

DPP-250

ESC/POS Thermal Printer

Programmer's Manual



Introduction

DATECS DPP-250 is a mobile ESC/POS thermal printer with 2-inch wide printing mechanism. It can be used in dynamic working conditions and its abundant built-in features allow it to be widely used for different applications.

DATECS DPP-250 can quickly and easily print text and/or graphics, depending on customer's needs – barcodes, logo, etc.

Features:

- Small and lightweight, for real mobility;
- High speed and low noise, owing to line thermal print;
- Easy paper-loading;
- Long lasting battery – max 20000 lines per charge
- Serial RS232 and USB interfaces;
- Supports protocol for POS and BARCODE;
- Capable of printing alpha-numeric and graphical data;
- Drivers for Pocket PC, Palm OS, Windows and Blackberry.

Specification

Feature	Specification
Emulation	ESC/POS Continuous paper Mode
Printer mechanism	FTP-628MCL103
Printing method	Line thermal dot printing
Printing speed	60 mm/s (480 dots/sec) at 8.5 V
Resolution	203 dpi (8 x 8 dots/mm)
Print width	48 mm / 384 dots per line
Dot pitch	Horizontal: 0.125 mm (8 dots/mm) Vertical: 0.125 mm (8 dots/mm)
Paper peed system	step
Reliability (MTBF)	50km (printing rate 25% max)
Fonts	Resident Font A: 12 x 24 dots (32 characters per line)
	Resident Font B: 9 x 16 dots (42 characters per line)
	Loadable Font C: 12 x 24 dots (32 characters per line)
	Loadable Font D: 9 x 16 dots (42 characters per line)
	Font E (JIS and Shift-JIS): 24 x 24 dots (28 characters per line) - Japanese version only (optional)
	Font F (GB2312): 24 x 24 dots, 28 characters per line - Chinese version only (optional)
Logo Registration	1 Black & White BMP format (1-bit per pixel); Size: 384 x 248
Resident Barcodes	EAN 13, EAN 8, UPC-A, UPC-E, CODEBAR, CODE 39, CODE 128, PDF417, QR Code
Input buffer	128 KB (131072 bytes)
Communications	RS-232C interface -max 115200 bps
	USB v 1.1, compatible with 2.0
	Bluetooth® (Optional)
Cables	RS-232 interface cable
	mini USB A to B cable (option)
Readers	Magnetic Card Reader - 3 track head, ISO7811 (optional)
	Smart Card Reader, ISO 7816-1/2/3 (optional)
Power supply	Rechargeable Li-ion battery (7.4 V / 1100mAh) Battery capacity: Per Charge (~ 20 000 lines)
	AC adapter, model: 10AD-E Input: AC 100 – 240 V / 1.3 A ; 50/60 Hz Output: DC 9 V / 1 A
Power switch	ON/OFF
Operation switches	Button LF – Paper feed, Self test, Dump mode
	Button ON/OFF- Switch On / Switch OFF
Thermal paper	58mm +0/-1 x 45mm diameter, thickness 60 μ m
Dimensions, (W x D x H) mm	86 x 113 x 57
Weight, g	295 (without paper) ; 350 (with paper)
Environment	Operating temperature: 0°C to + 40°C Operating humidity: 35 to 85% RH (no condensation) Storage temperature: -20°C to + 60°C Storage humidity: 10 to 90% RH (no condensation)

About DPP-250



Dip Switch Settings

The DPP-250 is designed to use different methods of communications. Care must be taken to ensure that the DIP Switches are not changed from its default factory configuration unless required.

◆ DIP SWITCH SETTINGS:

The printer has two absolutely different operation modes.

They are determined by the state of switch Sw2:

- Continuous Paper mode
- Black Mark mode

These two modes detect paper present conditions differently. The black mark searching mode is designed for proper alignment of the starting print position on indexed media with printed information.

Switch	OFF	ON
Sw1	Enable BT	Disable BT
Sw2	Continuous paper mode	Label/Black mark mode
Sw3	None	Xon/Xoff protocol
Sw4	Normal operation mode	Protocol mode

Diagnostic information

Holding LF button while power on for ~ 0.5 sec and releasing it after the 1-beep .	SHORT SELF TEST print.
Holding LF button while power on for ~ 2.5 sec and releasing it after 2-beep .	Hex DUMP mode . All input data are printed as hexadecimal.
Holding LF button while power on for ~ 4.5 sec and releasing it after 3-beep .	LONG SELF TEST print.
Holding LF button while power on for more than 8.5 sec and releasing it after the 5-beep 4-tone beep .	Program mode – loading the printer firmware.
Holding ON button while power on for ~ 4 sec (first sound signal)	If serial cable is connected (RS232 communication) – Temporary forcing 9600 bps serial speed. If no serial cable connected (Bluetooth or USB communication) – starting a hardware menu for fast Bluetooth pairing info reset.
Holding ON button while power on for ~ 6 sec.	Hardware Setup Mode .

Protocol mode

Protocol mode is active when DIP switch **4** is **on**. The purpose of this mode is to give full control over the optional peripherals (MC and smart card reader) and a stronger real time access to the printer. All input data are sent in packets as described below. The printer returns an answer to the packet immediately.

Output packet format:	Channel Command LenHi LenLo Data	
Answer format:	Channel Status LenHi LenLo Data	
Channel:	One byte:	Bits 0 – 6 Channel number (Device Type) Bit 7 0: Send data; 1: Response
Command:	One byte with	0: Open channel

	possible value:	(No action – all channels always open) 1: Close channel (No action – all channels always open) 2: Send data 3: Request data > 4: Application specific		
Status:	One byte:		0	1
		Bit 0	No error	Error occurred
		Bit 1	ACK (Packet accepted)	NACK (Packet not accepted)
		Bit 2	Channel and command OK	Wrong channel or command
		Bit 3	Battery OK	Low battery
		Bit 4	Printing head OK	Printing head too hot
		Bit 5	Paper OK	Out of paper
		Bit 6	Not defined	
	Bit 7	Printer ready	Printer busy	
		Bit 7 is set, if: <ul style="list-style-type: none">• There are unprinted lines in the print buffer.• There are bytes in the print buffer.• The printer is executing a macro.• The printer is executing a selftest.• The button <LF> is pressed – feeding paper.		
LenHi:	High byte of data length of data. From 00h to 08h.			
LenLo:	Low byte of data length of data. From 00h to FFh.			
Data:	256*LenHi +LenLo data bytes.			
The maximum packet length is 2048 bytes . The answer differs from the command by bit 7 (MSB) in the channel number. If bit 7 is '0' , then it is a command, if it is '1' – it is a response. Bit '0' in the Status byte shows if there was an error accepting or processing the data block. If this bit is '1' the other bits show the type of the error. The printer never issues a transmission by itself. It always responds as an answer to a command. The communication goes like this: Host – command, Printer – answer; Host – command, Printer – answer; etc.				
The defined channels are: 1 Printer. 16 (10h) Optional card reader.				
Commands for the printer channel 1:				
Command 2	Send data. The data is copied into the printer's print buffer. If there's not enough space into the print buffer, the packet is rejected, and a status byte with value 3 is returned in the answer.			
Command 3	Receive data If there is data to be transmitted from the printer to the host, it is transmitted in the data field of the packet, otherwise an empty packet is received. The application must take care to get the data fast enough from the output buffer or the data may be corrupt.			

Command 4	Get printer status. 5 data bytes returned in response: BufferHi BufferLo PrStatus Volt Temperature		
	BufferHi	High byte of the count of free bytes in input buffer.	
	BufferLo	Low byte of the count of free bytes in input buffer.	
	PrStatus	Printer status. The following bits defined:	
		Bit 0	Battery low
		Bit 1	Too hot
		Bit 2	No paper
	Volt	The battery voltage in units 0.1V	
	Temperature	The head temperature in degrees Celsius.	
If free bytes in input buffer are more than 65535 (FFFFh) , then FFFFh is returned.			
Using channel 16 is the only way for full control over the optional card reader .			
Communication example (all bytes hexadecimal):			
Send data:	>>> 01 02 00 05 11 22 33 44 55 <<< 81 00 00 00		
Send data with error:	>>> 01 02 00 05 11 22 33 44 55 <<< 81 01 00 00 >>> 01 02 00 05 11 22 33 44 55 <<< 81 01 00 00 >>> 01 02 00 05 11 22 33 44 55 <<< 81 00 00 00		
Receive data:	>>> 01 03 00 00 <<< 81 00 00 00 >>> 01 03 00 00 <<< 81 00 00 04 11 22 33 44 >>> 01 03 00 00 <<< 81 00 00 00		
Get status:	>>> 01 04 00 00 <<< 81 00 00 05 3F F8 01 49 27		

List of commands

No	Command	Description
1	BEL	Sounds the buzzer
2	HT	Horizontal Tab command
3	LF	Printing a line and Paper Feeding command
4	FF	Printing and paper feeding to the black mark position
5	CR	The operation of the command depends on the state of the configuration flags 2, 3 and 4
6	DC2 =	Image LSB/MSB select
7	DC3 (DC3 (Ruled line) commands sequence start
8	DC3 +	Sets the ruled line ON
9	DC3 -	Sets the ruled line off
10	DC3 A	Selects ruled line A
11	DC3 B	Selects ruled line B
12	DC3 C	Clears selected ruled line buffer
13	DC3 D	Sets a single dot in selected ruled line buffer
14	DC3 F	Ruled line pattern set
15	DC3 L	Ruled line line set
16	DC3 M	Selects ruled line combine mode
17	DC3 P	Ruled line 1 dot line print
18	DC3 p	Ruled line n dots line print
19	DC3 v	Ruled line image write
20	CAN	Canceling print data in page mode
21	ESC FF	Printing data in page mode
22	ESC RS	Sounds the buzzer
23	ESC SP	Setting character spacing
24	ESC #	Setting EURO symbol position
25	ESC \$	Specifying the absolute horizontal position of printing
26	ESC %	Selecting/Canceling the printing of downloaded user character sets
27	ESC &	Selecting user character set
28	ESC !	Specifying printing mode of text data
29	ESC *	Printing graphical data
30	ESC +	Switch's OFF the printer
31	ESC -	Selecting/Canceling underlining
32	ESC .	Printing self test/diagnostic information
33	ESC 2	Specifying 1/6-inch line feed rate
34	ESC 3	Specifying line feed rate n/203 inches
35	ESC <	Changes print direction to opposite

