

HENGSTLER



Emulation Command Set Reference Manual

Thermal Printer Family **Xpm**

Types

XPM-80 / XPM-80HR
XPM-200 / XPM-200HR

Firmware

R4-V1.03-FINAL
2012MAY24

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HENGSTLER GmbH

Uhlandstrasse 49

78554 Aldingen / Germany

Tel. +49 (0) 7424-89 0

Fax +49 (0) 7424-89 500

eMail: info@hengstler.com

www.hengstler.com

Document History

Revision	Mod. Nr	Status	Description
1	4 150709 HOR1	CLOSED	Initial released version: created for XPM firmware S690002-R1-V1.00-2009JUL15
2	4 260511 HOR1	CLOSED	<p>Second released version: created for XPM firmware S690002-R2-V1.02-2011MAY25.</p> <ul style="list-style-type: none"> Command “GS a+[n1]+[n2]” extended with multi barcode request ([n1]=0x01) (R2-V1.01f, M-R2-027-HOR). Extension of command “ESC %[n]” with country code specification. This command allows printing of the country specific characters that are now included in the font. Following country codes are available: #00=DISABLED, #01=USA, #02=FRANCE, #03=GERMANY, #04=UK, #05=DENMARK, #06=SCHWEDEN, #07=ITALY, #08=SPAIN, #09=JAPAN, #10=NORWAY, #11=DENMARK-2, #12=SPAIN_2, #13=LATIN_AMERICA, #14=JAPAN_2 (R2-V1.01f, M-R2-029-HOR). Addition of two new commands for character printing “ESC [5C]+[d1]+[d2]” and “ESC [5E]+[d]”. These commands allow immediate printing of up to 256+96 characters ignoring control characters and country codes (R2-V1.01f, M-R2-030-HOR) Emulation command “page header” (ESC+[F0]+[11]+[0A]+[d1]..[d10]) implemented, which contains 1) page size in bytes, 2) page length in dot lines and 3) page number. Both page length and page number are used for ticket monitoring (R2-V1.01i, M-R2-049-HOR). Command “GS a+[n1]+[n2]” extended with ticket information request ([n1]=0x02). After reception of this request, the printer will send a PRINTER TICKET monitoring data packet (identified by ESC [FF] [0A] [n] [d0]..[dn]), which contains following information: ticket-identifier, total length of ticket, length of printed area, percentage of ticket printed, various status information (R2-V1.01i, M-R2-050-HOR).
3	4 250112 HOR1	CLOSED	<p>Third released version: created for XPM firmware S690002-R3-V1.02-2012JAN25.</p> <ul style="list-style-type: none"> 2D Bar code printing command “ESC [F0] [0A] [n] [d1] ... [dn]” corrected (“[dn]” changed to “[dn-1]”)
4	4 240512 HOR1	CLOSED	Third released version: created for XPM firmware S690002-R4-V1.03-2012MAY24.

Applicable Documentation and Software

Id	Part Nr	Description
[1]	D 690 004	Thermal Printer Family XPM - Emulation Command Set Reference Manual - Types: XPM-80, XPM-200, XPM-200HR
[2]	S 690 002	Firmware for the Thermal Printer Family XPM

Comments

Revision	Comments
All	All XPM firmware versions ending in an uppercase extension 'A', 'B', 'C', etc. (e.g. V1.00B) are patches of the corresponding released firmware version and replaces it as well as the previous patches.
All	All XPM firmware versions ending in a lowercase extension 'a', 'b', 'c', etc. (e.g.V1.00c) are beta versions that are not fully tested and which have not been released. These firmware versions are to be used for evaluation purposes only. Final, released firmware versions will never have the extension 'a', 'b', etc.
1	Currently only XPM firmware S690002-R1-V1.00-2009JUL15 is released for usage on XPM80 printers, which optionally may have a dual feed unit attached, solely.

Safety Precautions

- Please read and understand these specifications thoroughly before using the XPM printer. We recommend that you save this document in a place where it may be easily consulted when the printer is used.
- Please do not modify or service this printer as this may cause unpredictable faults to occur.
- This product is not intended to be installed as a critical component in devices or applications which require extremely high reliability or which involve risk to human life, such as life-support medical equipment, undersea relays, aerospace applications or nuclear power control. If you are considering such applications, please consult our customer service department.
- As with every product, there is a possibility of component failure. Every effort has been made to insure optimal product quality, but the possibility of such failures cannot be completely eliminated. Please consider such failures when designing this printer into your application.
- Take care to verify that this document is intended for use with the firmware of your specific XPM printer by confirming firmware revision levels between the printer and this document.
- This manual is intended to be a supplement to the product operating manual. Any approval or order based solely upon this manual will not be accepted by HENGSTLER. Any approval must be made based upon testing and verification of samples of the product in the customer's application.

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1 Introduction

This XPM Emulation Command Set Reference describes the command set of the Hengstler XPM thermal printers. Please read this reference manual thoroughly before using the XPM and communicating with the printer.

Comments:

- Communication with the host is accomplished either through a USB or RS232 interface.
- XPM printers can print graphic data with or without compression.
- Burn time ("on" time of the thermal printhead) can be adjusted to control the printing intensity.
- Drivers are available for easy operation by PC. The Windows XP driver contains an API for easy integration to the host application.
- Upload of firmware revisions can be accomplished with a tool that accompanies the Windows XP driver.
- Note that when data is sent from the external equipment to the XPM printer, all data must be sent as binary data.
- Note that the XPM series of printers use advanced printing and positioning features, allowing the placement of images, bar codes, text, etc., anywhere on the printout. As a result, the XPM series does not automatically wrap text that exceeds its margins. Proper design of print location on the printout should eliminate the need for text wrapping.
- When using RS232 communications, the question of whether handshaking is required sometimes occurs. XPM printers employ large buffers and, in many cases, will work without any handshaking at all. However, to ensure that there is no data loss and to optimize performance of your XPM printer, we recommend that hardware handshaking always be employed and that the host queries the status of the XPM printer at appropriate times.

2 Printer Command Overview (Emulation)

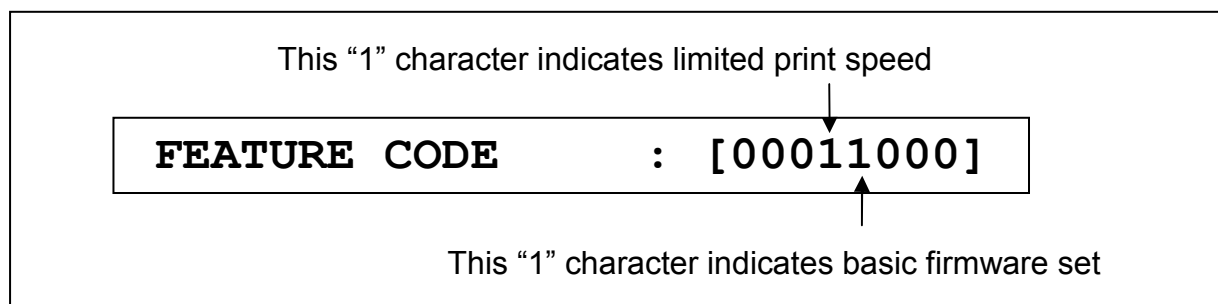
Each command is explained using the following conventions:

[Name]	Command name
[Function]	Function of command
[Code]	Control code represented in hexadecimal or decimal notation. [X] ¹⁶ Hexadecimal notation ('0'..'9', 'A'..'F') [X] ¹⁰ Decimal notation ('0'..'9') [X] ² Binary notation ('0'..'1')
[Description]	Explanation of command function

2.1 Firmware Feature Code

The XPM family of thermal printers is offered with either a Basic or an Advanced firmware set. Some commands listed in this manual function only with the Advanced firmware set, and are marked "Advanced Firmware Set only".

To determine if your printer has the Advanced or Basic firmware set, look at the short printout that is generated when paper is loaded. In the section under "PRINTER", locate the field "FEATURE CODE". This code shows 8 digits. If the 5th digit is a "0", then the printer has the advanced firmware set. If the 5th digit is a "1", then the printer has the Basic firmware set. See example below.



2.2 Emulation Command Set

The following commands are used when communicating with the printer controller. All other commands are ignored

2.2.1 Horizontal tab**TAB**

[Name]	Horizontal tab
[Function]	This command moves the printing position to the next horizontal tab position.
[Code]	[09] ¹⁶ [9] ¹⁰

[Description]

1. Command "HT" moves the printing position to the next tab position.
2. The horizontal tab positions are set with command „ESC 'D' ...”.
3. If the next horizontal tab position is not set, the HT command is ignored.
4. If the next horizontal tab position is outside the printing area, the printing position is shifted to the next line.

2.2.2 Line feed**LF**

[Name] Line feed

[Function] This command prints the data already contained in the print buffer, then sets the next-data receive position at the left most column on the next line.

[Code] [0A]¹⁶
[10]¹⁰

[Description]

1. Command "LF" prints the data already contained in the print buffer, then sets the next-data receive position at the leftmost column on the next line.
2. In the initial state, the line spacing is set to approx. 1/8 inch.
3. When there is no data in the print buffer, only a line feed operation is executed.
4. When different-height character typefaces are to be printed on the same line, these character typefaces are arranged so that their bottom ends are aligned at the same level.
5. If line spacing during printing/line-feeding is shorter than the character height, a length equal to the character height feeds the paper.

