" as 31H, 32H, 30H.
  Example2: If no memory is used, one byte is used to encode "0" as 30H.
  Used memory size (obtained by this function) + unused memory size (function code 4, 52) = the total user NV memory capacity.
- This function does not change or erase memory contents.
- Handshaking control is not used for data transfers with this function.
- See “Data transfer processing” for data transfer processing details.

<Function 4> **GS (C *pL pH m fn b*** (when *fn* = 4, 52)

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*03*	*00*	*00*	*fn*	*00*
Decimal	29	40	67	*3*	*0*	*0*	*fn*	*0*

[Range] ($pL + pH \times 256$) = 3 (*pL* = 3, *pH* = 0)
m = 0
fn = 4, 52
b = 0

[Description]
- Requests the amount of unused NV memory (number of bytes free) be sent.
- Structure of transferred data block

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	28H	40	1 byte
c) Used Memory	(*)	(*)	1 - 8 bytes
d) NUL	00H	0	1 byte

(*) Definition of c) Unused Memory

- Unused memory is the size of free (available) NV memory, in bytes.
- The size of unused memory is indicated by an ASCII-coded decimal value sent MSD first.
- Byte values are 30H - 39H, and the number of bytes is variable.

[Details]
- When data in the unused memory has the same value as the terminator, the space after the last terminator is included in the unused memory size.

  Example: If the memory contents are [$ 1 abcdef FFH $ 2 abcd$3efg FFH FFH FFH FFH FFH FFH], the unused memory size is 5 bytes.

- The decimal value is ASCII coded as follows:

  Example1: If the total memory capacity is 256 bytes, 120 bytes of which are used, the 136 bytes of unused memory is encoded in a 3-byte value as 31H, 33H, 36H.

  Example2: If the total memory capacity is 256 bytes, of which none is used, the unused memory size is encoded in the 3-byte value 32H, 35H, 36H.

  Unused memory size (obtained by this function) + used memory size (function code 3, 51) = the total user NV memory capacity.

- This function does not change or erase memory contents.
- Handshaking control is not used for data transfers with this function.
- See “Data transfer processing” for data transfer processing details.

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

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*03*	*00*	*00*	*fn*	*00*
Decimal	29	40	67	*3*	*0*	*0*	*fn*	*0*

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

[Description]
- Requests the keycode of a record in user NV memory be sent.
- If the record is present, the following data is sent:

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	71H	113	1 byte
c) Status	40H or 41H	64 or 65	1 byte
d) Data	(*)	(*)	2 - 80 bytes
e) NUL	00H	0	1 byte

(*) d) Data is the enumerator for the keycode (described below)

- Keycodes are the two-byte (*c1*, *c2*) pairs stored in the keycode list by Function 1, 49, which serve as enumerators for the data blocks in memory.
  Example: For the memory contents
  [**$ 1** abcdef FFH **$ 2** abcd$3efg FFH **% 1** abcd$3efg FFH FFH],
  the keycode list is the six bytes “$1$2%1”.
- If a keycode represents more than 40 characters (80 bytes), item d) Data consists of the maximum 80 bytes allowed for transfer, and:
  • If there is more data to transfer, item c) Status is set to 41H (bit 0 = 1), or
  • if the last block is being transferred, item c) Status is set to 40H (bit 0 = 0)

- If the record is not present, the following data is sent:

Transmission data	Hex	Decimal	Amount of data
a) Header	37H	55	1 byte
b) Identifier	71H	113	1 byte
c) Status	40H	64	1 byte
d) NUL	00H	0	1 byte

This function uses handshaking control when transferring data.

[Details]
- One record consists of [keycode (2 byte) + character string + terminator (FFH)].
- If terminator corresponding to a keycode is not found, the record is not recognized.
- Validity of data within the record is not checked.
- This function does not change or erase memory contents.
- See “Data transfer processing” and “Handshaking control for data transfers” for data transfer processing details.

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

[Format]	ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*
	Hex	1D	28	43	*06*	*00*	*00*	*fn*	*00*	*43*	*4C*	*52*
	Decimal	29	40	67	*6*	*0*	*0*	*fn*	*0*	*67*	*76*	*82*

[Range] (*pL* + *pH* × 256) = 6 (*pL* = 6, *pH* = 0)
m = 0
fn =6, 54
b = 0
d1 = 67 (character "C")
d2 = 76 (character "L")
d3 = 82 (character "R")

[Description]
- Erases all data in user NV memory.
- All memory is returned to the unused state.
- If an error occurs during data erasure, Memory Error processing is performed.

[Details]
- When Standard mode is selected, this command is valid only when at the beginning of a line. This command is ignored if it appears anywhere other than at the beginning of a line.
- This command is ignored when the Page mode is selected.
- After this function executes, Function 3 returns 0 bytes for the size of used memory.

GS (E *pL pH fn [parameter]*

[Name] User-defined commands

[Description]
- The user-defined commands control the values which are stored in the user NV memory.
  The functions are selected by *fn* as follows:

fn	Format	Function	
1	**GS (E *pL pH fn d1 d2***	1	Enters the user-defined mode
2	**GS (E *pL pH fn d1 d2 d3***	2	Ends the user-defined mode
3	**GS (E *pL pH fn [a1 b18...b11]...[ak bk8...bk1]***	3	Sets the customized data to the memory switch
4	**GS (E *pL pH fn a***	4	Transmits the customized data in the memory switch
5	**GS (E *pL pH fn*** ***[a1 n1L n1H] ... [ak nkL nkH]***	5	Set the customized setting values
6	**GS (E *pL pH fn a***	6	Transmit the customized setting values
11	**GS (E *pL pH fn a d1...dk***	11	Sets the configuration item for the serial interface.
12	**GS (E *pL pH fn a***	12	Transmits the configuration item for the serial interface.

  - *pL, pH* specifies (*pL* + *pH* ×256) for the number of bytes after *pH* (*fn and [parameter]*).
  - *fn* specifies the function.
  - *d1, d2, d3* specifies the parameters to select the mode.
  - *a* specifies the type of the stored data.
  - *nL, nH* specifies the value to be set to the stored data which is specified by *a.*
- The user-defined mode indicates the exclusive mode which can change the value in the user NV memory by this command.
- In the Function 2, the printer performs the reset. Therefore, the printer clears the receive and print buffers, and resets all settings (user-defined characters, downloaded bit images, and the character style) to the mode that was in effect at power on.

[Notes]
- Frequent write command executions by a NV memory write command (**FS q, GS (C, GS (E, GS (F, GS (M**) may damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- While processing this command, the printer is BUSY when writing the data to the user NV memory and stops receiving data. Therefore it is prohibited to transmit data including the real-time commands during the execution of this command.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

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

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*
Hex	1D	28	45	*pL*	*pH*	*01*	*d1*	*d2*
Decimal	29	40	69	*pL*	*pH*	*1*	*d1*	*d2*

[Range] *pL* = 3, *pH* = 0
fn = 1
d1 = 73
d2 = 78

[Description]
- Enters to the user-defined mode and transmits the following data:
  Header: Hexadecimal = 37H / Decimal = 55 (1 byte)
  Identifier: Hexadecimal = 20H / Decimal = 32 (1 byte)
  NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)
- In the user-defined mode, only the following commands can be executed:
  - Function 2, Function 3, Function 4, Function 5, Function 6, Function 11 Function 12 of this command
  - **GS I**

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

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
Hex	1D	28	45	*pL*	*pH*	*02*	*d1*	*d2*	*d3*
Decimal	29	40	69	*pL*	*pH*	*2*	*d1*	*d2*	*d3*

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

[Description]
- Ends the user-defined mode and performs the reset. Therefore, the printer clears the receive and print buffers, and resets all settings (user-defined characters, downloaded bit images, and the character style) to the mode that was in effect at power on.
- The function with *fn* = 2 of this command is only effective on the user-defined mode.

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

[Format]

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

[Range]

$10 \le (pL + pH \times 256) \le 65530$
(where $(pL + pH \times 256) = 9 \times k + 1$: $0 \le pL \le 255$; $0 \le pH \le 255$)
$fn = 3$
$1 \le a \le 8$
$b = 48, 49, 50$
$1 \le k \le 7281$

[Description]

- Changes the setting of the memory switch specified with a using the value of *b*.

b	Function
48	Sets the specified bit to Off.
49	Sets the specified bit to On.
50	Does not change the previous status of the specified bit.

- The total bits of the memory switch is 8.
- The value of *b* is processed in order of bit 8 to bit 1.
- If an error occurs in the process of writing data, the memory error process is executed.
- As for the memory switch, see Section 1.5.
- Set “2” (50) to the reserved bit.
- If the settings are changed, they become effective when the EU-T482 is reset or the power is turned on again.
- The setting values can be checked by executing the self-test.

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

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*04*	*a*
Decimal	29	40	69	*pL*	*pH*	*4*	*a*

[Range] (*pL* + *pH* × 256) =2 (*pL* = 2, *pH* = 0)
fn = 4
$1 \leq a \leq 8$

[Description]

- Sends the setting values of the memory switch specified with *a*.
  - The contents of the transmit data are as follows:

Transmit data	Hex	Decimal	Number of data
a) Header	37H	55	1 byte
b) Identifier	21H	33	1 byte
c) Data	30H, 31H	48, 49	8 bytes
d) NUL	00H	0	1 byte

- Contents of data shown in c) above
  - The on/off setting of the memory switch is defined as [Off: Hex = 30H / Decimal = 48] or [On: Hex = 31H / Decimal = 49]. Each 1 byte for 8 memory switches are transmitted from bit 8 to bit 1.
    Example: Transmitted data: "10110001"
    (31H, 30H, 31H, 31H, 30H, 30H, 30H, 31H):

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

- If a not-supported memory switch number is selected (out of *a*), this command is ignored. In this case, <*GS* ~ *a*> (7 bytes) are abandoned.
- If this command is ignored, the EU-T482 does not send any data.
- The memory switch number (*a*) treats the same information with the memory switch number (*a*) of <Function 3>.

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

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H]…[ak*	*nkL*	*nkH]*
Hex	1D	28	45	*pL*	*pH*	*05*	*[a1*	*n1L*	*n1H]…[ak*	*nkL*	*nkH]*
Decimal	29	40	69	*pL*	*pH*	*5*	*[a1*	*n1L*	*n1H]…[ak*	*nkL*	*nkH]*

[Range]

$4 \le (pL + pH \times 256) \le 65533$ ($pL + pH \times 256$) = $3 \times k + 1$: $0 \le pL \le 255$, $0 \le pH \le 255$)
fn = 5
a = 5, 6, 8, 9, 116, 117, 120, 121, 122, 123, 124, 125, 126
$0 \le (nL + nH \times 256) \le 9$, $65530 \le (nL+nH \times 256) \le 65535$

($0 \le nL \le 9$, nH=0, $250 \le nL \le 255$, nH = 255)		[when (a = 5)]
$1 \le (nL + nH \times 256) \le 10$ ($1 \le nL \le 10$, nH = 0)		[when (a = 6)]
$0 \le (nL + nH \times 256) \le 5$, $11 \le (nL + nH \times 256) \le 21$, ($nL + nH \times 256$) = 26, $30 \le (nL + nH \times 256) \le 53$, ($nL + nH \times 256$) = 255 ($0 \le nL \le 5$, $11 \le nL \le 21$, nL = 26 $30 \le nL \le 53$, nL = 255 , nH = 0)		[when (a = 8)]
$0 \le (nL + nH \times 256) \le 17$	($0 \le nL \le 17$, nH = 0)	[when (a = 9)]
$0 \le (nL + nH \times 256) \le 65535$	($0 \le nL \le 255$, $0 \le nH \le 255$)	[when (a = 116)]
$0 \le (nL + nH \times 256) \le 65535$	($0 \le nL \le 255$, $0 \le nH \le 255$)	[when (a = 117)]
($nL + nH \times 256$) = 1,2,3,4	(nL = 1,2,3,4 , nH = 0)	[when (a = 120)]
($nL + nH \times 256$) = 1,2,3	(nL = 1, 2,3 , nH = 0)	[when (a = 121)]
$0 \le (nL + nH \times 256) \le 360$	($0 \le nL \le 255$, $0 \le nH \le 1$)	[when (a = 122)]
$0 \le (nL + nH \times 256) \le 360$	($0 \le nL \le 255$, $0 \le nH \le 1$)	[when (a = 123)]
$0 \le (nL + nH \times 256) \le 2160$	($0 \le nL \le 255$, $0 \le nH \le 8$)	[when (a = 124)]
$12 \le (nL + nH \times 256) \le 8640$	($0 \le nL \le 255$, $0 \le nH \le 33$)	[when (a = 125)]
($nL + nH \times 256$) = 0,2,3	(nL = 0,2,3 , nH = 0)	[when (a = 126)]

$1 \le k \le 21844$

[Default (at shipping)]

($nL + nH \times 256$) = 0	(nL = 0 , nH = 0)	[when (a = 5)]
($nL + nH \times 256$) = 7, 10	(nL = 7, 10 , nH = 0)	[when (a = 6)]
(When media type setting is other than Type4	($nL + nH \times 256$) = 7)	
(When media type setting is Type4	($nL + nH \times 256$) = 10)	
($nL + nH \times 256$) = 0	(nL = 1, nH = 0)	[when (a = 8)]
($nL + nH \times 256$) = 0	(nL = 1, nH = 0)	[when (a = 9)]
($nL + nH \times 256$) = 0	(nL = 0, nH = 0)	[when (a = 116)]
($nL + nH \times 256$) = 0	(nL = 0, nH = 0)	[when (a = 117)]
($nL + nH \times 256$) = 2	(nL = 2, nH = 0)	[when (a = 120)]
($nL + nH \times 256$) = 2	(nL = 2, nH = 0)	[when (a = 121)]
($nL + nH \times 256$) = 1	(nL = 1, nH = 0)	[when (a = 122)]
($nL + nH \times 256$) = 30	(nL = 30, nH = 0)	[when (a = 123)]
($nL + nH \times 256$) = 180	(nL = 180, nH = 0)	[when (a = 124)]
($nL + nH \times 256$) =1440	(nL = 160, nH = 5)	[when (a = 125)]
($nL + nH \times 256$) = 3	(nL = 3, nH = 0)	[when (a = 126)]

[Description] • Changes the setting of the customized value that is specified with *a* with as (*nL* + *nH* × 256).

a	Function
5	Selects print density
6	Selects print speed
8	Specifies the default of the character code table
9	Specifies the default of international characters
116	Specifies the BM length. (*)
117	Specifies the BM interval. (*)
120	Specifies the sleep transition pattern
121	Specifies the LED lighting pattern
122	Specifies the sleep transition time (IDLE0 => IDLE1)
123	Specifies the sleep transition time (IDLE0 => IDLE2)
124	Specifies the sleep transition time (IDLE0 => IDLE3)
125	Specifies the sleep transition time (IDLE0 => GoFF)
126	Specifies the media type setting

(*): See Figure 3.11.1.

- When *a* = 5, specifies the print density.

(Value of (*nL* + *nH* × 256)	Print density	
65530	Print density level 1	lighter
65531	Print density level 2	|
65532	Print density level 3	|
65533	Print density level 4	|
65534	Print density level 5	|
65535	Print density level 6	|
0	Print density level 7	Standard
1	Print density level 8	|
2	Print density level 9	|
3	Print density level 10	|
4	Print density level 11	|
5	Print density level 12	|
6	Print density level 13	|
7	Print density level 14	|
8	Print density level 15	|
9	Print density level 16	Darker

* Printing is performed in the range of print density levels 1 to 9 when the media type setting is other than Type4. Printing is performed at the maximum density level (print density level 9) even if a print density level that is out of the range is specified.

* Printing is performed in the range of print density levels 4 to 16 when the media type setting is Type4. Printing is performed at the minimum density level (print density level 4) even if a print density level that is out of the range is specified.

- When *a* = 6, specifies the print speed

Value of (*nL* + *nH* × 256)	Print speed	
1	Print speed 1	Slower
2	Print speed 2	|
3	Print speed 3	|
4	Print speed 4	|
5	Print speed 5	|
6	Print speed 6	|
7	Print speed 7	|
8	Print speed 8	|
9	Print speed 9	|
10	Print speed 10	Faster

* Printing is performed in the range of print speed levels 1 to 7 when the media type setting is other than Type4. Printing is performed at the maximum speed level (print speed level 7) even if a print speed level that is out of the range is specified.

- When *a* = 8, the default of the character code table is specified.

  See (*n*) of the character code table selection command (**ESC t**).

- When *a* = 9, the default of international characters is specified.

  Refer to (*n*) of the international characters selection command (**ESC R**)

- When *a* = 116, the BM length is set as the length specified with (*nL* + *nH* × 256) × 0.1 mm.

Value of (*nL* + *nH* × 256)	BM Length
20 - 200	2 mm - 20 mm

- When *a* = 117, the BM interval is set as the length specified with (*nL* + *nH* × 256) × 0.1 mm.

Value of (*nL* + *nH* × 256)	BM Interval
200 - 4000	20 mm - 400 mm

- When *a* = 120, specifies the sleep transition pattern

Value of (*nL* + *nH* × 256)	Power-saving mode
1	Ready (IDLE1)
2	Sleep1 (IDLE2)
3	Sleep2 (IDLE3)
4	Sleep3 (GoFF)

Power-saving mode	Recovery elements
Ready (IDLE1)	Change in platen status and presenter cover, pressing of FEED, button, change in paper detection status, communication, interface reset, voltage drop
Sleep1 (IDLE2)	Change in platen status and presenter cover, pressing of FEED, button, change in paper detection status, communication, interface reset, voltage drop

Sleep2 (IDLE3)	Change in platen status and presenter cover, pressing of FEED, button, communication, interface reset, voltage drop
Sleep3 (GoFF)	Change in presenter cover, pressing of FEED, button, communication, interface reset, voltage drop

- When *a* = 121, specifies the LED lighting pattern

Value of (*nL* + *nH* × 256)	IDLE1	IDLE2	IDLE3
1	Bright	Dark	Dark
2	Dark	Dark	Dark
3	Dark	Off	Off

- When *a* = 122, specifies the sleep transition time (IDLE0 => IDLE1)

(Value of (*nL* + *nH* × 256)	Sleep transition time
1 - 360	(*nL* + *nH* × 256) x 10 sec
0	This transition mode is skipped

- When *a* = 123, specifies the sleep transition time (IDLE0 => IDLE2)

Value of (*nL* + *nH* × 256)	Sleep transition time
1 - 360	(*nL* + *nH* × 256) x 10 sec
0	This transition mode is skipped

- When *a* = 124, specifies the sleep transition time (IDLE0 => IDLE3)

Value of (*nL* + *nH* × 256)	Sleep transition time
1 - 2160	(*nL* + *nH* × 256) x 10 sec
0	This transition mode is skipped

- When *a* = 125, specifies the sleep transition time (IDLE0 => GoFF)

Value of (*nL* + *nH* × 256)	Sleep transition time
12 - 8640	(*nL* + *nH* × 256) x 10 sec

- When *a* = 126, specifies the media type

Value of (*nL* + *nH* × 256)	Media type
0	Type1 (Hunter paper)
2	Type3 (Synthetic paper)
3	Type4 (Normal paper)

[Description]
- The specification of length or interval of BM:
  - If the difference is detected as ± 12% or more comparing to each setting values, a BM detection error occurs.
  - The permittable range of the BM length is 2 - 20 mm.
  - The permittable range of the BM interval is 20 - 400 mm.
  - When *nL* = *nH* = 0, the detection function is disabled.
  - Enable or disable of the detection function can be specified respectively for length or interval of BM.
- If out of range as shown above is specified, this command is ignored.
- If an error occurs while the memory writing is processed, the printer performs the memory error process.
- If the settings are changed, they become effective when the EU-T482 is reset or the power is turned on again.

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

[Format]

ASCII	GS	(	E	*pL*	*pH*	*m*	*a*
Hex	1D	28	45	*02*	*00*	*06*	*a*
Decimal	29	40	69	*2*	*0*	*6*	*a*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 6
a = 5, 6, 8, 9, 116, 117, 120, 121, 122, 123, 124, 125, 126

[Description]

- Sends the setting values specified with *a*.
- The contents of the transmit data are follows:

Transmit data	Hex	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	27H	39	1 byte
③ Customized value number	(*)	(*)	3 bytes
④ Separator	1FH	31	1 byte
⑤ Customized value	(*)	(*)	1 – 4 bytes
⑥ NUL	00H	0	1 byte

(*) The customized value number (③) consists of the character strings that are converted from the decimal value.

(*) The customized value (⑤) consists of the character strings that are converted from the decimal value.

- If a not-supported memory switch number is selected (out of ***a***), this command is ignored. In this case, <***GS*** ***~a***> (7 bytes) are abandoned.
- If this command is ignored, the EU-T482 does not send any data.
- The contents of the customized value ***a*** is the same as the contents of the information specified by the customized number ***a*** of **GS (E** <Function 5>.

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

[Format]

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

[Range]
$3 \le (pL + pH \times 256) \le 65535$ $(0 \le pL \le 255, 0 \le pH \le 255)$ [when (*a* = 1)]
$(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$ [when (*a* = 2,3)]
$fn = 11$
$1 \le a \le 3$
$48 \le d \le 57$
$k = (pL + pH \times 256) - 2$

[Default (upon shipment)]
d1...dk = “19200” (depend on dip switch)

[Description]
- Sets the configuration item for the serial interface specified by *a* to the values specified by *d*.

	Configuration item
1	Transmission speed
2	Parity
3	Flow control

- Transmission speed settings (*a* = 1)

d1...dk	Transmission speed
“2400”	2400 bps
“4800”	4800 bps
“9600”	9600 bps
“19200”	19200 bps
“38400”	38400 bps
“57600”	57600 bps
“115200”	115200 bps

- Parity settings (*a* = 2)

d1	Parity Settings
48	None
49	Odd
50	Even

- Flow control settings (*a* = 3)

d1	Parity Settings
48	DTR/DSR, or CTS/RTS control
49	XON/XOFF control

[Note]
- The configuration item set by this function is enabled by executing **GS (E** <Function 2> or restarting the printer. Note that the host computer must be set to enable the printer to communicate with the host computer

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

[Name] Transmit the configuration item for the serial interface

[Format]

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

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$fn = 12$
$1 \leq a \leq 3$

[Description]

- Transmits the configuration item for the serial interface specified by *a*.
- The contents of the transmit data are follows:

Transmit data	Hex	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	33H	51	1 byte
③ Types of configuration items	30H -39H	48-57	1 - 3 bytes
④ Separator	1FH	31	1 byte
⑤ Setting values	30H -39H	48-57	1 – 16 bytes
⑥ NUL	00H	0	1 byte

* The types of configuration items ③ consist of the character strings that are converted from the decimal value.
* The contents of the setting values ⑤ is the same as the contents of the information specified by the values set in <Function 11>

- If this command is ignored, data is not transferred.
- The contents of the types of configuration items is the same as the contents of the information specified by the types of configuration items of <Function 11>.

GS (F *pL pH a fn nL nH*

[Name] Set adjustment value(s)

[Format]

ASCII	GS	(	F	*pL*	*pH*	*a*	*fn*	*nL*	*nH*
Hex	1D	28	46	*pL*	*pH*	*a*	*fn*	*nL*	*nH*
Decimal	29	40	70	*pL*	*pH*	*a*	*fn*	*nL*	*nH*

[Range] ($pL + pH \times 256$) = 4 (pL = 4, pH = 0)
$1 \le a \le 2$
fn = 0, 1, 48, 49
$0 \le (nL + nH \times 256) \le 65535$
(where $0 \le nL \le 255$, $0 \le nH \le 255$)

[Description]
- This command is effective only when the BM sensor is enabled.
- Sets adjustment values(s) for the printer operations specified by *a.*
  - pL, pH specifies ($pL + pH \times 256$) for the number of bytes after pH (*a, fn, nL and nH*).
  - *a* specifies setting values for the positions to start printing and cutting.

a	Function
1	Setting value for the positions to start the printing.
2	Setting value for the positions to start the cutting.

  - *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 [($nL + nH \times 256$) × 0.125 mm].

[Details]
- The adjustment value for the print starting position (*a* = 1) is affected with the following commands:
  FF, GS FF
- The adjustment value for the paper cutting position (*a* = 2) is affected with the following commands:
  GS V *m n*
- This command is stored in the receive buffer first from the host, then executed in the execution process of other normal commands. Therefore, there may occur time delay for the execution of this command after the EU-T482 receives this command. The delay time depends on the status of the receive buffer.
- To specify a backward paper feeding (*m* = 1), set the following:
  - Set MSW 8-3 to ON to enable backward paper feeding.
  - Paper is fed backward 88 steps maximum ($0 \le (nL + nH \times 256) \le 88$).

[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.)

[Note] If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

[Reference] **FF, GS FF, GS (M, GS V**

GS (H *pL pH fn m [d1…dk]*

[Name] Request response transmission

[Format]

ASCII	GS	(	H	*pL*	*pH*	*fn*	*m*	*[d1…dk]*
Hex	1D	28	48	*pL*	*pH*	*fn*	*m*	*[d1…dk]*
Decimal	29	40	72	*pL*	*pH*	*fn*	*m*	*[d1…dk]*

[Description] Executes the process for the response.

fn	Format	Function number	Function
48	**GS (H *pL pH fn m d1 d2 d3 d4***	Function 48	Specifies the process ID response.
49	**GS (H *pL pH fn m d***	Function 49	Specifies the offline response.

- *pL*, *pH* specify (*pL* + (*pH* × 256)) as the number of bytes after *pH* (*fn*, *m*, and *[d1…dk]*).
- *fn* specifies the function.
- *m* specifies the parameter depending on each function.
- *d1…dk* specify the parameters to select the mode.

[Details]

- If any of the following conditions for the parameters is encountered, this command is ignored.
  - (*pL* + *pH* × 256) is smaller than the value specified of each function.
  - No function corresponding to *fn* is specified
  - *m* is out of range.
- This command processes each function if all parameters are values in the correct range.
- This command specifies the process, but does not execute the response transmission.
- Since the data in the receive buffer is not processed when the printer is offline, this command is not processed.
- First, this command is stored in the receive buffer from the host; then it is executed in the execution process with other normal commands. Therefore, a time delay may occur for the execution of this command after the EU-T482 receives this command. The delay time depends on the status of the receive buffer.