36	ESC =	Data input control
37	ESC >	Selecting print direction
38	ESC ?	Reading magnetic stripe card
39	ESC @	Initializing the printer
40	ESC CAL	Black mark mode sensor calibration
41	ESC D	Setting horizontal tab position
42	ESC E	Specifying/Canceling highlighting
43	ESC F	Filling or inverting the page area in page mode
44	ESC G	Specifying/Canceling highlighting
45	ESC I	Specifying/Canceling Italic print
46	ESC J	Printing and Paper feed n/203 inches
47	ESC L	Selecting page mode
48	ESC N	Reading programmed serial number
49	ESC R	Selecting country
50	ESC S	Specifying speed (bps) of the serial port
51	ESC T	Printing short self test
52	ESC U	Selecting/Canceling underlined printing
53	ESC V	Selecting/Canceling printing 90° - right turned characters
54	ESC W	Defining the print area in page mode
55	ESC X	Specifying max printing speed
56	ESC Y	Selecting intensity level
57	ESC Z	Returning diagnostic information
58	ESC \	Specifying relative horizontal position
59	ESC]	Loading the default settings stored in Flash memory
60	ESC ^	Saving current settings in Flash memory
61	ESC _	Loading factory settings
62	ESC `	Reading the Battery Voltage and Thermal head temperature
63	ESC a	Aligning the characters
64	ESC b	Increasing text line height
65	ESC c5	Enabling/Disabling the functioning of the button LF
66	ESC d	Printing and feeding paper by n- lines
67	ESC i	Feeding paper backwards
68	ESC o	Temporarily feeding paper forward
69	ESC pair=	Enabling/Disabling PAIRING info saving in Bluetooth mode
70	ESC pwd=	Programming a new Bluetooth password (PIN)
71	ESC r	Full command for sounding buzzer
72	ESC s	Reading printer settings
73	ESC u	Selecting code table
74	ESC v	Transmitting the printer status
75	ESC x	Setting the time interval for automatically switching Off the printer

76	ESC y	Setting USB response strings
77	ESC {	Enabling/Canceling printing of 180° turned characters
78	GS FF	Printing in page mode and returning to standard mode
79	GS \$	Specifying the absolute vertical position in page mode
80	GS)	Setting printer flags (memory switches)
81	GS *	Defining a Downloaded Bit Image (logo)
82	GS /	Printing a Downloaded Bit Image
83	GS :	Starting/ending macro definitions
84	GS B	Enabling/Disabling inverse printing (white on black)
85	GS C	Read the Real Time Clock
86	GS H	Selecting printing position of HRI Code
87	GS L	Setting the left margin
88	GS Q	Printing 2-D barcodes
89	GS R	Filling or inverting a rectangle in page mode
90	GS S	Selecting 2-D barcode cell size
91	GS T	Selecting the print direction in page mode
92	GS U	Selecting standard mode
93	GS W	Setting the print area width
94	GS X	Drawing a rectangular box with selected thickness in page mode
95	GS Z	Printing the non blank page area only in page mode
96	GS \	Specifying the relative vertical position in page mode
97	GS ^	Executing macro
98	GS c	Setting the Real Time Clock
99	GS f	Setting the font of HRI characters of the barcode
100	GS h	Setting the height of the barcode
101	GS k	Printing a barcode
102	GS p	Settings for 2D barcode PDF417
103	GS q	Selecting the height of the module of 2D barcode PDF417
104	GS w	Selecting the horizontal size (Scale factor) of the barcode
105	GS x	Direct text print in page mode

Asian Languages Support

106	FS !	Specifying printing mode of two-byte text data
107	FS &	Selecting two-byte text mode (JIS or GB2312)
108	FS -	Selecting/Canceling underline mode for two-byte text mode
109	FS .	Canceling two-byte text mode
110	FS C	Selecting Shift-JIS mode (Japanese version only)
111	FS S	Specifying character spacing for two-byte text mode
112	FS W	Selecting double size characters for two-byte text mode

Page mode

Starting from **version 1.40** the printer supports page mode. For this mode is needed larger RAM, so it is possible, that some of the older printers will not support it. You can check this using command **ESC Z** (bit **29.6** will be set if page mode is supported).

New **13** commands are added in page mode, most of the old command work differently.

In standard mode the device prints the data after receiving new line command (**LF** or **CR** depending on memory switches) or when the line is wider than the defined print area.

In page mode the result of incoming commands is forwarded to a reserved memory area (page). The page place and size is defined using command **ESC W**. Command **GS T** selects the print direction in this page. At the end the collected information is printed using one of the commands, provided for this. Commands **ESC FF** and **GS FF** print only the currently defined page, but command **ESC Z** prints the area between the first and last line containing at least one black point.

All commands except **GS L** and **GS W** work in page mode. The centering and right alignment (command **ESC a**) is working in the currently defined page width.

Ruled lines

Starting with version 1.48 new commands added to make printing tables in standard and page mode easier.

The printer has two line buffers with size the maximum printing width (paper width in standard mode or the selected page width in page mode). When ruled lines are active, then every horizontal line of the text line is combined with the selected ruled line buffer. Bit '1' in the ruled line buffer is a black dot in OR mode and inverts the color of the dot in XOR mode. Two commands allow the ruled line buffers to be printed without combining with a text line.

When pressing the **FEED** button, no ruled lines buffer is applied.

All ruled lines commands start with symbol **DC3** (ASCII code 13h). Please see command **DC2 =**, too.

Warning!

*The ruled lines print position depends not on **GS L** and **GS W** (left margin and line width) and is always at the beginning of the line (or at the beginning of the printable area in page mode). The printed text and graphic change their position according these commands.*

*When printing 180 degrees rotated lines (command **ESC f**) ruled lines buffers are not rotated!*

Warning!

The ruled lines print position depends not on **GS L** and **GS W** (left margin and line width) and is always at the beginning of the line (or at the beginning of the printable area in page mode). The printed text and graphic change their position according these commands.

When printing 180 degrees rotated lines (command **ESC { 1**) ruled lines buffers are not rotated!

Command Details

1. Sounds the Buzzer (**BEL**)

Code: **[07h]**

By executing this command the buzzer will beep

2. Horizontal Tab command (**HT**)

Code: **[09h]**

Shifts the printing position to the next horizontal tab position. The horizontal tab position is set by **ESC D**. By default the horizontal tab position is at each 8th character (in 9th, 17th, 25th column) from **FONT A**.

3. Printing a line and Paper Feeding command (**LF**)

Code: **[0Ah]**

Prints data stored in input buffer and feeds paper with one line (the height of a line that has been set).

4. Printing and Paper Feeding to the black mark position (**FF**)

Code: **[0Ch]**

This command prints the data in the printer buffer and searches for black mark. It is ignored if black mark mode is not specified.

Note for Black Mark Function

- Error detection at black mark mode

Paper end is not checked during printing and also black mark is not checked.

After receiving **FF** command, printer checks **black mark** and **paper end**. Once black is detected and white is detected again within **6 mm** paper feed, it is determined as black mark. If the white is not detected within 6 mm paper feed, it is determined as paper end.

After receiving **FF** command, if printer cannot detect black mark by feeding paper for **360 mm**, printer recognizes it as black mark detecting error. And the result is same as detecting **paper end**.

To release the error, it is necessary to put correct paper and press **LF** switch long.

- LF switch operation in black mark mode

Press short: Feed one line

Press longer than 1 sec.: Feed paper to find next black mark.
(Same as sending FF command)

- Remarks for programming

As it is possible to print on black mark, if user does not want to print on the black mark, it have to be taken care by user side program.

- Remarks on handling

If the paper cover is open in black mark mode, there is a possibility to recognize it as detecting black mark.

5. The operation of the command depends on the state of the configuration flags 2, 3 and 4 (**CR**)

Code: **[0Dh]**

This command is ignored or its action is the same as **LF** depending on the state of memory switches set using last command **GS**).

6. Image LSB/MSB select (**DC2 =**)

Code: **[12h] + [3Dh] + n**

The command selects whether the left edge of print image is the LSB or MSB for commands **GS ***, **DC3 F** and **DC3 v**.

n is from **0** to **FFh**, but only least significant bit checked:

0: LSB is the left edge.

1: MSB is the left edge.

Default is 1.

The command is supported in firmware version 1.48 or higher.

7. DC3 (Ruled line) commands sequence start (**DC3 ()**)

Code: **[13h] + [28h]**

Following this command the printer receives **DC3** commands without DC3 symbol at the beginning. The symbol ')' ends the sequence. All commands, which are not **DC3** commands, are ignored.

The command is supported in firmware version 1.48 or higher.

8. Sets the ruled line ON (**DC3 +**)

Code: **[13h] + [2Bh]**

After receiving this command every printed line is combined with the selected ruled line buffer. This happens when commands **LF**, **ESC J**, **ESC d**, **DC3 P**, **DC3 p** are executed.

Depending on last command **DC3 M** executed the ruled line buffer is combined with the text using OR (if there is a bit '1' in ruled line buffer, a black dot is printed) or XOR (if there is a bit '1' in ruled line buffer, then the corresponding dot is inverted).

All **DC3** command except **DC3 P** and **DC3 p** are executed when ruled line mode is off, too. Su the ruled line buffers can be cleared or set before this command.

The command **DC3 -** sets ruled lines **off**.

In page mode nothing is printed outside the selected using **ESC W** region.

The command does not clear rule line buffers.

By default ruled lines are **disabled**.

The command is supported in firmware version 1.48 or higher.

9. Sets the ruled line OFF (**DC3 -**)

Code: **[13h] + [2Dh]**

The command disables ruled line mode.

All **DC3** command except **DC3 P** and **DC3 p** are executed when ruled line mode is off, too. Su the ruled line buffers can be cleared or set after this command.

The command **DC3 +** sets ruled lines **on**.

The command does not clear rule line buffers.

By **default** ruled lines are **disabled**.

The command is supported in firmware version 1.48 or higher.

10. Selects ruled line buffer **A** (**DC3 A**)

Code: **[13h] + [41h]**

Makes ruled line buffer **A** active.

All **DC3** commands for clearing or setting data use the active ruled line buffer. When ruled line is enabled, then printing a line and commands **DC3 P** and **DC3 p** use this buffer.

By **default** buffer **A** is **selected**.

The command is supported in firmware version 1.48 or higher.

11. Selects ruled line buffer **B** (**DC3 B**)

Code: **[13h] + [42h]**

Makes ruled line buffer **B** active.

All **DC3** commands for clearing or setting data use the active ruled line buffer. When ruled line is enabled, then printing a line and commands **DC3 P** and **DC3 p** use this buffer.

By **default** buffer **B** is **selected**.

The command is supported in firmware version 1.48 or higher.

12. Clears selected ruled line buffer (**DC3 C**)

Code: **[13h] + [43h]**

Clears selected ruled line buffer (Sets all bits to 0).

After power on or command **ESC @** both buffers are clear.

Entering or leaving ruled line mode (**DC3 +** and **DC3 -**) does not clear ruled line buffers.