2.2.3 Carriage Return**CR**

[Name] Carriage Return

[Function] This command resets the printing position to the leftmost column on the same line.

[Code] [0D]¹⁶

[14]¹⁰

[Description]

1. Command "CR" resets the printing position to the leftmost column on the same line. Please note that it does not cause the line to print. Use the Line Feed (LF) command to print the current line and advance to the next line.

2.2.4 Form Feed (new page)**FF**

[Name] Form Feed (new page)

[Function] This command feeds paper by the specified page length.

[Code] [0C]¹⁶
[12]¹⁰

[Description]

1. The "FF" command prints the data already contained in the print buffer, after which it feeds forward to the end of form.
2. The form length is defined with use of the Xpm-ConfigTool.
3. When mark control is enabled, then this command feeds to the mark offset, which is defined with use of the Xpm-ConfigTool.

2.2.5 Character set and country code selection ESC '%' [n]

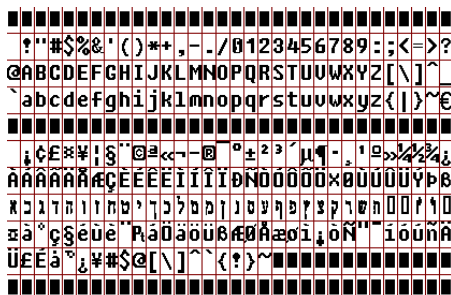
[Name] Character set and country code selection
 [Function] This command selects the character set and the country code
 [Code] [1B]¹⁶ [25]¹⁶ [n]
 [27]¹⁰ [37]¹⁰ [n]

[Description]

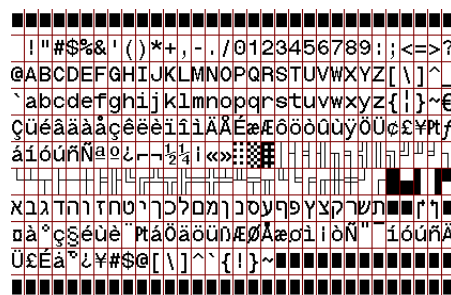
1. Command „ESC '%' [n]“ selects the primary or secondary character set and the country code within this character set.
2. Either character set can be changed by uploading a new character set to the printer using the supplied font upload tool.
3. Parameter [n] specifies character set and country code. The following figure shows the relationship between the bits of parameter [n] and character set and country code:

Parameter [n], bit	Value	Printing mode
(LSB) b0 – b2	0	Primary character set (default)
	1	Secondary character set
	2 – 7	Reserved for future use
b3 – b7 (MSB)	0	Country code disabled (default)
	1	USA
	2	France
	3	Germany
	4	U.K.
	5	Denmark 1
	6	Sweden
	7	Italy
	8	Spain 1
	9	Japan 1
	10	Norway
	11	Denmark 2
	12	Spain 2
13	Latin America	
14	Japan 2	
15 - 31	Reserved for future use	

4. The country code characters are available from firmware version R2-V1.01f or up.
5. The country code characters are positioned in row 9 and 10 of the primary and secondary character set:



Primary character set



Secondary character set

6. Note that from firmware version R2-V1.02f or up all character sets have been extended with 3 additional rows.
7. If a country code is enabled, then the ASCII characters indexes [23]¹⁶, [24]¹⁶, [40]¹⁶, [5B]¹⁶, [5C]¹⁶, [5D]¹⁶, [5E]¹⁶, [60]¹⁶, [7B]¹⁶, [7D]¹⁶ and [7E]¹⁶ (all codes in HEX) are mapped to corresponding characters in row 9 and 10 of the primary or secondary character set.
8. The corresponding country characters for each country code are as follows:

Character Index (HEX)		23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
Country Code													
0	Disabled	#	\$	@	[	\	\]	^	`	{	|	}	~
1	USA	#	\$	@	[	\	\]	^	`	{	|	}	~
2	France	#	\$	à	°	ç	§	^	`	é	ù	è	~
3	Germany	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	~
4	U.K.	£	\$	@	[	\	\]	^	`	{	|	}	~
5	Denmark 1	#	\$	@	Æ	Ø	Á	^	`	æ	ø	á	~
6	Sweden	#	¤	É	Ä	Ö	Á	Ü	é	ä	ö	á	ù
7	Italy	#	\$	@	°	\	é	^	ù	ä	ò	è	ì
8	Spain 1	Pt	\$	@	ı	Ñ	ı	^	`	ı	ñ	}	~
9	Japan 1	#	\$	@	[	¥	]	^	`	{	|	}	~
10	Norway	#	¤	É	Æ	Ø	Á	Ü	é	æ	ø	á	ù
11	Denmark 2	#	\$	É	Æ	Ø	Á	Ü	é	æ	ø	á	ù
12	Spain 2	#	\$	á	ı	ñ	ı	é	`	ı	ñ	ó	ú
13	Latin America	#	\$	á	ı	ñ	ı	é	Ü	ı	ñ	ó	ú
14	Japan 2	#	\$	@	[	¥	]	^	`	{	|	}	~

9. The type of primary/secondary character set (e.g. 8x16, 12x24, 16x32, 20x40) required is selected with the print mode command (see command „ESC '! ...”).

Printing mode specification (command „ESC '! ...”, lower 4 bits)	Primary character set	Secondary character set
08 x 16	08 x 16	08 x 16
12 x 24	12 x 24	12 x 24
16 x 32	16 x 32	16 x 32
20 x 40	20 x 40	20 x 40

2.2.6 Character size specification**ESC '!' [n]**

[Name] Character size specification
 [Function] This command specifies character size for text output.
 [Code] [1B]¹⁶ [21]¹⁶ [n]
 [27]¹⁰ [33]¹⁰ [n]

[Description]

1. Command „ESC '!' [n]“ specifies character size.
2. The following figure shows the relationship between the bits of parameter [n] and character size:

Parameter [n], bit	Value	Printing mode
(LSB) b0 - b1	[00] ²	08x16-dot character typeface
	[01] ²	12x24-dot character typeface
	[10] ²	16x32-dot character typeface
	[11] ²	20x40-dot character typeface
b2 - b3	[00] ²	No magnification
	[01] ²	2 X magnification
	[10] ²	3 X magnification
	[11] ²	4 X magnification
b4	0	Double width disabled
	1	Double width enabled
b5	0	Double height disabled
	1	Double height enabled
b6 – b7 (MSB)	Reserved for future use; must be set to “0”	

3. When one line contains different-height character typefaces, the character typefaces are arranged so that their bottom ends are aligned at the same level.

2.2.7 Black-on-white reversed printing specification GS 'B' [n]

[Name]	Black-on-white reversed printing specification		
[Function]	This command enables and disables black-on-white reversed printing.		
[Code]	[1D] ¹⁶	[42] ¹⁶	[n]
	[29] ¹⁰	[66] ¹⁰	[n]

[Description]

1. Command „GS 'B' [n]“ Enables or disables black-on-white (reversed) printing.
2. Permissible values of [n] are “0” and “1”.
3. If n = 0, black-on-white reversed printing is off. If n = 1, black-on-white reverse printing is on.
4. The default value for [n] is “0”.
5. The command can be used in all character modes and all character sets.
6. The line-spacing (line pitch) area does not appear in reverse format.
7. A single text-line can contain both normal printed characters and reverse printed characters.
8. No character spacing (except for character blanks, e.g. tabs, margins), appears reversed.

2.2.8 1/6-inch line pitch setting**ESC '2'**

[Name]	1/6-inch line pitch setting
[Function]	This command sets the single line pitch to 1/6 inch.
[Code]	[1B] ¹⁶ [32] ¹⁶ [27] ¹⁰ [50] ¹⁰

[Description]

1. Command „ESC '2'” sets single line pitch to 1/6 inch.
2. Please note that “line pitch” is defined as the distance from the top of one character line to the top of the next character line.
3. This command invalidates the line pitch previously set with command „ESC '3' ...”.
4. This command invalidates the line spacing previously set with the command „ESC 'A' ...”.

2.2.9 Line pitch setting**ESC '3' [n]**

[Name]	Line pitch setting
[Function]	This command sets the single line pitch in dot lines.
[Code]	[1B] ¹⁶ [33] ¹⁶ [n] [27] ¹⁰ [51] ¹⁰ [n]

[Description]

1. Command „ESC '3' [n]“ sets the single line pitch to n dot lines.
2. Please note that “line pitch” is defined as the distance from the top of one character line to the top of the next character line.
3. This command invalidates the line pitch previously set with command „ESC '2'”.
4. This command invalidates the line spacing previously set command „ESC 'A' [n]“.
5. Parameter [n] defines the line pitch in dot lines.
6. Parameter [n] must match following conditions:
 $[0]^{10} \leq [n] \leq [255]^{10}$
7. When a line feed is executed and there is printing on that character line, paper is fed by at least the height of the character currently specified. When a line feed is executed without printing on the character line, paper is fed only by the specified line spacing. For example, when line spacing of 10 dot lines is specified for a character whose height is 24 dot lines, paper is fed by 24 dot lines (if there are characters on the line) or 10 dot lines (if there are no characters on the line).