[Details: Processing the response transmission]

- The response is configured as follows:

Transmission data	Hexadecimal	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	See below (*)	See below (*)	1 byte
③ Data	See below (*)	See below (*)	See below (*)
④ NUL	00H	0	1 byte

(*) The values of ② Identifier and ③ Data differ, depending on each function.

<Function 48> **GS (H *pL pH fn m d1 d2 d3 d4*** (when *fn* = 48)

[Format]	ASCII	GS	(	C	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*
	Hex	1D	28	48	*06*	*00*	*30*	*30*	*d1*	*d2*	*d3*	*d4*
	Decimal	29	40	72	*6*	*0*	*48*	*48*	*d1*	*d2*	*d3*	*d4*

[Range] ($p_L + p_H \times 256) = 6$ ($p_L = 6$, $p_H = 0$)
fn = 48
m = 48
32 ≤ *d1, d2, d3, d4* = 126, (20H ≤ *d1, d2, d3, d4* ≤ 7EH)

[Description]

- If a currently printed line or already printed line exists when this command is processed, the EU-T482 processes this function as follows:
  - Adds the process ID to the last line of the currently printed line or the already printed line.
  - When the line with the process ID is printed completely, the EU-T482 starts to process the transmission of the process ID response.
- If no currently printed line or already printed line exists when this command is processed, the EU-T482 starts to process the transmission of the process ID response.
- The process ID response consists of the following:

Response	Hexadecimal	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	22H	34	1 byte
③ Data	See below (*)	See below (*)	4 bytes
④ NUL	00H	0	1 byte

(*) [③ Process ID] has the same values as the process ID specified with *d1*, *d2*, *d3*, and *d4*.

- The EU-T482 always transmits the latest response data. Therefore, if there is a response in the transmission buffer and a new response transmission occurs, the EU-T482 cancels the untransmitted data in the transmission buffer and stores the latest response in the buffer.
- If the buffer clear process (**DLE ENQ** or **DLE DC4**) is executed, the following process ID is transmitted:
  - The process ID that exists in the receive buffer and has not been added for the process.
  - The process ID that has not been added for the process to the line that has not finished printing yet.

<Function 49> **GS (H *pL pH fn m d*** (when *fn* = 49)

[Format]	ASCII	GS	(	C	*pL*	*pH*	*fn*	*m*	*d*
	Hex	1D	28	48	*03*	*00*	*30*	*30*	*d*
	Decimal	29	40	72	*3*	*0*	*48*	*48*	*d*

[Parameters] d sets or cancels transmission of offline response.

[Range] ($p_L + p_H \times 256) = 3$ ($p_L = 3$, $p_H = 0$)
$fn = 49$
$m = 49$
$0 \leq d \leq 2$, $48 \leq d \leq 50$

[Default] $d = 0$ (does not transmit the response)

[Description]
- Enables or disables the transmission of the offline response.
  - When *d* is 0 or 48, the transmission of the offline response is disabled. After this EU-T482 does not transmit the new response.
  - When *d* is 1, 2, 49, or 50, the transmission of the offline response is enabled. When the printer goes offline as a result of any of the following causes, the EU-T482 starts to process the transmission of the process ID response.
    a) Platen is open (while printing or in standby)
    b) Printing is stopped due to a paper-end
    c) A recoverable or unrecoverable error occurs
- The process of transmitting the offline cause in the offline response is executed as follows:
  - When *d* is 1 or 49, the offline cause is not added to the offline response.
  - When *d* is 2 or 50, the offline cause is added to the offline response.

[Details]
- If an untransmitted offline response exists in the printer when *d* = 0 or 48 is specified, this offline response is transmitted.
- When *d* = 1 or 49 is specified, the offline response is transmitted once in following cases:
  - Multiple offline causes occur simultaneously.
  - Another offline cause occurs during the offline process.
  - The printer goes offline again even when the previous offline cause has not been transmitted yet.

- When *d* = 1, 49 is specified, the offline cause consists of the following:

Transmission data	Hexadecimal	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	2EH	46	1 byte
③ NUL	00H	0	1 byte

- When *d* = 2, 50 is specified, the offline cause consists of the following:

Transmission data	Hexadecimal	Decimal	Amount of data
① Header	37H	55	1 byte
② Identifier	2EH	34	1 byte
③ Offline cause	20H – 77H	32 – 119	1 byte
④ NUL	00H	0	1 byte

- The offline causes that the EU-T482 processes are as follows:

Code	Offline cause
20H	Platen is open.
21H	Paper FEED button is pressed.
22H	Paper end is detected.
23H	Presenter is open. (not located in the standby position)
24H	Paper jam
40H	Autocutter error occurs.
41H	Platen open error occurs. (Platen is open during printing).
42H	BM detection error occurs.
43H	Presenter error occurs.
60H	CPU execution error occurs.
61H	Low voltage error occurs. (Lower than the specified power supply voltage).
62H	High voltage error occurs. (Higher than the specified power supply voltage).
63H	Memory read/write error occurs.
64H	Drive circuit connection abnormal error occurs.

- If multiple offline causes occur simultaneously, one of them is regarded as the [③ Offline cause].
- If the offline cause is changed when multiple offline causes occur simultaneously, the [③ Offline cause] is also changed. If an untransmitted offline response exists in the printer, the printer cancels the untransmitted offline cause and stores the latest response.
- The setting value for this command is not initialized with **ESC** @.

GS (K *pL pH fn m*

[Name] Select print control method(s)

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
$1 \leq fn \leq 255$
For *m,* see each functional descriptions of this command.

[Default] Differs for each function.

[Description] • This command sets the setting values for the print density and the printer's mechanism operation with *fn*.

fn	Function No.	Function
48	Function 48	Selects the print control mode.
49	Function 49	Sets the print density.
50	Function 50	Sets the print speed.

[Details]
- If a not-supported parameter's value is processed under the following conditions, this command is ignored:
  - In case of ($pL + pH \times 256$) < 2
  - In case that *fn* is specified if *n* does not correspond to any functions of the printer.
  - In case that *m* is out of range in each functions.
- The printer starts to process the specified function if all specified parameters are satisfied.
  If the printer is in an offline state, this command is not executed because the printer does not read the data.
- This command is stored in the receive buffer first from the host, then executed in the execution process of other normal commands. Therefore, there may be a time delay for the execution of this command after the EU-T482 receives this command. The delay time depends on the status of the receive buffer.

<Function 48 > **GS (K *pL pH fn m*** (when *fn* = 48)

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*02*	*00*	*30*	*m*
Decimal	29	40	75	*2*	*0*	*48*	*m*

[Range] ($pL + pH \times 256$) = 2 (*pL* = 2, *pH* = 0)
fn = 48
$0 \le m \le 2$, $48 \le m \le 50$

[Default] *m* = 0

[Description]
- *m* specifies the print control mode.

m	Function
0, 48	Specifies the print control mode at the initial power on.
1, 49	Specifies the full print head energizing mode.
2, 50	Specifies the two-part print head energizing mode.

  - The print control mode which is specified with *m* = 0, 48 is same as the print head energizing mode.
- Operation is fixed at full print head energizing mode when the media type setting is other than Type4.

<Function 49> **GS (K *pL pH fn m*** (when *fn* = 49)

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*02*	*00*	*31*	*m*
Decimal	29	40	75	*2*	*0*	*49*	*m*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 49
$-6 \le m \le 9$ ($250 \le m \le 255$, $0 \le m \le 9$) (corresponds to the print density 70 to 145%)

[Default] m = 0

[Description]
- m specifies the print density.
  - If $-6 \le m \le -1$, the print density set to be lighter ("–6" is the lightest) than the standard density (print density 100%).
  - If m = 0, the print density is set as the standard.
  - If $1 \le m \le 9$, the print density is set to be darker ("9" is the darkest) than the standard density.

[Details]
- If the standard mode is selected, the print density in one line is always same even though the different density is set. In this case, the last specified data for the print density is effective.
- If the page mode is selected, all batch processing data specified with the **FF** or **ESC FF** commands is set to the same density. If the different print density is set while the page mode is selected, the last specified data for the print density is effective.
- Using the printer with the print density set to 100% or higher may decrease the print head durability.
- Printing is performed in the range $-6 \le m \le 2$ when the media type setting is other than Type4. Printing is performed at the maximum density level (print density 110%) even if a print density level that is out of the range is specified.
- Printing is performed in the range of $-3 \le m \le 9$ when the media type setting is Type4. Printing is performed at the minimum density level (print density 85%) even if a print density level that is out of the range is specified.

<Function 50> **GS (K *pL pH fn m*** (when *fn* = 50)

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*02*	*00*	*31*	*m*
Decimal	29	40	75	*2*	*0*	*50*	*m*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 50
$0 \leq m \leq 10$, $48 \leq m \leq 57$

[Default] m = 0

[Description] • *m* specifies the print speed.

m	Print speed	
0, 48	Setting value of the customized value (**GS (E** <Function5> *a*=6)	
1, 49	Print speed level 1	Slower
2, 50	Print speed level 2	|
3, 51	Print speed level 3	|
4, 52	Print speed level 4	|
5, 53	Print speed level 5	|
6, 54	Print speed level 6	|
7, 55	Print speed level 7	|
8, 56	Print speed level 8	|
9, 57	Print speed level 9	|
10	Print speed level 10	Faster

[Details] • Printing is performed in the range of $0 \leq m \leq 7$, $48 \leq m \leq 55$ when the media type setting is other than Type4. Printing is performed at the maximum speed level (print speed level 7) even if a print speed level that is out of the range is specified.

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

[Name] Select graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*			*[parameters]*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*			*[parameters]*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*			*[parameters]*
ASCII	GS	8	L	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*
Hex	1D	38	4C	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*
Decimal	29	56	76	*p1*	*p2*	*p3*	*p4*	*m*	*fn*	*[parameters]*

* In the description below **GS (L** is used for explanation.

- Note that **GS (L** and **GS 8 L** have the same function.
- If the *[parameters]* of each format exceed 65533 bytes use **GS 8 L**.

[Description]

- Processes graphics data according to the function code *fn*.

fn	Format	Function No.	Function
0, 48	**GS (L *pL pH m fn***	Function 48	Transmits the NV graphics memory capacity.
2, 50	**GS (L *pL pH m fn***	Function 50	Prints the graphics data in the print buffer.
3, 51	**GS (L *pL pH m fn***	Function 51	Transmits the remaining capacity of the NV graphics memory.
64	**GS (L *pL pH m fn d1 d2***	Function 64	Transmits the defined NV graphics key code list.
65	**GS (L *pL pH m fn d1 d2 d3***	Function 65	Deletes all NV graphics data.
66	**GS (L *pL pH m fn kc1 kc2***	Function 66	Deletes the specified NV graphics data.
67	**GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b***	Function 67	Defines the raster graphics data in the non-volatile memory.
69	**GS (L *pL pH m fn kc1 kc2 x y***	Function 69	Prints the specified NV graphics data.
112	**GS (L *pL pH m fn a bx by c xL xH yL yH d1...dk***	Function 112	Stores the raster graphics data in the print buffer memory.

- *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* or *p4* (*m*, *fn*, and *[parameters]*).

[Notes]

- Frequent write command executions by this command may damage the NV memory. Therefore, it is recommended to write to the NV memory no more than 10 times a day.
- While processing this command, the printer is BUSY while writing data to the NV graphics memory and stops receiving data. Therefore it is prohibited to transmit data, including the real-time commands, during the execution of this command.
- This command cannot be used together with **FS p** or **FS q**. Otherwise, the registered data may disappear.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

<Function 48> **GS (L *pL pH m fn*** (when *fn* = 0, 48)

[Format]

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

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2 , *pH* = 0)
m = 48
fn = 0, 48

[Description]
- Transmits the total capacity of the NV bit-image memory (number of bytes in the memory area).

	Hexadecimal	Decimal	Amount of data
①Header	37H	55	1 byte
②Identifier	30H	48	1 byte
③Data	30H – 39H	48 – 57	1 – 8 bytes
④NUL	00H	0	1 byte

- The data describing total capacity is converted to character codes corresponding to decimal data, then transmitted from the MSB.
- The data length is variable.
- The total capacity of the NV user memory is 192 KB.

<Function 50> **GS (L *pL pH m fn*** (when *fn* = 2, 50)

[Format]

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

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
m = 48
fn = 2, 50

[Description]
- Prints the buffered graphics stored by the process of <Function 112>.
- Feeds paper by the amount corresponding to the number of dots in the *y* direction of the buffered graphics.

<Function 51> **GS (L *pL pH m fn*** (when *fn* = 3, 51)

[Format]

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

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
m = 48
fn = 3, 51

[Description]
- Transmits the number of bytes of remaining memory (unused area) in the NV user memory.

	Hexadecimal	Decimal	Amount of data
①Header	37H	55	1 byte
②Identifier	31H	49	1 byte
③Data	30H – 39H	48 – 57	1 – 8 bytes
④NUL	00H	0	1 byte

- The number of bytes of remaining memory is converted to character codes corresponding to decimal data, then transmitted from the MSB.
- The data length is variable.

<Function 64> **GS (L *pL pH m fn d1 d2*** (when *fn* = 64)

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*

[Range] (*pL* + *pH* × 256) = 4 (*pL* = 4, *pH* = 0)
m = 48
fn = 64
d1 = 75
d2 = 67

[Description]

- Transmits the defined NV graphics key code list.
  - When the key code is present:

	Hexadecimal	Decimal	Amount of data
①Header	37H	55	1 byte
②Identifier	72H	114	1 byte
③Status	40H or 41H	64 or 65	1 byte
④Data	30H – 39H	48 – 57	2 – 80 bytes
⑤NUL	00H	0	1 byte

  - When the key code is not present:

	Hexadecimal	Decimal	Amount of data
①Header	37H	55	1 byte
②Identifier	72H	114	1 byte
③Status	40H	64	1 byte
④NUL	00H	0	1 byte

- If the number of the key code exceeds 40, divide the key code by 40 for transmission.
  - The status if the continuous transmission data block is present is 41H.
  - The status if the continuous transmission data block is not present is 40H.
- After the [Header ~ NUL] is transmitted, the printer receives a response from the host; then it performs the process defined by the response. (See the tables below.)

  When the status (existence of the next data block) is
  Hexadecimal = 41H / Decimal = 65:

Response		Process performed
ASCII	Decimal	
ACK	6	Transmits the next data.
NAK	21	Transmits the previous data again.
CAN	24	Cancels the process.

  When the status (for the last data block) is
  Hexadecimal = 40H / Decimal = 64:

Response		Process performed
ASCII	Decimal	
ACK	6	Ends the process.
NAK	21	Transmits the previous data again.
CAN	24	Cancels the process.

<Function 65> **GS (L *pL pH m fn d1 d2 d3*** (when *fn* = 65)

[Format]	ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
	Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
	Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*

[Range] ($pL + pH \times 256$) = 5 (pL = 5, pH = 0)
m = 48
fn = 65
d1 = 67
d2 = 76
d3 = 82

[Description]
- Deletes all defined NV graphics data.

<Function 66> **GS (L *pL pH m fn kc1 kc2*** (when *fn* = 66)

[Format]	ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
	Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
	Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*

[Range] ($pL + pH \times 256$) = 4 (pL = 4, pH = 0)
m = 48
fn = 66
$32 \leq kc1 \leq 126$
$32 \leq kc2 \leq 126$

[Description]
- Deletes the NV graphics data defined by the key codes *kc1* and *kc2*.

<Function 67>

GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1… [c d1...dk]b* (when *fn* = 67)

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*a*	*kc1*	*kc2*	*b*
	xL	*xH*	*yL*	*yH [c*	*d1...dk]1... [c*	*d1...dk]b*					
Hex	1D	28	4C	*pL*	*pH*	*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]

- **GS (L** parameters
  $12 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
- **GS 8 L** parameters
  $12 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$
  ($0 \le p1 \le 255$, $0 \le p2 \le 255$, $0 \le p3 \le 255$, $0 \le p4 \le 255$)
- Common parameters for **GS (L** / **GS 8 L**
  $m = 48$
  $fn = 67$
  $a = 48$
  $32 \le kc1 \le 126$
  $32 \le kc2 \le 126$
  $b = 1$
  $1 \le (xL + xH \times 256) \le 8192$ ($0 \le xL \le 255$, $0 \le xH \le 32$)
  $1 \le (yL + yH \times 256) \le 2304$ ($0 \le yL \le 255$, $0 \le yH \le 9$)
  $c = 49$
  $0 \le d \le 255$
  $k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$
- The entire capacity size = 256 KB maximum.

[Description]

- Defines the raster graphics data in the NV graphics area.
  - *xL*, *xH* specify the defined data in the horizontal direction as ($xL + xH \times 256$) dots.
  - *yL*, *yH* specify the defined data in the vertical direction as ($yL + yH \times 256$) dots.

[Notes]

- In cases where there is sufficient capacity is not available for storing NV graphics data specified by ($xL + xH \times 256$) and ($yL + yH \times 256$), this function is ignored.
- The number of items of NV graphics registered should be within 50 to shorten the execution time of this function. The execution time is 60 seconds or less when the number of items registered is within 50. The execution time for 100 items is 120 seconds or less.
- The [data value (*k*) + control information data value (24 bytes)] area of the NV graphics data domain is used when this function is executed.
- When this command is processed while NV bit image data is defined with **FS q**, the printer deletes all NV bit image data, and then defines data with this command.

<Function 69> **GS (L *pL pH m fn kc1 kc2 x y*** (when *fn* = 69)

[Format]	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] ($pL + pH \times 256) = 6$ ($pL = 6$, $pH = 0$)
$m = 48$
$fn = 69$
$32 \leq kc1 \leq 126$
$32 \leq kc2 \leq 126$
$x = 1, 2$
$y = 1, 2$

[Description]
- Prints the NV graphics data defined by the key codes *kc1* and *kc2*. The graphics data is enlarged by *x* and *y* in the horizontal and vertical directions.

x, *y*	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	101 dpi	101 dpi

<Function 112> **GS (L *pL pH m fn a bx by c xL xH yL yH d1…dk*** (when *fn* = 112)

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*a*	*bx*	*by*	*c*	*xL*	*xH*	*yL*	*yH*	*d1…dk*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*a*	*bx*	*by*	*c*	*xL*	*xH*	*yL*	*yH*	*d1…dk*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*a*	*bx*	*by*	*c*	*xL*	*xH*	*yL*	*yH*	*d1…dk*

[Range]

- **GS (L** parameters
  $11 \le (pL + pH \times 256) \le 65535$ $(0 \le pL \le 255, 0 \le pH \le 255)$
- **GS 8 L** parameters
  $11 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$
  $(0 \le p1 \le 255, 0 \le p2 \le 255, 0 \le p3 \le 255, 0 \le p4 \le 255)$
- Common parameters for **GS (L** / **GS 8 L**
  $m = 48$
  $fn = 112$
  $a = 48$
  $bx = 1, 2$
  $by = 1, 2$
  $c = 49$
  $1 \le (xL + xH \times 256) \le 2047$ $(0 \le xL \le 255, 0 \le xH \le 7)$
  $1 \le (yL + yH \times 256) \le 1662$ $(0 \le yL \le 255, 0 \le yH \le 6)$ (when $by = 1$)
  $1 \le (yL + yH \times 256) \le 831$ $(0 \le yL \le 255, 0 \le yH \le 3)$ (when $by = 2$)
  $0 \le d \le 255$
  $k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$

[Description]

- Stores the raster graphics data, enlarged by *bx* and *by* in the horizontal and vertical directions to the print buffer.

bx, by	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	101 dpi	101 dpi

  - *xL*, *xH* specify the raster graphics data in the horizontal direction as $(xL + xH \times 256)$ dots.
  - *yL*, *yH* specify the raster graphics data in the vertical direction as $(yL + yH \times 256)$ dots.

[Details]

- In standard mode, this command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster graphics.
- If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (*m* = 0, 48) and double-height (*m* = 2, 50), 2 dots in double-width (*m* = 1, 49) and quadruple (*m* = 3, 51) modes.
- Data outside the printing area is read in and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster graphics is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC ** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is a multiple of 8.
- The **ESC a** (Select justification) setting is also effective on raster graphics.
- *d* indicates the bit-image data. Setting a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Note] • If the data for multiple graphics are stored in standard mode, the size or magnification rate of each graphics data item must be the same.

GS (M *pL pH a fn m*

[Name] Customize printer control value(s)

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

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

[Description] • Saves or loads the data which are defined with the commands.

fn	Function
1, 49	Saves the data which are set by **GS (F** to the user NV memory.
2, 50	Loads the data which are set by **GS (F** from the user NV memory.
3, 51	Specifies to disable or enable the automatic-data-loading process at the initial setting.

- *m* specifies the data as follows:
  - *m* = 0, 48: The same with the initial setting value of each command described in this specification.
  - *m* = 1, 49: Memory area to be stored.
  - Only the settings with **GS (F** can be stored.

[Default] Memory area to be stored (at the initial setting):

The same with the initial setting value of **GS (F** command described in this specification.

[Notes]
- Frequent write command (**FS q, GS (C, GS (E, GS (F, GS (M**) executions may damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- When the printer becomes BUSY during processing of this command, its prohibited to transmit data.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

[Reference] **GS I, ESC** @

<Function1> **GS (M *pL pH fn m*** (when *fn* = 1, 49)

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$fn = 1, 49$
$m = 1, 49$

[Description]
- Saves the data which are set by **GS (F** command to the user NV memory.
  - If the data will be written in the user NV memory which are already written with the same data, the data saving process is not executed.
- If an error will occur in writing the data, the printer executes the memory error process.

[Details]
- The EU-T482 executes the following process:
  - Before saving the data to the NV memory, the printer sets BUSY for the interface. In this case, the printer becomes BUSY regardless of the memory switch settings.
  - Even if the ASB function is enabled, the printer does not transmit the ASB status. However, if the status change occurs during the data transmission, the printer transmits the ASB status after transmitting the data.

[Default] None

<Function 2> **GS (M *pL pH fn m*** (when *fn* = 2, 50)

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$fn = 2, 50$
$0 \le m \le 1$, $48 \le m \le 49$

[Description]
- When $m = 0$ or 48, the setting value of **GS (F** command is set to the default value which is described in this specification.
  - If there is no data in the memory, the setting value of **GS (F** command is set to the default value which is described in this specification.
- When $m \neq 0$ or 48, the setting values are stored in area *m* of the memory.

[Details]
- This command is enabled only when processed at the beginning of a line in standard mode.
- This command has no effect in page mode.
- See <Function 1> of this command for the setting values for this function.

[Default] None

<Function 3> **GS (M *pL pH fn m*** (when *fn* = 3, 51)

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] $(pL + pH \times 256) = 2 \quad (pL = 2, pH = 0)$
$fn = 3, 51$
$0 \le m \le 1, \quad 48 \le m \le 49$

[Description]
- When $m = 0$ or 48, the printer does not load the data from the user NV memory at the initialization.
  After the initialization, the setting value of **GS (F** becomes the initial value which is described in this specification.
- When $m \neq 0$ or 48, the printer loads the data from the user NV memory at the initialization.
  After the initialization, the setting value of **GS (F** becomes the setting values which are stored in area *m* of the memory.
- The specified data by this command are stored in the NV memory.
  If the data will be written in the flash ROM which are already written with the same data, the data saving process is not executed.
- If an error will occur in writing the data, the printer executes the memory error process.

[Details]
- When the data is automatically loaded, the initialization process is executed when any of the following process is executed.
  - Power-on process by the power switch
  - Power-on process when the hardware reset is executed by the interface reset
  - Execution of **ESC** @

[Default] *m* = 0

GS (k *pL pH cn fn [parameters]*

[Name] Setup and print symbol

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*[parameter]*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*[parameter]*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*[parameter]*

[Description]

- Various processes are performed to the symbol specified with *cn*.

cn	Type of Symbol
48	PDF417 (2-dimensional code)
49	QR Code (2-dimensional code)
50	MaxiCode (2-dimensional code)
51	2-dimensional GS1 DataBar (GS1 DataBar Stacked, GS1 DataBar Stacked Omnidirectional, GS1 DataBar Expanded Stacked)
52	Composite Symbology (2-dimensional code)

cn	*fn*	Code	Function	Description
48	65	**GS (k *pL pH cn fn n***	Function 065	Sets the number of columns for PDF417.
	66	**GS (k *pL pH cn fn n***	Function 066	Sets the number of rows for PDF417.
	67	**GS (k *pL pH cn fn n***	Function 067	Sets the module width for PDF417.
	68	**GS (k *pL pH cn fn n***	Function 068	Sets the module height for PDF417.
	69	**GS (k *pL pH cn fn m n***	Function 069	Sets the error correction level for PDF417.
	70	**GS (k *pL pH cn fn m***	Function 070	Specifies the options for PDF417.
	80	**GS (k *pL pH cn fn m d1...dk***	Function 080	Stores received data in the symbol storage area for PDF417.
	81	**GS (k *pL pH cn fn m***	Function 081	Prints symbol data in the symbol storage area for PDF417.
	82	**GS (k *pL pH cn fn m***	Function 082	Transmits the size of information for the symbol data in the symbol storage area for PDF417.
49	65	**GS (k *pL pH cn fn n1 n2***	Function 165	QR Code: Selects the model.
	67	**GS (k *pL pH cn fn n***	Function 167	QR Code: Sets the size of module.
	69	**GS (k *pL pH cn fn n***	Function 169	QR Code: Selects the error correction level.
	80	**GS (k *pL pH cn fn m d1...dk***	Function 180	QR Code: Stores the data into the symbol storage area.
	81	**GS (k *pL pH cn fn m***	Function 181	QR Code: Prints the symbol data in the symbol storage area.
	82	**GS (k *pL pH cn fn m***	Function 182	QR Code: Transmits the size information of the symbol data in the symbol storage area.