The command is supported in firmware version 1.48 or higher.

13. Sets a single dot in selected ruled line buffer (**DC3 D**)

Code: **[13h] + [44h] + nL + nH**

Set to '1' one bit of the active ruled line buffer.

The dot coordinates are **nL+256*nH**. Coordinates outside the printable area are ignored.

The command is supported in firmware version 1.48 or higher.

14. Ruled line pattern set (**DC3 F**)

Code: **[13h] + [46h] + n1 + n2**

The command fills the selected ruled line buffer with the data sequence **n1, n2**.

Permitted values: 0-FFh.

Every byte sets **8 dots**, last executed command **DC2 =** determines whether the MSB is the left or the right side.

The existing data in the buffer are replaced with the new data.

Dots outside the printable area are ignored.

The command is supported in firmware version 1.48 or higher.

15. Ruled line line set (**DC3 L**)

Code: **[13h] + [4Ch] + mL + mH + nL + nH**

The command sets to '1' the bits between to specified coordinates in the selected ruled line buffer.

The coordinates are **mL+256*mH** and **nL+256*nH**. The part of the line outside the printable area is ignored.

The command is supported in firmware version 1.48 or higher.

16. Selects ruled line combine mode (**DC3 M**)

Code: **[13h] + [4Dh] + n**

The command selects the logical operation between the selected ruled line buffer and the print buffer when ruled line is enabled.

n is from 1 to FFh, but only the LSB is used:

0: OR operation – bit '1' in ruled line buffer sets a black dot on paper.

1: XOR operation – bit '1' in ruled line buffer inverts the dot.

For commands **DC3 P**, **DC3 p** and when printing an empty line the logical operation doesn't matter.

Logical operation XOR is useful to invert the whole height of a text line (white letters on black background).

By **default** OR mode is selected (value **0**).

The command is supported in firmware version 1.48 or higher.

17. Ruled line one dot line print (**DC3 P**)

Code: **[13h] + [50h]**

The active ruled line buffer is printed as a single line (0.125 mm high).

If ruled line is off, then the paper is moved one line (0.125 mm) without printing.

If there are graphic or text data in the line, they are ignored (erased).

The same effect will have command **ESC 3 [01h]** without text or graphic data in the line.

Warning!

Because of the characteristics of thermal printing it is possible, that the quality of single horizontal lines on the paper is not good.

The command is supported in firmware version 1.48 or higher.

18. Ruled line **n** dot line print (**DC3 p**)

Code: **[13h] + [70h] + nL + nH**

The selected ruled line buffer is repeated on **nL+256*nH** lines.

If ruled line is off, then the paper is moved **nL+256*nH** dots without printing.

If there are graphic or text data in the line, they are ignored (erased).

The same effect will have command **ESC 3 n** without text or graphic data in the line (the difference is, that the possible line height is **up to 255 dots**).

Warning!

Because of the characteristics of thermal printing it is possible, that the quality of single horizontal lines on the paper is not good.

The command is supported in firmware version 1.48 or higher.

19. Ruled line image write (**DC3 v**)

Code: **[13h] + [76h] + nL + nH + D₁ + ...**

The command fills the selected ruled line buffer with **nL+256*nH** data bytes.

Possible values of data bytes: **0-FFh**.

Every byte defines **8 dots**, last executed **DC2 =** determines whether MSB is left or right side.

Selected ruled line buffer is erased and new data are written.

Dots outside the printable area **are ignored**.

The command is supported in firmware version 1.48 or higher.

20. Canceling print data in page mode (**CAN**)

Code: **[18h]**

The command clears the currently selected page area and sets current print position to coordinates (0, 0) in the current page (depending on the currently selected print direction with command **GS T**).

The command is not valid in standard mode.

The command is supported in firmware version 1.42 or higher.

21. Printing data in page mode (**ESC FF**)

Code: **[1Bh] + [0Ch]**

The command executes a batch printout of the data, mapped in the currently selected page. The printer continues to work in page mode and data is not destroyed, so the command may be executed many times.

The command is not valid in standard mode.

The command is supported in firmware version 1.42 or higher.

22. Sounds the buzzer (**ESC RS**)

Code: **[1Bh] + [1Eh]**

By executing this command the buzzer will beep.

23. Setting character spacing (**ESC SP**)

Code: **[1Bh] + [20h] + n**

$0 \leq n < 40h$

The rightward space amount is set in dot unit (1/203 inch unit). The initial value is $n=0$. When the font size is doubled the space between characters is also doubled.

Possible values are **from 0 to 63 dots**.

24. Setting EURO symbol position (**ESC #**)

Code: **[1Bh] + [23h] + n**

$0 \leq n \leq FF$ The ASCII code of EURO symbol

This command forces the **EURO** symbol to appear at the selected ASCII code. So when a code table without EURO symbol is selected, the user can use this symbol at the desired place. The original character with this ASCII code becomes inaccessible until redefinition using the same command.

ASCII codes from **00H to 1FH** disable **EURO substitution** and the selected code table is printed unchanged.

Default value is **00H** (EURO substitution disabled).

25. Specifying the absolute horizontal position of printing (**ESC \$**)

Code: **[1Bh] + [24h] + n1 + n2**

$0 \leq n1 \leq FF$ Horizontal shifting in dots (least significant byte LSB)

$0 \leq n2 \leq 02$ Horizontal shifting in dots (most significant byte MSB)

The shifting is $n1 + 256 \cdot n2$ dots. Specifying beyond the line end is ignored.

26. Selecting/Canceling the printing of downloaded user character sets (**ESC %**)

Code: **[1Bh] + [25h] + n**

n can be from **0 to 255**, but only the Least significant bit (LSB) is important:

0 canceling selection of user characters (default characters set is chosen)

1 loaded user character set is chosen
Character set is defined by the command **ESC &**. The chosen character set is kept even if printer is switched off.

27. Selecting user character set (**ESC &**)

Code: **[1Bh] + [26h] + a + n + m + D₁ + ... + D_(m-n+1)k**
20h ≤ n ≤ m FFh

a is the number of the sub-command and can be:

- 0** or **'0'**: Copies **internal** character **set A** over **user** character **set A**. All parameters after the number of the command are omitted.
- 1** or **'1'**: Copies **internal** character **set B** over **user** character **set B**. All parameters after the number of the command are omitted.
- 2** or **'2'**: Defines a sequence of characters **for Font A (12x24)**
- 3** or **'3'**: Defines a sequence of characters **for Font B (9x16)**
- 4** or **'4'**: Defines a sequence of characters **for Font B (9x16)**

n is the ASCII code of the first of the **(m-n+1)** consecutive characters.

m is the ASCII the last of the **(m-n+1)** consecutive characters.

When only one symbol is defined **m=n**.

With **D_{ij}** are described the data for the characters.

Each character from **Font A** is defined with **48 bytes**.

Each character from Font B is defined with **16 bytes** for **subcommand 3** (the 9-th horizontal bit is always white) and with **32 bytes** for **subcommand 4** (2 bytes for each horizontal row, only the most significant bit of the second byte is used).

The data for character set (**font**) **A** is composed from left to right and from top to bottom with two bytes for each horizontal line. From the second byte only the first nibble (the most significant 4 bits) is valid. Each bit defines one dot, 1 is for black, starting from the most significant bit.

Warning!

Downloaded characters are valid even after switching off the printer.

28. Specifying printing mode of text data (**ESC !**)

Code: **[1Bh] + [21h] + n**

Data is given in binary code.

Each bit of **n** indicates the following:

Bit	Function	Value 0	Value 1
0	Character Font	A (12x24)	B (9x16)
1	Undefined		
2	Undefined		
3	Highlighting	Canceled	Specified
4	Double Height	Canceled	Specified
5	Double Width	Canceled	Specified
6	Undefined		
7	Underline	Canceled	Specified

An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab. Neither is it attached to 90°-right-turned characters.

The underline width is as having been specified by (ESC -). (The default setting is 1 dot width.)

Highlighting is valid for character **font A (12x24)** and **font B (9x16)**. It is not recommended to be used for font B because text is not readable. If at same time are given double height and/or double width and to 90°-right-turning of character, then the sequence of execution is as follows:

- characters is doubled in the direction indicated
- character is turned at 90°-right-angle

29. Printing graphical data (ESC *)

Code: **[1Bh] + [2Ah] + m + n1 + n2 + D₁ + ... + D_k**

m (0, 1, 20h или 21h) Graphics mode (see table below).

0 ≤ **n1** ≤ FFh specifies the number of dots in horizontal line (LSB).

0 ≤ **n2** ≤ 09h specifies the number of dots in horizontal line (MSB).

D_i (i from 1 to k) bit image data.

The number of dots in horizontal direction is **n1+n2*256**.

Number of data bytes **k** is:

n1 + 256*n2 for modes 0 and 1,

and

(n1+256*n2)*3 for 20h and 21h.

The bits subject to printing are taken as "1" and those not as "0".

Bit image data is sent starting from the top to bottom and from the left to right (vertical columns scanning). In modes **m=0 and 1** only **one byte** per column is sent and in mode **m=20h, 21h - 3 bytes** for each column are sent.

m	Mode	Vertical Direction		Horizontal Direction	
		Dots	Dot density	Dot density	Max. dots
0	8-dots single density	8	67 DPI	101 DPI	192
1	8-dots double density	8	67 DPI	203 DPI	384
20h	24-dots single density	24	203 DPI	101 DPI	192
21h	24-dots double density	24	203 DPI	203 DPI	384

Warning!

When the values set in **m** or **n2** are out of the above range, the data is processed as normal printing data.

If some part of the graphic or the entire graphic is outside the printable area, then graphics data are accepted, but only the needed part of them are printed.

In page mode and rotated by 90 degrees page the max. dot count is larger than the numbers in the table above.

This command has one more version with 3 new modes:

Code: **[1Bh] + [2Ah] + m + n + { a + [00h] } + D₁ + ... + D_k**

Designates a bit image of **n*8** dots horizontal and by **24** or **a** dots vertical. Depending on **m** there is compression of data. All 3 modes are with high dot density (203x203 dpi).

m can be:

10h Not compressed data with height 24 lines. Byte **a** and byte **00h** are not sent.

11h Compressed data with height 24 lines. Byte **a** and byte **00h** are not sent.

12h Compressed data with height **a** lines ($a \leq 24$).

$0 \leq n \leq FFh$ defines horizontal size.

D_i are the bit image data. Their number is $n \cdot 24$ bytes for mode 10h. The compressed data in mode 11h must give same number of bytes, but after the decompression. The number of data bytes for mode 12h must be $a \cdot n$ (after decompression).