2.2.10 Line spacing setting**ESC 'A' [n]**

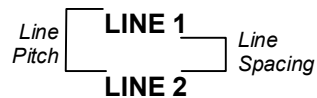
[Name] Line spacing setting

[Function] This command sets the line spacing to a specific amount of dot lines.

[Code] [1B]¹⁶ [41]¹⁶ [n]
[27]¹⁰ [65]¹⁰ [n]

[Description]

1. Command „ESC 'A' [n]“ sets the line spacing to [n] dot lines.
2. Condition $[0]^{10} \leq [n] \leq [255]^{10}$ must be satisfied.
3. If this command is set two or more times for the same line, the last set line spacing is valid.
4. When line pitch is set with command „ESC '3'“ or „ESC '2'“, the line spacing set with this command is invalidated.
5. Please note that “line spacing” is defined as the distance from the bottom of one character line to the top of the next character line. Note the difference between line pitch and line spacing:



2.2.11 Left margin specification**GS 'L' [n] [m]**

[Name]	Left margin specification		
[Function]	This command sets the left margin.		
[Code]	[1D] ¹⁶	[4C] ¹⁶	[n] [m]
	[29] ¹⁰	[76] ¹⁰	[n] [m]

[Description]

1. Command „GS 'L' [n] [m]“ specifies the left margin in dots.
2. Both parameters [n] and [m] specify the left margin, whereas this margin is calculated as follows:
“left margin” = [n] + [m] * [256]¹⁰.
3. The range of parameter [n] is [0]¹⁰ ≤ [n] ≤ [255]¹⁰.
4. The range of parameter [m] is as follows.
 XPM-80 (203 dpi): [0]¹⁰ ≤ [m] ≤ [2]¹⁰
 XPM-200 (203 dpi): [0]¹⁰ ≤ [m] ≤ [6]¹⁰
 XPM-200HR (300 dpi): [0]¹⁰ ≤ [m] ≤ [10]¹⁰
5. If the result of the calculation [n] [m] * [256]¹⁰ is greater than the number of dots in the dot row (640 for the XPM-80/203 dpi, 1680 for the XPM-200/203 dpi, 2592 for the XPM-200HR/300 dpi), then this command will be ignored.

2.2.12 Character spacing specification**ESC SP [n]**

[Name]	Character spacing specification		
[Function]	This command specifies the character spacing in dots.		
[Code]	[1B] ¹⁶	[20] ¹⁶	[n]
	[27] ¹⁰	[32] ¹⁰	[n]

[Description]

1. Command „ESC SP [n]“ specifies the spacing between characters in dots.
2. Parameter [n] specifies the number of blank dots between adjacent characters.
3. Condition $[0]^{10} \leq [n] \leq [32]^{10}$ must be satisfied.
4. Initially the value for [n] is $[0]^{10}$ (no character spacing).

2.2.13 Character underlining**ESC ‘-‘ [n]**

[Name] Character underlining

[Function] This command turns character underlining on and off, and specifies the number of dot rows to be used when underlining a character.

[Code] [1B]¹⁶ [2D]¹⁶ [n]
[27]¹⁰ [45]¹⁰ [n]

[Description]

1. Command „ESC ‘-‘ [n]“ controls character underlining and the number of dot rows used for the underline.
2. Parameter [n] specifies the number of dot rows to be used when underlining.
3. Condition $[0]^{10} \leq [n] \leq [3]^{10}$ must be satisfied; I.E., a maximum of three dot rows can be used for underlining.
4. The default value for [n] is $[0]^{10}$ (no underlining).
5. Underlining remains in effect until a subsequent underline command changes the value.
6. It is possible to mix underlining on a single line. For example, part of the line can be underlined with three dot rows, part with two, part with one, and part with none.

2.2.14 Bold characters enable/disable**ESC 'E' [n]**

[Name]	Bold characters enable/disable		
[Function]	This command enables/disables bold character printing		
[Code]	[1B] ¹⁶	[45] ¹⁶	[n]
	[27] ¹⁰	[69] ¹⁰	[n]

[Description]

1. Command „ESC 'E' [n]“ Enables or disables bold character printing.
2. Bold characters are enabled when parameter [n] = [1]¹⁰, and disabled otherwise.
3. Condition $[0]^{10} \leq [n] \leq [1]^{10}$ must be satisfied.
4. The default value for [n] is [0]¹⁰ (bold characters disabled).

2.2.15 Enable wide font printing**ESC [F0] [07] [01] [n]**

[Name] Enable wide font printing (**Note: Advanced Firmware Set only**)
 [Function] This command enables/disables wide font printing with standard/ GB2312-Chinese/KS5601-Korean character sets.

[Code] [1B]¹⁶ [F0]¹⁶ [07]¹⁶ [01]¹⁶ [n]
 [27]¹⁰ [240]¹⁰ [7]¹⁰ [1]¹⁰ [n]

[Description]

1. Command „ESC [F0] [07] [01] [n]“ Enables/disables wide font printing, where the wide font is represented by 7000 characters, each made up of 24X24 or 20X20 dots.
2. If wide font printing is enabled, then each character in this font is represented by a specific 2 byte code, which correlates to a specific wide font character. The selected wide font index specifies how the two byte code is mapped onto an entry in the wide font.
3. Four wide font indexes are available: standard 24X24, GB2312-Chinese 24X24, standard 20X20 and KS5601-Korean 20X20. Wide font printing is automatically enabled if one of these indexes is selected.
4. For both standard indexes, each two consecutive bytes that exceed [E0]¹⁶[00]¹⁶ are regarded as wide font character code references, whereas the corresponding character in the wide font is selected by subtracting [E0]¹⁶[00]¹⁶ (e.g. [E0]¹⁶[00]¹⁶ is the 1st character, [E0]¹⁶[01]¹⁶ is the 2nd character, ..., [E0]¹⁶[FF]¹⁶ is the 256th character, [E1]¹⁶[00]¹⁶ is the 257th character, etc.).
5. For the GB2312-Chinese index, each two consecutive bytes that exceed [A0]¹⁶[00]¹⁶ are regarded as wide font character code references, whereas the corresponding character in the wide font is selected according to the “GB2312” Simplified Chinese character map. The GB2312-Chinese index operates with a special preprocessed GB2312 type font only.
6. For the KS5601-Korean index, each two consecutive bytes that exceed [A0]¹⁶[00]¹⁶ are regarded as wide font character code references, whereas the corresponding character in the wide font is selected according to the “KS5601” Korean character map. The KS5601-Korean index operates with a special preprocessed KS5601 type font only.
7. Bytes that are not regarded as wide font character code references are regarded as normal single byte references in the internal/external character sets. If received, then the corresponding internal/external character is printed.
8. Escape commands that affect the internal/external character set (e.g. print mode) also affect the wide font printing (e.g. double width, 3X magnification, etc.).
9. The default wide font index is stored in flash memory. Its value can be wide font disabled, wide font enabled with standard index or wide font enabled with Chinese index.
10. The valid range for parameter [n] is [0]¹⁰ ≤ [n] ≤ [4]¹⁰ or [7]¹⁰. All other values are ignored. The meaning of each value of [n] is as follows.

n	Result
0	Wide font printing disabled
1	Wide font printing enabled with standard 24 x 24 index
2	Wide font printing enabled with GB3212 Chinese 24 x 24 index
3	Wide font printing enabled with standard 20 x 20 index
4	Wide font printing enabled with KS5601-Korean 20 x 20 index
7	Wide font printing index is reset to its default value, which is stored in flash memory.

11. The printer status information that is printed after paper insertion also contains information on the selected wide font index, provided that wide font printing is enabled.

2.2.16 Form length setting**“ESC ‘C’ [n1] [n2]”**

[Name] Form length setting

[Function] This command sets the form length to a specific length.

[Code] [1B]¹⁶ [43]¹⁶ [n1] [n2]
[27]¹⁰ [67]¹⁰ [n1] [n2]

[Description]

1. Command „ESC ‘C’ [n1] [n2]“ sets the form length to a specific length.
2. Parameter [n1] and [n2] represents the form length in 1/10 mm. (For example, “1234” = 123.4 mm).
3. Parameter [n1] and [n2] form a 16-bit, unsigned integer with a valid range up to 65,535. Parameter [n1] is the MSB and parameter [n2] the LSB of this value.
4. With this command it is possible to represent a length of approx. 6.5 meters of paper (approx. 21 feet). Care should be taken to avoid the paper wasted associated with accidentally setting the page length so long.