50	65	**GS (k *pL pH cn fn n***	Function 265	MaxiCode: Selects the print mode.
	80	**GS (k *pL pH cn fn m d1...dk***	Function 280	MaxiCode: Stores data in the symbol storage area.
	81	**GS (k *pL pH cn fn m***	Function 281	MaxiCode: Prints symbol data in the symbol storage area.
	82	**GS (k *pL pH cn fn m***	Function 282	MaxiCode: Transmits size information of the symbol data in the symbol storage area.
51	67	**GS (k *pL pH cn fn n***	Function 367	Two-dimensional GS1 DataBar: Sets the module width.
	71	**GS (k *pL pH cn fn nL nH***	Function 371	Two-dimensional GS1 DataBar: Sets the maximum width of GS1 DataBar Expanded Stacked.
	80	**GS (k *pL pH cn fn m n d1...dk***	Function 380	Two-dimensional GS1 DataBar: Stores data in the symbol storage area.
	81	**GS (k *pL pH cn fn m***	Function 381	Two-dimensional GS1 DataBar: Prints symbol data in the symbol storage area.
	82	**GS (k *pL pH cn fn m***	Function 382	Two-dimensional GS1 DataBar: Transmits size information of the symbol data in the symbol storage area.
52	67	**GS (k *pL pH cn fn n***	Function 467	Composite Symbology: Sets the module width.
	71	**GS (k *pL pH cn fn nL nH***	Function 471	Composite Symbology: Sets the maximum width of GS1 DataBar Expanded Stacked.
	72	**GS (k *pL pH cn fn n***	Function 472	Composite Symbology: Selects an HRI font.
	80	**GS (k *pL pH cn fn m a b d1...dk***	Function 480	Composite Symbology: Stores data in the symbol storage area.
	81	**GS (k *pL pH cn fn m***	Function 481	Composite Symbology: Prints symbol data in the symbol storage area.
	82	**GS (k *pL pH cn fn m***	Function 482	Composite Symbology: Transmits size information of symbol data in the symbol storage area.

- "Symbol data" refers to the data (*d1*…*dk*) received with <Function 080,180,280,380,480>.
- "Symbol storage area" refers to the range for storing data received with <Function 080,180,280,380,480> before encoding.

[Notes]
- After transmitting <Function 082, 182, 282, 382, or 482>, do not transmit the other data until its corresponding data is received.

[Reference] APPENDIX F

<Function 065> **GS (k *pL pH cn fn n*** (when *cn* = 48, *fn* = 65)

[Format]	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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 48$
$fn = 65$
$0 \leq n \leq 30$

[Default] $n = 0$

[Description] Sets the number of columns in the data area for PDF417.

- $n = 0$ specifies automatic processing. When automatic processing ($n = 0$) is specified, the number of columns is calculated with the number of code words based on the range of the printable area.
- $n \neq 0$ sets the number of columns of the data area to n code words.

[Notes] The following data is not included in the number of columns.

- Start and stop patterns
- Left and right indicator code words

<Function 066> **GS (k *pL pH cn fn n*** (when *cn* = 48, *fn* = 66)

[Format]	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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 48$
$fn = 66$
$n = 0, 3 \leq n \leq 90$

[Default] $n = 0$

[Description] Sets the number of rows in the data area for PDF417.

- $n = 0$ specifies automatic processing.
- When automatic processing ($n = 0$) is specified, the number of rows is calculated with the number of code words or the range of the printable area.
- $n \neq 0$ sets the number of rows to n.

<Function 067> **GS (k *pL pH cn fn n*** (when *cn* = 48, *fn* = 67)

[Format]	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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 48$
$fn = 67$
$2 \le n \le 8$

[Default] $n = 3$

[Description] Sets the width of one module of PDF417 symbol as *n* dots.

<Function 068> **GS (k *pL pH cn fn n*** (when *cn* = 48, *fn* = 68)

[Format]	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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 48$
$fn = 68$
$2 \le n \le 8$

[Default] $n = 3$

[Description] Sets the height of one module of PDF417 symbol to [(module width) $\times$ *n*].

- The module width is set with <Function 067> of this command.

<Function 069> **GS (k *pL pH cn fn m n*** (when *cn* = 48, *fn* = 69)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*n*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*n*

[Range] ($pL + pH \times 256$) = 4 (pL = 4, pH = 0)
cn = 48
fn = 69
m = 48, 49
$48 \le n \le 56$ (when *m* = 48 is specified)
$1 \le n \le 40$ (when *m* = 49 is specified)

[Default] *m* = 49, *n* = 1

[Description] Set the error correction level for PDF417 symbols.

- When *m* = 48, the error correction level is set by the “Level Setting” error correction code word.

n	Function	Error correction code word
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
54	Select error correction level 6	128
55	Select error correction level 7	256
56	Select error correction level 8	512

- When *m* = 49, the error correction level is set to the level indicated by the data code word value.

  The rate is set to [$n \times 10\%$].

  The error correction levels in the following table are determined by the calculation [Data code word $\times$ $n \times 0.1$ = (A)] (round up fractions of 0.5 and over and truncate others).

Result (A)	Error correction level	Error correction code word
0 - 3	Error correction level 1	4
4 - 10	Error correction level 2	8
11 - 20	Error correction level 3	16
21 - 45	Error correction level 4	32
46 - 100	Error correction level 5	64
101 - 200	Error correction level 6	128
201 - 400	Error correction level 7	256
401 or more	Error correction level 8	512

<Function 070> **GS (k *pL pH cn fn m*** (when *cn* = 48, *fn* = 70)

[Format]	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*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
cn = 48
fn = 70
m = 0, 1

[Default] *m* = 0

[Description] Specifies or cancels various PDF417 symbol options

- When *m* = 0, the simple PDF417 symbol processing is canceled, and the standard PDF417 symbol processing is specified.
- When *m* = 1, the simple PDF417 symbol processing is specified.

<Function 080> **GS (k *pL pH cn fn m d1…dk*** (when *cn* = 48, *fn* = 80)

[Format]	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] $4 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
cn = 48
fn = 80
m = 48
$0 \le d \le 255$
$k = (pL + pH \times 256) - 3$

[Description] Stores symbol data (*d1...dk*) in the PDF417 symbol storage area.

- Bytes of (($pL + pH \times 256$) – 3) after *m* (*d1…dk*) are processed as symbol data.

<Function 081> **GS (k *pL pH cn fn m*** (when *cn* = 48, *fn* = 81)

[Format]	ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*
	Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*30*
	Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*48*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
cn = 48
fn = 81
m = 48

[Description] Print the PDF417 symbol data in the symbol storage area.

[Note]
- Users must consider the quiet zone for the PDF417 symbols (upward and downward spaces and left and right spaces for the PDF417 symbols specified in the specifications for the PDF417 symbols).

<Function 082> **GS (k *pL pH cn fn m*** (when *cn* = 48, *fn* = 82)

[Format]

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*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 48
fn = 82
m = 48

[Description] Transmit the size of the symbol data in the symbol storage area.

The basic types of symbol size information are as follows:

Transmission data	Hexadecimal	Decimal	Amount of data
Header	37H	55	1 byte
Identifier	2FH	47	1 byte
Width	30H - 39H	48 - 57	1 - 5 bytes
Separator	1FH	31	1 byte
Height	30H - 39H	48 - 57	1 - 5 bytes
Separator	1FH	31	1 byte
Fixed Value	31H	49	1 byte
Separator	1FH	31	1 byte
Other Information	30H or 31H	48 or 49	1 byte
NUL	00H	0	1 byte

Description of the width and height data sent:

- The height and width values of the symbol data are in dot units.

Description of the Other Information data sent:

“Hexadecimal = 30H / Decimal = 48” indicates that the data is printable.

“Hexadecimal = 31H / Decimal = 49” indicates that the data is not printable.

[Notes]

- This command does not print the PDF417 symbols.
- Users must consider the quiet zone for the PDF417 symbols (upward and downward spaces and left and right spaces for the PDF417 symbols specified in the specifications for the PDF417 symbols).

<Function 165> **GS (k *pL pH cn fn n1 n2*** (when *cn* = 49, *fn* = 65)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*n1*	*n2*

[Range] (*pL* + *pH* × 256) = 4 (*pL* = 4, *pH* = 0)
cn = 49
fn = 65
n1 = 49, 50
n2 = 0

[Default] *n1* = 50, *n2* = 0

[Description] • Select the model of QR Code.

n1	Function
49	Selects model 1 conversion processing.
50	Selects model 2 conversion processing.

<Function 167> **GS (k *pL pH cn fn n*** (when *cn* = 49, *fn* = 67)

[Format]

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*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 49
fn = 67
$1 \leq n \leq 16$

[Default] *n* = 3

[Description] • Sets the size of the module for QR Code to ***n*** dots.

<Function 169> **GS (k *pL pH cn fn n*** (when *cn* = 49, *fn* = 69)

[Format]

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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 49$
$fn = 69$
$48 \le n \le 51$

[Default] $n = 48$

[Description]
- Selects the error correction level for QR Code.

n	Function	Reference: Approx. figure of recovery
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 %

<Function 180> **GS (k *pL pH cn fn m d1…dk*** (when *cn* = 49, *fn* = 80)

[Format]

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] $4 \le (pL + pH \times 256) \le 7092$ $(0 \le pL \le 255, 0 \le pH \le 27)$
$cn = 49$
$fn = 80$
$m = 48$
$0 \le d \le 255$
$k = (p_L + p_H \times 256) - 3$

[Description]
- Stores the QR Code symbol data (*d1...dk*) into the symbol storage area.

<Function 181> **GS (k *pL pH cn fn m*** (when *cn* = 49, *fn* = 81)

[Format]

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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 49$
$fn = 81$
$m = 48$

[Description]
- Encodes and prints the QR Code symbol data in the symbol storage area with **GS (k** <Function 180>.

[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.

<Function 182> **GS (k *pL pH cn fn m*** (when *cn* = 49, *fn* = 82)

[Format]

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*

[Range] ($pL + pH \times 256$) = 3 (*pL* = 3, *pH* = 0)
cn = 49
fn = 82
m = 48

[Description]
- Transmits the size information for the encoded QR Code symbol data in the symbol storage area with **GS (k** <Function 180>.

[Notes]
- This function does not print data.
- The size information does not include the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications).

<Function 265> **GS (k *pL pH cn fn n*** (when *cn* = 50, *fn* = 65)

[Format]

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*

[Range] ($pL + pH \times 256$) = 3 (*pL* = 3, *pH* = 0)
cn = 50
fn = 65
$50 \leq n \leq 54$

[Default] *n* = 50

[Description]
- Specifies a mode for MaxiCode.

n	Function
50	Executes conversion mode 2.
51	Executes conversion mode 3.
52	Executes conversion mode 4.
53	Executes conversion mode 5.
54	Executes conversion mode 6.

<Function 280> **GS (k *pL pH cn fn m*** (when *cn* = 50, *fn* = 80)

[Code]

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] $4 \le (pL + pH \times 256) \le 141$ ($4 \le pL 141$, $0 \le pH \le 27$)
cn = 50
fn = 80
m = 48
$0 \le d \le 255$
$k = (pL + pH \times 256) - 3$

[Description]
- Stores the symbol data (***d1***...***dk***) in the symbol storage area.

<Function 281> **GS (k *pL pH cn fn m*** (when *cn* = 50, *fn* = 81)

[Code]

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*

[Range] $(pL + pH \times 256) = 3$ ($pL = 3$, $pH = 0$)
cn = 50
fn = 81
m = 48

[Description]
- Encodes and prints the symbol data stored by **GS (k** <Function 280> in the symbol storage area.

[Notes]
- User must secure the quiet zones (the space of the top, bottom, right and left of the symbols, which is specified by MaxiCode standard.).

<Function 282> **GS (k *pL pH cn fn m*** (when *cn* = 50, *fn* = 82)

[Format]

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*

[Range] $(pL + pH \times 256) = 3$ ($pL = 3$, $pH = 0$)
cn = 50
fn = 82
m = 48

[Description]
- Transmits size information for printing the symbol data stored by **GS (k** <Function 280> in the symbol storage area.

[Notes]
- Executing this command does not print data.
- The size information excludes the quiet zones (the space of the top, bottom, right and left of the symbols, which is specified by MaxiCode standard).

<Function 367> **GS (k *pL pH cn fn n*** (when *cn* =51, *fn*=67)

[Format]

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*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$cn = 51$
$fn = 67$
$2 \le n \le 8$

[Default] $n = 2$

[Description]
- Set the width of one module of 2-dimensional GS1 DataBar to *n* dots.

<Function 371> **GS (k *pL pH cn fn nL nH*** (when *cn* =51, *fn* = 71)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*

[Range] $(pL + pH \times 256) = 4$ $(pL = 4,$ $pH = 0)$
$cn = 51$
$fn = 71$
$106 \le (nL + nH \times 256) \le 3952$, $(nL + nH \times 256) = 0$ $(0 \le nL \le 255, 0 \le nH \le 15)$

[Default] $(nL + nH \times 256) = 160$ $(nL = 160, nH = 0)$

[Description]
- Set the maximum width of GS1 DataBar Expanded Stacked (2-dimensional GS1 DataBar) to $(nL + nH \times 256)$ dots.

<Function 380> **GS (k *pL pH cn fn m n d1...dk*** (when *cn* =51, *fn*=80)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*n*	*d1...dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*n*	*d1...dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*n*	*d1...dk*

[Range] $6 \le (pL + pH \times 256) \le 259$ $(0 \le pL \le 255, pH = 0, 1)$
$cn = 51$
$fn = 80$
$m = 48$
$n = 72, 73, 76$
$0 \le d \le 255$
$k = (pL + pH \times 256) - 4$

[Description]
- Store symbol data (*d1*…*dk*) in 2-dimensional GS1 DataBar in the symbol storage area

n	Types of 2-dimensional GS1 DataBar
72	GS1 DataBar Stacked
73	GS1 DataBar Stacked Omnidirectional
76	GS1 DataBar Expanded Stacked

<Function 381> **GS (k *pL pH cn fn m*** (when *cn* = 51, *fn* = 81)

[Format]

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*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
cn = 51
fn = 81
m = 48

[Description]
- Encodes and prints the symbol data stored by **GS (k** <Function 380> in the symbol storage area.

[Notes]
- The user must secure the quiet zones (the space of the top, bottom, right and left of the symbols, which is specified by 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.

<Function 382> **GS (k *pL pH cn fn m*** (when *cn* = 51, *fn* = 82)

[Format]

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*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
cn = 51
fn = 82
m = 48

[Description]
- Transmits the size information when printing the symbol data stored by **GS (k** <Function 380> in the symbol storage area.

[Notes]
- Printing is excluded from the processing executed by this function.
- The size information excludes the quiet zones (the space of the top, bottom, right and left of the symbols, which is specified by 2-dimensional GS1 DataBar standard).

<Function 467> **GS (k *pL pH cn fn n*** (when *cn* =52, *fn* = 67)

[Format]

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*

[Range] ($pL + pH \times 256$) = 3 (pL = 3, pH = 0)
cn = 52
fn = 67
$2 \leq n \leq 8$

[Default] *n* = 2

[Description]
- Set one module width of Composite Symbology to *n* dots.

<Function 471> **GS (k *pL pH cn fn nL nH*** (when *cn* = 52, *fn* = 71)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*nL*	*nH*

[Range] $(pL + pH \times 256) = 4 \quad (pL = 4, pH = 0)$
$cn = 52$
$fn = 71$
$106 \le (pL + pH \times 256) \le 3952 \quad (nL + nH \times 256) = 0 \quad (0 \le nL \le 255, 0 \le nH \le 15)$

[Default] $(nL + nH \times 256) = 160 \quad (nL = 160, nH = 0)$

[Description]
- Set the maximum width of GS1 DataBar Expanded Stacked (the straight line element of Composite Symbology) to ($\boldsymbol{pL} + \boldsymbol{pH} \times 256$).

<Function 472> **GS (k *pL pH cn fn n*** (when *cn* = 52, *fn* = 72)

[Format]

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*

[Range] $(pL + pH \times 256) = 3 \quad (pL = 3, pH = 0)$
$cn = 52$
$fn = 72$
$0 \le n \le 2, 2 \le n \le 8$

[Default] $n = 0$

[Description]
- Selects whether or not to turn on/off HRI character, and selects a font for HRI character when printing Composite Symbology.

n	Function
0, 48	Does not turn HRI character on.
1, 49	Turns HRI character on. (Selects Font A.)
2,50	Turns HRI character on. (Selects Font B.)

[Notes]
- HRI character is not turned on for the straight line element of the following, even if “Turn HRI character on” is selected.
  - GS1 DataBar Stacked
  - GS1 DataBar Stacked Omnidirectional
  - GS1 DataBar Expanded Stacked

<Function 480> **GS (k *pL pH cn fn m a b d1...dk*** (when *cn* = 52, *fn* = 80)

[Format]

ASCII	GS	(	k	*pL*	*pH*	*cn*	*fn*	*m*	*a*	*b*	*d1...dk*
Hex	1D	28	6B	*pL*	*pH*	*cn*	*fn*	*m*	*a*	*b*	*d1...dk*
Decimal	29	40	107	*pL*	*pH*	*cn*	*fn*	*m*	*a*	*b*	*d1...dk*

[Range] $7 \le (pL + pH \times 256) \le 2366$ $(0 \le pL \le 255, 0 \le pH \le 9)$ [When *a* = 48]

$8 \le (pL + pH \times 256) \le 2366$ $(0 \le pL \le 255, 0 \le pH \le 9)$ [When *a* = 49]

cn = 52

fn = 80

m = 48

a = 48, 49

$65 \le b \le 77$ [When *a* = 48]

b = 65, 66 [When *a* = 49]

$0 \le d \le 255$

$k = (pL + pH \times 256) - 5$

[Description]

- Stores symbol data (*d1*…*dk*) in Composite Symbology in the symbol storage area
- (When a = 48) *b* specifies the type of straight line element.

b	Type of straight line element
65	EAN8
66	EAN13
67	UPC-A
68	UPC-E (6-digit version (0 excluded))
69	UPC-E (11-digit version (0 included))
70	GS1 DataBar Omnidirectional
71	GS1 DataBar Truncated
72	GS1 DataBar Stacked
73	GS1 DataBar Stacked Omnidirectional
74	GS1 DataBar Limited
75	GS1 DataBar Expanded
76	GS1 DataBar Expanded Stacked
77	GS1-128

- (When *a* = 49) *b* selects the type of 2-dimensional synthetic element.

b	2-dimensional synthetic element
65	CC-A, CC-B, or CC-C is automatically selected depending on the number of digits.
66	Fixed to CC-C.

<Function 481> **GS (k *pL pH cn fn m*** (when *cn* = 52, *fn* = 81)

[Format]

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*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 52
fn = 81
m = 48

[Description]
- Encodes and prints the symbol data stored by **GS (k** <Function 480> in the symbol storage area.

[Notes]
- The user must secure the quiet zones (the space of the top, bottom, right and left of the symbols, which is specified by Composite Symbology 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.

<Function 482> **GS (k *pL pH cn fn m*** (when *cn* = 52, *fn* = 82)

[Format]

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*

[Range] (*pL* + *pH* × 256) = 3 (*pL* = 3, *pH* = 0)
cn = 52
fn = 82
m = 48

[Description]
- Transmits size information of the symbol data stored by **GS (k** <Function 480> in the symbol storage area.
  - Detailed error information added to size information

Detailed information	Value
Ready for printing (No error)	"0000"
Symbol data of straight line element is incorrect.	"1001"
Symbol data for 2-dimensional synthetic element is incorrect.	"1002"
Number of digits of symbol data for 2-dimensional synthetic element is too many.	"1003"
(Reserved: Incorrect settings of 2-dimensional synthetic element string)	"1004"
Combination of the straight line element type and 2-dimensional synthetic element type is incorrect.	"1005"
There is no symbol data that has straight line element or 2-dimensional synthetic element in the symbol storage area.	"1006"
Data exists in the print buffer.	"2001"
Size of encoded symbols exceeds the print area.	"2002"

[Notes]
- Printing is excluded from the processing executed with this function.
- The size information excludes the quiet zones (the space at the top, bottom, on the right and left of the symbols, which is specified by Composite Symbology standard.)

GS / *m*

[Name] Print downloaded bit image

[Format]

ASCII	GS	/	*m*
Hex	1D	2F	*m*
Decimal	29	47	*m*

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

[Description] Prints a downloaded bit image using the mode specified by *m*.
m selects a mode from the table below:

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

[dpi: dots per inch (number of dots per 25.4 mm)]

[Notes]

- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- See Section 4.2.3 for the downloaded bit image development position in page mode.
- If the width of the printing area set by **GS L** and **GS W** is less than the width required by the data sent with the **GS /** command; the following will be performed on the line in question (but the printing cannot exceed the maximum printable area)
  1) The width of the printing area is extended to the right to accommodate the amount of data.
  2) If step 1) does not provide sufficient width for the data, the left margin is reduced to accommodate the data.

  For each bit of data in normal mode (*m* = 0,48) and double-height mode (*m* = 2, 50), the printer prints one dot: for each bit of data in double-width mode (*m* = 1, 49) and quadruple mode (*m* = 3, 15), the printer prints two dots.

[Reference] **GS∗**

GS B *n*

[Name] Turn white/black reverse printing mode

[Format]

ASCII	GS	B	*n*
Hex	1D	42	*n*
Decimal	29	66	*n*

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

[Description]
- Turns on or off white/black reverse printing mode.
  - When the LSB of *n i*s 0, white/black reverse mode is turned off.
  - When the LSB of *n* is 1, white/black reverse mode is turned on.

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

[Default] *n* = 0

GS E *n*

[Name] Select head control method

[Format]

ASCII	GS	E	*n*
Hex	1D	45	*n*
Decimal	29	69	*n*

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

[Default] $n = 0$

[Description] Selects head control method.

Bit	Function	ON	OFF
0	Undefined	–	–
1	Undefined	–	–
2	Undefined	–	–
3	Undefined	–	–
4	Print speed selection	See Table below.	
5			
6	Undefined	–	–
7	Undefined	–	–

Table Print Speed Selection

Print Speed Level	Bit 5	Bit 4	
Speed 1 (153 mm/s maximum)	0	0	High
Speed 2 (105 mm/s maximum)	0	1	↕
Speed 3 (80 mm/s maximum)	1	0	
Speed 4 (50 mm/s maximum)	1	1	Low

[Notes]
- This command is effective only when processed at the beginning of the line in standard mode.
- The print speed is the maximum (126 mm/s) even if Speed 1 is specified when the media type setting is other than Type4.

[Default] Speed 1

GS H *n*

[Name] Select printing position for HRI characters

[Format]

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

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

[Description] Selects the printing position of HRI characters when printing a bar code.

n selects the printing position as follows:

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

[Notes]
- HRI indicates Human Readable Interpretation.
- HRI characters are printed using the font specified by **GS f**.

[Default] *n* = 0

[Reference] **GS f**, **GS k**

GS I *n*

[Name] Transmit printer ID

[Format]

ASCII	GS	I	*n*
Hex	1D	49	*n*
Decimal	29	73	*n*

[Range] $1 \le n \le 3$, $49 \le n \le 51$, $n = 65, 69, 114, 115$

[Description] Transmits the printer ID specified.

- *n* specifies the types of the printer ID.

n	Printer ID type	Interface	Value (Hex)	Header
1, 49	Printer model ID	Serial / Parallel	27 h	
		USB	08 h	
2, 50	Type ID	See table below for Type ID.		
3, 51	Firmware version ID	Depends on firmware version.		
65	Firmware version	Depends on firmware version.		* (See Note)
69	Installed font	See table below for installed font.		* (See Note)
114	Capacity of the expanded side flash ROM	See table below for capacity of the expanded side flash ROM.		* (See Note)
115	Special type ID for EU	See table below for special type ID for EU.		* (See Note)

[Note]

- The printer IDs which are marked with * in the header column are transmitted the data with the header code of 5FH and the terminated code of 00H..

[Type ID]

Bit	Hex	Decimal	Function
0	00	0	Two-byte character code not supported.
	01	1	Two-byte character code supported.
1	02	2	Autocutter installed.
2	00	0	BM sensor disabled.
	04	4	BM sensor enabled.
3	00	0	Not used.
4	00	0	Not used.
5	-	-	Undefined.
6	-	-	Undefined.
7	00	0	Not used.

[Installed font]

Transmitted data	Installed Font
5Fh, 00h	Only alphanumeric and Katakana

[Capacity of the expanded side flash ROM]

Transmitted data	Capacity of the Expanded ROM
5Fh, 80h, 00h	Not installed

[Special type ID for EU]

Bit	Function	0	1
0	Cut sheet presenter module	Not installed	Installed
1	Undefined	Fixed to "0"	
2	Undefined	Fixed to "0"	
3	Undefined	Fixed to "0"	
4	Paper supply device	Not installed	Installed
5	Undefined	Fixed to "0"	
6	Undefined	Fixed to "1"	
7	Reserved	Fixed to "1"	

[Details]

- The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS I** and the ASB status must be differentiated. See Appendix B, Transmission Status Identification.

GS L *nL nH*

[Name] Set left margin

[Format]

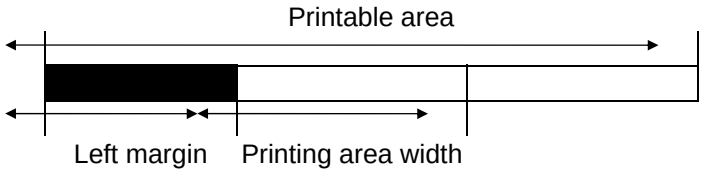
ASCII	GS	L	*nL*	*nH*
Hex	1D	4C	*nL*	*nH*
Decimal	29	76	*nL*	*nH*

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

$0 \le nH \le 255$

[Description] Sets the left margin using *nL* and *nH*.

- The left margin is set to [(*nL* + *nH* × 256) × 0.125 mm].



[Notes]
- This command is effective only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.

[Default] *nL* = 0, *nH* = 0

[Details] The left margin for the raster bit image with **GS v 0** or **GS (L** <Function 112> can be set for each 8 bit. If there exceeds flowing out of the value divided with eight, they are ignored. For example, (*nL* + *nH* × 256) = 20 ... setting value is 16.

[Reference] **GS W**

GS T *n*

[Name] Set print position to the beginning of print line

[Format]

ASCII	GS	T	*n*
Hex	1D	54	*n*
Decimal	29	84	*n*

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

[Description] Sets the print position to the beginning of print line.