Decompression in modes **11h** and **12h** is similar to the one used in PCX monochrome graphic mode. If the 2 most significant bits of the consecutive byte are 1, so the next define a counter of iterations from **0** to **63**, and the next byte contains the data that has to be repeated. If at least one of the most significant bytes is 0, the byte contains data which is directly used. If the data for the printer contains a byte with two most significant bits 1, it has to be sent as 2 bytes with counter 1.

Data for both modes is sent horizontally, from right to left and from top to bottom. Each byte contains 8 points, the "1"-s are black starting from the most significant bit.

A new mode for printing vertical lines added in version 1.39.

Code: **[1Bh] + [2Ah] + [18h] + L + n + R**

L Offset (white dots) before the vertical line. From **0** to **255**.

n Vertical line thickness in dots. From **0** to **255**.

R Offset (white dots) after the vertical line. From **0** to **255**.

The command prints a vertical black line with thickness **n** and height – the whole height of the line (including the space between the lines set with commands **ESC 2**, **ESC 3** or **ESC J**). The printer adds **L** dots to the current X coordinate, draws the line and adds **R** dots to the X coordinate after the line. The purpose of the command is to draw tables independent of the type or of the font of the printed symbols between the vertical lines.

Starting from version 1.40 two new modes for printing graphics are added.

Code: **[1Bh] + [2Ah] + [13h] + n1 + n2 + a + D₁ + ... + D_k**

or **[1Bh] + [2Ah] + [14h] + n1 + n2 + a + D₁ + ... + D_k**

n1 Lower part of bytes count in horizontal direction. From **0** to **255**.

n2 Higher part of bytes count in horizontal direction. From **0** to **1**.

a Vertical size of the image in dots. From **1** to **24**.

For command **ESC * [13h]** data for a bit image with size $(n1 + 256 \cdot n2) \cdot 8$ dots horizontally and **a** dots vertically are sent, with data compression (exactly as in command **ECS * [12h]**). The graphics mode is single density (203x203 dots/inch).

Data bytes count is $a \cdot (n1 + 256 \cdot n2)$ after decompression.

For command **ESC * [14h]** data are without compression like **ESC * [10h]** command.

The commands are added to make printing of graphics in page mode easier – in page mode with page height more than 2040 dots and print direction 90 or 270 degrees it is not possible to fill the whole page height using only one of the older commands for compressed graphics (**ESC * [11h]** and **ESC * [12h]**).

30. Switch's OFF the printer (**ESC +**)

Code: **[1Bh] + [2Bh]**

This command switches **OFF** the printer as by setting the power switch to **OFF**.

31. Selecting/Cancelling Underline (**ESC -**)

Code: **[1Bh] + [2Dh] + n**

An underline is attached to the full character width. It is, however, not attached to the part having been skipped by horizontal tab command.

An underline is not attached to a **90°- right-turned** characters.

The following values of **n** are possible:

0 or **30h** Canceling an underline.

- 1 or **31h** Specifying an underline for 1-dot width.
- 2 or **32h** Specifying an underline for 2-dots width.

Note:

This command only selects the underline thickness. For specifying/canceling the Underline mode command **ESC ! ([1Bh] + [21h])** must be used.

32. Printing Self Test/diagnostic information (**ESC .**)

Code: **[1Bh] + [2Eh]**

Prints test page and self-diagnostic information. The self-diagnostic information includes print density, print head temperature, battery voltage, baud rate in case of work via RS232 and others.

33. Specifying 1/6-inch line feed rate (**ESC 2**)

Code: **[1Bh] + [32h]**

If in the line there are symbols that will not fit in the defined size, the line automatically is set to be of the necessary height so they fit.

34. Specifying line feed rate n/203 inches (**ESC 3**)

Code: **[1Bh] + [33h] + n**

n is from 0 to 255.

Default value is **n=22h** (1/6 inches).

35. Changes print direction to opposite (**ESC <**)

Code: **[1Bh] + [3Ch]**

The command changes current print direction. It is needed when using Hebrew and Arabic code tables, but is working for all code tables.

Default print direction is from right to left for code tables 19, 21, 22, 23, 24 and from left to right for all others.

The command is supported starting from version 1.42.

36. Data input control (**ESC =**)

Code: **[1Bh] + [3Dh] + n**

n can be from **0 to 255**, but only the LSB is of significance.

Value **0**: Printer is not selected.

Value **1**: Printer is selected.

When the printer is not selected, it does not accept data (abandons all the received data) and the only command that it executes is **ESC = n** with least significant bit **1**.

By **default** the printer is **selected**.

37. Select print direction (**ESC >**)

Code: **[1Bh] + [3Eh] + n**

Possible values for **n**:

0 or **'0'**: Default direction for the selected code table.

1 or **'1'**: Left to right direction forced.

2 or **'2'**: Right to left direction forced.

The command sets the print direction. It is needed when using Hebrew and Arabic code tables, but is working for all code tables.

Default print direction is from right to left for code tables 19, 21, 22, 23, 24 and from left to right for all others.

Commands **ESC <** and **ESC >** work together. The sequence, which selects the direction, is as follows:

- The print direction is set according to the currently selected code table.
- If command **ESC >** with argument > 0 was executed since last **ESC u** command, then this is the print direction.
- If command **ESC <** was executed after this, the print direction is changed to the opposite.

The command is supported starting from version 1.42.

38. Reading magnetic stripe card (**ESC ?**)

Code: **[1Bh] + [3Fh] + n**

The tracks that are read are returned in ascending order and depending on that which of them have been demanded. The returned data end with **ASCII code 00h**.

The bits of the argument **n** have the following meaning:

- 0** Read track 1
- 1** Read track 2
- 2** Read track 3
- 3** Not used
- 4** Not used
- 5** Not used
- 6** If it is **1**, magnetic stripe card data are returned in raw format (as a bit sequence)
- 7** If it is **1**, the reading is with time-out **60 seconds**, else it is **10 seconds**.

Response data format when bit 6 = 1

Always all 3 tracks data are returned (independent of the value of the least significant bits of **n**). Data format:

n₁m₁D_{1i}n₂m₂D_{2i}n₃m₃D_{3i}[00h]

where:

- n₁** Two characters - track 1 bytes count.
- m₁** Two characters - valid bit count in last data byte of track 1.
- D_{1i}** **2*n₁** characters, containing track 1 data. Data are regarded as bit sequence. If total bit count is not a **multiple of 8**, then valid are **m₁** most significant bits of last byte only.

n₁, **m₁** and **D_{1i}** are returned as text, hexadecimal, i. e. every byte of data is returned as two characters in the range **'0' – '9'** or **'A' – 'F'**.

The format of track 2 and 3 is the same. The response ends with ASCII code **00h**. If no magnetic stripe card is read (a timeout has occurred), only **00h** is returned.

Warning!

Data are returned as they are read from the magnetic stripe card. They will not be the same when sliding the card in left and right direction. The application software must "know" and interpret correctly the bits read before using them!

39. Initializing the printer (**ESC @**)

Code: **[1Bh] + [40h]**

Clears data stored in the print buffer and brings various settings to the initial state (Default state). Data (items) in serial buffer are not cleared.

40. Black mark mode sensor calibration (ESC CAL)

Code: **[1Bh] + [43h] + [41h] + [4Ch] + n**

Selects the ADC value, which the printer uses to distinguish the black marks on paper or labels. The command is used in black mark mode only.

Possible values for n:

- 01h** Returns one byte, which is the current ADC threshold value.
- 02h** After receiving this command the printer moves approximately **20 cm** of paper and searches minimum and maximum of paper sensor values. **Two bytes** data are returned – **minimum** value and **maximum** value.
- 03h** After receiving this command the printer moves approximately **20 cm** of paper and searches minimum and maximum of paper sensor values. Then a reasonable value of the ADC threshold is calculated and stored in flash memory. One byte data is returned, which is the new ADC threshold value.
- 20h to C0h** The byte is used as ADC threshold value and is stored in flash memory. **One byte** data is returned, which is the **new ADC threshold value**.
The factory setting of ADC threshold value is **4Dh**.

Note:

Use this command carefully and only if the printer has problems in black mark / label recognition.

41. Setting horizontal tab position (ESC D)

Code: **[1Bh] + [44h] + n₁ + ... + n_k + [00h]**

n_i is from **0 to 255**.

n_i indicates the number of the column from the beginning to the horizontal tab position, minus 1. For example, to set the position at **9th** column, **n=8** is to be specified.

The tab position is set at position where it is "character width multiplied by n_i" from the line beginning. The character width, at this time, includes the rightward space amount. In double wide characters, it is made double of the ordinary case.

Tab positions can be specified are maximum **32**.

ESC D [00h] clears all the set tab positions. Following clearing, horizontal tab command is ignored.

42. Specifying / Canceling highlighting (ESC E)

Code: **[1Bh] + [45h] + n**

n can be from **0 to 255**, but only the least significant bit is of significance.

Value **0**: Canceling highlighting

Value **1**: Highlighting is specified

This is effective for character font **A (12x24)** and font **B (9x16)**.

Note:

It is **not** recommended to be used for **font B** because text is **not readable**.

43. Filling or inverting the page area in page mode (ESC F)

Code: **[1Bh] + [46h] + n**

Allowed values for n:

0 or **'0'**: The area is cleared (white)

1 or **'1'**: The area is filled (black)

2 or '2': The area is inverted.

The command fills the selected with **ESC W** page with the desired color or inverts it. The command is not valid in standard mode.

The command is supported in firmware version 1.42 or higher.

44. Specifying / Canceling highlighting (**ESC G**)

Code: **[1Bh] + [47h] + n**

Same as command **ESC E**.

45. Specifying / Canceling Italic Print (**ESC I**)

Code: **[1Bh] + [49h] + n**

n can be from **0 to 255**, but only the least significant bit is of significance.

Value **0**: Normal Print

Value **1**: Italic Print

46. Printing and Paper Feed **n/203** inches (**ESC J**)

Code: **[1Bh] + [4Ah] + n**

n can be from **0 to 255**.

Prints data in the print buffer and feeds paper by **n/203** inch.

- This function is temporary and does not affect the feed operation thereafter.
- Value **n=0** feeds paper by **n/203** inch .

47. Selecting page mode (**ESC L**)

Code: **[1Bh] + [4Ch]**

The command switches from standard mode to page mode. In this mode the printing is not immediately, but is accumulated in a reserved for this purpose memory area. The resulting image is printed using one of the commands **ESC FF**, **GS FF** or **GS Z**.

The page area is the maximum (**384 x 2432 dots**) or the result of the last executed command **ESC W**.

The print direction is the default (left to right) or the result of the last executed command **GS T**.

The current print position is (0, 0) depending on the selected print direction.

The command is not valid in page mode.

The command is supported in firmware version 1.42 or higher.