2.2.17 End of page**ESC [F0] [06] [x] [n] [m]**

[Function] This command signals the end of page, prints the buffer, initiates cutting (if desired), and allows the transmission of a parameter byte to be echoed back by the printer after printing is completed

[Code] [1B]¹⁶ [F0]¹⁶ [06]¹⁶ [x] [n] [m]
 [29]¹⁰ [240]¹⁰ [6]¹⁰ [x] [n] [m]

[Description]

- Command „ESC [F0] [06] [x] [n] [m]“ signals the end of page, prints the buffer, initiates cutting (if desired), and allows the transmission of a parameter byte to be echoes back by the printer after printing is completed.
- Permissible values of [x] are “1” and “2”.
 If x = 1, then the command is to be used without a parameter byte to be echoed back. In this case, the syntax is [1B]¹⁶ [F0]¹⁶ [06]¹⁶ [01] [n].
 If x = 2, then the command is to be used with a parameter byte. The syntax then is [1B]¹⁶ [F0]¹⁶ [06]¹⁶ [02] [n] [m].
- Parameter [n] is broken into a most significant Nibble (MSN) and a least significant Nibble (LSN). The LSN controls cutting, as follows, and has the permissible values of “0”, “1” or “2”.
 If LSN[n] = 0, no cut will occur after printing.
 If LSN[n] = 1, a partial cut will occur after printing (if available).
 If LSN[n] = 2, a full cut will occur after printing (if available).
 The MSN of n determines whether the command is interpreted as an “End of Print” or an “End of Form”.
 If MSN [n] = 0, the command is treated as an “End of Print”.
 If MSN [n] = 1, the command is treated as an “End of Form”.
- “End of Print” acts as follows. (Please note that the “End of Print” command generally causes immediate movement of the paper and execution of the cut, as commanded. Also please note that anytime the “Top of Page” is set, the “Top of Form” is also set to the same location. When the “Top of Form” is set directly, it has no impact on the “Top of Page” location.)
 If End of Print is sent with no cut command, the current location will be set as “Top of Page”.
 If End of Print is sent with a partial cut command, this location will be set as “Top of Page”, the paper will be advanced to the cut line, and a partial cut will occur. There will be no retracting to the park position because the partially cut paper is still attached to the paper roll.
 If End of Print is sent with a full cut command, this location will be set as “Top of Page”, the paper will be advanced to the cut line, and a full cut will occur. The paper will then be retracted to the park position.
- “End of Form” acts as follows. (Please note that the “End of Form” command generally causes no movement of the paper.)
 If End of Form is sent with no cut command, the current location will be set as “Top of Form”.
 If End of Form is sent with a partial cut command, this location will be set as “Top of Form” and a partial cut will occur when this location moves under the cut line due to other printing commands (additional data printed, line feeds, etc.).
 If End of Form is sent with a full cut command, this location will be set as “Top of Page”, and a full cut will occur when this location moves under the cut line due to other printing commands (additional data printed, line feeds, etc.).
- The default value for [n] is “0”.
- Permissible values for [m] are in the range [0]¹⁰ <= [m] <= [255]¹⁰.
- The parameter [m] will be echoed back through the Status information. See the Request Printer Status section for the format of the data being returned.

9. The status parameter [m] can also be set via the Set Status Parameter command. See the Set Status Parameter section for a more detailed discussion of how this parameter is used.

2.2.18 Horizontal tab positions**ESC D [d1] ... [dn] NUL**

[Name] Sets Horizontal tab positions

[Function] This command sets one or more horizontal tab positions or deletes all tab positions.

[Code] [1B]¹⁶ [44]¹⁶ [d1] .. [dn] [00]¹⁶
 [27]¹⁰ [68]¹⁰ [d1] .. [dn] [0]¹⁰

[Description]

1. Command „ESC ‘D’ [d1] ... [dn] NUL” sets one or more tab positions, which are used by the horizontal tab command “HT”.
2. The following conditions must be satisfied for the values of d1, d2, etc. (tab position).
 XPM-80 / 203 dpi Printer: [1]¹⁰ ≤ [d] ≤ [80]¹⁰
 XPM-200 / 203 dpi Printer: [1]¹⁰ ≤ [d] ≤ [200]¹⁰
 XPM-200HR / 300 dpi Printer: [1]¹⁰ ≤ [d] ≤ [200]¹⁰
3. The maximum number of tabs that can be set is 32. Therefore, the condition [1]¹⁰ ≤ [n] ≤ [32]¹⁰ must be satisfied. Any data sent after the 32nd horizontal tab position will be treated as ordinary data.
4. The horizontal tab position is set to [d] x 8 dots distant from the head of the line in the printing area.
5. When the horizontal tab is set with this command, all horizontal tab positions previously set are deleted. Therefore, to add a tab, it is necessary to resend all the previous tab locations along with the new tab location.
6. The [d] values must be entered in ascending order, and the data string must end with NUL ([0]¹⁰).
7. All horizontal tab positions can be deleted with command „ESC ‘D’ NUL”.
8. When the power to the printer is cycled or the printer is reset, the horizontal tab positions are set to intervals of 8 default characters as selected during initialization.

2.2.19 Forward paper feed**ESC 'J' [n]**

[Name]	Forward paper feed		
[Function]	This command feeds paper in the forward direction.		
[Code]	[1B] ¹⁶	[4A] ¹⁶	[n]
	[27] ¹⁰	[74] ¹⁰	[n]

[Description]

9. Command „ESC 'J' [n]“ feeds paper in the forward direction by [n] dot lines.
10. Condition $[0]^{10} \leq [n] \leq [255]^{10}$ must be satisfied.
11. When there is data in the print buffer, this data will be printed first, and then the paper will be fed in the forward direction as specified by [n].
12. If parameter [n] equals $[0]^{10}$, the data contained in the buffer is printed but paper is not fed.

2.2.20 Forward n-line feed**ESC 'd' [n]**

[Name] Forward n-line feed

[Function] This command prints the data and feeds a line, then feeds the paper by [n] character lines.

[Code] [1B]¹⁶ [64]¹⁶ [n]
[27]¹⁰ [100]¹⁰ [n]

[Description]

1. Command „ESC 'd' [n]“ feeds paper by a character line count specified with parameter [n].
2. Condition $[0]^{10} \leq [n] \leq [255]^{10}$ must be satisfied.
3. After [n] lines are fed, the next print position is located at the left edge on the line.
4. When there is data in the print buffer, the data contained in the buffer is printed upon receipt of this command, after which paper is fed by [n] character lines.
5. Pitch or spacing is also taken into account by this command.

2.2.21 Set position ESC '\$' [n1] [n2] [m1] [m2]

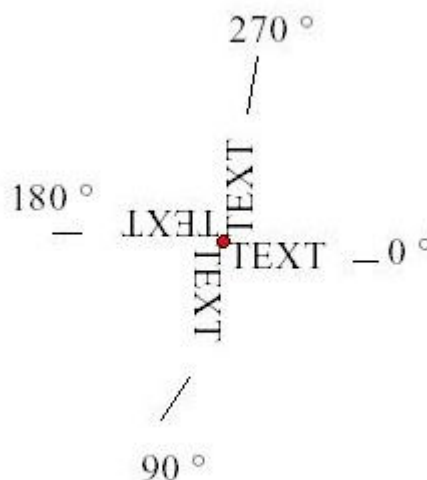
[Name] Set position
 [Function] This command specifies the position at which predefined objects such as graphics, text, bar codes, etc. will print.
 [Code] [1B]¹⁶ [24]¹⁶ [n1] [n2] [m1] [m2]
 [27]¹⁰ [36]¹⁰ [n1] [n2] [m1] [m2]

[Description]

1. Command „ESC '\$' [n1] [n2] [m1] [m2]“ specifies the position at which a predefined object, such as graphics, text, bar codes, etc., will be printed.
2. Parameters n1 and n2 define the X coordinate of the upper, left-hand corner of where the object will print, defined in tenths of a mm (0.1 mm), n1 is the MSB, while n2 is the LSB. The X coordinate is therefore defined as $n1 * [256]^{10} n2$, in tenths of a mm.
3. Parameters m1 and m2 define the Y coordinate of the upper, left-hand corner of where the object will print, defined in tenths of a mm (0.1 mm), m1 is the MSB, while m2 is the LSB. The Y coordinate is therefore defined as $m1 * [256]^{10} m2$, in tenths of a mm.
4. The ranges of the four parameters are as follows. Also please note that if the value of $n1 * 256 + n2$ exceeds **800** for an XPM-80 / 203 dpi, **2000** for an XPM-200 / 203 dpi or **2000** for an XPM-200HR / 300 dpi, the upper left corner of the printing start position will be off the paper.
5. Similarly, please note that the value of $m1 * 256 + m2$ can become quite large, positioning the upper left corner of the print start position over one meters down the paper. Care should be taken to avoid this situation accidentally.

Parameter	Valid Ranges
n1	$[0]^{10} \leq [n1] \leq [255]^{10}$
n2	$[0]^{10} \leq [n2] \leq [255]^{10}$
m1	$[0]^{10} \leq [m1] \leq [40]^{10}$
m2	$[0]^{10} \leq [m2] \leq [255]^{10}$

6. Note the red dot in the image below. This represents the position as defined by this command and shows where the text, image, bar code, etc. will be oriented with regard to that position with different degrees of rotation.



2.2.22 Text, image, bar code and character rotation**ESC 'V' [n] [m]**

[Name] Text, image, bar code and character rotation

(Note: Advanced Firmware Set only)

[Function] This command specifies the rotation angle for text, images, bar codes and characters.

[Code] [1B]¹⁶ [56]¹⁶ [n] [m]
[27]¹⁰ [86]¹⁰ [n] [m]

[Description]

- Command „ESC 'V' [n] [m]“ specifies the rotation angle for:
 - text rotation: 0°, 90°, 180° and 270°
 - image rotation: 0°, 90°, 180° and 270°
 - bar code rotation: 0°, 90°, 180° and 270°
 - character rotation: 0°, 90°, 180° and 270°
- Parameter [n] defines what is affected by the rotation:

Parameter [n]	Rotation
[0] ¹⁰	Text
[1] ¹⁰	Images
[2] ¹⁰	Bar Codes
[3] ¹⁰	Characters

- Parameter [m] defines the angle of rotation:

Parameter [m]	Angle of rotation
[0] ¹⁰	0°
[1] ¹⁰	90°
[2] ¹⁰	180°
[3] ¹⁰	270°

- All objects can be rotated in all available directions, whereas the left upper position is defined by the “Set position” command „ESC \$ [n1] [n2] [m1] [m2]“.
- Text rotation causes the entire text to be rotated as a unit.
- Character rotation causes only the individual characters to be rotated, not the entire text.
- All bar code settings (height, width, magnification) are effective when printing bar codes.