- *n* specifies the data processing method in the print buffer.

n	Printing position
0, 48	Sets the print position to the beginning of print line after deleting all data in the print buffer.
1, 49	Set the print position to the beginning of print line after printing all data in the print buffer.

① GS V *m* ② GS V *m n*

[Name] Select cut mode and cut paper

[Format]

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

[Range] ① $m = 1, 49$

② $m = 66$, $0 \leq n \leq 255$

[Description] Selects a mode for cutting paper and executes paper cutting. The value of *m* selects the mode as follows:

m	Print mode
1, 49	Cuts paper
66	Feeds paper (cutting position + [$n \times 0.125$ mm]), and cuts the paper.

[Notes for ① and ②]

- Cutting status is different, depending on the installed autocutter type.
- This command is effective only when processed at the beginning of a line.

[Notes for ①]
- Cuts paper.

[Notes for ②]
- When $n = 0$, the printer feeds the paper to the cutting position and cuts it.
- When $n \neq 0$, the printer feeds the paper to (cutting position + [$n \times 0.125$ mm {0.0049"}]) and cuts it.
- When the BM sensor is set to be effective with DIP switch 7, [(Value which is set by **GS (F**) + *n* x 0.125 mm] is applied.

GS W *nL nH*

[Name] Set printing area width

[Format]

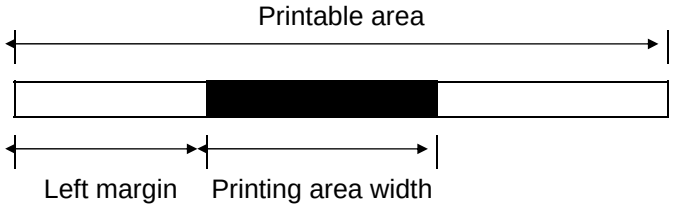
ASCII	GS	W	*nL*	*nH*
Hex	1D	57	*nL*	*nH*
Decimal	29	87	*nL*	*nH*

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

$0 \le nH \le 255$

[Description] Sets the printing area width to the area specified by nL and nH.

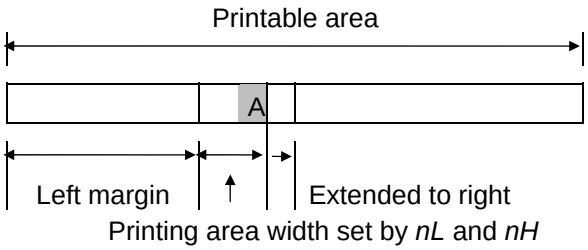
- The printing area width is set to [$(nL + nH \times 256) \times 0.125$mm {0.0049"}].



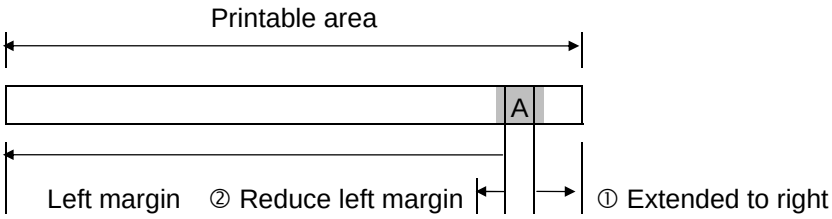
[Notes]

- This command is effective only when processed at the beginning of the line.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The setting by **GS L** takes precedence over the setting by **GS W**. If the [left margin + printing area width] exceeds the printable area, the printer uses [Printable area width - left margin]. However, the setting by **GS W** is still reserved, even when it is not used in the current printing..
- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:

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



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



③ If the printing area width cannot be extended sufficiently, the right space is reduced.

- If the width set for the printing area is less than one vertical line, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:
  ① The printing area width is extended to the right to accommodate one line vertical for the bit image within the printable area.
  ② If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one vertical line.

[Default] *nL* and *nH* are as follows:

Number of dots in horizontal	Default value
576 dots	*nL* = 64, *nH* = 2

[Reference] **GS L**

GS \ *nL nH*

[Name] Set relative vertical print position in page mode

[Format]

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

[Range] $0 \le nL \le 255$
$0 \le nH \le 255$

[Description] Sets the relative vertical print starting position from the current position in page mode.

- This command sets the distance from the current position to [(*nL* + *nH* × 256) × 0.125 mm {0.0049"}].

[Notes]

- This command is ignored unless page mode is selected.
- When pitch *N* is specified for the movement downward:

  nL + *nH*× 256 = *N*

  When pitch *N* is specified for the movement upward (the negative direction), use the complement of 65536.

  When pitch *N* is specified for the movement upward:

  nL + *nH* × 256 = 65536 - *N*
- Any setting that exceeds the specified printing area is ignored.
- This command functions as follows, depending on the print starting position set by **ESC T**:

  1) When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (*y*) is used.

  2) When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (*x*) is used.

[Reference] **ESC $**, **ESC T**, **ESC W**, **ESC **, **GS $**, Section 4.2, *Page Mode*

GS a *n*

[Name] Enable/Disable Automatic Status Back (ASB)

[Format]

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

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

[Description] Enables or disables ASB and specifies the status items to include, using *n* as follows:

Bit	Hex	Decimal	Status for ASB
0	00	0	Not used. Fixed to Off.
1	00	0	Online/offline status disabled.
	02	2	Online/offline status enabled.
2	00	0	Error status disabled.
	04	4	Error status enabled.
3	00	0	Paper sensor status disabled.
	08	8	Paper sensor status enabled.
4	-	-	Undefined.
5		-	Undefined.
6	00	0	Paper FEED button status disabled.
	40	64	Paper FEED button status enabled.
7	-	-	Undefined.

[Notes]

- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
- If all status items are disabled, the ASB function is also disabled.
- If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission are possible at the first time from when the printer is turned on.
- The following four status bytes are transmitted without confirming whether the host computer is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
- Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
- When using **DLE EOT**, or **GS r**, the status transmitted by these commands and ASB status must be differentiated, according to the procedure in Appendix B, *Transmission Status Identification*.

First byte (printer information)

Bit	Hex	Decimal	Status for ASB
0	00	0	Not used. Fixed to Off.
1	00	0	Not used. Fixed to Off.
2	00	0	Cut sheet presenter is closed.
	04	4	Cut sheet presenter is open.
3	00	0	Online.
	08	8	Offline.
4	10	16	Not used. Fixed to On.
5	00	0	Platen is closed.
	20	32	Platen is open.
6	00	0	Paper is not being fed by using the paper FEED button.
	40	64	Paper is being fed by using the paper FEED button.
7	00	0	Not used. Fixed to Off.

Bit 6: Becomes same as bit 1 of the second byte.

Second byte (printer error information)

Bit	Hex	Decimal	Status for ASB
0	00	0	Not in online waiting status.
	01	1	During online waiting status.
1	00	0	Paper FEED button is turned Off.
	02	2	Paper FEED button is turned On.
2	00	0	No mechanical error.
	04	4	Mechanical error has occurred.
3	00	0	No autocutter error.
	08	8	Autocutter error occurred.
4	00	0	Not used. Fixed to Off.
5	00	0	No unrecoverable error.
	20	32	Unrecoverable error occurred.
6	00	0	No automatically recoverable error.
	40	64	Automatically recoverable error occurred.
7	00	0	Not used. Fixed to Off.

Bit 6: Bit 6 is on when printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is opened during printing.

Third byte (paper sensor information)

Bit	Hex	Decimal	Status for ASB
0	00	0	Paper end sensor : paper not present.
	01	1	Paper end sensor : paper present. (When memory switch 5-4 is Off.)
1	00	0	Paper near-end sensor 1: paper adequate.
	02	2	Paper near-end sensor 1: paper near end.
2	-	-	Undefined.
3	00	0	Paper sensor: paper present.
	08	8	Paper sensor: paper not present.
4	00	0	Not used. Fixed to Off.
5	-	-	Undefined.
6	00	0	The secondary paper near-end detected.
	40	64	The secondary paper near-end detected.
7	00	0	Not used. Fixed to Off.

Fourth byte (paper sensor information)

Bit	Hex	Decimal	Status for ASB
0	00	0	T/E sensor on the presenter: Paper present.
	01	1	T/E sensor on the presenter: Paper not present.
1	00	0	T/T sensor on the presenter: Paper present.
	02	2	T/T sensor on the presenter: Paper not present.
2	-	-	Undefined.
3	-	-	Undefined.
4	00	0	Not used. Fixed to Off.
5	-	-	Undefined.
6	-	-	Undefined.
7	00	0	Not used. Fixed to Off.

[Default]
- When Memory Switch 1-3 is Off: *n* = 0
- When Memory Switch 1-3 is On: *n* = 2

[Reference] **DLE EOT**, **GS r**, Appendix B, *Transmission Status Identification,* Section 1.5, *Memory Switches*

GS b *n*

[Name] Turns smoothing mode on/off

[Format]

ASCII	GS	b	*n*
Hex	1D	62	*n*
Decimal	29	98	*n*

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

[Description] Turns smoothing mode on or off.

When the LSB of *n* is 0, smoothing mode is turned off.

When the LSB of *n* is 1 smoothing mode is turned on.

[Notes]
- Only the lowest bit of *n* is valid.
- Smoothing mode is available for built-in, user-defined characters.
- Even if smoothing mode is turned on, smoothing is not performed when either character width or character height is the normal size.

[Default] *n* = 0

[Reference] **ESC !**, **GS !**

GS f *n*

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

[Format]

ASCII	GS	f	*n*
Hex	1D	66	*n*
Decimal	29	102	*n*

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

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

n selects a font from the following table:

n	Font
0, 48	Font A (12 × 24)
1, 49	Font B (9 × 24)

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

[Default] *n* = 0

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

GS g 0 *m nL nH*

[Name] Initialize maintenance counter

[Format]

ASCII	GS	g	0	*m*	*nL*	*nH*
Hex	1D	67	30	*m*	*nL*	*nH*
Decimal	29	103	48	*m*	*nL*	*nH*

[Range] *m* = 0
(*nL* + *nH* × 256) = 20, 21, 22, 50, 61, 70 (*nL* = 20, 21, 22, 50, 61, 70, *nH* = 0)

[Default] none

[Description] Sets the resettable maintenance counter specified by (*nL* + *nH* × 256) to 0.

(*nL* + *nH* × 256)		Maintenance counter [Units]
Hex	Decimal	
14	20	Number of lines fed. [Lines]
15	21	Count of head energizations. [Times]
16	22	Number of lines fed (when the print head was replaced) [Lines]
32	50	Count of autocutter operations. [Times].
3D	61	Paper presenter operations [Times].
46	70	Duration of printer operation. [Hours].

[Details]

- When Standard mode is selected, this command is valid only when at the beginning of a line. When processed anywhere other than beginning of a line, the three bytes **GS g 0** are read and discarded, then data after *m* is processed as normal data.
- When Page mode is selected, this command is ignored. The three bytes **GS g** 0 are read and discarded, then data after *m* is processed as normal data.
- If an out-of-range parameter is encountered, processing of this command is aborted. Parameter processes that abort this command are as follows.
- When the counter is reset (initialized), the following processes occur:
  - The interface status is made BUSY just before writing begins. In this case, the printer is set to the BUSY state regardless of the (BUSY status) memory switch setting.
  - Real-time commands are ignored.
  - The printer does not transmit the ASB status even if the ASB function is enabled. If the ASB status changes while writing to NV memory, it is sent after writing is finished.
- The maintenance counter is not initialized by the **ESC** @ command, or by reset or power off.
- This command cannot execute when off line, because data in the receive buffer is not processed.

[Note]
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

[Reference] **GS g 2**

GS g 2 *m nL nH*

[Name] Transmit maintenance counter

[Format]

ASCII	GS	g	2	*m*	*nL*	*nH*
Hex	1D	67	32	*m*	*nL*	*nH*
Decimal	29	103	50	*m*	*nL*	*nH*

[Range] *m* = 0
(*nL* + *nH* × 256) = 20, 21, 22, 50, 61, 70, 148, 149, 150, 178, 189, 198
(*nL* =20,21,22,50,61,70, 148, 149, 150, 178, 189, 198, *nH* =0)

[Default] none

[Description] Transmits the value of the maintenance counter specified by (*nL* + *nH* × 256)

(*nL* + *nH* × 256)		Maintenance counter [Units]	Type of counter
Hex	Decimal		
14	20	Number of lines fed. [Lines] (30 dots per line)	Resettable (can be reset)
15	21	Number of head energizations. [Times]	
16	22	Number of lines fed (when the print head was replaced) [Lines]	
32	50	Number of autocutter operations. [Times].	
3D	61	Paper presenter operations [Times].	
46	70	Duration of printer operation. [Hours].	
94	148	Number of lines fed. [Lines]	Cumulative
95	149	Number of head energizations. [Times]	
96	150	Number of lines fed (when the print head was replaced) [Lines]	
B2	178	Number of autocutter operations. [Times].	
BD	189	Paper presenter operations [Times].	
C6	198	Duration of printer operation. [Hours].	

[Details] 1) If an out-of-range parameter is encountered, processing of this command is aborted. Parameter processes that abort this command are as follows.

- If *m* is out of range, the four bytes <**GS** - *m*> are read in and discarded, afterwhich *nL* is processed as normal data.
- <*nL, nH*> are processed as [Counter No.: (*nL* + *nH* × 256)], except when there is no function associated with [Counter No. (*nL, nH*)], in which case they are ignored.

2) When counter data preparation processing is complete, the following processes are performed:

- READY→BUSY processing is performed. If the status is already BUSY, nothing is done.
- Header - NUL data is transmitted.
- BUSY→READY processing is performed. If the status is already BUSY due to another condition, nothing is done.

Counter values are transferred as follows

Transmission data	Hex	Decimal	Amount of data
a) Header	5FH	95	1 byte
b) Counter Value	see below	see below	1 - 10 bytes
c) NUL	00H	0	1 byte

Item c) Counter Value is an ASCII-coded decimal value transmitted MSD first. Transmitted byte values are 30H to 39H, and can consist of one to ten bytes.

Example 1: If the counter value is 78H, the transmitted data is three bytes, encoding "120" as 31H, 32H, 30H.

Example 2: If the counter value is 7CDH, the transmitted data is four bytes, encoding "1997" as 31H, 39H, 39H, 37H.

3) The maximum maintenance counter data size is four bytes for each value, used in the NV memory.

4) This function does not change or initialize any counter values.

Upon initialization, all maintenance counters are set to “0”. Also, when a counter reaches its maximum value, the next count resets the counter to “0”.

The maintenance counters are not initialized by executing **ESC @**, **FS q**, reset or power off.

This command cannot execute when offline, because data in the receive buffer is not processed.

[Details: Data transfer processing]

While data [Header - NUL] is being transferred, the following processes are affected:

- Mechanical operations such as head initialization by opening the platen or manual paper feed by button are disabled. Required mechanical operations can be done after data has been transferred.
- Real-time commands are ignored.
- The printer does not transmit the ASB status even if the ASB function is enabled. If the ASB status changes while writing to NV memory, it is sent after writing is finished.

[Notes]

- The maintenance counter values are measurements; therefore, their values will be affected by the timing of errors and how and when the power is turned off.
- When this command is transmitted, do not transmit data that follows until the status is received.

[Reference] **GS g 0**

GS h *n*

[Name] Select bar code height

[Format]

ASCII	GS	h	*n*
Hex	1D	68	*n*
Decimal	29	104	*n*

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

[Description] Selects the height of the bar code.

n specifies the number of dots in the vertical direction.

[Default] *n* = 162

[Reference] **GS k**

① GS k *m d1...dk NUL* ②GS k *m n d1...dn*

[Name] Print bar code

[Format]

①ASCII	GS	k	*m*	*d1*...d*k*	*NUL*
Hex	1D	6B	*m*	*d1*...d*k*	*00*
Decimal	29	107	*m*	*d1*...d*k*	*0*
②ASCII	GS	k	*m*	*n*	*d1...dn*
Hex	1D	6B	*m*	*n*	*d1...dn*
Decimal	29	107	*m*	*n*	*d1...dn*

[Range] ① $0 \le m \le 6$ (*k* and *d* depend on the bar code system used)

② $65 \le m \le 78$ (*n* and *d* depend on the bar code system used)

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

<Function ①>

m	Bar Code System	Number of Characters	Remarks
0	UPC-A	*k* = 11, 12	$48 \le d \le 57$
1	UPC-E	$6 \le k \le 8$ *k* = 11, 12	$48 \le d \le 57$ [Where *k* = 7,8,11,12, *d1* = 48]
2	JAN13 (EAN)	*k* = 12, 13	$48 \le d \le 57$
3	JAN 8 (EAN)	*k* = 7, 8	$48 \le d \le 57$
4	CODE39	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 90$, *d* = 32, 36, 37, 42, 43, 45, 46, 47
5	ITF	$2 \le k$ (even number)	$48 \le d \le 57$
6	CODABAR	$2 \le k$	$48 \le d \le 57$, $65 \le d \le 68$, $97 \le d \le 100$ *d* = 36, 43, 45, 46, 47, 58 [Where $65 \le d1 \le 68$, $65 \le dk \le 68$, $97 \le d1 \le 100$, $97 \le dk \le 100$]

- ***k*** of <Function ①> indicates the number of bar code data.
- ***d*** specifies bar code data.

<Function ②>

m	Bar Code System	Number of Characters	Remarks
65	UPC-A	$n = 11, 12$	$48 \le d \le 57$
66	UPC-E	$6 \le n \le 8$ $n = 11, 12$	$48 \le d \le 57$ [Where n=7,8,11,12, $d1 = 48$]
67	JAN13 (EAN)	$n = 12, 13$	$48 \le d \le 57$
68	JAN 8 (EAN)	$n = 7, 8$	$48 \le d \le 57$
69	CODE39	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 90$, $d = 32, 36, 37, 42, 43, 45, 46, 47$
70	ITF	$2 \le n \le 254$ (even number)	$48 \le d \le 57$
71	CODABAR	$2 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 68$, $d = 36, 43, 45, 46, 47, 58$ [Where $65 \le d1 \le 68$, $65 \le dn \le 68$, $97 \le d1 \le 100$, $97 \le dn \le 100$]
72	CODE93	$1 \le n \le 255$	$0 \le d \le 127$
73	CODE128	$2 \le n \le 255$	$0 \le d \le 127$ [Where $d1 = 123$, $65 \le d2 \le 67$]
74	GS1-128	$2 \le n \le 255$	$0 \le d \le 127$
75	GS1 DataBar Omnidirectional	$n = 13$	$48 \le d \le 57$
76	GS1 DataBar Truncated	$n = 13$	$48 \le d \le 57$
77	GS1 DataBar Limited	$n = 13$	$48 \le d \le 57$ [Where $48 \le d1 \le 49$]
78	GS1 DataBar Omnidirectional	$2 \le n \le 255$	$32 \le d \le 34$, $37 \le d \le 63$, $65 \le d \le 90$, $d = 95$, $97 \le d \le 122$, $d = 123$ [Where $d1 = 40$, $48 \le d2 \le 57$, $48 \le d3 \le 57$ or $48 \le d1 \le 57$, $48 \le d2 \le 57$]

- ***n*** of <Function ②> specifies the number of bytes of bar code data.
- ***d*** specifies bar code data.

[Notes] Users must secure the quiet zone (left or right side space area defined by the bar code standard) for bar code printing.

[Notes for ①]

- This command ends with a NUL code.
- When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes of bar code data and processes the following data as normal data.
- When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes of bar code data and processes the following data as normal data.
- When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes of bar code data and processes the following data as normal data.
- The number of data for the ITF bar code must be even numbers. When an odd number of bytes of data is input, the printer ignores the last received data.

[Notes for ②]

- *n* indicates the number of bar code data bytes, and the printer processes *n* bytes from the next character data as bar code data.
- If *n* is outside the specified range, the printer stops command processing and processes the following data as normal data.

[Notes in standard mode]

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

[Notes in page mode]

- This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
- If *d* is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.
- If bar code width exceeds the printing area, the printer does not print the bar code, but moves the data buffer position to the left side out of the printing area.
- See Section 4.2.3 for the bar code data buffer position.

When CODE93 (*m* = 72) is used:

- The printer prints an HRI character (□) as the start character at the beginning of the HRI character string.
- The printer prints an HRI character (□) as a stop character at the end of the HRI character string.

- The printer prints HRI characters (+ an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

Control character			HRI character	Control character			HRI character
ASCII	Hex	Decimal		ASCII	Hex	Decimal	
NUL	00	0	U	DLE	10	16	P
SOH	01	1	A	DC1	11	17	Q
STX	02	2	B	DC2	12	18	R
ETX	03	3	C	DC3	13	19	S
EOT	04	4	D	DC4	14	20	T
ENQ	05	5	E	NAK	15	21	U
ACK	06	6	F	SYN	16	22	V
BEL	07	7	G	ETB	17	23	W
BS	08	8	H	CAN	18	24	X
HT	09	9	I	EM	19	25	Y
LF	0A	10	J	SUB	1A	26	Z
VT	0B	11	K	ESC	1B	27	A
FF	0C	12	L	FS	1C	28	B
CR	0D	13	M	GS	1D	29	C
SO	0E	14	N	RS	1E	30	D
SI	0F	15	O	US	1F	31	E
				DEL	7F	127	T

[Example] Printing **GS k** 72 7 67 111 100 101 13 57 51

When CODE128 (*m* = 73) is used:

- See Appendix D for the information for the CODE128 bar code and its code table.
- When using CODE128 in this printer, take the following points into account for data transmission:
  ① The top of the bar code data string must be the code set selection character (CODE A, CODE B, or CODE C), which selects the first code set.

② Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

Specific character	Transmit data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123,83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
"{"	{{	7B, 7B	123, 123

[Example] Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56

- If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.
- If the combination of "{" and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.
- If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.
- The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
- HRI character for the function character is space.
- HRI characters for the control character (<00>H to <1F>H and <7F>H) are space.

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

[Reference] **GS H**, **GS f**, **GS h**, **GS w**, Appendix D

GS r *n*

[Name] Transmit status

[Format]

ASCII	GS	r	*n*
Hex	1D	72	*n*
Decimal	29	114	*n*

[Range] *n* = 1, 49

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

n	Function
1, 49	Transmits paper sensor status

[Notes]

- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated using the table in Appendix B.
- The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

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

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

[Reference] **DLE EOT**, **GS a**, Appendix B

GS w *n*

[Name] Set bar code width

[Format]

ASCII	GS	w	*n*
Hex	1D	77	*n*
Decimal	29	119	*n*

[Range] $2 \leq n \leq 6$

[Description] Sets the horizontal size of the bar code.

n specifies the bar code width as follows:

n	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin Element Width (mm)	Thick Element Width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.560	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

[Notes]

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 (EAN), JAN8 (EAN), CODE93, CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, CODABAR

[Default] *n* = 3

[Reference] **GS k**

2.5 Obsolete Commands

FS p *n m* [obsolete command]

GS (L <Function 69>, which is the upward-compatible command replacing **FS p**, is recommended to use, since **FS p** is an obsolete command in the ESC/POS command system.

[Name] Print NV bit image

[Format]

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

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

[Description]
- Prints NV bit image *n* with the mode specified by *m*.

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

[dpi: dots per inch (25.4 mm)]

- *n* specifies the number of the NV bit image.
- m specifies the mode of the NV bit image.

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

[Reference] **ESC ∗**, **FS q**, **GS /**, **GS v 0**

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

GS (L <Function 67>, which is the upward-compatible command replacing **FS q**, is recommended to use, since **FS q** is an obsolete command in the ESC/POS command system.

[Name] Define NV bit image

[Format]

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

[Range]
$1 \le n \le 255$
$0 \le xL \le 255$
$0 \le xH \le 3$ [where $1 \le (xL + xH \times 256) \le 1023$]
$0 \le yL \le 255$
$0 \le yH \le 1$ [where $1 \le (yL + yH \times 256) \le 288$]
$0 \le d \le 255$
$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
The entire capacity size = 192 KB.

[Description]
- Defines the specified NV bit image in the NV graphics area.
  - *n* specifies the number of NV bit images to define.
  - *xL*, *xH* specify the number of bytes in the horizontal direction as $(xL + xH \times 256) \times 8$ dots.
  - *yL*, *yH* specify the number of bytes in the vertical direction as $(yL + yH \times 256) \times 8$ dots.

[Details]
- This command cancels all NV bit images that have already been defined by this command. The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- From the beginning of the processing of this command till the finish of reset, mechanical operations (including initializing the position of the print head when the platen is open, paper feeding using the FEED button, etc.) cannot be performed.
- NV bit image is a bit image defined in non-volatile memory by **FS q** and printed by **FS p**.
- In standard mode, this command is effective only when processed at the beginning of the line.
- In page mode, this command is not effective.
- This command is effective when 7 bytes <FS~yH> of the command are processed normally.
- When the amount of data exceeds the capacity left in the range defined by *xL, xH, yL, yH*, the printer processes *xL, xH, yL, yH* out of the defined range.
- In the first group of NV bit images, when any of the parameters *xL, xH, yL, yH* is out of the definition range, this command is disabled.
- In groups of NV bit images other than the first one, when the printer encounters *xL, xH, yL, yH* out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.
- The *d* indicates the definition data. In data (*d*) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.