48. Reading programmed serial number (**ESC N**)

Code: **[Bh] + [4Eh]**

The command returns the programmed serial number of the printer as an ASCII string. Number length is **13** characters. If no serial number is programmed, then only one symbol is returned - **00h**.

Note:

The command is supported in firmware versions 1.09 or newer.

49. Selecting Country (ESC R)

Code: **[1Bh] + [52h] + n**

n can be from **0 to 13** and has the following meaning:

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

50. Specifying speed (bps) of the serial port (ESC S)

Code: **[1Bh] + [53h] + n**

Sets new communication speed for the serial interface.

Possible values of parameter n:

0 or **'0'**: 1200 bps

1 or **'1'**: 2400 bps

2 or **'2'**: 4800 bps

3 or **'3'**: 9600 bps

4 or **'4'**: 19200 bps

5 or **'5'**: 57600 bps

6 or **'6'**: 115200 bps

7 or **'7'**: 38400 bps

Default value is **6 (115200 bps)**.

The command is valid only when the printer is connected through a serial cable. The last setting is valid after switching **OFF** and **ON** the printer.

51. Printing short self test (ESC T)

Code: **[1Bh] + [54h]**

Prints current printer parameters, including intensity, temperature of the print head, battery voltage, speed in case of serial connection, etc.

52. Selecting / Canceling underlined printing (**ESC U**).

Code: **[1Bh] + [55h] + n**

Possible values for **n**:

0 or '**0**' Canceling underlined characters

1 or '**1**' Specifying underlined characters

Note:

No underlines are attached to 90°-right- turned characters.

53. Selecting / Canceling printing 90° - right turned characters (**ESC V**)

Code: **[1Bh] + [56h] + n**

n can be from **0 to 255**, but only the least significant bit is of significance:

Value **0**: Canceling 90°-right- turned Characters

Value **1**: Specifying 90°-right- turned Characters

Note:

No underlines are attached to 90°-right- turned characters.

54. Defining the print area in page mode (**ESC W**)

Code: **[1Bh] + [57h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH**

xL and **xH** Low and high byte of the horizontal offset of the relative top left corner of the page.

yL and **yH** Low and high byte of the vertical offset of the relative top left corner of the page.

dxL and **dxH** Low and high byte of the width of the page.

dyL and **dyH** Low and high byte of the height of the page.

The command defines the relative position and size of the page. In page mode the new values are active immediately, in standard mode they are memorized and used after entering page mode. The print position has coordinates (**0, 0**) depending on the currently selected print direction (command **GS T**). If the relative position is invalid, the command is not accepted. If only a part of the selected page is in the printable area (current paper width and maximal height of **2432 dots**), this area is used as page area.

The default page size is **384 x 2432 dots**.

The command is supported in firmware version 1.42 or higher.

55. Specifying max printing speed (**ESC X**)

Code: **[1Bh] + [58h] + n**

n is between **0 and 3** or between '**0**' and '**3**':

0 or '**0**' 60 mm/s (2.4 inch/s)

1 or '**1**' 50 mm/s (2.0 inch/s)

2 or '**2**' 37 mm/s (1.5 inch/s)

3 or '**3**' 25 mm/s (1.0 inch/s)

Default value is **0 (60 mm/s)**.

Note:

The defined speed is recommended and can be achieved with not very cold printing head and comparatively little data to print in the line (less black).

56. Specifying intensity level (ESC Y)

Code: **[1Bh] + [59h] + n**

n is between **0** and **6** or between '**0**' and '**6**':

0 or ' 0 '	Intensity 60 %
1 or ' 1 '	Intensity 75 %
2 or ' 2 '	Intensity 90 %
3 or ' 3 '	Intensity 100 %
4 or ' 4 '	Intensity 120 %
5 or ' 5 '	Intensity 140 %
6 or ' 6 '	Intensity 160 %

Default value is **3 (100%)**.

Note:

Higher intensity can cause decrease in printing speed.

57. Returning diagnostic information (ESC Z)

Code: **[1Bh] + [5Ah]**

The printer will return **32** bytes of information with the following structure:

1-22: Printer name up to **22** characters.

23-25: Firmware version – **3** digits.

26-27: Language version, described by **two characters**.

28-32: **5 bytes** with flags. When the corresponding bit is **1**, the function is supported and when **0**, the function is not supported.

Bits are listed below:

Bit	Meaning
28.0	Supports IrDA mode
28.1	Mag-stripe reader support
28.2	Supports reading of all 3 tracks on magnetic card
28.3	Katakana support, ASCII codes above 127 contain Katakana characters
28.4	JIS and Shift-JIS support
28.5	Prints in commands ESC . and ESC T and in command ESC ` returns temperature in ° Fahrenheit
28.6	Bluetooth support
28.7	Reserved – always is 1
29.0	Update via firmware interface
29.1	Korean characters support
29.2	BLACK MARK mode support
29.3	Barcode reader support
29.4	USB support
29.5	Not in use
29.6	Page mode support
29.7	Reserved – always is 1
30.0	GB2312 (Simplified Chinese) support
30.1	BIG5 (Traditional Chinese) support
30.2	Not in use
30.3	Not in use
30.4	Not in use
30.5	Not in use
30.6	Not in use
30.7	Reserved – always is 1
31.0	State of flag 3 – determined in command GS)

31.1	State of flag 2 – determined in command GS)
31.2	State of flag 1 – determined in command GS)
31.3	State of DIP switch 4
31.4	State of DIP switch 3
31.5	State of DIP switch 2
31.6	State of DIP switch 1
31.7	Reserved – always is 1
32.0	State of flag 10 – determined in command GS)
32.1	State of flag 9 – determined in command GS)
32.2	State of flag 8 – determined in command GS)
32.3	State of flag 7 – determined in command GS)
32.4	State of flag 6 – determined in command GS)
32.5	State of flag 5 – determined in command GS)
32.6	State of flag 4 – determined in command GS)
32.7	Reserved – always is 1

58. Specifying relative horizontal position (**ESC **)

Code: **[1Bh] + [5Ch] + n1 + n2**

0 <= **n1** <= FFh Specifying number of dots from current position in horizontal (LSB).

0 <= **n2** <= FFh Specifying number of dots from current position in horizontal (MSB).

The printing start position is specified with **n1 + 256*n2** dots. Specifying exceeding the top of line or the end of line is ignored.

Specifying dots in minus (left) direction from the current one, is the **complement** of **N** with **65536** (**N=65536 - N**).

59. Loading the default settings stored in Flash memory (**ESC]**)

Code: **[1Bh] + [5Dh]**

The following parameters are read from flash memory and become active:

- Speed of communication in serial port
- Time for automatic turn off
- Configuration “switches”
- Max printing speed
- Print density
- Height of printing line
- Country
- Code table
- Height of barcode
- Width of barcode single line
- Font of the text (HRI characters) corresponding to the barcode
- Position of the HRI characters.

60. Saving current settings in Flash memory (**ESC ^**)

Code: **[1Bh] + [5Eh]**

The values of the following settings are stored in flash memory:

- Speed of communication in serial port
- Time for automatic turn off
- Configuration “switches”

- Max printing speed
- Print density
- Height of printing line
- Country
- Code table
- Height of barcode
- Width of barcode single line
- Font of the text (HRI characters) corresponding to the barcode
- Position of the HRI characters

These setting become default settings.

61. Loading factory settings (ESC _)

Code: [1Bh] + [5Fh]

This command sets the printer in default state with the following settings:

- All printing attributes like underline, rotating etc. are cleared.
 - Internal font A (12 x 24) is selected.
 - Pitch between lines is 1/6 inch.
 - Barcode height is 80 dots, and barcode width is 3.
 - All downloaded fonts and bit images are cleared.
 - Printing speed is set to 60 mm/s.
 - Print density is 100%.
 - Communication speed is set to 115200 bps.
 - Code table becomes 437 (US), and country 0 (US).
- For Japanese version default values are: Code table Katakana and country Japan.

62. Returning the battery voltage and printer head temperature (ESC `)

Code: [1Bh] + [60h]

Returns **2 bytes** of information - the first one is battery **voltage** returned in the format: **battery voltage x 10 + 20H** and second is head temperature returned in the format: **head temperature + 20H**.

63. Aligning the characters (ESC a)

Code: [1Bh] + [61h] + n

n is between 0 and 2 or between '0' and '2':

0 or '0' Left end alignment

1 or '1' Centering

2 or '2' Right end alignment

Default value is 0.

After printing of the line the alignment becomes automatically left-justified.

64. Increase text line height (ESC b)

Code: [1Bh] + [62h] + n

The command adds n dots to current text line height.

n is from 0 to 255.

After receiving the every symbol for printing, the printer checks its size (depending on double height attributes, rotation e.c.t.) and sets current line height so, that the whole letter is printed. The command adds additional dots to so calculated line height.

The maximum line height is 48 dots above base line (the line, at which the bottom of most latin letters is, for example the letter 'A'). If adding **n** to the current height is larger than maximum height (48), then 48 is set as height.

If no text or graphic data in line, the command is not executed.

The difference between line height in commands **LF**, **ESC 2**, **ESC 3** and **ESC J** is that the height is increased above the letters. The command is useful when inverting a text line in XOR ruled lines mode.

The command is supported in firmware version 1.48 or higher.

65. Enabling/Disabling the functioning of the button **LF** (**ESC c5**)

Code: **[1Bh] + [63h] + [35h] + n**

n can be from **0** too **255**, but only the least significant bit is of significance.

Value **0**: Button LF is valid.

Value **1**: Button LF is invalid.

Default value is **0**.

66. Printing and feeding paper by **n**-lines (**ESC d**)

Code: **[1Bh] + [64h] + n**

n can be from **0** to **255**.

Prints data inside the buffer and feeds paper by **n** lines.

The beginning of the line is to be considered as the next printing start position.

When **n=0** paper is fed with 1 line.

67. Feeding paper backwards (**ESC i**)

Code: **[1Bh] + [69h]**

If paper has been fed forward with command **ESC o**, then it returns backwards. The feed is exactly the same as it was defined in command **ESC o**, but in reverse direction.

If paper has not been fed forward then this command is ignored.

68. Temporarily feeding paper forward (**ESC o**)

Code: **[1Bh] + [6Fh] + n**

n can be from 0 to 255.

This command temporarily feeds paper forward with the defined number of steps **n** (1/8 mm).

At command **ESC i** or at first command for printing the paper feeds backwards.

69. Disabling/enabling PAIRING info saving in Bluetooth mode (**ESC pair=**)

Code: **[1Bh] + [70h] + [61h] + [69h] + [72h] + [3Dh] + n**

Possible values of **n**:

'0': Disables PAIRING info saving.

'1': Enables PAIRING info saving.