2.2.23 Start block rotation

ESC [F0] [0B] [01] [n]

[Name] Start block rotation (*Note: Advanced Firmware Set only*)
 [Function] This command signifies that all commands sent after it are to be treated as a single block and rotated intact as specified below.
 [Code] [1B]¹⁶ [F0]¹⁶ [0B]¹⁶ [01]¹⁶ [n]
 [27]¹⁰ [240]¹⁰ [11]¹⁰ [1]¹⁰ [n]

[Description]

1. Command „ESC [F0] [0B] [01] [n]“ signifies that all commands and data sent after it, until receipt of the End Block Rotation command, are to be treated as a single block and rotated intact as specified below.
2. Parameter [n] defines the angle of rotation for the entire block:

Parameter [n]	Angle of rotation
[FF] ¹⁶	Disabled
[00] ¹⁶	0°
[01] ¹⁶	90°
[02] ¹⁶	180°
[03] ¹⁶	270°

3. The upper left corner of the block is the key when rotating, and the block will start as far to the upper left as defined by the rotation of the objects sent.

The “T” in “The” is the upper left hand corner before rotation.

The “T” in “The” is the upper left hand corner after rotation.

4. Please note that all commands, including Line Feed, are stored and are used only to position and format the data to be printed. Once this command has been sent, there will be no printing until receipt of the End Block Rotation command, which will cause the entire block to be printed.
5. The commands “Print uncompressed graphics” and “Print RLE8 compressed graphics” are ignored by the Start Block Rotation command.

2.2.24 End block rotation**ESC [F0] [0C] [00]**

[Name]	End block rotation <i>(Note: Advanced Firmware Set only)</i>
[Function]	This command closes the Start Block Rotation command and immediately causes printing of the data sent after the Start Block Rotation command was received.
[Code]	[1B] ¹⁶ [F0] ¹⁶ [0C] ¹⁶ [00] ¹⁶ [27] ¹⁰ [240] ¹⁰ [12] ¹⁰ [0] ¹⁰
[Description]	<ol style="list-style-type: none">1. Command „ESC [F0] [0C] [00]“ Ends the transmission of data to be printed as a block that was initiated by the Start Block Rotation command and causes it to be printed.

2.2.25 Printer reset (software)**ESC '@'**

[Name]	Printer reset (software)
[Function]	This command initializes/resets the printer.
[Code]	[1B] ¹⁶ [40] ¹⁶ [27] ¹⁰ [64] ¹⁰

[Description]

1. Command „ESC '@” resets the printer settings to their default values.
2. “Default” is defined as the status of the printer after initial power up.
3. Command „ESC '@” prints the data contained in the print buffer before resetting.

2.2.26 Printer reset (hardware)**ESC [F2] [03] [00]**

[Name] Printer reset (hardware)

[Function] This command performs a hard reset of the printer by resetting the hardware.

[Code] [1B]¹⁶ [F2]¹⁶ [03]¹⁶ [00]¹⁶
[27]¹⁰ [142]¹⁰ [03]¹⁰ [00]¹⁰

[Description]

1. Command „ESC [F2] [03] [00]“ performs a hardware reset of the printer.
2. When command „ESC [F2] [03] [00]“ is executed, the printer does not print the buffer before resetting. All data in the buffer is lost. All conditions are returned to those that would exist if the power were removed and then restored.

2.2.27 Print stored image data**GS ‘‘ [m] [n]**[Name] Print stored image data (**Note: Advanced Firmware Set only**)

[Function] This command causes stored image data to be printed.

[Code] [1D]¹⁶ [27]¹⁶ [m] [n]
[29]¹⁰ [39]¹⁰ [m] [n]

[Description]

1. Command „GS ‘‘ [m] [n]“ causes image data, stored in flash memory, to be printed.
2. Parameter [m] specifies the identification number of the stored image. (The first stored image is identification no. 1, the second ID no. 2, etc.)
3. The range of parameter [m], the identification number, is $[1]^{10} \leq [m] \leq [255]^{10}$.
4. If there is no registered image stored for a transmitted identification number, then the command is ignored.
5. Parameter [n] specifies the print mode, as follows:

Parameter [n]	Print mode	Caption
[0] ¹⁰	Normal	The stored image data is printed in the original stored size.
[1] ¹⁰	Double width	The stored image data is printed in double width.
[2] ¹⁰	Double height	The stored image data is printed in double height.
[3] ¹⁰	Double width and height	The stored image data is printed in double width and height.

6. Use of values for Parameters [m] and [n] other than as described above will cause the command to be ignored.
7. Images can be created and stored in the XPM printer by using the tools that come with the XPM print driver.

2.2.28 Bar code bar width setting**GS 'e' [n] [m]**

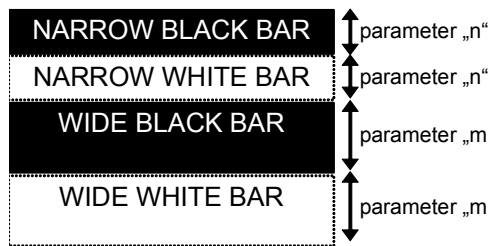
[Name] Bar code bar width setting

[Function] This command sets the width of the bar code narrow and wide bars.

[Code] $[1D]^{16}$ $[65]^{16}$ [n] [m]
 $[29]^{10}$ $[101]^{10}$ [n] [m]

[Description]

1. Command „GS 'e' [n] [m]“ defines the width of the bar code bars.
2. The bars in a one-dimensional bar code can be wide or narrow and black or white.



3. Parameter [n] specifies the width of a narrow white/black bar in dots.
4. Parameter [m] specifies the width of a wide white/black bar in dots.
5. When the bar code selected does not consist of wide bars and/or narrow bars, the value of parameter [n] is set as the minimum width.
6. The initial value of parameter [n] is $[2]^{10}$.
7. The initial value of Parameter [m] is $[6]^{10}$.
8. The following conditions must be satisfied:
 $[1]^{10} \leq [n] \leq [255]^{10}$ and $[1]^{10} \leq [m] \leq [255]^{10}$

2.2.29 Bar code height setting**GS 'h' [n]**

[Name]	Bar code height setting
[Function]	This command sets the height of a bar code in dots.
[Code]	[1D] ¹⁶ [68] ¹⁶ [n] [29] ¹⁰ [104] ¹⁰ [n]

[Description]

1. Command „GS 'h' [n]“ defines the height of a bar code.
2. Parameter [n] specifies the height of the bar code in dots.
3. The following conditions must be satisfied:
 $[1]^{10} \leq [n] \leq [255]^{10}$.
4. The default value of parameter [n] is [60]¹⁰.

2.2.30 Bar code width magnification setting**GS w [n]**

[Name] Bar code width magnification setting

[Function] This command sets the width magnification for a bar code.

[Code] [1D]¹⁶ [77]¹⁶ [n]
[29]¹⁰ [109]¹⁰ [n]

[Description]

1. Command „GS w [n]“ specifies the width magnification of a one-dimensional bar code by multiplying the dot width of the narrow and wide bars by a specified integer value.
2. Parameter [n] specifies the horizontal magnification of a bar code.
3. The following conditions must be satisfied:
 $[1]^{10} \leq [n] \leq [4]^{10}$.
4. The default value of parameter [n] is $[1]^{10}$.
5. The widths of the narrow and wide bars (black and white) are multiplied by [n].
6. This command is ignored two-dimensional bar codes.

2.2.31 Bar code printing**GS 'k' [m] [n] [d1] ... [dn]**

[Name] Bar code printing

[Function] This command selects a one dimensional bar code type and prints a one dimensional bar code.

[Code] [1D]¹⁶ [6B]¹⁶ [m] [n] [d1] ... [dn]
[29]¹⁰ [107]¹⁰ [m] [n] [d1] ... [dn]

[Description]

1. Command „GS 'k' [m] [n] [d1] ... [dn]“ selects a bar code type, supplies the data to be encoded and prints a bar code. The XPM printer will determine and print the bar code based on the data sent to it for encoding. The XPM is also capable of printing any bar code of appropriate resolution sent to it as a graphics file. For printing of two dimensional bar codes, see “2D Bar code configuration” and “2D Bar code printing”.
2. Parameter [m] specifies the type of bar codes to be printed, which can be UPCA, UPCE, EAN13, EAN8, Code39, ITF (also called “Interleaved Two of Five”), Codabar, Code 128.
3. The command configuration, code, definition area, and certain other conditions depend on parameter [m].
4. Parameter [n] specifies the number of characters to be encoded by the bar code, which depends on the type of bar code.
5. If the print data generates a bar code wider than will fit on one line, the excess portion of the bar code will print on the next line.
6. Bar code height will be determined by the bar code height setting GS h [n], regardless of the line spacing set with the ESC 2 or ESC 3 commands.
7. When printing an ITF bar code with parameter [m] = [70]¹⁰, the checksum digit must be calculated by the customer and transmitted as part of the data. See “Restrictions and Notes Regarding ITF Bar Codes” below for details on the algorithm and other ITF restrictions.
8. When one line contains both a bar code and characters to be printed, the bottom of these characters and the bottom of the bar code are aligned.
9. Two or more bar codes cannot be contained on the same line. If this GS command is received when there is a bar code in the print buffer, the data contained in the print buffer is automatically printed, after which the new command is accepted.