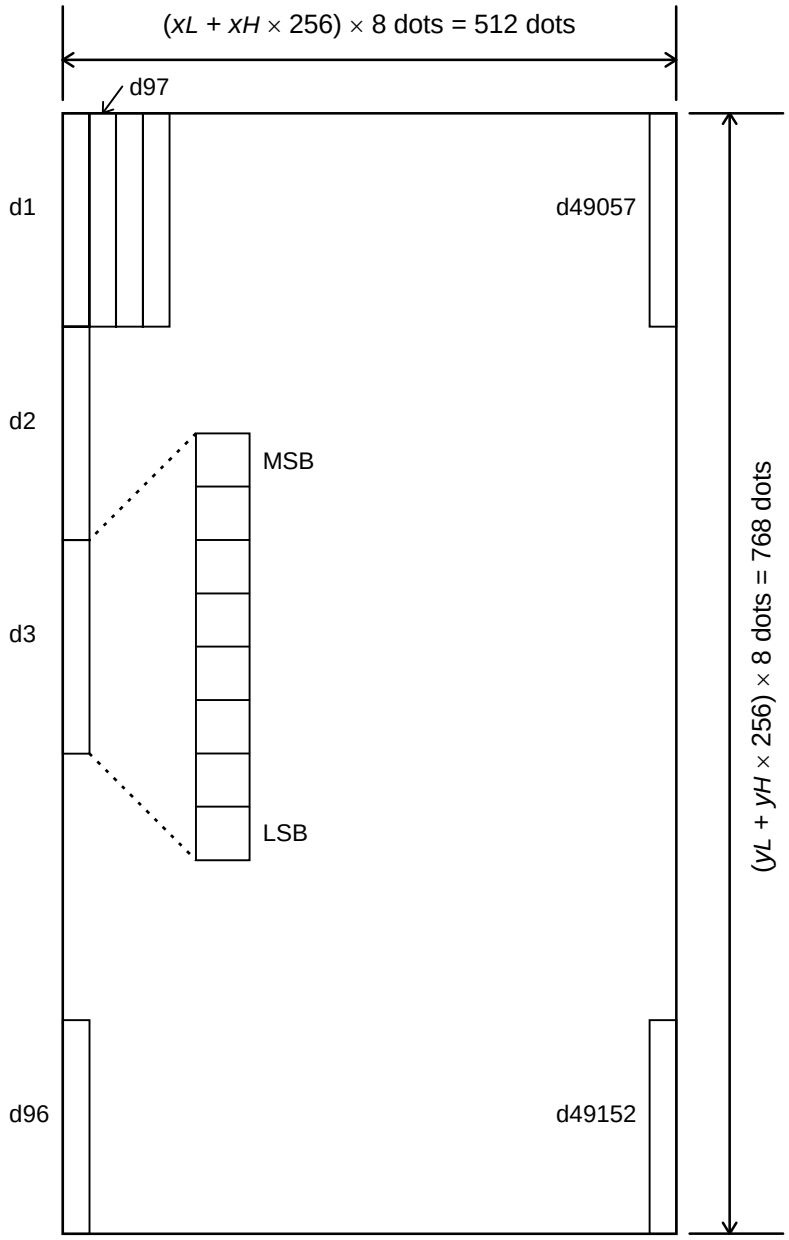
- This command defines *n* as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group *[xL xH yL yH d1...dk]* is NV bit image 01H, and the last data group *[xL xH yL yH d1...dk]* is NV bit image *n.* The total agrees with the number of NV bit images specified by the command **FS p**.
- The definition data for an NV bit image consists of *[xL xH yL yH d1...dk].* Therefore, when only one NV bit image is defined *n*=1, the printer processes a data group *[xL xH yL yH d1...dk]* once. The printer uses ([data: (*xL* + *xH* x 256) x (*yL* + *yH* x 256) x 8] + [header :4]) bytes of NV memory.
- The definition area in this printer is a maximum of 192K bytes. This command can define several NV bit images, but cannot define bit image data whose total capacity [bit image data + header] exceeds 192K bytes.
- The printer is busy immediately before writing into NV memory, regardless of [Busy condition] by the setting of DIP switch.
- The printer does not transmit ASB status or perform status detection during processing of this command even when ASB is specified.
- Once an NV bit image is defined, it is not erased by performing **ESC** @, reset, and power off.
- This command performs only definition of an NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

[Notes]

- Frequent write command executions may damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, and downloaded bit images should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, DIP switch settings are checked again.
- During processing of this command, the printer is BUSY when writing data to the user NV memory and stops receiving data. Therefore it is prohibited to transmit the data, including real-time commands, during the execution of this command.
- If this command is processed while the NV graphics has been defined with **GS (L**, the data must be newly defined after all graphics data is deleted.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Do not turn the power off or let the printer be reset via an interface while this command is being executed.

[Reference] **FS p**

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



GS v 0 *m xL xH yL yH d1...dk* [obsolete command]

GS (L <Function 112 and 50>, which is the upward-compatible command replacing **GS v 0**, is recommended to use, since **GS v 0** is an obsolete command in the ESC/POS command system.

[Name] Print raster bit image

[Format]

ASCII	GS	v	0	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Hex	1D	76	30	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*
Decimal	29	118	48	*m*	*xL*	*xH*	*yL*	*yH*	*d1...dk*

[Range]
$0 \le m \le 3, 48 \le m \le 51$
$1 \le xL \le 255$
$xH = 0$ [where $1 \le (xL+xH \times 256) \le 128$]
$0 \le yL \le 255$
$0 \le yH \le 15$ [where $1 \le (yL+yH \times 256) \le 4095$]
$0 \le d \le 255$
$k = (xL+xH \times 256) \times (yL+yH \times 256)$ [where $k \ne 0$]

[Description]
- Prints a raster bit image using the mode specified by ***m***.

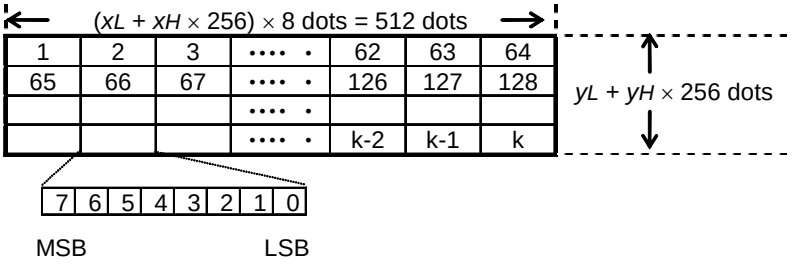
m	Mode	Vertical density	Horizontal density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Double-width/Double-height	101 dpi	101 dpi

[dpi: dots per inch (25.4 mm)]

- xL, xH specify the number of bytes in the horizontal direction as $(xL + xH \times 256)$.
- yL, yH specify the number of dots in the vertical direction as $(yL + yH \times 256)$.

[Details]
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.
- Data outside the printing area is read in and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC ** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is a multiple of 8.
- The **ESC a** (Select justification) setting is also effective on raster bit images.
- *d* indicates the bit-image data. Setting a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Example] When $xL + xH \times 256 = 64$



3. FUNCTIONS

3.1 Character Code Tables

3.1.1 Common to all pages (International character set: U.S.A.)

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

3.1.2 Page 0 (PC437: USA, Standard Europe)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.1.3 Page 1 (Katakana)

HEX	8	9	A	B	C	D	E	F
0	128	144	SP 160	176	192	208	224	240
1	129	145	161	177	193	209	225	241
2	130	146	162	178	194	210	226	242
3	131	147	163	179	195	211	227	243
4	132	148	164	180	196	212	228	244
5	133	149	165	181	197	213	229	245
6	134	150	166	182	198	214	230	246
7	135	151	167	183	199	215	231	247
8	136	152	168	184	200	216	232	248
9	137	153	169	185	201	217	233	249
A	138	154	170	186	202	218	234	250
B	139	155	171	187	203	219	235	251
C	140	156	172	188	204	220	236	252
D	141	157	173	189	205	221	237	253
E	142	158	174	190	206	222	238	254
F	143	159	175	191	207	223	239	SP 255

3.1.4 Page 2 (PC850: Multilingual)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

3.1.5 Page 3 (PC860: Portuguese)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	À 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	È 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	Ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	Ê 137	õ 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Í 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.1.6 Page 4 (PC863: Canadian-French)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	¦ 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Ê 146	Ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	Ô 147	Ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	¶ 134	û 150	³ 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	‗ 141	Ù 157	¾ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	À 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.1.7 Page 5 (PC865: Nordic)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	▮ 254
F	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.1.8 Page 11 (PC851: Greek)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	Ί 144	ΐ 160	░ 176	└ 192	Τ 208	ζ 224	- 240
1	ü 129	SP 145	Ϊ 161	▒ 177	┴ 193	Υ 209	η 225	± 241
2	é 130	Ό 146	ό 162	▓ 178	┬ 194	Φ 210	θ 226	ϋ 242
3	â 131	ô 147	ύ 163	│ 179	├ 195	Χ 211	ι 227	φ 243
4	ä 132	ö 148	Α 164	┤ 180	─ 196	Ψ 212	κ 228	χ 244
5	à 133	Ύ 149	Β 165	Κ 181	┼ 197	Ω 213	λ 229	§ 245
6	Ά 134	û 150	Γ 166	Λ 182	╞ 198	α 214	μ 230	ψ 246
7	ç 135	ù 151	Δ 167	Μ 183	╟ 199	β 215	ν 231	΄ 247
8	ê 136	Ώ 152	Ε 168	Ν 184	╚ 200	γ 216	ξ 232	° 248
9	ë 137	Ö 153	Ζ 169	╣ 185	╔ 201	┘ 217	ο 233	¨ 249
A	è 138	Ü 154	Η 170	║ 186	╩ 202	┌ 218	π 234	ώ 250
B	ï 139	ά 155	½ 171	╗ 187	╦ 203	▉ 219	ρ 235	Ü 251
C	î 140	£ 156	Θ 172	╝ 188	╠ 204	■ 220	σ 236	ΰ 252
D	Έ 141	έ 157	Ι 173	Ξ 189	═ 205	δ 221	ς 237	ώ 253
E	Ä 142	ή 158	« 174	Ο 190	╬ 206	ε 222	τ 238	▮ 254
F	Ή 143	ί 159	» 175	┐ 191	Σ 207	■ 223	΄ 239	SP 255

3.1.9 Page 12 (PC853: Turkish)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	SP 208	Ó 224	- 240
1	ü 129	ċ 145	í 161	▒ 177	┴ 193	SP 209	ß 225	SP 241
2	é 130	Ċ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	ℓ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	ʼn 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	Ġ 228	˘ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	ġ 229	§ 245
6	ĉ 134	û 150	Ğ 166	Â 182	ŝ 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	ğ 167	À 183	Ŝ 199	Î 215	Ħ 231	¸ 247
8	ê 136	İ 152	Ĥ 168	Ş 184	╚ 200	Ï 216	ħ 232	° 248
9	ë 137	Ö 153	ĥ 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	SP 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ĝ 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	SP 251
C	ĵ 140	£ 156	Ĵ 172	╝ 188	╠ 204	■ 220	Ŭ 236	³ 252
D	ì 141	Ĝ 157	Ş 173	Ż 189	═ 205	SP 221	ŭ 237	² 253
E	Ä 142	× 158	« 174	ż 190	╬ 206	Ì 222	• 238	▮ 254
F	Ĉ 143	ĵ 159	» 175	┐ 191	¤ 207	■ 223	´ 239	SP 255

3.1.10 Page 13 (PC857: Turkish)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	º 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	ª 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	SP 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6	å 134	û 150	Ğ 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	ğ 167	À 183	Ã 199	Î 215	SP 231	¸ 247
8	ê 136	İ 152	¿ 168	© 184	╚ 200	Ï 216	× 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	• 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	ì 236	³ 252
D	ı 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	ÿ 237	² 253
E	Ä 142	Ş 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	▮ 254
F	Å 143	ş 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

3.1.11 Page 14 (PC737: Greek)

HEX	8	9	A	B	C	D	E	F
0	Α 128	Ρ 144	ι 160	▒ 176	└ 192	╨ 208	ω 224	Ω 240
1	Β 129	Σ 145	κ 161	▓ 177	┴ 193	╤ 209	ά 225	± 241
2	Γ 130	Τ 146	λ 162	▓ 178	┬ 194	╥ 210	έ 226	≥ 242
3	Δ 131	Υ 147	μ 163	│ 179	├ 195	╙ 211	ή 227	≤ 243
4	Ε 132	Φ 148	ν 164	┤ 180	─ 196	╘ 212	ϊ 228	Ϊ 244
5	Ζ 133	Χ 149	ξ 165	╡ 181	┼ 197	╒ 213	ί 229	Ÿ 245
6	Η 134	Ψ 150	ο 166	╢ 182	╞ 198	╓ 214	ό 230	÷ 246
7	Θ 135	Ω 151	π 167	╖ 183	╟ 199	╫ 215	ύ 231	≈ 247
8	Ι 136	α 152	ρ 168	╕ 184	╚ 200	╪ 216	ϋ 232	° 248
9	Κ 137	β 153	σ 169	╣ 185	╔ 201	┘ 217	ώ 233	∙ 249
A	Λ 138	γ 154	ς 170	║ 186	╩ 202	┌ 218	Ά 234	· 250
B	Μ 139	δ 155	τ 171	╗ 187	╦ 203	█ 219	Έ 235	√ 251
C	Ν 140	ε 156	υ 172	╝ 188	╠ 204	■ 220	Ή 236	n 252
D	Ξ 141	ζ 157	φ 173	╜ 189	═ 205	▌ 221	Ί 237	2 253
E	Ο 142	η 158	χ 174	╛ 190	╬ 206	▐ 222	Ό 238	■ 254
F	Π 143	θ 159	ψ 175	┐ 191	╧ 207	■ 223	Ύ 239	SP 255

3.1.12 Page 15 (ISO8859-7: Greek)

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	SP 160	° 176	ΐ 192	Π 208	ΰ 224	π 240
1	SP 129	SP 145	‘ 161	± 177	Α 193	Ρ 209	α 225	ρ 241
2	SP 130	SP 146	’ 162	² 178	Β 194	SP 210	β 226	ς 242
3	SP 131	SP 147	£ 163	³ 179	Γ 195	Σ 211	γ 227	σ 243
4	SP 132	SP 148	€ 164	΄ 180	Δ 196	Τ 212	δ 228	τ 244
5	SP 133	SP 149	₯ 165	΅ 181	Ε 197	Υ 213	ε 229	υ 245
6	SP 134	SP 150	¦ 166	Ά 182	Ζ 198	Φ 214	ζ 230	φ 246
7	SP 135	SP 151	§ 167	· 183	Η 199	Χ 215	η 231	χ 247
8	SP 136	SP 152	¨ 168	Έ 184	Θ 200	Ψ 216	θ 232	ψ 248
9	SP 137	SP 153	© 169	Ή 185	Ι 201	Ω 217	ι 233	ω 249
A	SP 138	SP 154	ͺ 170	Ί 186	Κ 202	Ϊ 218	κ 234	ϊ 250
B	SP 139	SP 155	« 171	» 187	Λ 203	Ϋ 219	λ 235	ü 251
C	SP 140	SP 156	¬ 172	Ό 188	Μ 204	ά 220	μ 236	ό 252
D	SP 141	SP 157	- 173	½ 189	Ν 205	έ 221	ν 237	ύ 253
E	SP 142	SP 158	SP 174	Ύ 190	Ξ 206	ή 222	ξ 238	ώ 254
F	SP 143	SP 159	― 175	Ώ 191	Ο 207	ί 223	ο 239	SP 255

3.1.13 Page 16 (WPC1252)

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

3.1.14 Page 17 (PC866: Cyrillic #2)

HEX	8	9	A	B	C	D	E	F
0	А 128	Р 144	а 160	▒ 176	└ 192	╨ 208	р 224	Ё 240
1	Б 129	С 145	б 161	▓ 177	┴ 193	╤ 209	с 225	ё 241
2	В 130	Т 146	в 162	▓ 178	┬ 194	╥ 210	т 226	Є 242
3	Г 131	У 147	г 163	│ 179	├ 195	╙ 211	у 227	є 243
4	Д 132	Ф 148	д 164	┤ 180	─ 196	╘ 212	ф 228	Ї 244
5	Е 133	Х 149	е 165	╡ 181	┼ 197	╒ 213	х 229	ї 245
6	Ж 134	Ц 150	ж 166	╢ 182	╞ 198	╓ 214	ц 230	Ў 246
7	З 135	Ч 151	з 167	╖ 183	╟ 199	╫ 215	ч 231	ў 247
8	И 136	Ш 152	и 168	╕ 184	╚ 200	╪ 216	ш 232	° 248
9	Й 137	Щ 153	й 169	╣ 185	╔ 201	┘ 217	щ 233	∙ 249
A	К 138	Ъ 154	к 170	║ 186	╩ 202	┌ 218	ъ 234	· 250
B	Л 139	Ы 155	л 171	╗ 187	╦ 203	█ 219	ы 235	√ 251
C	М 140	Ь 156	м 172	╝ 188	╠ 204	■ 220	ь 236	№ 252
D	Н 141	Э 157	н 173	╜ 189	═ 205	▌ 221	э 237	¤ 253
E	О 142	Ю 158	о 174	╛ 190	╬ 206	▐ 222	ю 238	■ 254
F	П 143	Я 159	п 175	┐ 191	╧ 207	▀ 223	я 239	SP 255

3.1.15 Page 18 (PC852: Latin2)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	đ 208	Ó 224	- 240
1	ü 129	Ĺ 145	í 161	▓ 177	┴ 193	Đ 209	ß 225	˝ 241
2	é 130	Í 146	ó 162	▓ 178	┬ 194	Ď 210	Ô 226	˛ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ń 227	ˇ 243
4	ä 132	ö 148	Ą 164	┤ 180	─ 196	ď 212	ń 228	˘ 244
5	ů 133	Ľ 149	ą 165	Á 181	┼ 197	Ň 213	ň 229	§ 245
6	ć 134	ľ 150	Ž 166	Â 182	Ă 198	Í 214	Š 230	÷ 246
7	ç 135	Ś 151	ž 167	Ě 183	ă 199	Î 215	š 231	¸ 247
8	ł 136	ś 152	Ę 168	Ş 184	╚ 200	ě 216	Ř 232	° 248
9	ë 137	Ö 153	ę 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	ő 138	Ü 154	€ 170	║ 186	╩ 202	┌ 218	ŕ 234	˙ 250
B	ő 139	Ť 155	Ź 171	╗ 187	╦ 203	█ 219	Ű 235	ű 251
C	î 140	ť 156	Č 172	╝ 188	╠ 204	■ 220	ý 236	Ř 252
D	Ź 141	Ł 157	Ş 173	Ż 189	═ 205	ţ 221	Ý 237	ř 253
E	Ä 142	× 158	« 174	ż 190	╬ 206	Ů 222	Ţ 238	▮ 254
F	Ć 143	Č 159	» 175	┐ 191	¤ 207	■ 223	´ 239	SP 255

3.1.16 Page 19 (PC858: Euro)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	▮ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

3.1.17 Page 20 (KU42: Thai)

HEX	8	9	A	B	C	D	E	F
0	128	144	SP 160	176	192	208	224	240
1	129	145	161	177	193	209	225	241
2	130	146	162	178	194	210	226	242
3	131	147	163	179	195	211	227	243
4	132	148	164	180	196	212	228	244
5	133	149	165	181	197	213	229	245
6	134	150	166	182	198	214	230	246
7	135	151	167	183	199	215	231	247
8	136	152	168	184	200	216	232	248
9	137	153	169	185	201	217	233	249
A	138	154	170	186	202	218	234	250
B	139	155	171	187	203	219	235	251
C	140	156	172	188	204	220	236	252
D	141	157	173	189	205	221	237	253
E	142	158	174	190	206	222	238	254
F	143	159	175	191	207	223	239	SP 255

3.1.18 Page 21 (TIS11: Thai)

HEX	8	9	A	B	C	D	E	F
0	◌ั 128	◌ิ 144	ไ 160	฿ 176	ภ 192	◌ั 208	เ 224	๐ 240
1	◌ั 129	◌ิ 145	ก 161	ฑ 177	ม 193	◌ั 209	แ 225	๑ 241
2	◌ั 130	◌ิ 146	ป 162	ฒ 178	ย 194	า 210	โ 226	๒ 242
3	◌ั 131	◌ิ 147	ป 163	ณ 179	ร 195	ำ 211	ใ 227	๓ 243
4	◌ั 132	◌ิ 148	ค 164	ด 180	ฤ 196	◌ั 212	ไ 228	๔ 244
5	◌ั 133	◌ิ 149	ค 165	ต 181	ล 197	◌ั 213	า 229	๕ 245
6	◌ั 134	◌ิ 150	ม 166	ถ 182	ฦ 198	◌ั 214	า 230	๖ 246
7	◌ั 135	◌ิ 151	ง 167	ท 183	ว 199	◌ั 215	๗ 231	๗ 247
8	◌ั 136	◌ิ 152	จ 168	ธ 184	ศ 200	◌ั 216	๘ 232	๘ 248
9	◌ั 137	ร 153	ฉ 169	น 185	ษ 201	◌ั 217	๙ 233	๙ 249
A	◌ั 138	◌ 154	ช 170	บ 186	ส 202	◌ั 218	๚ 234	ฯ 250
B	◌ั 139	ล 155	ซ 171	ป 187	ห 203	◌ั 219	๛ 235	ๆ 251
C	◌ั 140	◌ 156	ฌ 172	ผ 188	ฬ 204	◌ั 220	๜ 236	๑ 252
D	◌ั 141	◌ 157	ญ 173	ฝ 189	อ 205	◌ั 221	๝ 237	๑ 253
E	◌ั 142	◌ 158	ฎ 174	พ 190	ฮ 206	◌ั 222	๞ 238	๕ 254
F	◌ั 143	◌ 159	ฏ 175	ฟ 191	ฯ 207	฿ 223	๟ 239	SP 255

3.1.19 Page 26 (TIS18: Thai)

HEX	8	9	A	B	C	D	E	F
0	128	144	SP 160	176	192	208	224	240
1	129	145	161	177	193	209	225	241
2	130	146	162	178	194	210	226	242
3	131	147	163	179	195	211	227	243
4	132	148	164	180	196	212	228	244
5	133	149	165	181	197	213	229	245
6	134	150	166	182	198	214	230	246
7	135	151	167	183	199	215	231	247
8	136	152	168	184	200	216	232	248
9	137	153	169	185	201	217	233	249
A	138	154	170	186	202	218	234	250
B	139	155	171	187	203	219	235	251
C	140	156	172	188	204	220	236	252
D	141	157	173	189	205	221	237	253
E	142	158	174	190	206	222	238	254
F	143	159	175	191	207	223	239	SP 255

3.1.20 Page 30 (TCVN-3: Vietnamese)

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	SP 160	SP 176	SP 192	é 208	SP 224	SP 240
1	SP 129	SP 145	SP 161	SP 177	SP 193	ẹ 209	ỏ 225	ủ 241
2	SP 130	SP 146	SP 162	SP 178	SP 194	ề 210	õ 226	ũ 242
3	SP 131	SP 147	SP 163	SP 179	SP 195	ể 211	ó 227	ú 243
4	SP 132	SP 148	SP 164	SP 180	SP 196	ễ 212	ọ 228	ụ 244
5	SP 133	SP 149	SP 165	à 181	SP 197	ế 213	ồ 229	ừ 245
6	SP 134	SP 150	SP 166	ả 182	ặ 198	ệ 214	ổ 230	ử 246
7	SP 135	SP 151	SP 167	ã 183	ầ 199	ì 215	ỗ 231	ữ 247
8	SP 136	SP 152	ă 168	á 184	ẳ 200	ỉ 216	ố 232	ứ 248
9	SP 137	SP 153	â 169	ạ 185	ẵ 201	SP 217	ộ 233	ự 249
A	SP 138	SP 154	ê 170	SP 186	ấ 202	SP 218	ờ 234	ỳ 250
B	SP 139	SP 155	ô 171	ắ 187	ậ 203	SP 219	ở 235	ỷ 251
C	SP 140	SP 156	ơ 172	ằ 188	è 204	ĩ 220	ỡ 236	ỹ 252
D	SP 141	SP 157	ư 173	ẵ 189	SP 205	í 221	ớ 237	ý 253
E	SP 142	SP 158	đ 174	ắ 190	ẻ 206	ị 222	ợ 238	ỵ 254
F	SP 143	SP 159	SP 175	SP 191	ẽ 207	ò 223	ù 239	SP 255

3.1.21 Page 31 (TCVN-3: Vietnamese)

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	SP 160	SP 176	SP 192	É 208	SP 224	SP 240
1	SP 129	SP 145	Ă 161	SP 177	SP 193	Ẹ 209	Ỏ 225	Ủ 241
2	SP 130	SP 146	Â 162	SP 178	SP 194	Ề 210	Õ 226	Ũ 242
3	SP 131	SP 147	SP 163	SP 179	SP 195	Ể 211	Ó 227	Ú 243
4	SP 132	SP 148	SP 164	SP 180	SP 196	Ễ 212	Ọ 228	Ụ 244
5	SP 133	SP 149	SP 165	À 181	SP 197	Ế 213	Ồ 229	Ừ 245
6	SP 134	SP 150	SP 166	Ả 182	Ặ 198	Ệ 214	Ổ 230	Ử 246
7	SP 135	SP 151	Đ 167	Ã 183	Ầ 199	Ì 215	Ỗ 231	Ữ 247
8	SP 136	SP 152	SP 168	Á 184	Ẩ 200	Ỉ 216	Ố 232	Ứ 248
9	SP 137	SP 153	SP 169	Ạ 185	Ẫ 201	SP 217	Ộ 233	Ự 249
A	SP 138	SP 154	Ê 170	SP 186	Ấ 202	SP 218	Ờ 234	Ỳ 250
B	SP 139	SP 155	Ô 171	Ằ 187	Ậ 203	SP 219	Ở 235	Ỷ 251
C	SP 140	SP 156	Ơ 172	Ẳ 188	È 204	Ĩ 220	Ỡ 236	Ỹ 252
D	SP 141	SP 157	Ư 173	Ẵ 189	SP 205	Í 221	Ớ 237	Ý 253
E	SP 142	SP 158	SP 174	Ắ 190	Ẻ 206	Ị 222	Ợ 238	Ỵ 254
F	SP 143	SP 159	SP 175	SP 191	Ẽ 207	Ò 223	Ù 239	SP 255