Note:

After PAIRING info saving no password is required when making new **Bluetooth** connection, but only paired devices can communicate. If an old connection (pairing) was saved, it will be destroyed and first new connection will be saved in it's place.

After executing this command with argument '**0**' the current saved information will be destroyed, but no new connection will be saved. Every time a password will be required. The printer will work with all **Bluetooth** devices.

After the command the printer must be switched off (using **ON/OFF** button or **ESC x** command). The **Bluetooth** connection will be reinitialized the next time the printer is switched on in **Bluetooth** mode.

70. Programming a new Bluetooth password (PIN) (**ESC pwd=**)

Code: **[1Bh] + [70h] + [77h] + [64h] + [3Dh] + d + [00h]**

This command changes the **Bluetooth** module PIN.

d contains the new PIN. PIN length is from **0** to **16** characters, allowed are **digits** and **capital Latin letters**. The string ends with **00h** (ASCIIZ). If the length is **0**, Bluetooth module uses **no password** (PIN).

New password is active after switching the printer on next time in **Bluetooth** mode (without serial or USB cable). The change is **unconditionally** and does not require the knowledge of the old PIN.

Note:

This command exists in firmware versions 1.20 or newer.

Warning:

The command destroys saved PAIRING info (like after command **ESC pair=0**).

71. Full command for sounding buzzer (**ESC r**)

Code: **[1Bh] + [72h] + Data**

This command is used for making (beeping) a sequence of sounds with a certain frequency and duration. The data is in format, similar to the one used for writing notes and can be of any length. The first invalid character cancels the command.

Data format:

- Notes: a Latin letter of value from '**A**' to '**G**'.

' C '	Do
' D '	Re
' E '	Mi
' F '	Fa
' G '	Sol
' A '	La
' B '	Si

If immediately after the note comes character '**#**', then the note is higher in pitch by a semitone (**sharp**).
If immediately after the note comes character '**&**', then the note is lower in pitch by a semitone (**flat**).

- Pause: Character space (**ASCII 20h**).

After a note or pause there can be one or a few bytes, which specify the duration. Valid are characters from '**0**' to '**5**', they have the following meaning:

' 0 '	basic duration of a note/pause
' 1 '	basic duration * 2
' 2 '	basic duration * 4
' 3 '	basic duration * 8
' 4 '	basic duration * 16
' 5 '	basic duration * 32

If there are a few durations one after another they are summed up.

- Going to higher scale: character '**+**'.
- Going to lower scale: character '**-**'.
- Specifying tempo: character '**A**', followed by a number. The number specifies the percentage: duration of notes and intervals to basic duration. Values:

' 1 '	200 %
' 2 '	175 %

'3'	140 %
'4'	120 %
'5'	100 %
'6'	80 %
'7'	60 %
'8'	50 %
'9'	40 %

- Return to scale 1 (it is default). Character '@'. Tone 'La' in it is **440 Hz**.

Note:

It is recommended that the data ends with ASCII code **03h**, although any other non-printing character will also stop the command.

72. Reading current printer settings (**ESC s**)

Code: **[1Bh] + [73h] + n**

This command returns current settings or loaded data in printer. Possible values for n:

0 or '**0**': Current settings from flash memory are returned in following order:

- Hardware switches - 4 digits **0** or **1**.
- Memory switches -10 digits **0** or **1**.
- Serial port speed (bauds) – an integer.
- Country number (from command **ESC R**) – an integer.
- Current character table (from command **ESC u**) – an integer.
- Print density (from command **ESC Y**) – an integer.
- Print speed (from command **ESC X**) – an integer.
- Power off time (from command **ESC x**) – an integer (in minutes).
- EURO symbol position (from command **ESC #**) – an integer from 0 to 255.

Field separator is ','.

1 or '**1**': Current settings from printer RAM are returned. The format of data is the same as for subcommand **0**.

2 or '**2**': The currently load graphic logo is returned in format:

w h D_i, where:

w Graphics width in bytes (**pixels*8**).

h Graphics height in pixels.

D_i Graphics data – **2*w*h** bytes in the sequence as in command **GS ***. Data are in hexadecimal format (each byte sent as two hexadecimal symbols).

3 or '**3**': Current USB strings from **ESC y** are returned. Format is as in command **ESC y Usb**, all fields present in increasing order.

The command is supported in firmware version 1.42 or higher.

73. Selecting Code table (**ESC u**).

Code: **[1Bh] + [75h] + n**

Values for **n**:

0	ENGLISH (437)
1	LATIN 1 (850)
2	PORTUGUESE (860)
3	LITHUANIAN
4	LATIN 2 (852)
5	POLISH
6	TURKISH (857)
7	BALTIC (775)
8	BULGARIAN (856)
9	RUSSIAN (866)
10	LATVIAN
11	GREEK (737)
12	HEBREW (862)
13	WESTERN (1252)
14	CE (1250)
15	TURKISH (1254)
16	BALTIC (1257)
17	CYRILLIC (1251)
18	GREEK (1253)
19	HEBREW (1255)
20	KATAKANA
21	ARABIC
22	ARABIC (1256)
23	ARABIC (1256 with Arabic digits and punctuation)
24	ARABIC (1256 with Farsi Arabic digits and punctuation)

Note:

When the printer is switched ON it is loaded the default code table which is stored in flash-memory.

Addition information about Arabic code tables:

Arabic code tables are included in firmware **version 1.42**.

When selected, the default print direction is from right to left (the same for code table **19 – Hebrew**). The print direction can be changed using commands **ESC >** and **ESC <**.

Arabic symbols are larger than the symbols in from the other code tables (**16 dots** for **font A** and **12 dots** for **font B**). Depending on the position of the letter in a word, Arabic letters may have **up to 4 different forms** – single letter, right form, middle form and left form.

Code table 21 includes all forms of every letter, so the application program has to select the correct ASCII code. When using code tables **22**, **23** and **24**, the printer automatically selects the correct letter form dependant on its neighbors. If it is needed to print directly a form of the letter when one of the pages **22**, **23** or **24** is selected, the **ASCII code 7Fh** is sent to the printer – the first symbol after it is taken directly from code table **21**.

Code table 23 differs from **22** by that the digits and some of the punctuation marks are changed with Arabic. **Table 24** differs from **23** by that the Arabic digits are Farsi variant (3 of them are different).

For Japanese and Chinese versions of the printer only: When one of the Arabic code tables is selected, then two-byte Asian letters are not accessible – a non-Arabic code page must be selected to print them.

74. Transmitting the printer status (ESC v)

Code: **[1Bh] + [76h]**

The printer returns one byte whose bits have the **following meaning**:

Bit	Value 0	Value 1
0	Not in use	
1	Not in use	
2	There is paper and paper cover is closed	No paper or paper cover is open
3	Printing head is with normal temperature	Printing head is overheated
4	Not in use	
5	Not in use	
6	Battery Voltage is normal	Low battery voltage
7	Not in use	

75. Setting the time interval for automatically switching Off the printer (ESC x)

Code: **[1Bh] + [78h] + n**

Sets the time interval after which the printer will be switched **Off** automatically if there is no incoming data and **LF** button is not pressed.

n is one byte with value between **1** and **60**, it sets time in minutes. This time is remembered after printer is switched off.

If value **0** is programmed, then the printer **will not be switched off automatically**.

Default value is **10 minutes**.

76. Setting USB response strings. (ESC y)

Code: **[1Bh] + [79h] + [55h] + [53h] + [42h] + [3Ah] + Data**

The command changes the USB response ID numbers and strings, used when connecting to a PC in USB slave mode.

Data format: **VendorID + [03h] + ProductID + [03h] + ManufacturerName + [03h] + ModelName + [03h] + DeviceStr + [03h]**

VendorID: 4 hexadecimal symbols.

ProductID: 4 hexadecimal symbols.

ManufacturerName: Up to 48 symbols (ASCII codes 20h-7Eh).

ModelName: Up to 48 symbols (ASCII codes 20h-7Eh).

DeviceStr: Up to 152 symbols (ASCII codes 20h-7Eh).

[03h] is one byte (ASCII code 03h) - field separator.

All fields of the commands are obligatory.

The settings will be active after next power on.

Starting with **version 1.41**, a new form of the command with USB class support added (**ESC y Usb**).

Format: **[1Bh] + [79h] + [75h] + [73h] + [62h] + [3Ah] + Data**

Format for **Data**: **T₁ + D₁ + T₂ + D₂ + ... + [00h]**

T_i is one byte, selecting the data type, which follows. Possible values:

01h USBclass : one byte - 'P': принтер; 'S': серийн.

02h VendorID: 4 hexadecimal symbols.

03h ProductID (for USB printer class): 4 hexadecimal symbols.

- 04h ProductID1** (for USB serial class): 4 hexadecimal symbols.
- 05h ManufacturerName**: Up to 48 symbols (ASCII codes 20h-7Eh)
- 06h ModelName**: Up to 48 symbols (ASCII codes 20h-7Eh)
- 07h DeviceStr**: Up to 150 symbols (ASCII codes 20h-7Eh)

Not all fields are obligatory. Missing fields don't change values.

Note:

Downloading new firmware will destroy the last USB response string (the place they are stored is part of the firmware).

77. Enabling/Canceling printing of 180° turned characters (**ESC {**)

Code: **[1Bh] + [7Bh] + n**

n can be from **0 to 255**, but only the least significant bit is of significance:

- 0** Cancel printing of 180° turned characters
- 1** Enable printing of 180° turned characters

Default value is **0**.

The whole line is turned.

78. Printing in page mode and returning to standard mode (**GS FF**)

Code: **[1Dh] + [0Ch]**

The command prints the image in the currently defined page and leaves page mode.
If the page memory is erased.

The command is supported in firmware version 1.42 or higher.

79. Specifying the absolute vertical position in page mode (**GS \$**)

Code: **[1Dh] + [24h] + nL + nH**

nL Lower byte of the new vertical position

nH Higher byte of the new vertical position

The command sets new vertical print position. If the position is outside the currently active page, the command is not accepted. The real new coordinates depend on the print direction (selected using **GS T**). The command is invalid in standard mode.

The horizontal position is changed with commands **ESC \$** and **ESC ** - they work both in page and standard mode.

The command is supported in firmware version 1.42 or higher.

80. Setting printer flags (memory switches) (**GS)**)

Code: **[1Dh] + [29h] + f1 + f2 + ... + f10**

This model has 10 memory switches and selecting, releasing, and changing a function is available with this command. With this command can be set 10 flags (memory switches), they are switched ON or OFF. Memory switch setting is retained even after printer power off. These flags are like virtual switches defining the state of the printer.

f_i is the flag that we want to switch **ON** or **OFF**. All flags must be set. Possible values are:

'0': Flag is **OFF**

'1': Flag is **ON**

‘.’: Flag stays unchanged.