Parameter [m]	Type of Bar code	Number of bar code characters	Value of parameter [d1] ... [dn]
[41] ¹⁶	UPCA	[11] ¹⁰ <=n<= [12] ¹⁰	[48] ¹⁰ <=d<=[57] ¹⁰
[42] ¹⁶	UPCE	[11] ¹⁰ <=n<= [12] ¹⁰	[48] ¹⁰ <=d<=[57] ¹⁰
[43] ¹⁶	EAN13	[12] ¹⁰ <=n<= [13] ¹⁰	[48] ¹⁰ <=d<=[57] ¹⁰
[44] ¹⁶	EAN8	[7] ¹⁰ <=n<= [8] ¹⁰	[48] ¹⁰ <=d<=[57] ¹⁰
[45] ¹⁶	Code39	Variable	Space , \$, % , , - , . , / , 0-9 , A-Z
[46] ¹⁶	ITF	Variable but must be an even number	Even number, ASCII digits 0-9 only, last digit must be a checksum
[47] ¹⁶	Codabar	Variable	'0' ~ '9', '-', '\$', ':', '/', ',', '+', 'A', 'D' ('A' or 'D' are end characters)
[49] ¹⁶	Code128	Variable	0 to 105

10. Restrictions and notes regarding UPCA:
- if n is [11]¹⁰, then the XPM printer will calculate the checksum.
11. Restrictions and notes regarding EAN8:
- if n is [7]¹⁰, then the XPM printer will calculate the checksum.

12. Restrictions and notes regarding EAN13:
 - if n is $[12]^{10}$, then the XPM printer will calculate the checksum.
13. Restrictions and notes regarding Code 39:
 - The first and last characters must be '*' (required by code 39 syntax).
14. Restrictions and notes regarding ITF:
 - Only the digits 0 – 9 can be encoded by ITF, and they are sent as ASCII characters
 - ITF bar code must have an even number of digits, including the checksum
 - The last digit in the ITF bar code is the checksum.
 - The ITF checksum is calculated as follows.

$$d_1 \times 3 d_2 \times 1 d_3 \times 3 d_4 \times 1 \dots d_{n-1} \times 3 = Z$$
 Checksum = $10 - (Z \text{ MOD } 10)$
 Example:
 ITF barcode = 123456789
 $Z = 1 \times 3 \ 2 \times 1 \ 3 \times 3 \ 4 \times 1 \ 5 \times 3 \ 6 \times 1 \ 7 \times 3 \ 8 \times 1 \ 9 \times 3 = 95$
 Checksum = $10 - (95 \text{ MOD } 10) = 10 - 5 = 5$
 So, if manually transmitting the entire bar code with checksum, one should send 1234567895.
15. Restrictions and notes regarding Code 128.
 - There are three subset of Code128 (Code128A, Code128B and Code128C).
 - The start character specifies which character set to be used.
 - The start character must be either 103 (subset A), 104 (subset B), 105 (subset C).

The following table shows the value encoded for data (d) depending upon which subset is selected.

Code128 bar code table

data 'd'	subset A	subset B	subset C	data 'd'	subset A	subset B	subset C
$[0]^{10}$	Space	Space	0	$[52]^{10}$	T	T	52
$[1]^{10}$	!	!	1	$[53]^{10}$	U	U	53
$[2]^{10}$	"	"	2	$[54]^{10}$	V	V	54
$[3]^{10}$	#	#	3	$[55]^{10}$	W	W	55
$[4]^{10}$	\$	\$	4	$[56]^{10}$	X	X	56
$[5]^{10}$	%	%	5	$[57]^{10}$	Y	Y	57
$[6]^{10}$	&	&	6	$[58]^{10}$	Z	Z	58
$[7]^{10}$	'	'	7	$[59]^{10}$	[	[	59
$[8]^{10}$	(	(	8	$[60]^{10}$	\	\	60
$[9]^{10}$	)	)	9	$[61]^{10}$	]	]	61
$[10]^{10}$	*	*	10	$[62]^{10}$	^	^	62
$[11]^{10}$	+	+	11	$[63]^{10}$	_	_	63
$[12]^{10}$	,	,	12	$[64]^{10}$	NUL	'	64
$[13]^{10}$	-	-	13	$[65]^{10}$	SOH	a	65
$[14]^{10}$	.	.	14	$[66]^{10}$	STX	b	66
$[15]^{10}$	/	/	15	$[67]^{10}$	ETX	c	67
$[16]^{10}$	0	0	16	$[68]^{10}$	EOT	d	68
$[17]^{10}$	1	1	17	$[69]^{10}$	ENQ	e	69
$[18]^{10}$	2	2	18	$[70]^{10}$	ACK	f	70
$[19]^{10}$	3	3	19	$[71]^{10}$	BEL	g	71
$[20]^{10}$	4	4	20	$[72]^{10}$	BS	h	72
$[21]^{10}$	5	5	21	$[73]^{10}$	HT	i	73
$[22]^{10}$	6	6	22	$[74]^{10}$	LF	j	74

[23] ¹⁰	7	7	23	[75] ¹⁰	VT	k	75
[24] ¹⁰	8	8	24	[76] ¹⁰	FF	l	76
[25] ¹⁰	9	9	25	[77] ¹⁰	CR	m	77
[26] ¹⁰	:	:	26	[78] ¹⁰	SO	n	78
[27] ¹⁰	;	;	27	[79] ¹⁰	SI	o	79
[28] ¹⁰	<	<	28	[80] ¹⁰	DLE	p	80
[29] ¹⁰	=	=	29	[81] ¹⁰	DC1	q	81
[30] ¹⁰	>	>	30	[82] ¹⁰	DC2	r	82
[31] ¹⁰	?	?	31	[83] ¹⁰	DC3	s	83
[32] ¹⁰	@	@	32	[84] ¹⁰	DC4	t	84
[33] ¹⁰	A	A	33	[85] ¹⁰	NAK	u	85
[34] ¹⁰	B	B	34	[86] ¹⁰	SYN	v	86
[35] ¹⁰	C	C	35	[87] ¹⁰	ETB	w	87
[36] ¹⁰	D	D	36	[88] ¹⁰	CAN	x	88
[37] ¹⁰	E	E	37	[89] ¹⁰	EM	y	89
[38] ¹⁰	F	F	38	[90] ¹⁰	SUB	z	90
[39] ¹⁰	G	G	39	[91] ¹⁰	ESC	{	91
[40] ¹⁰	H	H	40	[92] ¹⁰	FS	|	92
[41] ¹⁰	I	I	41	[93] ¹⁰	GS	}	93
[42] ¹⁰	J	J	42	[94] ¹⁰	RS	~	94
[43] ¹⁰	K	K	43	[95] ¹⁰	US	DEL	95
[44] ¹⁰	L	L	44	[96] ¹⁰	FNC3	FNC3	96
[45] ¹⁰	M	M	45	[97] ¹⁰	FNC2	FNC2	97
[46] ¹⁰	N	N	46	[98] ¹⁰	SHIFT	SHIFT	98
[47] ¹⁰	O	O	47	[99] ¹⁰	Code C	Code C	99
[48] ¹⁰	P	P	48	[100] ¹⁰	Code B	FNC 4	Code B
[49] ¹⁰	Q	Q	49	[101] ¹⁰	FNC 4	Code A	Code A
[50] ¹⁰	R	R	50	[102] ¹⁰	FNC 1	FNC 1	FNC1
[51] ¹⁰	S	S	51				

2.2.32 Bar code text subtitle setting

ESC [F0] [08] [01] [n]

[Name] Bar code text subtitle setting
 [Function] This command allows enabling or disabling of the bar code text subtitle
 [Code] [1B]¹⁶ [F0]¹⁶ [08]¹⁶ [01]¹⁶ [n]
 [27]¹⁰ [240]¹⁰ [8]¹⁰ [1]¹⁰ [n]

[Description]

1. Command „ESC [F0] [08] [01] [n]“ Enables/disables bar code text subtitling and specifies it's appearance.
2. Parameter [n] specifies bar code text subtitling enabled/disabled, font size 8x16/12x24 and font source primary/secondary character set.

Subtitle Fonts		
Size	Primary Font	Secondary Font
8x16	[01] ¹⁶	[09] ¹⁶
12x24	[03] ¹⁶	[0B] ¹⁶
16x32	[05] ¹⁶	[0D] ¹⁶
20x40	[07] ¹⁶	[0F] ¹⁶

3. Parameter [n] has following bit map:

Bit	Status	Caption	
0	Bar Code Plain Text Subtitle	0: Disabled	1: Enabled
1-2	Font size	00: 08x16, 01: 12x24, 10: 16x32, 11: 20x40	
3	Font source	0: Primary	1: Secondary
4-7	Reserved	0 (these values should always be set to "0")	

4. Bar code text subtitling is disabled by default.
5. Bar code text subtitling is not available when bar code rotation is enabled.
6. The bar code text subtitling may be unreadable or incorrect if the bar code dimension exceeds the paper width.
7. Since the internal primary or secondary font is used for bar code text subtitling, a replacement of the default fonts might result in an incorrect subtitling.