3.1.22 Page 32 (PC720: Arabic)

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	ب 160	▒ 176	┗ 192	╨ 208	ض 224	≡ 240
1	SP 129	ّ 145	ة 161	▒ 177	┻ 193	╤ 209	ط 225	ً 241
2	é 130	° 146	ت 162	▒ 178	┳ 194	╥ 210	ظ 226	ٌ 242
3	â 131	Ô 147	ث 163	│ 179	┣ 195	╙ 211	ع 227	ٍ 243
4	SP 132	¤ 148	ج 164	┤ 180	─ 196	╘ 212	غ 228	َ 244
5	à 133	– 149	ح 165	╡ 181	┼ 197	╒ 213	ف 229	ُ 245
6	SP 134	Û 150	خ 166	╢ 182	╞ 198	╥ 214	µ 230	ِ 246
7	ç 135	Ù 151	د 167	╖ 183	╟ 199	╫ 215	ق 231	≈ 247
8	ê 136	ء 152	ذ 168	╕ 184	╚ 200	╪ 216	ك 232	° 248
9	ë 137	Ï 153	ر 169	╣ 185	╔ 201	┘ 217	ل 233	• 249
A	è 138	أ 154	ز 170	║ 186	╩ 202	┌ 218	م 234	· 250
B	ï 139	ؤ 155	س 171	╗ 187	╦ 203	▉ 219	ن 235	√ 251
C	î 140	£ 156	ش 172	╝ 188	╠ 204	■ 220	ه 236	n 252
D	SP 141	إ 157	ص 173	╜ 189	═ 205	▌ 221	و 237	2 253
E	SP 142	ئ 158	« 174	╛ 190	╬ 206	▐ 222	ى 238	▮ 254
F	SP 143	ا 159	» 175	┐ 191	╧ 207	▀ 223	ي 239	SP 255

3.1.23 Page 33 (WPC775: Baltic Rim)

HEX	8	9	A	B	C	D	E	F
0	Ć 128	É 144	Ā 160	▒ 176	└ 192	ą 208	Ó 224	- 240
1	ü 129	æ 145	Ī 161	▒ 177	┴ 193	č 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	ę 210	Ō 226	“ 242
3	ā 131	ō 147	Ż 163	│ 179	├ 195	ė 211	Ń 227	¾ 243
4	ä 132	ö 148	ż 164	┤ 180	─ 196	į 212	õ 228	¶ 244
5	ģ 133	Ģ 149	ź 165	Ą 181	┼ 197	š 213	Õ 229	§ 245
6	å 134	¢ 150	” 166	Č 182	Ų 198	ų 214	µ 230	÷ 246
7	ć 135	Ś 151	¦ 167	Ę 183	Ū 199	ū 215	ń 231	” 247
8	ł 136	ś 152	© 168	Ė 184	╚ 200	Ž 216	Ķ 232	° 248
9	ē 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	ķ 233	• 249
A	Ŗ 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ļ 234	· 250
B	ŗ 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	ļ 235	¹ 251
C	Ī 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	Ņ 236	³ 252
D	Ź 141	Ø 157	Ł 173	Į 189	═ 205	▌ 221	Ē 237	² 253
E	Ä 142	× 158	« 174	Š 190	╬ 206	▐ 222	Ņ 238	▮ 254
F	Å 143	¤ 159	» 175	┐ 191	Ž 207	▀ 223	’ 239	SP 255

3.1.24 Page 34 (PC855: Cylillic)

HEX	8	9	A	B	C	D	E	F
0	Ђ 128	Љ 144	а 160	▒ 176	└ 192	л 208	Я 224	- 240
1	Ћ 129	Л 145	А 161	▒ 177	┴ 193	Л 209	р 225	ы 241
2	Ѓ 130	Њ 146	б 162	▒ 178	т 194	м 210	Р 226	Ы 242
3	Ѓ 131	Њ 147	Б 163	│ 179	├ 195	М 211	с 227	з 243
4	ё 132	Ђ 148	ц 164	┤ 180	─ 196	н 212	С 228	З 244
5	Ё 133	Ђ 149	Ц 165	х 181	┼ 197	Н 213	т 229	ш 245
6	є 134	Ќ 150	д 166	Х 182	к 198	о 214	Т 230	Ш 246
7	Є 135	Ќ 151	Д 167	и 183	К 199	О 215	у 231	э 247
8	ѕ 136	ў 152	е 168	И 184	╚ 200	п 216	У 232	Э 248
9	Ѕ 137	ў 153	Е 169	╣ 185	╔ 201	┘ 217	ж 233	щ 249
A	і 138	Џ 154	ф 170	║ 186	╩ 202	г 218	Ж 234	Щ 250
B	І 139	Џ 155	Ф 171	╗ 187	╦ 203	▉ 219	в 235	ч 251
C	ї 140	ю 156	г 172	╝ 188	╠ 204	■ 220	В 236	Ч 252
D	Ї 141	Ю 157	Г 173	й 189	═ 205	П 221	ь 237	§ 253
E	ј 142	ъ 158	« 174	Й 190	╬ 206	я 222	Ь 238	▮ 254
F	Ј 143	Ъ 159	» 175	┐ 191	¤ 207	■ 223	№ 239	SP 255

3.1.25 Page 35 (PC861: Icelandic)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	Á 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	þ 149	Í 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	Ó 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	Ý 151	Ú 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ý 152	¿ 168	╕ 184	╚ 200	╪ 216	φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Ð 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	ð 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	Þ 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	▮ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.1.26 Page 36 (PC862: Hebrew)

HEX	8	9	A	B	C	D	E	F
0	128	144	160	176	192	208	224	240
1	129	145	161	177	193	209	225	241
2	130	146	162	178	194	210	226	242
3	131	147	163	179	195	211	227	243
4	132	148	164	180	196	212	228	244
5	133	149	165	181	197	213	229	245
6	134	150	166	182	198	214	230	246
7	135	151	167	183	199	215	231	247
8	136	152	168	184	200	216	232	248
9	137	153	169	185	201	217	233	249
A	138	154	170	186	202	218	234	250
B	139	155	171	187	203	219	235	251
C	140	156	172	188	204	220	236	252
D	141	157	173	189	205	221	237	253
E	142	158	174	190	206	222	238	254
F	143	159	175	191	207	223	239	SP 255

3.1.27 Page 37 (PC864: Arabic)

HEX	8	9	A	B	C	D	E	F
0	° 128	β 144	SP 160	• 176	¢ 192	ذ 208	ـ 224	ّ 240
1	· 129	ϖ 145	- 161	١ 177	ء 193	ر 209	ف 225	ّ 241
2	• 130	ϕ 146	آ 162	٢ 178	آ 194	ز 210	ق 226	ن 242
3	√ 131	± 147	£ 163	٣ 179	أ 195	س 211	ك 227	ه 243
4	▒ 132	½ 148	¤ 164	٤ 180	ؤ 196	ش 212	ل 228	ه 244
5	─ 133	¼ 149	أ 165	٥ 181	خ 197	ص 213	م 229	ى 245
6	│ 134	≈ 150	SP 166	٦ 182	ئ 198	ض 214	ن 230	ي 246
7	┼ 135	« 151	€ 167	٧ 183	ا 199	ط 215	ه 231	ـغ 247
8	┤ 136	» 152	ا 168	٨ 184	ب 200	ظ 216	و 232	ق 248
9	┬ 137	لأ 153	ب 169	٩ 185	ة 201	ع 217	ى 233	لآ 249
A	├ 138	لأ 154	ت 170	ف 186	ت 202	غ 218	ي 234	لآ 250
B	┴ 139	SP 155	ث 171	؛ 187	ث 203	ـا 219	ض 235	ل 251
C	┐ 140	SP 156	، 172	س 188	ج 204	ـ 220	ـع 236	ك 252
D	┌ 141	لا 157	ج 173	ش 189	ح 205	÷ 221	خ 237	ي 253
E	└ 142	لا 158	ح 174	ص 190	خ 206	× 222	غ 238	■ 254
F	┘ 143	ـ 159	خ 175	؟ 191	د 207	ع 223	م 239	SP 255

3.1.28 Page 38 (PC869: Greek)

HEX	8	9	A	B	C	D	E	F
0	SP 128	Ί 144	ΐ 160	░ 176	└ 192	Τ 208	ζ 224	- 240
1	SP 129	Ϊ 145	Α 161	▒ 177	┴ 193	Υ 209	η 225	± 241
2	SP 130	Ό 146	Β 162	▓ 178	┬ 194	Φ 210	θ 226	ϋ 242
3	SP 131	SP 147	Γ 163	│ 179	├ 195	Χ 211	ι 227	φ 243
4	SP 132	SP 148	Δ 164	┤ 180	─ 196	Ψ 212	κ 228	χ 244
5	SP 133	Ύ 149	Ε 165	Κ 181	┼ 197	Ω 213	λ 229	§ 245
6	Ά 134	Ϋ 150	Ζ 166	Λ 182	Π 198	α 214	μ 230	ψ 246
7	€ 135	© 151	Η 167	Μ 183	Ρ 199	β 215	ν 231	΅ 247
8	• 136	Ώ 152	Θ 168	Ν 184	╚ 200	γ 216	ξ 232	° 248
9	¬ 137	² 153	Ι 169	╣ 185	╔ 201	┘ 217	ο 233	¨ 249
A	¦ 138	³ 154	Κ 170	║ 186	╩ 202	┌ 218	π 234	ώ 250
B	‘ 139	ά 155	½ 171	╗ 187	╦ 203	▉ 219	ρ 235	Ü 251
C	’ 140	£ 156	Θ 172	╝ 188	╠ 204	■ 220	σ 236	ΰ 252
D	Έ 141	έ 157	Ι 173	Ξ 189	═ 205	δ 221	ς 237	ώ 253
E	– 142	ή 158	« 174	Ο 190	╬ 206	ε 222	τ 238	▮ 254
F	Ή 143	ί 159	» 175	┐ 191	Σ 207	■ 223	΄ 239	SP 255

3.1.29 Page 39 (ISO8859-2: Latin2)

HEX	8	9	A	B	C	D	E	F
0	▒ 128	Ľ 144	SP 160	° 176	Ŕ 192	Đ 208	ŕ 224	đ 240
1	▒ 129	┴ 145	Ą 161	ą 177	Á 193	Ń 209	á 225	ń 241
2	▒ 130	┬ 146	˘ 162	Ł 178	Â 194	Ň 210	â 226	ň 242
3	│ 131	├ 147	Ł 163	ł 179	Ă 195	Ő 211	ă 227	ő 243
4	┤ 132	─ 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	┘ 133	┼ 149	Ľ 165	ľ 181	Ĺ 197	Ő 213	Í 229	ő 245
6	┌ 134	■ 150	Ś 166	ś 182	Ć 198	Ö 214	ć 230	ö 246
7	▉ 135	■ 151	§ 167	ˇ 183	Ç 199	× 215	ç 231	÷ 247
8	© 136	╚ 152	¨ 168	¸ 184	Č 200	Ř 216	č 232	ř 248
9	╣ 137	╔ 153	Š 169	š 185	É 201	Ů 217	é 233	ů 249
A	║ 138	╩ 154	Ş 170	ş 186	Ę 202	Ú 218	ę 234	ú 250
B	╗ 139	╦ 155	Ť 171	ť 187	Ë 203	Ű 219	ë 235	ű 251
C	╝ 140	╠ 156	Ź 172	ź 188	Ě 204	Ü 220	ě 236	ü 252
D	¢ 141	═ 157	- 173	˝ 189	Í 205	Ý 221	í 237	ý 253
E	¥ 142	╬ 158	Ž 174	ž 190	Î 206	Ţ 222	î 238	ţ 254
F	┐ 143	® 159	Ż 175	ż 191	Ď 207	ß 223	ď 239	˙ 255

3.1.30 Page 40 (ISO8859-15: Latin9)

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

3.1.31 Page 41 (PC1098: Farsi)

HEX	8	9	A	B	C	D	E	F
0	SP 128	ؤ 144	ح 160	▒ 176	└ 192	ع 208	ک 224	- 240
1	SP 129	ئ 145	خ 161	▒ 177	┴ 193	ع 209	ک 225	ی 241
2	، 130	ب 146	خ 162	▒ 178	┬ 194	ع 210	گ 226	ﻱ 242
3	؛ 131	ﺑ 147	د 163	│ 179	├ 195	غ 211	گ 227	ﻳ 243
4	؟ 132	پ 148	ذ 164	┤ 180	─ 196	غ 212	ل 228	٥ 244
5	ً 133	ﭘ 149	ر 165	ض 181	┼ 197	غ 213	ﻟ 229	١ 245
6	آ 134	ت 150	ز 166	ﺿ 182	ظ 198	ﻏ 214	م 230	٢ 246
7	ﺂ 135	ﺗ 151	ژ 167	ط 183	ع 199	ف 215	ﻣ 231	٣ 247
8	ﺁ 136	ث 152	س 168	ﻃ 184	╚ 200	ﻓ 216	ن 232	۴ 248
9	ا 137	ﺛ 153	ﺳ 169	╣ 185	╔ 201	ﻟ 217	ﻧ 233	۵ 249
A	ﺎ 138	ج 154	ش 170	║ 186	╩ 202	ר 218	و 234	۶ 250
B	ﻟ 139	ﺟ 155	ﺷ 171	╗ 187	╦ 203	▉ 219	ه 235	٧ 251
C	ء 140	چ 156	ص 172	╝ 188	╠ 204	■ 220	ﻫ 236	٨ 252
D	أ 141	ﭼ 157	ﺻ 173	╜ 189	═ 205	ق 221	ﻬ 237	٩ 253
E	ﺄ 142	× 158	« 174	ظ 190	╬ 206	ﻗ 222	ۀ 238	▉ 254
F	ؤ 143	ح 159	» 175	┐ 191	SP 207	■ 223	ی 239	SP 255

3.1.32 Page 42 (PC1118: Lithuanian)

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	ą 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▓ 177	┴ 193	č 209	β 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	ę 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	ė 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	į 212	Σ 228	⁾ 244
5	à 133	ò 149	Ñ 165	Ą 181	┼ 197	š 213	σ 229	“ 245
6	å 134	û 150	a 166	č 182	Ų 198	ų 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	Ę 183	Ū 199	ū 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	Ė 184	╚ 200	Ž 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	¥ 157	¡ 173	Į 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	Š 190	╬ 206	▐ 222	ε 238	▮ 254
F	Å 143	ƒ 159	» 175	┐ 191	Ž 207	▀ 223	∩ 239	SP 255

3.1.33 Page 43 (PC1119: Lithuanian)

HEX	8	9	A	B	C	D	E	F
0	А 128	Р 144	а 160	▒ 176	└ 192	ą 208	р 224	Ё 240
1	Б 129	С 145	б 161	▒ 177	┴ 193	č 209	с 225	ё 241
2	В 130	Т 146	в 162	▒ 178	┬ 194	ę 210	т 226	≥ 242
3	Г 131	У 147	г 163	│ 179	├ 195	ė 211	у 227	≤ 243
4	Д 132	Ф 148	д 164	┤ 180	─ 196	į 212	ф 228	⌠ 244
5	Е 133	Х 149	е 165	Ą 181	┼ 197	š 213	х 229	⌡ 245
6	Ж 134	Ц 150	ж 166	Č 182	Ų 198	ų 214	ц 230	÷ 246
7	З 135	Ч 151	з 167	Ę 183	Ū 199	ū 215	ч 231	≈ 247
8	И 136	Ш 152	и 168	Ė 184	╚ 200	Ž 216	ш 232	° 248
9	Й 137	Щ 153	й 169	╣ 185	╔ 201	┘ 217	щ 233	∙ 249
A	К 138	Ъ 154	к 170	║ 186	╩ 202	┌ 218	ъ 234	· 250
B	Л 139	Ы 155	л 171	╗ 187	╦ 203	█ 219	ы 235	√ 251
C	М 140	Ь 156	м 172	╝ 188	╠ 204	■ 220	ь 236	n 252
D	Н 141	Э 157	н 173	¦ 189	═ 205	▌ 221	э 237	2 253
E	О 142	Ю 158	о 174	Š 190	╬ 206	▐ 222	ю 238	■ 254
F	П 143	Я 159	п 175	┐ 191	Ž 207	■ 223	я 239	SP 255

3.1.34 Page 44 (PC1125: Ukrainian)

HEX	8	9	A	B	C	D	E	F
0	А 128	Р 144	а 160	▒ 176	└ 192	╨ 208	р 224	Ё 240
1	Б 129	С 145	б 161	▒ 177	┴ 193	╤ 209	с 225	ё 241
2	В 130	Т 146	в 162	▒ 178	┬ 194	╥ 210	т 226	Ґ 242
3	Г 131	У 147	г 163	│ 179	├ 195	╙ 211	у 227	ґ 243
4	Д 132	Ф 148	д 164	┤ 180	─ 196	╘ 212	ф 228	Є 244
5	Е 133	Х 149	е 165	╡ 181	┼ 197	╒ 213	х 229	є 245
6	Ж 134	Ц 150	ж 166	╢ 182	╞ 198	╓ 214	ц 230	І 246
7	З 135	Ч 151	з 167	╖ 183	╟ 199	╫ 215	ч 231	і 247
8	И 136	Ш 152	и 168	╕ 184	╚ 200	╪ 216	ш 232	Ї 248
9	Й 137	Щ 153	й 169	╣ 185	╔ 201	┘ 217	щ 233	ї 249
A	К 138	Ъ 154	к 170	║ 186	╩ 202	┌ 218	ъ 234	÷ 250
B	Л 139	Ы 155	л 171	╗ 187	╦ 203	█ 219	ы 235	± 251
C	М 140	Ь 156	м 172	╝ 188	╠ 204	■ 220	ь 236	№ 252
D	Н 141	Э 157	н 173	╜ 189	═ 205	▌ 221	э 237	¤ 253
E	О 142	Ю 158	о 174	╛ 190	╬ 206	▐ 222	ю 238	■ 254
F	П 143	Я 159	п 175	┐ 191	╧ 207	■ 223	я 239	SP 255

3.1.35 Page 45 (WPC1250: Latin 2)

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	Ŕ 192	Đ 208	ŕ 224	đ 240
1	SP 129	‘ 145	ˇ 161	± 177	Á 193	Ń 209	á 225	ń 241
2	‚ 130	’ 146	˘ 162	˛ 178	Â 194	Ň 210	â 226	ň 242
3	SP 131	“ 147	Ł 163	ł 179	Ă 195	Ő 211	ă 227	ó 243
4	„ 132	” 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	… 133	• 149	Ą 165	µ 181	Ĺ 197	ő 213	Í 229	ő 245
6	† 134	– 150	¦ 166	¶ 182	Ć 198	Ö 214	ć 230	ö 246
7	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	SP 136	SP 152	¨ 168	¸ 184	Č 200	Ř 216	č 232	ř 248
9	‰ 137	™ 153	© 169	ą 185	É 201	Ů 217	é 233	ů 249
A	Š 138	š 154	Ş 170	ş 186	Ę 202	Ú 218	ę 234	ú 250
B	‹ 139	› 155	« 171	» 187	Ë 203	Ű 219	ë 235	ű 251
C	Ś 140	ś 156	¬ 172	Ľ 188	Ě 204	Ü 220	ě 236	ü 252
D	Ť 141	ť 157	- 173	˝ 189	Í 205	Ý 221	í 237	ý 253
E	Ž 142	ž 158	® 174	ľ 190	Î 206	Ţ 222	î 238	ţ 254
F	Ź 143	ź 159	Ż 175	ż 191	Ď 207	ß 223	ď 239	˙ 255

3.1.36 Page 46 (WPC1251: Cyrillic)

HEX	8	9	A	B	C	D	E	F
0	Ђ 128	ђ 144	SP 160	° 176	А 192	Р 208	а 224	р 240
1	Ѓ 129	‘ 145	ў 161	± 177	Б 193	С 209	б 225	с 241
2	’ 130	’ 146	Ў 162	І 178	В 194	Т 210	в 226	т 242
3	ѓ 131	“ 147	Ј 163	і 179	Г 195	У 211	г 227	у 243
4	” 132	” 148	¤ 164	ґ 180	Д 196	Ф 212	д 228	ф 244
5	… 133	• 149	Ґ 165	µ 181	Е 197	Х 213	е 229	х 245
6	† 134	– 150	¦ 166	¶ 182	Ж 198	Ц 214	ж 230	ц 246
7	‡ 135	— 151	§ 167	· 183	З 199	Ч 215	з 231	ч 247
8	€ 136	SP 152	Ё 168	ё 184	И 200	Ш 216	и 232	ш 248
9	‰ 137	™ 153	© 169	№ 185	Й 201	Щ 217	й 233	щ 249
A	Љ 138	љ 154	Є 170	є 186	К 202	Ъ 218	к 234	ъ 250
B	‹ 139	› 155	« 171	» 187	Л 203	Ы 219	л 235	ы 251
C	Њ 140	њ 156	¬ 172	j 188	М 204	Ь 220	м 236	ь 252
D	Ќ 141	ќ 157	- 173	S 189	Н 205	Э 221	н 237	э 253
E	Ћ 142	ћ 158	® 174	s 190	О 206	Ю 222	о 238	ю 254
F	Џ 143	џ 159	Ї 175	ї 191	П 207	Я 223	п 239	я 255

3.1.37 Page 47 (WPC1253: Greek)

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	Ϊ 192	Π 208	Ϋ 224	π 240
1	SP 129	‘ 145	¨ 161	± 177	Α 193	Ρ 209	α 225	ρ 241
2	‚ 130	’ 146	Ά 162	² 178	Β 194	SP 210	β 226	ς 242
3	ƒ 131	“ 147	£ 163	³ 179	Γ 195	Σ 211	γ 227	σ 243
4	„ 132	” 148	¤ 164	΄ 180	Δ 196	Τ 212	δ 228	τ 244
5	… 133	• 149	¥ 165	µ 181	Ε 197	Υ 213	ε 229	υ 245
6	† 134	– 150	¦ 166	¶ 182	Ζ 198	Φ 214	ζ 230	φ 246
7	‡ 135	— 151	§ 167	· 183	Η 199	Χ 215	η 231	χ 247
8	SP 136	SP 152	¨ 168	Έ 184	Θ 200	Ψ 216	θ 232	ψ 248
9	‰ 137	™ 153	© 169	Ή 185	Ι 201	Ω 217	ι 233	ω 249
A	SP 138	SP 154	ª 170	Ί 186	Κ 202	Ϊ 218	κ 234	ϊ 250
B	‹ 139	› 155	« 171	» 187	Λ 203	Ϋ 219	λ 235	ü 251
C	SP 140	SP 156	¬ 172	Ό 188	Μ 204	ά 220	μ 236	ό 252
D	SP 141	SP 157	- 173	½ 189	Ν 205	έ 221	ν 237	ύ 253
E	SP 142	SP 158	® 174	Ύ 190	Ξ 206	ή 222	ξ 238	ώ 254
F	SP 143	SP 159	― 175	Ώ 191	Ο 207	ί 223	ο 239	SP 255

3.1.38 Page 48 (WPC1254: Turkish)

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

3.1.39 Page 49 (WPC1255: Hebrew)

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	ְ 192	׀ 208	א 224	ן 240
1	SP 129	‘ 145	¡ 161	± 177	ֱ 193	ׁ 209	ב 225	ס 241
2	‚ 130	’ 146	¢ 162	² 178	ֲ 194	ׂ 210	ג 226	ע 242
3	ƒ 131	“ 147	£ 163	³ 179	ֳ 195	׃ 211	ד 227	ף 243
4	„ 132	” 148	₪ 164	´ 180	ִ 196	ׄ 212	ה 228	פ 244
5	… 133	• 149	¥ 165	µ 181	ֵ 197	ׅ 213	ו 229	ץ 245
6	† 134	– 150	¦ 166	¶ 182	ֶ 198	׆ 214	ז 230	צ 246
7	‡ 135	— 151	§ 167	· 183	ַ 199	ׇ 215	ח 231	ק 247
8	ˆ 136	˜ 152	¨ 168	¸ 184	ָ 200	״ 216	ט 232	ר 248
9	‰ 137	™ 153	© 169	¹ 185	ֹ 201	SP 217	י 233	ש 249
A	SP 138	SP 154	× 170	÷ 186	SP 202	SP 218	ך 234	ת 250
B	‹ 139	› 155	« 171	» 187	ֻ 203	SP 219	כ 235	SP 251
C	SP 140	SP 156	¬ 172	¼ 188	ּ 204	SP 220	ל 236	SP 252
D	SP 141	SP 157	173	½ 189	ֽ 205	SP 221	ם 237	SP 253
E	SP 142	SP 158	® 174	¾ 190	־ 206	SP 222	מ 238	SP 254
F	SP 143	SP 159	¯ 175	¿ 191	ֿ 207	SP 223	ן 239	SP 255

3.1.40 Page 50 (WPC1256: Arabic)

HEX	8	9	A	B	C	D	E	F
0	€ 128	ک 144	SP 160	° 176	ہ 192	ذ 208	à 224	ً 240
1	پ 129	‘ 145	، 161	± 177	ء 193	ر 209	ل 225	ٌ 241
2	‚ 130	’ 146	¢ 162	² 178	آ 194	ز 210	â 226	ٍ 242
3	ƒ 131	“ 147	£ 163	³ 179	أ 195	س 211	م 227	َ 243
4	„ 132	” 148	¤ 164	´ 180	ؤ 196	ش 212	ن 228	Ô 244
5	… 133	• 149	¥ 165	µ 181	ﻹ 197	ص 213	ه 229	ُ 245
6	† 134	– 150	¦ 166	¶ 182	ئ 198	ض 214	و 230	ّ 246
7	‡ 135	— 151	§ 167	· 183	ا 199	× 215	ç 231	÷ 247
8	ˆ 136	ک 152	¨ 168	¸ 184	ب 200	ط 216	è 232	ٓ 248
9	‰ 137	™ 153	© 169	¹ 185	ة 201	ظ 217	é 233	ù 249
A	ٹ 138	ڑ 154	ھ 170	؛ 186	ت 202	ع 218	ê 234	° 250
B	‹ 139	› 155	« 171	» 187	ث 203	غ 219	ë 235	û 251
C	Œ 140	ۓ 156	¬ 172	¼ 188	ج 204	ـ 220	ى 236	ü 252
D	۾ 141	SP 157	173	½ 189	ح 205	ف 221	ي 237	SP 253
E	ژ 142	SP 158	® 174	¾ 190	خ 206	ق 222	î 238	SP 254
F	ڈ 143	ں 159	¯ 175	؟ 191	د 207	ك 223	ï 239	ے 255