Meaning of different flags:

Flag	OFF	ON
1	Power On/Off sound disabled	Power On/Off sound enabled
2	CR (ASCII code 13) is not executed	CR is executed as LF (ASCII code 10)
3	LF (ASCII code 10) is executed	LF (ASCII code 10) is not executed
4	LF immediately after CR as selected by flag 3	LF immediately after CR is not executed
5	Default is font A (12x24)	Default is font B (9x16)
6	“Cover open” sensor monitored	“Cover open” sensor disabled
7	Disable IrDA module	Enable IrDA module (if present)
8	Bluetooth in DISCOVERABLE mode	Bluetooth in NONDISCOVERABLE mode
9	USB interface disabled	USB interface enabled
10	USB in mode HOST	USB in mode DEVICE

81. Defining a Downloaded Bit Image (logo) (GS *)

Code: **[1Dh] + [2Ah] + n1 + n2 + D₁ + ... + D_n**

n1 is between **1** and **127** and defines the horizontal size of the downloaded image.

n2 is between **1** and **248** and defines the vertical size of the downloaded image.

D_i are the data for the bit image. This data consists of **n1*n2** bytes, from left to right and from top to bottom, but **n1** bytes in each horizontal line (**n1*8** dots) and **n2** lines. Each bit defines a dot, 1 corresponds to black. Total number of bytes cannot be bigger than 16 kB.

The command defines a bit image that contains number of dots, defined by **n1** and **n2**. Image is stored and after the printers is switched off.

The so defined bit image is printed with command **GS /**.

82. Printing a Downloaded Bit Image (logo) (GS /)

Code: **[1Dh] + [2Fh] + m**

m defines the printing mode and can be:

m	Mode	Vertical dots	Horizontal dots
0	Normal	203 DPI	203 DPI
1	Double width	203 DPI	101 DPI
2	Double height	101 DPI	203 DPI
3	Double height and double width	101 DPI	101 DPI

Note:

When a download bit image has not been defined, this command is ignored.

A portion of a download bit image exceeding one line length is not printed.

Command ESC @ (initialization of the printer) does not clear downloaded bit image.

83. Starting/Ending macro definitions (GS :)

Code: **[1Dh] + [3Ah]**

Specifies starting/ending macro definition. Maximum content available for macro definition is **4094 bytes**. **After the last byte of data, the command is sent once again to define the end.**

Even with **ESC @** (initialization of the printer) having been executed, defined content is not cleared. Therefore, it is **possible to include ESC @ into the content of macro definition**.

Normal printing operation is carried out even while in macro definition.

84. Enable / Disable inverse printing (white on black) (GS B)

Code: **[1Dh] + [42h] + n**

n is from **0 to 255**, but only LSB is checked:

0 Disable inverse printing

1 Enable inverse printing

Default value: 0.

85. Read the Real Time Clock (GS C)

Code: **[1Dh] + [43h]**

The command returns the current value of the RTC as string.

Returned data format (21 bytes):

YY MM DD WW hh mm ss[00h]

YY Year without the century (00-99)

MM Month (01-12)

DD Day (01-31)

WW Day of the week (01-07)

hh Hour (00-23)

mm Minutes (00-59)

ss Seconds (00-59)

Field separator is space symbol (ASCII 32h).

Data are terminated with ASCII **00h**.

The command exists in printer versions 1.12 or newer.

86. Selecting printing position of HRI Code (GS H)

Code: **[1Dh] + [48h] + n**

Selecting printing position of HRI code when printing barcodes.

n is between **0** and **3** or between '**0**' and '**3**':

Value:	Printing position:
0	No printing
1	Above the barcode
2	Below the barcode
3	Both above and below the barcode

87. Setting the left margin (GS L)

Code: **[1Dh] + [4Ch] + n1 + n2**

This command sets the position in dots (1/203 inches), from which begins printing of each line.

This command only works when it is entered at the beginning of a line. The value of the left margin is **n1+256*n2** dots.

Default value is **0**.

The command is valid in standard mode only.

88. Printing 2-D (two dimensional) barcodes (GS Q)

Code: **[1Dh] + [51h] + n + ...**

n selects the type of barcode:

2 or '2': PDF417

6 or '6': QR Code

PDF417

Code: **[1Dh] + [51h] + n + Type + EncMode + ECCL+Size +nl + nh +Data_i**

Type PDF417 type

0: Standard

1: Truncate

EncMode Encoding mode

0: Automatic most suitable encoding

1: Binary encoding

ECCL Error correction control level. Possible values **0 to 9**. **ECCL=9** automatically selects correction level dependent on data length.

Size Specify one from the bellow table (**X**: bar width, **Y**: row height).

0	X=2, Y=4	8	X=12, Y=4
1	X=2, Y=9	9	X=12, Y=9
2	X=2, Y=15	10	X=12, Y=15
3	X=2, Y=20	11	X=12, Y=20
4	X=7, Y=4	12	X=20, Y=4
5	X=7, Y=9	13	X=20, Y=9
6	X=7, Y=15	14	X=20, Y=15
7	X=7, Y=20	15	X=20, Y=20

nl, nh Specify lower byte and upper byte of data size (**1 to 384**).

Data_i Data bytes

QR Code

Code: **[1Dh] + [51h] + n + Size + ECCL + nl + nh + Data_i**

Size Size of symbol. Possible values: **1, 4, 6, 8, 10, 12, 14**

ECCL Error correction control level:

1: L (7%)

2: M (15%)

3: Q (25%)

4: H (30%)

nl, nh Specify lower byte and upper byte of data size (**1 to 448**).

Data_i Data bytes

89. Filling or inverting a rectangle in page mode (GS R).

Code: **[1Dh] + [52h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH + n**

xL and xH	Low and high byte of the horizontal position of the top left corner of the rectangle in the active page.
yL and yH	Low and high byte of the vertical position of the top left corner of the rectangle in the active page.
dxL and dxH	Low and high byte of the width of the rectangle.
dyL and dyH	Low and high byte of the height of the rectangle.
n	Filling mode: <div> <div>0 or '0'</div><div>Rectangle area is cleared (white).</div> <div>1 or '1'</div><div>Rectangle area is filled (black).</div> <div>2 or '2'</div><div>Rectangle area is inverted.</div> </div>

The coordinates are relative to the left corner of the page, defined using **ESC W** (The print direction doesn't matter).

If some part of the rectangle is outside the page, only the part inside the page is filled.

The command is invalid in standard mode.

The command is supported in firmware version 1.42 or higher.

90. Selecting 2-D barcode cell size (GS S)

Code: **[1Dh] + [53h] + n**

This command sets the cell size for two dimensional barcode QR Code.

Possible values:

n=0 or '0'	Cell size 3.
n=1 or '1'	Cell size 4.

91. Selecting the print direction in page mode (GS T)

Code: **[1Dh] + [54h] + n**

The command selects the current print direction and set starting point to (0, 0) according to this direction.

Accepted values of **n**:

0 or '0'	Printing from left to right, feed to bottom. Starting point in left top corner of the page.
1 or '1'	Printing from bottom to top, feed to right. Starting point in left bottom corner of the page.
2 or '2'	Printing from right to left, feed to top. Starting point in right bottom corner of the page.
3 or '3'	Printing from top to bottom, feed to left. Starting point in right top corner of the page.

Note:

In page mode this command changes immediately the print direction. In standard mode the new value is memorized and used after entering page mode.

The command is supported in firmware version 1.42 or higher.

92. Selecting standard mode (GS U)

Code: **[1Dh] + [55h]**

The command switches from page mode to standard mode.

The whole memory area of page mode is cleared.

The command is invalid in standard mode.

The command is supported in firmware version 1.42 or higher.

93. Setting the print area width (GS W)

Code: **[1Dh] + [57h] + n1 + n2**

This command sets the print area width in dots (1/203 inches). This command only works when it is entered at the beginning of a line. The defined value of print area width is **n1+256*n2** dots.

The default value is 384.

The command is valid in standard mode only.

94. Drawing a rectangular box with selected thickness in page mode (GS X)

Code: **[1Dh] + [58h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH + n + d**

xL and xH	Low and high byte of the horizontal position of the top left corner of the box in the active page.	
yL and yH	Low and high byte of the vertical position of the top left corner of the box in the active page.	
dxL and dxH	Low and high byte of the width of the box.	
dyL and dyH	Low and high byte of the height of the box.	
n	Filling mode:	
	0 or '0'	Area under the box is cleared (white).
	1 or '1'	Area under the box is filled (black).
	2 or '2'	Area under the box is inverted.
d	Box thickness (from 1 to 64).	

The coordinates are relative to the left corner of the page, defined using **ESC W** (The print direction doesn't matter).

If some part of the rectangle is outside the page, only the part inside the page is filled.

The box thickness is always to the inner side of the rectangle.

The command is invalid in standard mode.

The command is supported in firmware version 1.42 or higher.

95. Printing the non blank page area only in page mode (GS Z)

Code: **[1Dh] + [5Ah]**

The command checks the whole memory of the page mode. The area from the first horizontal line with at least 1 black dot to the last such line is printed. The printer does not leave page mode, current page start position and sizes are not changed. The printed width is **384 dots**.

The command is invalid in standard mode.

The command is supported in firmware version 1.42 or higher.

96. Specifying the relative vertical position in page mode (GS \)

Code: **[1Dh] + [5Ch] + nL + nH**

nL Lower byte of the new vertical position

nH Higher byte of the new vertical position

The command sets new vertical print position relative to the current one. If the position is outside the currently active page, the command is not accepted. The real new coordinates depend on the print direction (selected using **GS T**). The command is invalid in standard mode.

The horizontal position is changed with commands **ESC \$** and **ESC ** - they work both in page and standard mode.

The relative vertical offset is **nL + 256*nH** dots. Offsets in negative direction are given as complement of 65536 (**n=65536 - n**).

The command is supported in firmware version 1.42 or higher.

97. Executing macro (GS ^)

Code: **[1Dh] + [5Eh] + n1 + n2 + n3**

n1 is between **1** and **255**: The number of times of macro execution.

n2 is between **1** and **255**: Waiting time on macro execution. Waiting time of **n2 x 100 msec** is given for every execution.

n3 Macro execution mode. Possible values are:

0 Continuous execution: The Macro is executed n1 times continuously at the time intervals specified by **n2**.

1 Execution by **LF** switch: When **LF** switch is pressed, the macro is executed once

98. Setting the Real Time Clock (GS c)

Code: **[1Dh] + [63h] + YY MM DD WW hh mm[00h]**

where:

YY Year without the century (00-99)

MM Month (01-12)

DD Day (01-31)

WW Day of the week (01-07)

hh Hour (00-23)

mm Minutes (00-59)

Field separator is space symbol (ASCII 32h).