2.2.33 2D Bar code configuration ESC [F0] [09] [07] [n1] ... [n7]

[Name] 2D Bar code configuration (**Note: Advanced Firmware Set only**)
 [Function] This command selects a 2D bar code and sets the conditions for printing it.
 [Code] [1B]¹⁶ [F0]¹⁶ [09]¹⁶ [07]¹⁶ [n1] ... [n7]
 [27]¹⁰ [240]¹⁰ [9]¹⁰ [7]¹⁰ [n1] ... [n7]

[Description]

1. Command „ESC [F0] [09] [07] [n1] ... [n7]“ selects a two-dimensional (2D) bar code type and sets the conditions to be used for printing it. This command does not initiate the printing of 2D bar code itself. See “2D Bar code printing” for the details on printing the bar code itself. The XPM printer will determine and print the bar code based on the settings from this command and the data sent to it for encoding from the “2D Bar code printing” command. The XPM is also capable of printing any bar code of appropriate resolution sent to it as a graphics file.
2. Parameter [n1] specifies the type of 2D bar code to be printed. At present, the only valid selection is “0”, which specifies a PDF417 bar code. Other 2D bar codes may be added in the future.
3. Parameter [n2] specifies the 2D bar code style.

Parameter [n2]	Style
0	Normal style
1	Truncated style; no stop pattern or right row indicator

4. Parameter [n3] specifies the ECC-error correction level. The valid range is $[0]^{10} \leq [n3] \leq [8]^{10}$, where 0 = least error correction and 8 = most error correction. ECC-error correction is intended to allow the bar code to be read even when there is damage to it, such as a line being drawn across it or part of it being torn or destroyed. The more error correction that is used, the more redundancy exists in the data and the larger the bar code is. Therefore, selection of this parameter is a tradeoff between greater readability when damaged and smaller size.
5. Parameter [n4] specifies the magnification range of the bar code. The valid range is $[1]^{10} \leq [n4] \leq [4]^{10}$. The default value is “1”.
6. Parameter [n5] specifies the height to be used when setting the bar code’s aspect ration. The valid range is $[1]^{10} \leq [n5] \leq [255]^{10}$.
7. Parameter [n6] specifies the width to be used when setting the bar code’s aspect ration. The valid range is $[1]^{10} \leq [n6] \leq [255]^{10}$.
8. Additionally, the ratio of [n5]/[n6] must fall in the range of 0.1 to 10.0. The default aspect ratio is 1:2.
9. Parameter [n7] specifies the height of the smallest module (mark) in the 2D bar code.
10. Once the above data has been transmitted, use the command „ESC [F0] [0A] [n] [d1] ... [dn-1]“ from the “2D Bar code printing” section to print 2D bar codes.

2.2.34 2D Bar code printing**ESC [F0] [0A] [n] [d1] ... [dn]**

[Name]	2D Bar code printing (Note: Advanced Firmware Set only)			
[Function]	This command encodes and prints a 2D bar code whose configuration has already been determined.			
[Code]	[1B] ¹⁶	[F0] ¹⁶	[0A] ¹⁶	[n] [d1] ... [dn]
	[27] ¹⁰	[240] ¹⁰	[10] ¹⁰	[n] [d1] ... [dn]

[Description]

1. Command „ESC [F0] [0A] [n] [d1] ... [dn]“ Encodes and prints a 2D bar code whose configuration has already been determined. This command does not configure the 2D bar code itself. See “2D Bar code configuration” for the details on configuring the 2D bar code. The XPM printer will determine and print the bar code based on the settings from the “2D Bar code configuration” command and the data sent to it for encoding by this command. The XPM is also capable of printing any bar code of appropriate resolution sent to it as a graphics file.
2. Parameter [n] specifies the number of bytes to be encoded, plus itself. For example, if there are 8 bytes of actual data to be encoded, n = 9. [d1] ... [dn] is the actual data to be encoded in the 2D bar code. If there are fewer than 255 bytes of data to be encoded, the bar code will print after receipt of the last data byte.
3. If parameter [n] = [256]¹⁰, then there are 255 bytes of data to be encoded. In order to allow for larger bar codes than 255 bytes, the bar code will not print if [n] = [256]¹⁰. The XPM printer will wait for an additional „ESC [F0] [0A] [n] [d1] ... [dn]“ command, and will print when the last „ESC [F0] [0A] [n] [d1] ... [dn]“ command has a value of [n] < 256. If the amount of data to be encoded is exactly 255 bytes, then a second „ESC [F0] [0A] [n] [d1] ... [dn]“ command must be send with [n] = 1 and no data following it.

2.2.35 Request printer data packet

GS 'a' [n1] [n2]

[Name] Request printer data
 [Function] This command requests that the printer report data
 [Code] [1D]¹⁶ [61]¹⁶ [n1] [n2]
 [29]¹⁰ [97]¹⁰ [n1] [n2]

[Description]

1. The „GS 'a' [n1] [n2]“ requests the printer to transmit one ore more data packets back to the host.
2. Parameter [n1] [n2] determines which data packets requested from the printer, based on the following chart. The exact content of these packets is documented below. Note that any combination of data packets can be requested and that requested data packets are send in chronological order.

Parameter [n1] [n2], Bit #	Value	Data Packet Request
b0 (LSB)	0	No effect
	1	Request printer status packet
b1	0	No effect
	1	Request printer info packet
b2	0	No effect
	1	Request printer sensor packet
b3	0	No effect
	1	Request flash info packet
b4	0	No effect
	1	Request feeder status packet
b5	0	No effect
	1	Request barcode data packet
b6	0	No effect
	1	Request presenter data packet
b7	0	No effect
	1	Request life data packet
b8	0	No effect
	1	Request multi barcode data packet (available for firmware R2-V1.01f and up)
b9	0	No effect
	1	Request ticket monitoring data packet (available from firmware R2-V1.01i and up)
b10-b14	Reserved (must be 0)	
b15 (MSB)	0	Include header in data packet response
	1	Omit header in data packet response

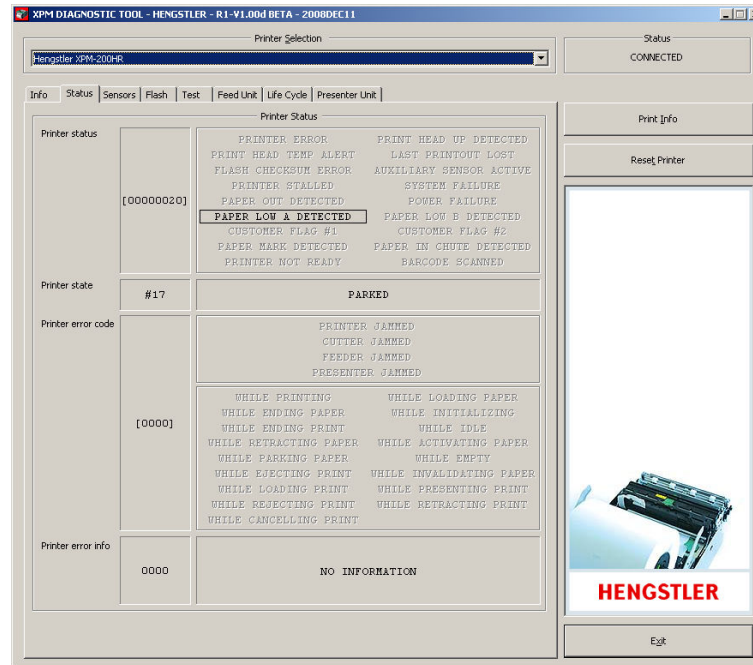
3. All Status Packets will send their results in the sequence shown in their respective charts.