3.2.41 Page 51 (WPC1257: Baltic Rim)

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	Ą 192	Š 208	ą 224	š 240
1	SP 129	‘ 145	SP 161	± 177	Į 193	Ń 209	į 225	ń 241
2	‚ 130	’ 146	¢ 162	² 178	Ā 194	Ņ 210	ā 226	ņ 242
3	SP 131	“ 147	£ 163	³ 179	Ć 195	Ó 211	ć 227	ó 243
4	„ 132	” 148	¤ 164	´ 180	Ä 196	Ō 212	ä 228	ō 244
5	… 133	• 149	SP 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	† 134	– 150	¦ 166	¶ 182	Ę 198	Ö 214	ę 230	ö 246
7	‡ 135	— 151	§ 167	· 183	Ē 199	× 215	ē 231	÷ 247
8	SP 136	SP 152	Ø 168	ø 184	Č 200	Ų 216	č 232	ų 248
9	‰ 137	™ 153	© 169	¹ 185	É 201	Ł 217	é 233	ł 249
A	SP 138	SP 154	Ŗ 170	ŗ 186	Ź 202	Ś 218	ź 234	ś 250
B	‹ 139	› 155	« 171	» 187	Ė 203	Ū 219	ė 235	ū 251
C	SP 140	SP 156	¬ 172	¼ 188	Ģ 204	Ü 220	ģ 236	ü 252
D	¨ 141	¯ 157	- 173	½ 189	Ķ 205	Ż 221	ķ 237	ż 253
E	ˇ 142	‘ 158	® 174	¾ 190	Ī 206	Ž 222	ī 238	ž 254
F	¸ 143	SP 159	Æ 175	æ 191	Ļ 207	ß 223	ļ 239	˙ 255

3.1.42 Page 52 (WPC1258: Vietnamese)

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	À 192	Đ 208	à 224	đ 240
1	SP 129	‘ 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	‚ 130	’ 146	¢ 162	² 178	Â 194	̉ 210	â 226	̣ 242
3	ƒ 131	“ 147	£ 163	³ 179	Ă 195	Ó 211	ă 227	ó 243
4	„ 132	” 148	¤ 164	́ 180	Ä 196	Ô 212	ä 228	ô 244
5	… 133	• 149	¥ 165	µ 181	Å 197	Ơ 213	å 229	ơ 245
6	† 134	– 150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	ˆ 136	˜ 152	¨ 168	̧ 184	È 200	Ø 216	è 232	ø 248
9	‰ 137	™ 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	SP 138	SP 154	a 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	‹ 139	› 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	Œ 140	œ 156	¬ 172	¼ 188	̀ 204	Ü 220	́ 236	ü 252
D	SP 141	SP 157	173	½ 189	Í 205	Ư 221	í 237	ư 253
E	SP 142	SP 158	® 174	¾ 190	Î 206	̃ 222	î 238	đ 254
F	SP 143	Ÿ 159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

3.1.43 Page 53 (KZ1048: Kazakhstan)

HEX	8	9	A	B	C	D	E	F
0	Ђ 128	ђ 144	SP 160	° 176	А 192	Р 208	а 224	р 240
1	Ѓ 129	‘ 145	Ұ 161	± 177	Б 193	С 209	б 225	с 241
2	‚ 130	’ 146	ұ 162	І 178	В 194	Т 210	в 226	т 242
3	ѓ 131	“ 147	Ә 163	і 179	Г 195	У 211	г 227	у 243
4	„ 132	” 148	¤ 164	ө 180	Д 196	Ф 212	д 228	ф 244
5	… 133	• 149	Ө 165	µ 181	Е 197	Х 213	е 229	х 245
6	† 134	– 150	¦ 166	¶ 182	Ж 198	Ц 214	ж 230	ц 246
7	‡ 135	— 151	§ 167	· 183	З 199	Ч 215	з 231	ч 247
8	€ 136	SP 152	Ё 168	ё 184	И 200	Ш 216	и 232	ш 248
9	‰ 137	™ 153	© 169	№ 185	Й 201	Щ 217	й 233	щ 249
A	Љ 138	љ 154	Ғ 170	ғ 186	К 202	Ъ 218	к 234	ъ 250
B	‹ 139	› 155	« 171	» 187	Л 203	Ы 219	л 235	ы 251
C	Њ 140	њ 156	¬ 172	ә 188	М 204	Ь 220	м 236	ь 252
D	Қ 141	қ 157	- 173	Ң 189	Н 205	Э 221	н 237	э 253
E	һ 142	һ 158	® 174	ң 190	О 206	Ю 222	о 238	ю 254
F	Ү 143	ү 159	Ү 175	ү 191	П 207	Я 223	п 239	я 255

3.1.44 Page 255 (User-defined page)

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

3.1.45 International character sets

Country	ASCII code (Hex)													
	23	24	25	26	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	%	*	@	[	\	]	^	`	{	|	}	~
France	#	$	%	*	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	%	*	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	%	*	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	%	*	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	%	*	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	%	*	@	°	\	é	^	ù	à	ò	è	ì
Spain I	₧	$	%	*	@	¡	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	#	¥	%	*	@	[	\	]	^	`	{	|	}	~
Vietnam	₫	$	%	*	@	[	\	]	^	`	{	|	}	~
Arabia	#	$	٪	*	@	[	\	]	^	`	{	|	}	~

4. EU-T482 SERIES SUPPLEMENT INFORMATION

4.1 Black Mark Sensor

The EU-T482 series can use the paper which is pre-printed with a black mark (abbreviated to BM). As for the specification of the BM, see the printer specification.

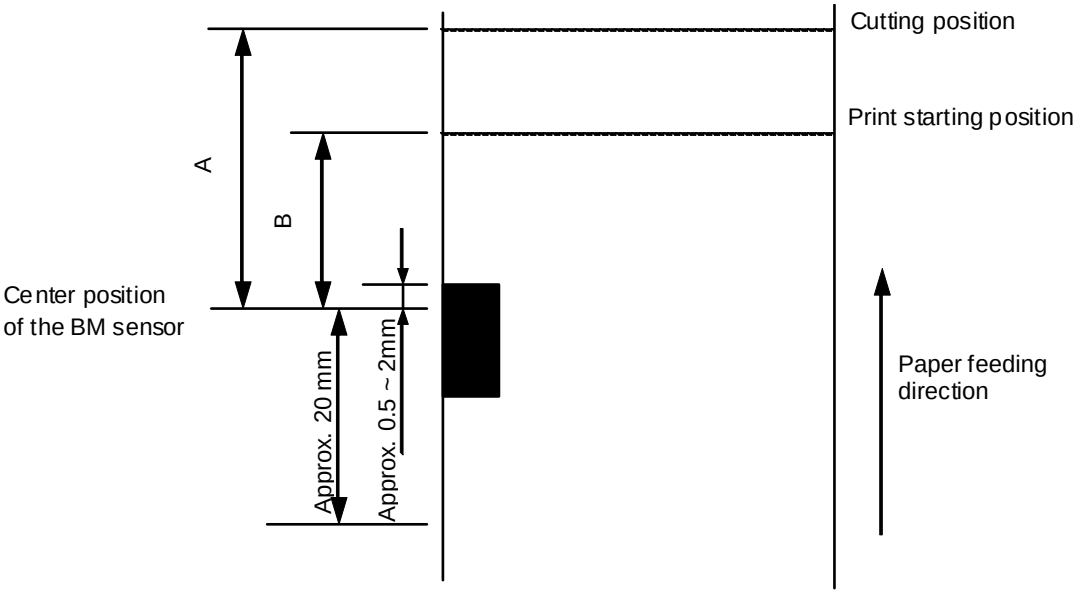
4.1.1 How to use the BM

Set the DIP switch 6 to On to use the BM.

(See Section 1.4.1.)

4.1.2 Detection position of the BM

The BM is detected at the position which the beginning of the BM comes into approximately 0.5 to 2 mm from the center of the BM sensor. After detecting the BM, the BM is not detected for approximately 20 mm.



A: 33.6 mm
B: 17.6 mm

Figure 4.1.1 BM Detection Position, Print Starting Position, Cutting Position

4.1.3 Print Starting Position and Cutting Position

At the factory, 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.

The print starting position and the cutting position can be changed with the **GS (F** command.

(See Section 2.4 Control Commands for **GS (F** *pL pH a m nL nH*.)

4.1.4 Applicable width and interval of BM

The width and interval of BM for which the printer operation is guaranteed are as follows:

BM width: 5 to 20 mm {0.20"} to {0.79"} BM interval: 50 to 300 mm {1.97"} to {11.81"}

When media type setting is other than Type1

BM width: 3.2 to 20 mm {0.13"} to {0.79"} BM interval: 50 to 300 mm {1.97"} to {11.81"}
(When media type setting is Type1

4.2 Page Mode

4.2.1 General Description

The printer operates in two print modes only when the paper roll is selected as the paper supply: standard mode and page mode. In standard mode, the printer prints and feeds paper each time it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are processed in the specified memory, and the printer executes no operations. All the data in the memory is then printed when an **ESC FF** or **FF** command is received.

For example, when the printer receives the data "ABCDEF" <**LF**> in standard mode, it prints "ABCDEF" and feeds the paper by one line. In page mode, "ABCDEF" is written to the specified printing area in memory, and the position in memory for the next print data is shifted by one line.

The **ESC L** command puts the printer into page mode, and all commands received thereafter are processed in page mode. Executing an **ESC FF** command prints the received data collectively, and executing an **FF** command restores the printer to standard mode after the received data is printed collectively. Executing an **ESC S** command restores the printer to standard mode without printing the received data in page mode; the received data is cleared from memory instead.

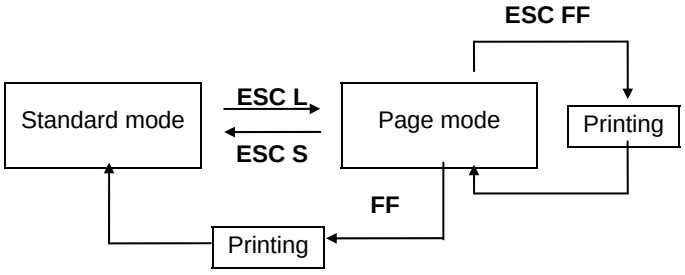


Figure 4.2.1 Shifting Between Standard Mode and Page Mode

4.2.2 Setting Values in Standard and Page Modes

1) The available commands and parameters are the same for both standard and page modes. However, these values can be set independently in each mode for the **ESC SP**, **ESC 2**, and **ESC 3** commands. For these commands, different settings can be stored for each mode.

2) Although the maximum number of printable dots for a bit image when the paper roll is selected as the paper supply is 576 in standard mode, 738 bit-image dots can be printed in the y direction (paper feed direction) in page mode. (This is possible only when the **ESC W** command has specified 738 printable-area dots in the y direction and the printing direction value of ***n*** in the **ESC T** command is 1 or 3.)

4.2.3 Formatting of Print Data in the Printable Area

Formatting of print data in the printable area is performed as follows:

1) The printable area is set using **ESC W**. If all printing and feeding are complete before the printer receives the **ESC W** command, the left side (as you face the printer) is taken as the origin (*x0, y0*) of the printable area. The printable rectangular area is defined by the length (*dx* dots) extending from and including the origin (*x0, y0*) in the x direction (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction). (If the **ESC W** command is not used, the printable area remains the default value.)

2) When the printer receives print data after **ESC W** sets the printable area and **ESC T** sets the printing direction, the print data is formatted within the printable area so that point A in Figure 4.2.2 is at the beginning of the printable area as a default value. (When a character is printed, point A is the baseline.)

   Print data containing downloaded bit images or bar codes is formatted so that the bottom point of the left side of the image data (point B in Figure 4.2.3) is aligned with the baseline. However, any Human Readable Interpretation (HRI) characters are printed under the baseline.

   At the points labeled Point B, if characters (such as double-height characters) that are higher than normal size characters or downloaded bit image characters are received, any part of the character higher than the normal-size character is not printed.

3) If the print data (including the space to the right of a character) exceeds the printable area before the printer receives a command (e.g., **LF** or **ESC J**) that includes line feeding, a line feed is executed automatically within the printable area. The print position, therefore, moves to the beginning of the next line. The line feed amount depends on the values set by commands (such as **ESC 2** and **ESC 3**).

4) The default value of the line spacing is set to 1/6 inch and corresponds to 30 dots in the vertical direction. If print data for the next line contains extended characters that are higher than double-height characters, bit images taking up two or more lines, or bar codes higher than normal characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line. To avoid this, increase the amount of line spacing. The line spacing in Figure 4.2.4 requires 27 dots (54 pitch) or more.

Example

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula:

{number of vertical dots (8 × 6) - number of dots for feeding at the beginning of the printable area (21)} = 27

Therefore, 27 dots are required for feeding.

Use the following commands:

ESC W ***xL***, ***xH***, ***yL***, ***yH***, ***dxL***, ***dxH***, ***dyL***, ***dyH***
ESC T ***n***
ESC 3 27 ← Set line spacing to be added.
LF
GS / 1
ESC 2 ← Reset the line spacing to 30 dots.

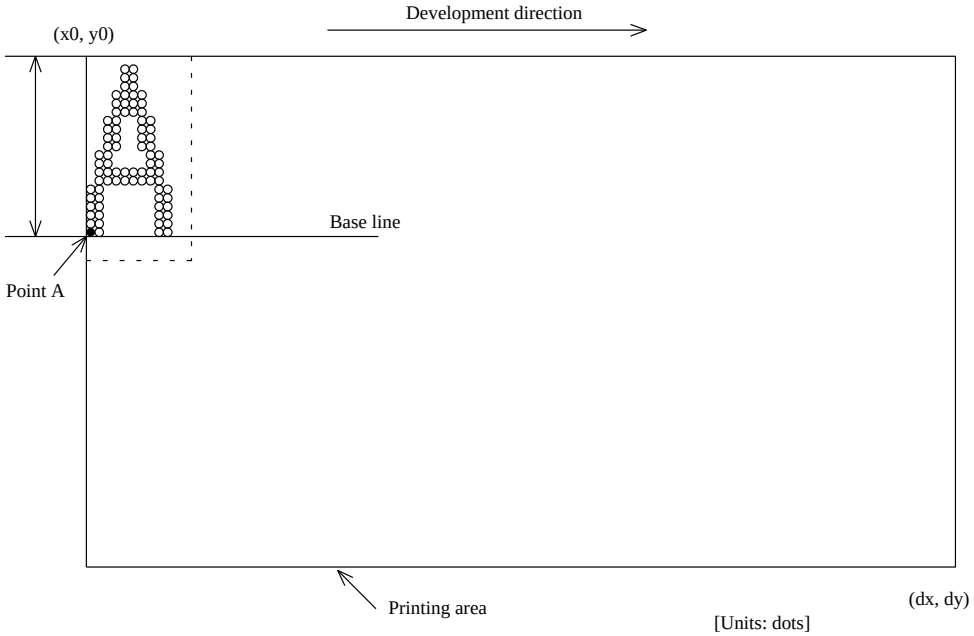


Figure 4.2.2 Character Data Developing Position

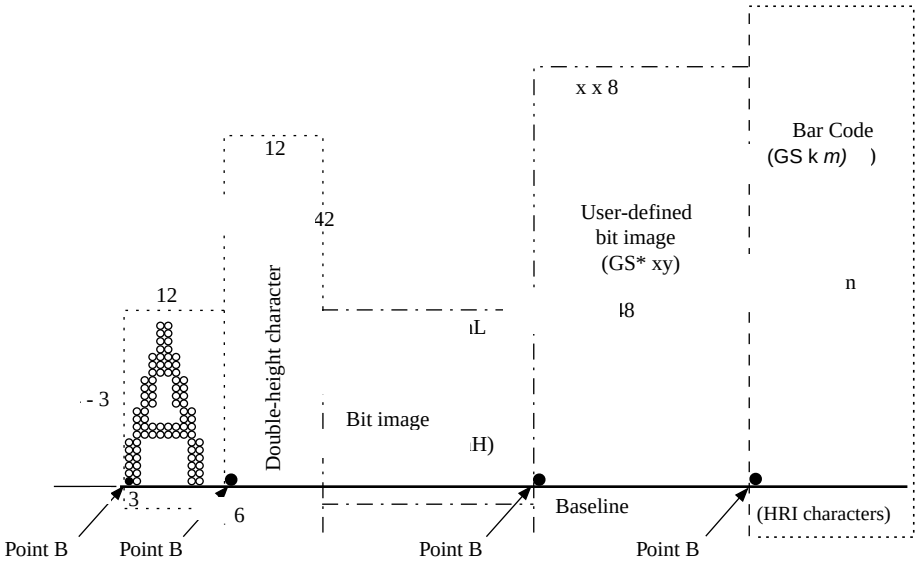


Figure 4.2.3 Print Data Developing Positions

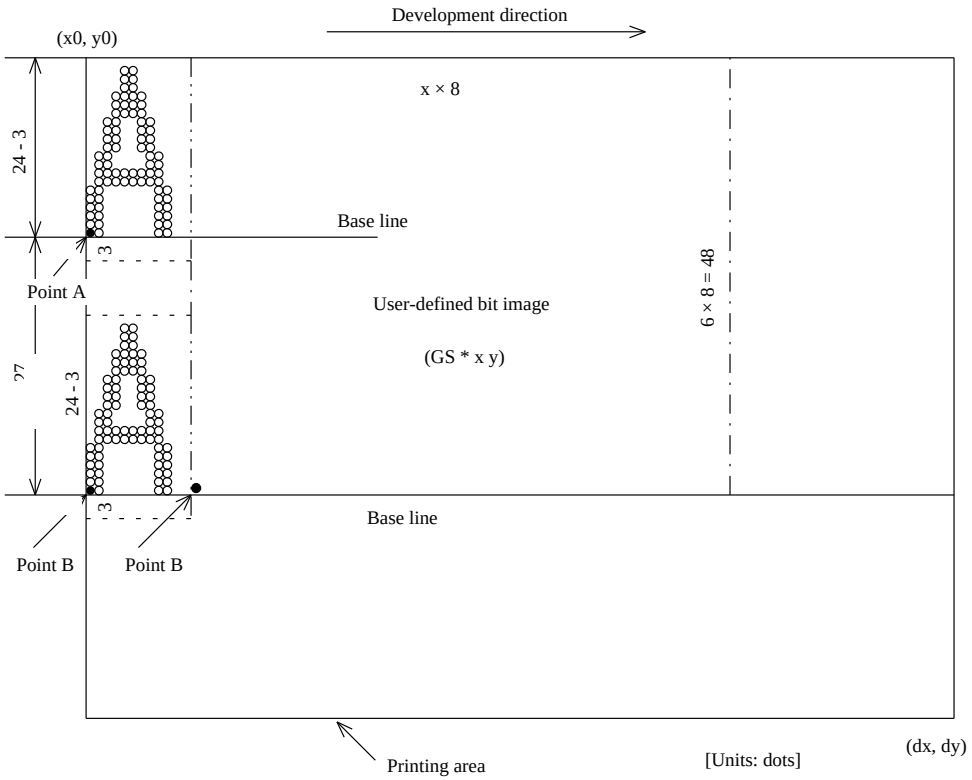


Figure 4.2.4 Downloaded Bit Image Developing Position

APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

1) Because the EU-T482 series printer is a line printer, it automatically feeds paper after printing the data.

   Therefore, when the line spacing for one line is set to a smaller value than the print data, paper may be fed more than the set amount just to print the data.

   For example, when the line spacing for one line is set to 10 dots (10/180 inches) and only paper feeding is executed, paper is fed for 10 dots; however, if bit-image characters are printed, paper is fed for 24 dots. (See Table A.1.)

   When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1.

Table A.1 Paper Feeding Amount

		Required Paper Feeding Amount (dots)
Normal Characters	Font A	24 × number of times enlarged vertically
	Font B	17 × number of times enlarged vertically
	Kanji	24 × number of times enlarged vertically
Rotated Characters	Font A	12 × number of times enlarged vertically
	Font B	9 × number of times enlarged vertically
	Kanji	24 × number of times enlarged vertically
Bit image (**ESC ∗**)		24

2) When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects bit-image printing.

3) Interval of autocutting operation in the receipt section

   For driving the autocutter of the receipt section, take the interval as a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the autocutter).

A.2 Notes on Connecting the External Power Supply

- Connect the external power supply to the power supply connector of the printer. Then plug in the external power supply and turn it on if necessary. Be sure not to connect the external power supply with the wrong polarity. If it is connected incorrectly, the internal circuit fuse of the printer may be blown, or the external power supply may be damaged.
- The power supply voltage is within the range of 24 V ± 2.4 V. If the power supply voltage drops outside of the range above during printing, the printer stops printing and waits until the voltage returns to normal and then automatically begins printing again. Therefore, printing speed may slow, the print pitch may not be correct, and some dots in some characters may not be printed.
- When either a high or low voltage error occurs, the ERROR LED flashes.
- When either a high or low voltage error occurs, turn off the power as soon as possible.
- The power supply capability to be used with the EU-T482 series is recommended to be 150W or more.

APPENDIX B: TRANSMISSION STATUS IDENTIFICATION

Because the specified status bits transmitted from the board series printer are fixed, the user can confirm the command to which the status belongs, as shown in the following table.

Table B.1 Transmission Status Identification

Command & Function	Status Reply
GS r	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0**1**10>B
ASB (1st byte)	<0**1**00>B
ASB (2nd to 4th bytes)	<0**0****>B

APPENDIX C: EXAMPLE PRINTING IN PAGE MODE

An example of using page mode is described in this appendix.

A typical procedure for transmitting commands in page mode is as follows:

1) Transmit **ESC L** to enter page mode.
2) Specify the printable area using **ESC W**.
3) Specify the printing direction using **ESC T**.
4) Transmit the print data.
5) Collectively print the data by sending an **FF**.
6) After printing, the printer automatically returns to standard mode.

Example 1: Sample program in BASIC (assumes transmission to the printer is already possible with file #1 open)

```
100 PRINT #1,CHR$(&H1B);"L";
110 PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120 PRINT #1,CHR$(200);CHR$(0);CHR$(144);CHR$(1);
130 PRINT #1,CHR$(&H1B);"T";CHR$(0);
140 PRINT #1,"Page mode lesson TEST 1"
150 PRINT #1,CHR$(&HC);
```

In the program for Example 1, a printable area of 200 × 400 dots starting at (0,0) is set, and characters are printed on the first line of the area as shown in Figure C.1.

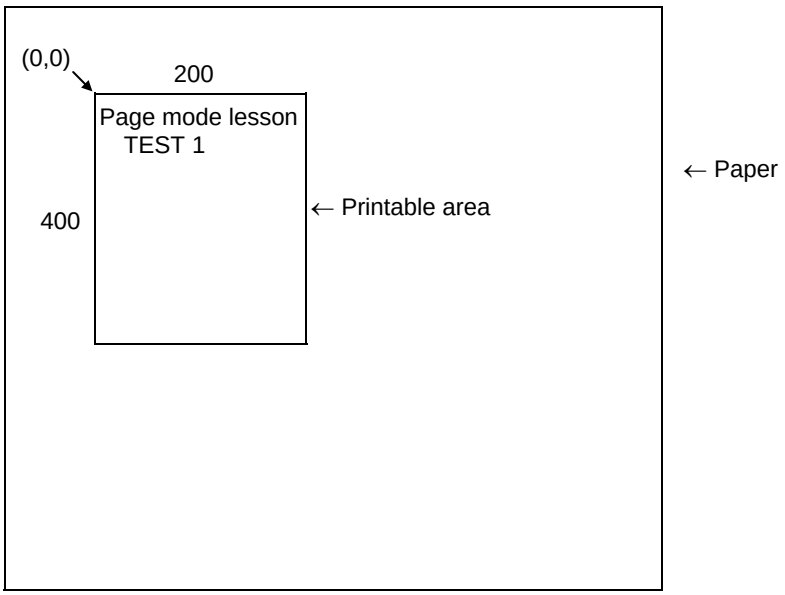


Figure C.1 Page Mode Example 1

Note that a line feed was inserted between "lesson" and "TEST 1" in Figure C.1. This line feed was inserted automatically because there was no room for the blank " " following the word "lesson" within the horizontal range of the 200 × 400 printable area. The feed amount here is that specified by **ESC 3**. Any number of printable areas can be specified before the **FF** is executed. If any printable areas overlap, however, the logical sum of the data written to the overlapping portions is used for the final printing.

It is possible to erase a portion of the data that is already developed. Using **ESC W**, specify a printable area consisting of only the section to be erased; then use **CAN** to erase the data. All the data existing in the specified printable area can be erased, even if it is just a portion of a character.

Example 2: Sample program in BASIC

```
100 PRINT #1,CHR$(&H1B);"L";
110 PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120 PRINT #1,CHR$(200);CHR$(0);CHR$(144);CHR$(1);
130 PRINT #1,CHR$(&H1B);"T";CHR$(0);
140 PRINT #1,"Page mode lesson 2 CAN command"
150 PRINT #1,CHR$(&HA);
160 PRINT #1,"ABCDEFGHIJKLMNOPQRST1234567890"
170 PRINT #1,CHR$(&HC);
```

This example works as follows:

First, transmit **ESC L** to switch to page mode (line no. 100). Then use **ESC W** to send 8 parameters from *n1* to *n8* to specify the printable area. To specify a printable area of 200 dots in the x direction and 400 dots in the y direction, starting from the origin (0,0), the parameters are transmitted in the order of 0,0,0,0,200,0,144,1 (line nos. 110 and 120). In addition, the printing direction is specified as 0 by using **ESC T** (line no. 130).

After these items are specified, the print data "Page mode lesson 2 CAN command" and "ABCDEFGHIJKLMNOPQRST1234567890" are transmitted (line nos. 140 to 160). By sending **FF** (line no. 170), the printout shown in Figure C.2 is produced.