Data are terminated with ASCII **00h**.

The command exists in printer versions 1.12 or newer.

Note:

The command clears the seconds!

99. Setting the font of HRI characters of the barcode (GS f)

Code: **[1Dh] + [66h] + n**

n can be the following values:

0 Font A

1 Font B

100. Setting the height of the barcode (GS h)

Code: **[1Dh] + [68h] + n**

n is between **1** and **FFh** and it defines the heights of barcode in dots (1/203 inches).

Default value: **n=162**.

101. Printing a barcode (GS k)

Code: **(1) [1Dh] + [6Bh] + m + Di + [00h]** or

(2) [1Dh] + [6Bh] + m + n + Di or

(3) [1Dh] + [6Bh] + m + c + n1 + n2 + Di

Di are the data for the barcode. The number and possible characters depend on the type of barcode and are defined underneath.

n defines the length of the data when $65 \leq m \leq 73$.

For 2-D barcode PDF417:

n1 and **n2** define the length of the data: **N=n1+256*n2. Max value 1000.**

- c** defines whether the barcode data is compressed. **Possible values are 0 or 1.**
m defines the type of barcode and may be:

m (1)	Type of barcode	Length	Possible characters
0	UPC-A	11	48 ≤ D _i ≤ 57
1	UPC-E	11	48 ≤ D _i ≤ 57
2	EAN13 (JAN13)	12	48 ≤ D _i ≤ 57
3	EAN 8 (JAN8)	7	48 ≤ D _i ≤ 57
4	CODE 39	-	48 ≤ D _i ≤ 57, 65 ≤ D _i ≤ 90, 32, 36, 37, 43, 45, 46, 47
5	ITF	-	48 ≤ D _i ≤ 57
6	CODABAR (NW-7)	-	48 ≤ D _i ≤ 57, 65 ≤ D _i ≤ 68, 36, 43, 45, 46, 47, 58

m (2)	Type of barcode	Length	Possible characters
65	UPC-A	11	48 ≤ D _i ≤ 57
66	UPC-E	11	48 ≤ D _i ≤ 57
67	EAN13 (JAN13)	12	48 ≤ D _i ≤ 57
68	EAN 8 (JAN8)	7	48 ≤ D _i ≤ 57
69	CODE 39	-	48 ≤ D _i ≤ 57, 65 ≤ D _i ≤ 90, 32, 36, 37, 43, 45, 46, 47
70	ITF	-	48 ≤ D _i ≤ 57
71	CODABAR (NW-7)	-	48 ≤ D _i ≤ 57, 65 ≤ D _i ≤ 68, 36, 43, 45, 46, 47, 58
72	CODE 93	-	0 ≤ D _i ≤ 127
73	CODE 128	-	0 ≤ D _i ≤ 127
75	CODE 128 Auto	-	0 ≤ D _i ≤ 127
76	EAN 128	-	0 ≤ D _i ≤ 127

m (3)	Type of barcode	Length	Possible characters
74	PDF417	-	0 ≤ D _i ≤ 255

Note:

If the barcode is wider than the print area for one line, the barcode is not printed.

Additional information for Code 128:

Code 128 covers the range of ASCII codes from **0 to 127** with the help of 3 code sets **A**, **B** and **C**, which can be used in one and the same barcode.

Code set A: consists of characters with ASCII codes from **0 to 95** and function characters FNC1, FNC2, FNC3, FNC4, SHIFT, CODEB, CODEC.

Code set B: consists of characters with ASCII codes from **32 to 127** and function characters FNC1, FNC2, FNC3, FNC4, SHIFT, CODEA, CODEC.

Code set C: is used for coding sections of the barcode which consist only of digits. Each character defines 2 digits, that are coded with ASCII code from **0 to 99**. Also possible are function characters FNC1, CODEA, CODEB.

The barcode always begins with one of the characters CODEA, CODEB or CODEC, which defines the code set that will be used. If necessary the code set can be changed by inserting one of these characters in the barcode. The character following **SHIFT** is treated as a character of code set **B** if the current code set is **A**, and as a character of code set **A** if the current code set is **B**. If a character unacceptable for the current code set is given then barcode is not printed.

Function characters are defined with 2 bytes as follows:

Character	Coding		
	Decimal	Hexadecimal	Text
FNC1	123, 49	7B, 31	{1
FNC2	123, 50	7B, 32	{2
FNC3	123, 51	7B, 33	{3
FNC4	123, 52	7B, 34	{4
CODEA	123, 65	7B, 41	{A
CODEB	123, 66	7B, 42	{B
CODEC	123, 67	7B, 43	{C
SHIFT	123, 83	7B, 53	{S
{	123, 123	7B, 7B	{{

Code 128 Auto uses the same code sets, but the printer test the data and automatically switches between the code sets, trying to print a minimum width barcode. **D_i** contains only the real data to be printed.

EAN 128 uses Code 128 code sets, but puts an FNC1 code in the beginning, and if human readable text is enabled, the text is separated in fields (Application identifiers). If any of the fields contains invalid data, the barcode is not printed. Code sets are switched automatically like **Code 128 Auto**.

102. Settings for 2D barcode PDF417 (**GS p**)

Code: **[1Dh] + [70h] + e + c + r**

e is error correction level for barcode **PDF417**. At **value bigger than 8** the printer chooses automatically the appropriate level depending on the quantity of the coded data, else the defined value is being used.

c is the max number of columns, which the printer uses for printing the barcode.

r is max number of rows, which the printer uses for printing the barcode.

103. Selecting the height of the module of 2D barcode PDF417 (**GS q**)

Code: **[1Dh] + [71h] + n**

n is between **4** and **32** including and is the height of one line from the barcode.

By **default n=18**.

104. Selecting the horizontal size (Scale factor) of the barcode (**GS w**)

Code: **[1Dh] + [77h] + n**

n is between **2** and **4** including and is the number of dots in barcode's fine element width.

By **default n=3**.

105. Direct text print (text string print) in page mode (**GS x**)

Code: **[1Dh] + [78h] + xL + xH + yL + yH + sX + sY + Attr + D_i + [00h]**

The command prints a text string in page mode. It allows larger multiplication of the symbols in comparison with the normal text printing (more than 2).

xL and **xH** **X** coordinate of upper left corner of first letter.

yL and **yH** **Y** coordinate of upper left corner of first letter.

sX Size (multiplication) in horizontal direction. From **1** to **16**.

sY Size (multiplication) in vertical direction. From **1** to **16**.

Attr Print attributes. One byte from **0** to **255**.

Each bit of **Attr** indicates the following:

Bit	Function	Value 0	Value 1
0	Font size	A (12x24 or 24x24)	B (9x16 or 16x16)
1	Not used		
2	Not used		
3	Bold	Enabled	Disabled
4	Not used		
5	Not used		
6	Not used		
7	Not used		

Di Data. Bytes with ASCII codes below **20h** are ignored.

X and **Y** coordinates are **xL+256*xH** and **yL+256*yH**.

The currently active page direction, country and code table are used. From all print attributes only BOLD is used.

After every printed symbol **X** coordinate is automatically increased by symbol width + character space, multiplied by **sX**.

If some part of the symbol is not in the selected page area, the symbol is not printed.

The command is executed in page mode only.

The command is supported in firmware version 1.48 or higher.

106. Specifying printing mode of two-byte text data (FS !)

Code **[1Ch] + [21h] + n**

Data is given in binary code.

Each **n** bit indicates the following:

Bit	Function	Value 0	Value 1
0	Font size	24x24	16x16
1	Undefined		
2	Undefined		
3	Double Height	Canceled	Specified
4	Double Width	Canceled	Specified
5	Undefined		
6	Undefined		
7	Underline	Canceled	Specified

An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab. Neither is it attached to 90°-right-turned characters.

The underline width is as having been specified by (FS -). The **default setting** is **1 dot width**.)

If at the same time are given double height and/or double width and 90°-right-turning of character, then the sequence of execution is as follows:

- character is doubled in the direction indicated
- character is turned at 90°-right-angle.

107. Selecting the two-byte text mode - JIS or GB2312 (FS &)

Code: [1Ch] + [26h]

The command selects two-byte characters mode. Depending on the version of the printer, this may be: Each **n** bit indicates the following:

- **Japanese version: JIS character table.** First byte is between 20h and 7Fh, second byte between 00h and 7Fh. If outside this range, one-byte ASCII characters are printed.
- **Chinese version: GB2312 (Simplified Chinese).** First and second bytes are between A0h and FFh. If outside this range, one-byte ASCII characters are printed.

108. Selecting/Cancelling underline for two-byte text mode (FS -)

Code: [1Ch] + [2Dh] + n

An underline is attached to the full character width. It is, however, not attached to the part having been skipped by horizontal tab command.

An underline is not attached to 90°- right-turned characters.

The following values of **n** are possible:

- 0 or 30h** Canceling an underline.
- 1 or 31h** Specifying an underline of 1-dot width.
- 2 or 32h** Specifying an underline of 2-dots width.

109. Cancelling the two-byte text mode (FS .)

Code: [1Ch] + [2Eh]

The command cancels two-byte characters mode (**JIS** or **GB2312** depending on the version).

For **Japanese version** only: If **Shift-JIS character mode** was selected before using **FS C** command, then the printer returns to Shift-JIS mode instead to one byte ASCII text mode.

110. Selecting Shift-JIS mode (Japanese version only) (FS C)

Code: [1Ch] + [43h] + n

The following values of **n** are possible:

- 0 or 30h** Canceling two-byte Shift-JIS mode.
- 1 or 31h** Specifying two-byte Shift-JIS mode.

The command selects/cancels two-byte characters mode **Shift-JIS**. It is supported only in **Japanese version** of the printer. First byte is between 80h and 9Fh or between E0h and FFh, second byte between 40h and FFh. If outside this range, one-byte ASCII characters are printed.

If both **JIS** and **Shift-JIS modes** are selected, the **Shift-JIS mode** is active.

111. Specifying character spacing for two-byte text mode (FS S)

Code: [1Ch] + [53h] + n1 +n2

The command sets the leftward and rightward space amount for two-byte character mode.

n1 specifies leftward space

n2 rightward space.

The space amount is set in dot unit (1/203 inch unit).

The initial values are **n1=0** and **n2=0**. When the font size is doubled the space between characters is also doubled. Possible values are from **0** to **63** dots.

112. Selecting double size characters for two-byte text mode (FS W)

Code: **[1Ch] + [57h] + n**

The following values of **n** are possible:

0 or **30h** Canceling double size characters.

1 or **31h** Specifying double size characters.

Double size characters may be selected using command **FS !**.