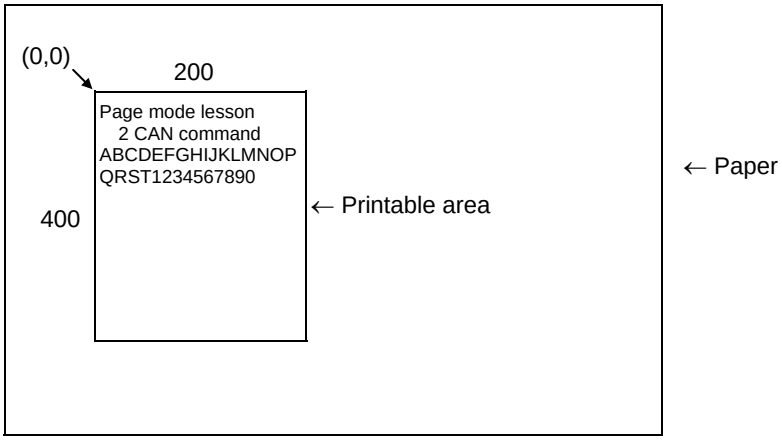


Figure C.2 Page Mode Example 2

If the program lines listed below are included before the **FF** is transmitted, a portion of the data will be deleted:

```
170 PRINT #1,CHR$(&H1B);"W";CHR$(72);CHR$(0);CHR$(96);CHR$(0);
180 PRINT #1,CHR$(51);CHR$(0);CHR$(81);CHR$(0);
190 PRINT #1,CHR$(&H18);
200 PRINT #1,CHR$(&HC);
```

If the above program is included, character string "GHI" is deleted, resulting in the printout shown in Figure C.3. When an area is deleted with **CAN**, the deleted part is left blank.

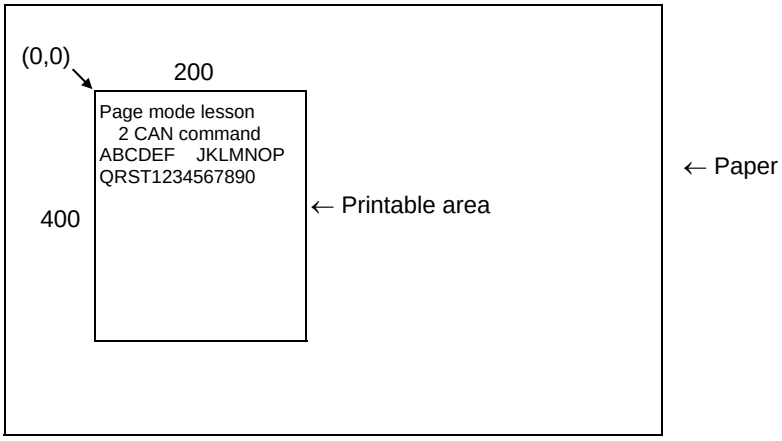


Figure C.3 Page Mode Example 3

APPENDIX D: CODE128 BAR CODE

D.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

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

The following special characters are also available in CODE128:

- SHIFT characters

  In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.

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

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

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

  The usage of function characters depends on the application software. In code set C, only FNC1 is available.

D.2 Code Tables

Printable characters in code set A

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

Printable characters in code set B

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

Printable characters in code set C

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

APPENDIX E: NOTES ON PRINTING 2-DIMENSIONAL CODES

Be sure to follow the notes below when printing 2-dimensional codes.

1) The user is supposed to set the quiet zone based on the 2-dimensional code standard.

2) When printing PDF417 (2-dimensional code), it is recommended to set the height of one module of the symbol to three to five times the width of one module, also making sure that the total height is almost 5 mm {0.20"} or more.

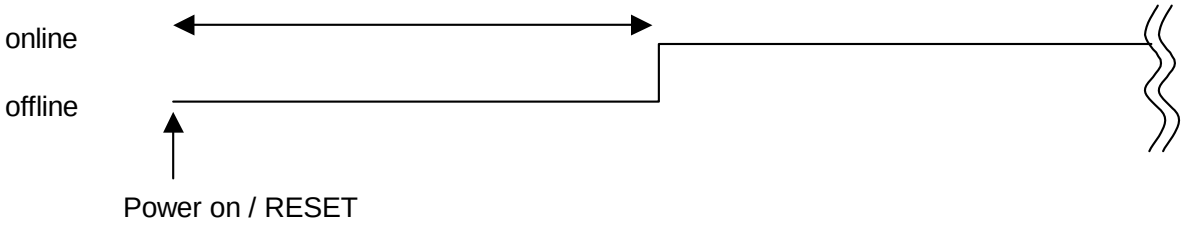
3) The recognition rate of ladder bar codes and 2-dimensional code may be affected by such items as different widths of the modules, print density, environmental temperature, type of the thermal paper, and characteristics of the reader. Therefore, the user should check the recognition rate in advance so that the limitations of the reader can be considered.

APPENDIX F: SWITCHING ONLINE AND OFFLINE

The printer changes from offline to online or from online to offline in the following instances:

1) When the power is turned on or during the self-test using the paper FEED button:

- While initializing the printer mechanism and loading the paper
- During the self-test



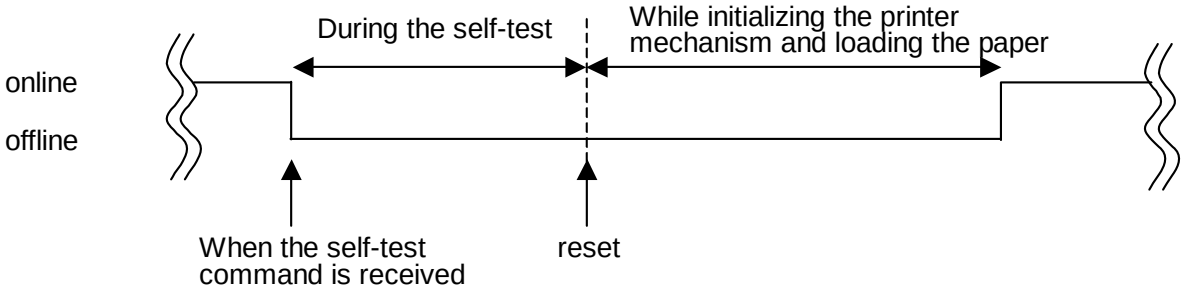
The printer is offline between the time when power is turned on (or the printer is reset) and when the printer is ready to receive data.

If ASB (Auto Status Back) is enabled, the printer transmits each status item such as when an error occurs. When the printer detects a status change with the sensors even if the printer is offline, the printer transmits the ASB.

If the sensor's status changes while the printer initializes as described above, the printer transmits the offline information with the cause unknown.

If this occurs, wait until the printer process a change in the status or the printer comes online.

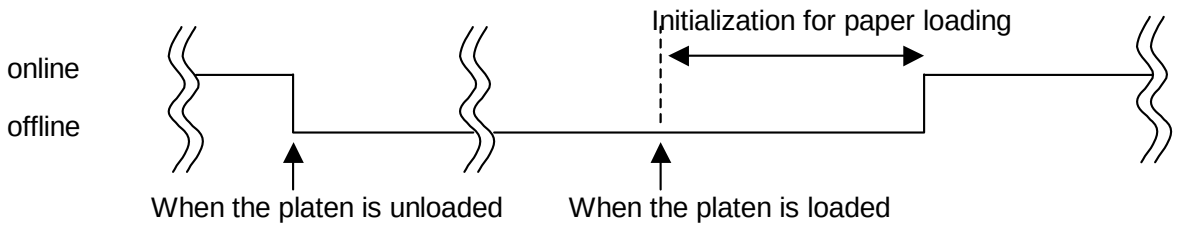
2) When the self-test is executed (by a command):



The printer goes offline during the self-test. When the self-test is ended, the printer is reset automatically.

When the self-test is executed by a command, the printer does not transmit the offline information even if the ASB is enabled.

3) While the platen is unloaded (in standby)



If the platen is unloaded in the printer's standby state, the printer goes offline (this is not an error). If the platen is loaded again, the printer comes online.

If ASB is enabled, the printer transmits each status item each time when an event occurs.

When the printer detects a status change with the sensors, even if the printer is offline, the printer transmits the ASB.

If the sensor's status changes while paper loading is initialized, the printer transmits the offline information with the cause unknown. (If offline is not caused by an error or a paper-end).

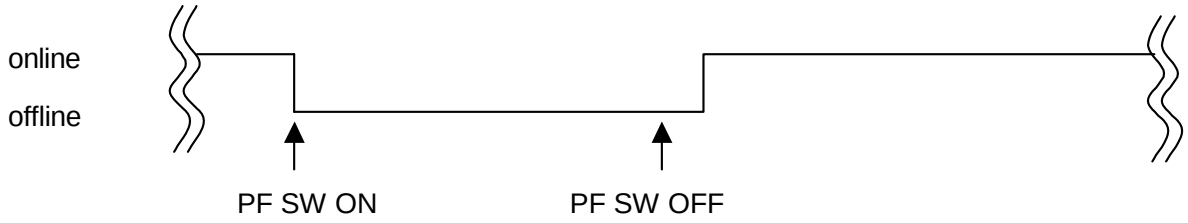
If the offline occurs as a result of a paper near-end, wait until the printer processes a change in status or the printer comes online.

4) While the platen is unloaded (during printing)

If the platen is unloaded during printing, the printer goes offline causing an error.

The printer does not recover from offline only by loading the platen. Transmission of the error recovery command (**DLE ENQ**) or resetting is also required.

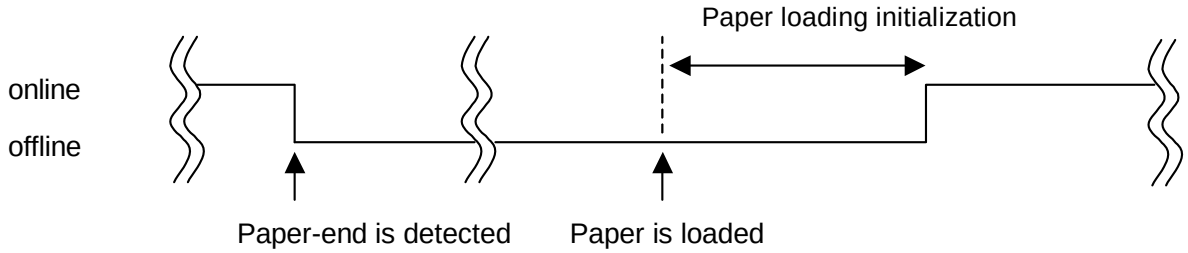
5) When paper is fed with the paper FEED button



The printer is offline when the paper is fed with the paper FEED button. The printer comes online after the current paper feeding is ended by releasing the paper FEED button.

If ASB (Auto Status Back) is enabled, the printer transmits each status item each time an event occurs. When the printer detects a status change with the sensors, even if the printer is offline, the printer transmits the ASB.

6) When a paper-end is detected:



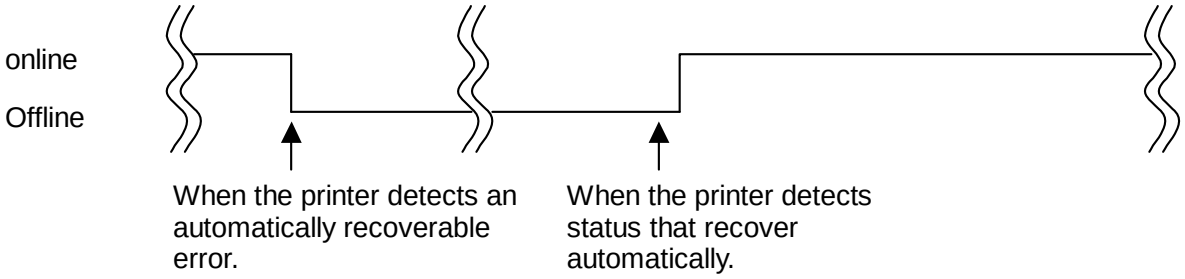
If a paper-end is detected, the printer goes offline causing printing to stop (this is not an error).

The printer recovers to online when the printer is ready to receive data, if the paper loading initialization is finished after the paper is loaded.

If ASB (Auto Status Back) is enabled, the printer transmits each status item each time an event occurs. When the printer detects a status change with the sensors, even if the printer is offline, the printer transmits the ASB.

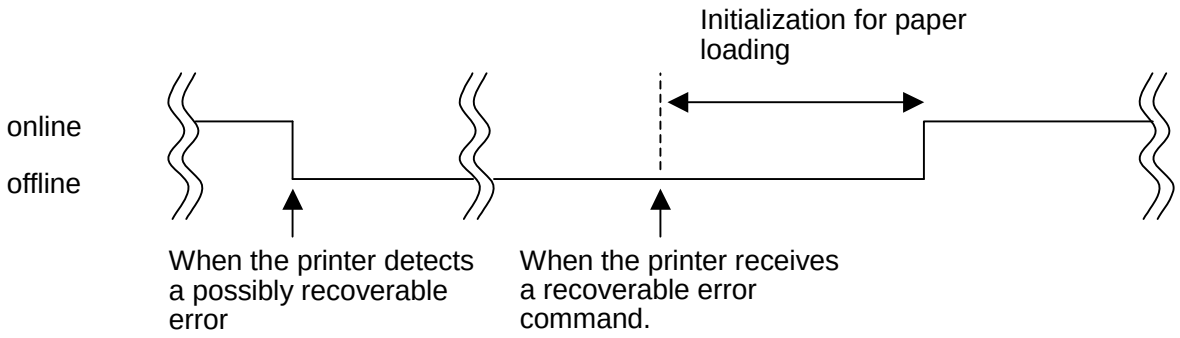
If a status change is detected by the sensors during paper loading initialization, the printer may go offline without identifying the cause. If this occurs, wait until the status changes or until the printer goes online.

7) When an automatically recoverable error occurs:



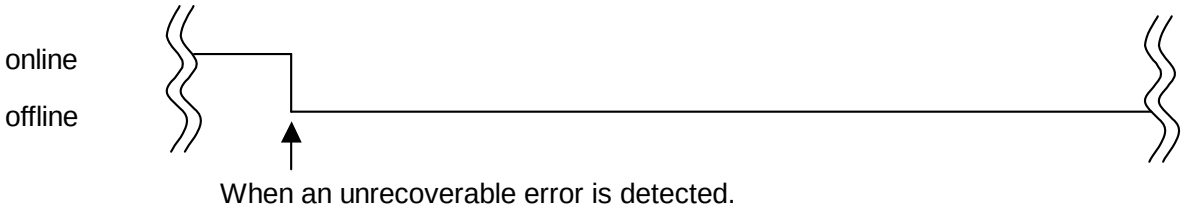
When the printer detects an automatically recoverable error, the printer goes offline.
If the printer detects status that can recover automatically, the printer recovers to online automatically. If ASB is enabled, the printer transmits the ASB when the error occurs. After that, the printer does not transmit ASB again until the printer recovers to online. In this product, a head high temperature error is one of the automatically recoverable errors.

8) When a possibly recoverable error occurs:



When the printer detects a possibly recoverable error, the printer goes offline.
When the printer is in the state that can possibly recover to online, the printer recovers to online by a recoverable error command or resetting the printer. (For the RESET timing, see 1) in this section.)
If ASB is enabled, the printer transmits the ASB when the error occurs.
After then the printer does not transmit the ASB again until the printer recovers to online.
In this product, an autocutter error is one of the possibly recoverable errors.

9) When an unrecoverable error occurs:



When the printer detects an unrecoverable error, the printer goes offline. The only way to recover from an unrecoverable error is to reset or turn the power off and on again. (If a malfunction causes the error, the printer will not recover until the printer is fixed.)

(For the RESET timing, see 1) in this section.)

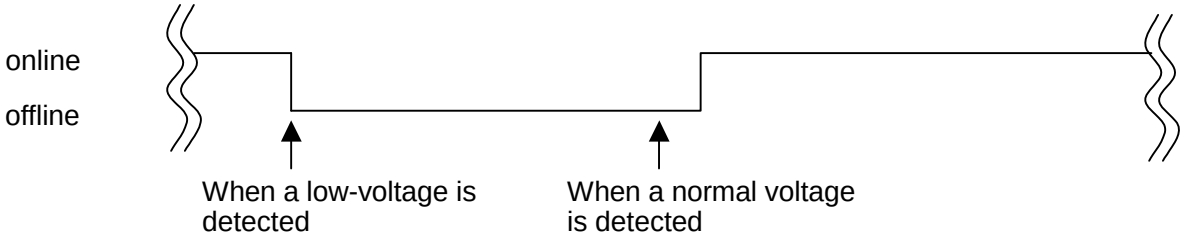
If ASB is enabled, the printer transmits the ASB when an error occurs. After this, the printer does not transmit the ASB again until the printer recovers to online.

In this product, a high-voltage error is one of the unrecoverable errors.

However, when a fatal error, such as a CPU execution error or a memory error, is detected, the printer won't transmit the ASB.

In this product, a high voltage error is one of the unrecoverable errors.

10) When the printer goes offline temporarily without any specified cause:

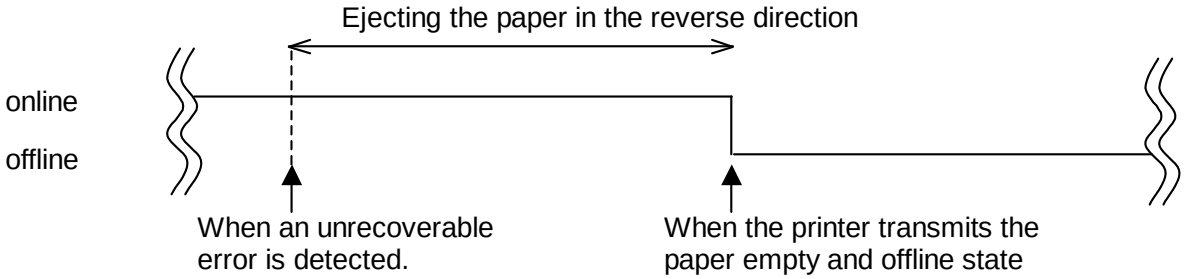


If the printer detects a low voltage temporarily while printing, the printer stops printing and goes offline without identifying the cause.

After the printer detects a normal level of the voltage, the printer comes back online and starts printing automatically. If the printer detects a low voltage again, the printer sends the low-voltage error status (unrecoverable error).

If the printer goes offline without any identified cause (for an offline not caused by an error or paper-end), when monitoring the printer's status, it is recommended not to decide the printer status until the printer recovers to online or the printer goes offline with the cause identified (for an offline caused by an error or paper-end).

11) When the paper is ejected in the reverse direction
(by a button or a command execution with **FS (z** <Function 100>)



The printer goes offline each time when the reverse paper feed is completed if the command for preparing to exchange the paper is executed or the reverse paper feed is executed by the button. If ASB is enabled, the printer transmits the paper empty and offline state when the reverse paper feed is completed.

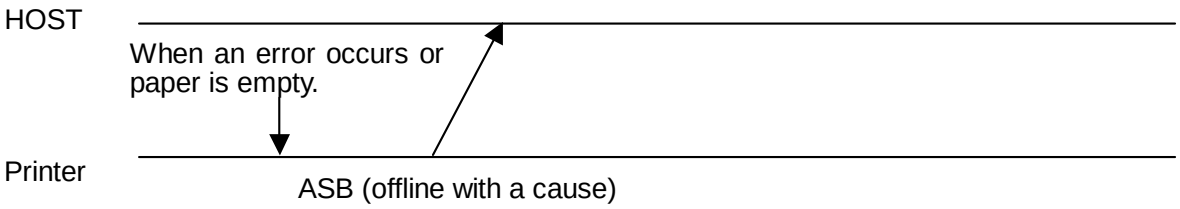
NOTE: After completing the paper eject in the reverse direction, the paper is still present in the paper end sensor, but the paper is not present in the platen rollers.
If the printer is reset in this case, the printer returns an error since the paper cannot be initialized even though the paper is present in the paper real-end sensor.
Therefore, to avoid from this, make sure to pull the paper out completely, and load a new one.

APPENDIX G: STATUS TRANSMISSION PROCESSING

This product transmits the status according to the following sequence.
In this section, the ASB is assumed to be always enabled, and memory switch 8-5 is On (discards the data in a specific offline).

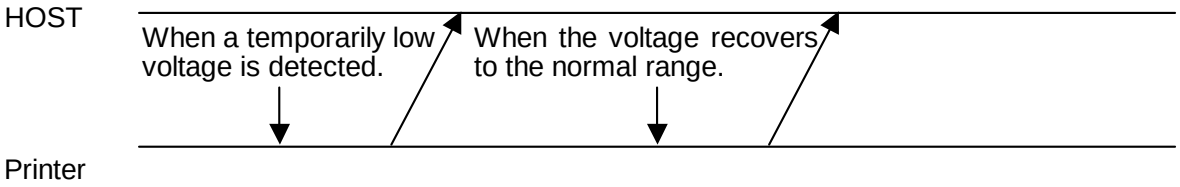
A buffer clear response transmits 3 bytes –37H, 24H, and 00H, only when memory switch 8-5 is On.)

1) When the printer offline is caused by an error or paper empty.

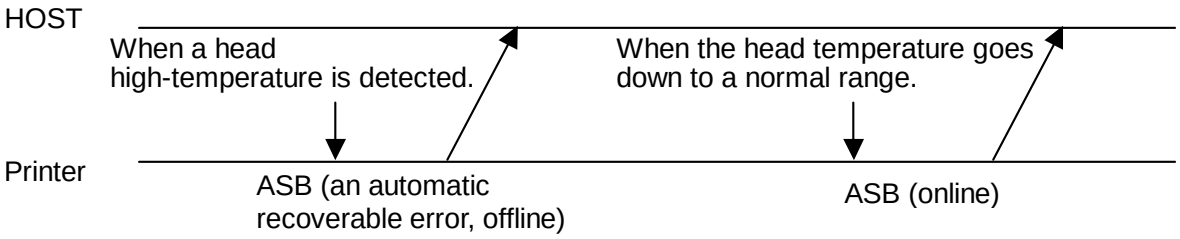


The printer is offline when the paper is fed with the paper FEED button. The printer comes online after the current paper feeding is ended by releasing the paper FEED button.
If ASB (Auto Status Back) is enabled, the printer transmits each status item each time an event occurs.
When the printer detects a status change with the sensors, even if the printer is offline, the printer transmits the ASB.

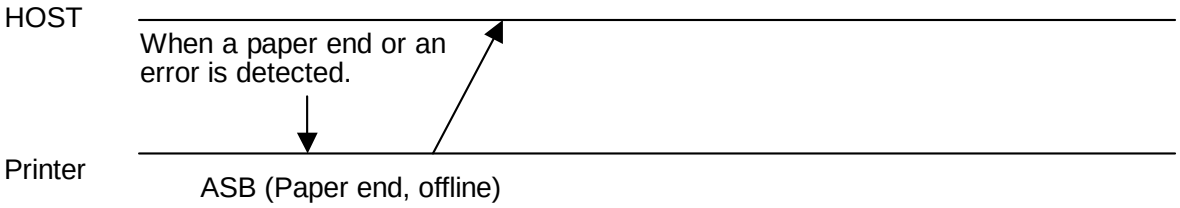
2) When the printer goes offline for an automatically recoverable error caused by a temporarily low voltage while printing.
(Since the printer does not discard the data for the automatically recoverable offline status, the printer does not output the buffer-clear response.)



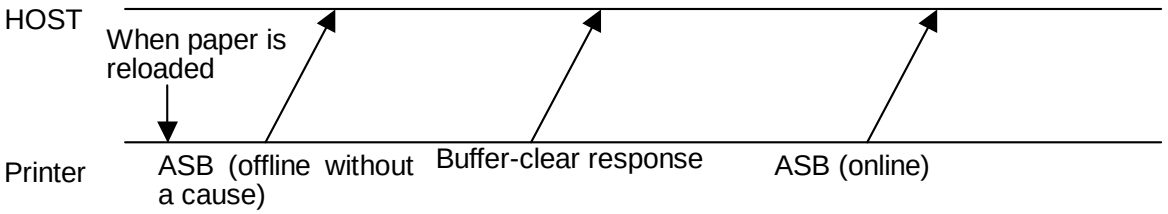
3) When the printer goes offline for an automatically recoverable error offline caused by a head high-temperature error.
(Since the printer does not discard the data in the automatically recoverable offline status, the printer does not output the buffer-clear response.)



4) When the printer goes offline as a result of a paper end or an error occurance.



5) When the printer recovers to online.
(Such as from paper end to adequate paper reloaded.)

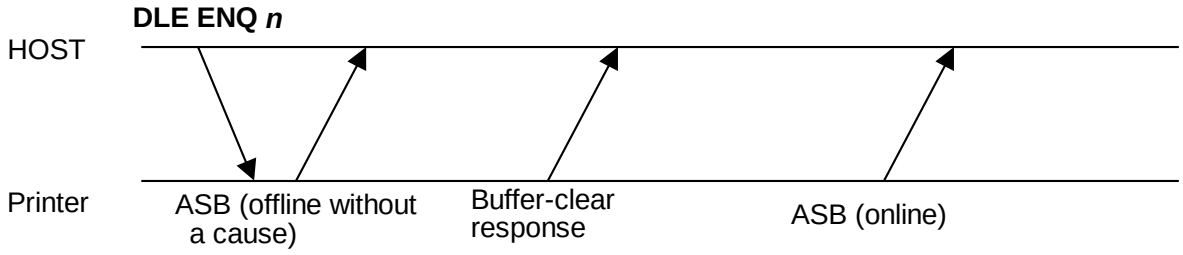


While the paper is auto-loading after reloading, the printer with a black mark sensor (BM) goes offline when initializing the BM sensor.

If an error occurs while auto-loading or initializing the BM, the printer transmits the ASB (offline with a cause), and does not recover to online.

When closing the platen from opening in standby, the printer operates as described above.

6) When the printer recovers to online from a recoverable error (such as an autocutter error) by a command



While initializing the autocutter and loading the paper (initializing the BM sensor if the printer has a BM sensor) after receiving the error recovery command (**DLE ENQ *n***), the printer goes offline without identifying a cause.

If an error occurs during an error recovery process, the printer transmits the ASB (offline with a cause), and does not recover to online.

When closing the platen from open in standby, the printer operates as described above.

7) Limitation for use

- If the host is not ready to receive data, the printer stores the data in the data transmission buffer, but does not transmit data until the host is ready to receive data.
- If the printer status is changed such as detecting the paper near-end while initializing the BM sensor, the printer transmits the ASB at any timing.
- The printer transmits the following status or response at any time: Presenter status (**FS (z** <Function 4>), ASB, or buffer clear response.
  If the presenter status and the ASB are transmitted simultaneously, the order of the status is not decided.