PRINTER STATUS PACKET „[1B] [FF] [02] [m] [d1] ... [dn]“																																																																	
Description	# Bytes	Definition																																																															
Header (optional)	4	[1B] [FF] [02] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [02] ¹⁶ indicates a Printer Status Packet.																																																															
Printer Status Summary	4	Each of the 32 bits of the Printer Status Summary (DWORD) is available as a flag for the following purposes.																																																															
		<table border="1"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0</td> <td>Printer error flag</td> <td>0 = no printer error 1 = printer error</td> </tr> <tr> <td>1</td> <td>Printhead over temperature alert;</td> <td>0 = not over temperature 1 = over temperature</td> </tr> <tr> <td>2</td> <td>Flash checksum error</td> <td>0 = no flash checksum error 1 = flash checksum error</td> </tr> <tr> <td>3</td> <td>Printer stalled</td> <td>0 = printer not stalled 1 = printer stalled</td> </tr> <tr> <td>4</td> <td>Paper out detected</td> <td>0 = paper available 1 = paper out (in at least one paper path)</td> </tr> <tr> <td>5</td> <td>Paper low A detected</td> <td>0 = paper not low 1 = paper low (in at least one paper path)</td> </tr> <tr> <td>6</td> <td>Paper mark detected</td> <td>0 = paper mark not detected 1 = paper mark detected</td> </tr> <tr> <td>7</td> <td>Paper in chute detected</td> <td>0 = paper not in chute 1 = paper in chute detected</td> </tr> <tr> <td>8</td> <td>Printhead raised detected</td> <td>0 = printhead not raised 1 = printhead raised</td> </tr> <tr> <td>9</td> <td>Last printout lost</td> <td>0 = last printout not lost 1 = last printout lost</td> </tr> <tr> <td>10</td> <td>Auxiliary sensor active</td> <td>0 = aux. sensor not active 1 = aux. sensor active</td> </tr> <tr> <td>11</td> <td>System failure</td> <td>0 = no system failure 1 = system failure</td> </tr> <tr> <td>12</td> <td>Power failure</td> <td>0 = no power failure 1 = power failure</td> </tr> <tr> <td>13</td> <td>Customer flag #1</td> <td>0 = flag #1 not set 1 = flag #1 set</td> </tr> <tr> <td>14</td> <td>Customer flag #2</td> <td>0 = flag #2 not set 1 = flag #2 set</td> </tr> <tr> <td>15</td> <td>Printer not ready to print (Note that any print data transmitted while this bit is high will be ignored)</td> <td>0 = printer ready 1 = printer not ready</td> </tr> <tr> <td>16</td> <td>Paper low B detected</td> <td>0 = paper not low 1 = paper low (in at least one paper path)</td> </tr> <tr> <td>17</td> <td>Barcode detected</td> <td>0 = no barcode data buffered 1 = barcode data buffered</td> </tr> <tr> <td>18</td> <td>Print unit empty</td> <td>0 = print unit has paper 1 = print unit has no paper</td> </tr> <tr> <td>19 - 31</td> <td>Reserved for future use</td> <td>N/A</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0	Printer error flag	0 = no printer error 1 = printer error	1	Printhead over temperature alert;	0 = not over temperature 1 = over temperature	2	Flash checksum error	0 = no flash checksum error 1 = flash checksum error	3	Printer stalled	0 = printer not stalled 1 = printer stalled	4	Paper out detected	0 = paper available 1 = paper out (in at least one paper path)	5	Paper low A detected	0 = paper not low 1 = paper low (in at least one paper path)	6	Paper mark detected	0 = paper mark not detected 1 = paper mark detected	7	Paper in chute detected	0 = paper not in chute 1 = paper in chute detected	8	Printhead raised detected	0 = printhead not raised 1 = printhead raised	9	Last printout lost	0 = last printout not lost 1 = last printout lost	10	Auxiliary sensor active	0 = aux. sensor not active 1 = aux. sensor active	11	System failure	0 = no system failure 1 = system failure	12	Power failure	0 = no power failure 1 = power failure	13	Customer flag #1	0 = flag #1 not set 1 = flag #1 set	14	Customer flag #2	0 = flag #2 not set 1 = flag #2 set	15	Printer not ready to print (Note that any print data transmitted while this bit is high will be ignored)	0 = printer ready 1 = printer not ready	16	Paper low B detected	0 = paper not low 1 = paper low (in at least one paper path)	17	Barcode detected	0 = no barcode data buffered 1 = barcode data buffered	18	Print unit empty	0 = print unit has paper 1 = print unit has no paper	19 - 31	Reserved for future use	N/A
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	(MSB)		
Status Parameter	1	If a print job completed correctly, this will be the character previously sent to the printer using the FS r [n] command.	
Printhead Temperature	2	Printhead temperature in degrees Celsius. Note that this is a 16-bit signed integer, allowing for both positive and negative numbers. The bytes are sent LSB, MSB.	
Control Board Voltage	2	Control board supply voltage in tenths of a volt. Note that this is a 16-bit unsigned integer. The bytes are sent LSB, MSB.	
Printer Control State	1	Internal printer control state (undocumented).	
Error Code	2	If non zero, then this 16 bit error code informs about "WHAT" printer error "WHEN" occurred.	
		Bit #	Definition
		Value	
	(LSB) 0 - 7	Error byte which indicates "WHAT" causes the error if non zero	0 = no error 1 = paper jammed 2 = cutter jammed 3 = feeder jammed 4 = presenter jammed
	8 - 15 (MSB)	Error byte which indicates "WHEN" the error occurred	0 = no information 1 = while printing 2 = while loading paper 3 = while ending paper 4 = while initializing 5 = while ending print 6 = while idle 7 = while retracting paper 8 = while activating paper 9 = while parking paper 10 = while empty 11 = while ejecting print 12 = while invalidating print 13 = while loading print 14 = while presenting print 15 = while rejecting print 16 = while retracting print 17 = while canceling print
Error Info	2	Detailed error number (for future use)	

NOTES regarding PRINTER STATUS PACKET

The "Xpm-DiagnosticTool" periodically inquires the PRINTER STATUS PACKET and displays most of it's contents in the "Status" tab.



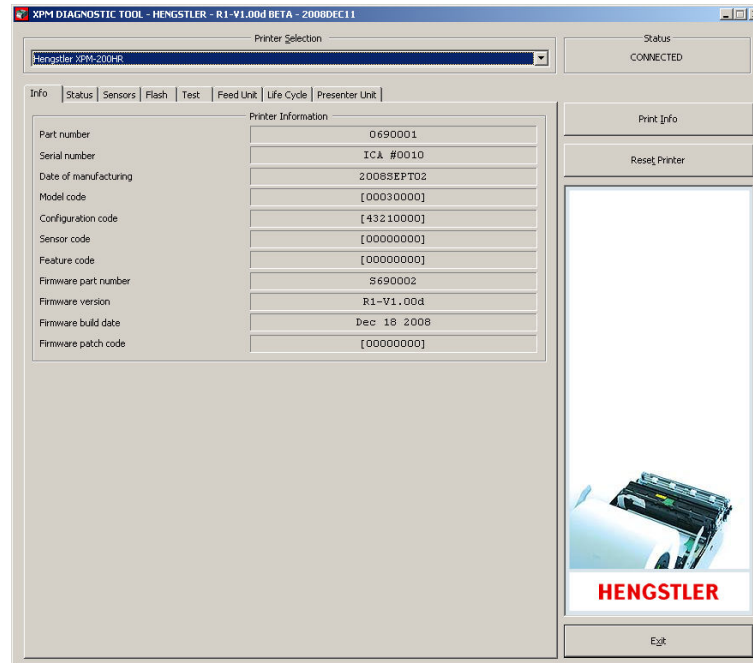
Structure `TS_XPM_API_PCKT_PRINTER_STATUS` in file "Api.h" of the XPM Windows XP Printer Driver defines the PRINTER STATUS PACKET

PRINTER INFO PACKET „[1B] [FF] [03] [m] [d1] ... [dn]“																													
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Header (optional)	4	[1B] [FF] [03] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [03] indicates a Printer Info Packet.																											
Revision No.	1	This byte contains the data packet revision number.																											
Printer Part Number	16+1	The first 16 bytes of this string contain the printer part number in ASCII format. The last byte is a NUL character, which acts as a string terminator.																											
Printer Serial Number	16+1	The first 16 bytes of this string contain the printer serial number in ASCII format. The last byte is a NUL character, which acts as a string terminator.																											
Date of Manufacture	16+1	The first 16 bytes of this string contain the printer's date of manufacture in ASCII format. The last byte is a NUL character, which acts as a string terminator.																											
System Model	4	The 32 bit value identifies the printer model type according to following bit mask: <table border="1" data-bbox="512 875 1418 1137"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0 - 15</td> <td>Reserved for future use</td> <td>N/A</td> </tr> <tr> <td>16 - 31 (MSB)</td> <td>Model type</td> <td>[0000]¹⁶ = XPM-80 [0001]¹⁶ = XPM-200 [0002]¹⁶ = XPM-200HR [FFFF]¹⁶ = Custom</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0 - 15	Reserved for future use	N/A	16 - 31 (MSB)	Model type	[0000] ¹⁶ = XPM-80 [0001] ¹⁶ = XPM-200 [0002] ¹⁶ = XPM-200HR [FFFF] ¹⁶ = Custom																		
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(LSB) 0 - 15	Reserved for future use	N/A																											
16 - 31 (MSB)	Model type	[0000] ¹⁶ = XPM-80 [0001] ¹⁶ = XPM-200 [0002] ¹⁶ = XPM-200HR [FFFF] ¹⁶ = Custom																											
System Configuration	4	This 32 bit value identifies the printer configuration according to following bit mask: <table border="1" data-bbox="512 1261 1418 1957"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0 - 3</td> <td>Reserved for future use</td> <td>N/A</td> </tr> <tr> <td>4 - 7</td> <td>Presenter unit identification</td> <td>0 = none</td> </tr> <tr> <td>8 - 11</td> <td>Scanner unit identification</td> <td>0 = none 1 = barcode scanner</td> </tr> <tr> <td>12 - 15</td> <td>Feed unit identification</td> <td>0 = none 1 = dual feed unit</td> </tr> <tr> <td>16 - 19</td> <td>Cutter identification</td> <td>0 = none 1 = pizza cutter</td> </tr> <tr> <td>20 - 23</td> <td>Communication port identification</td> <td>0 = undefined 1 = RS-232 2 = USB 1.1</td> </tr> <tr> <td>24 - 27</td> <td>Operating voltage identification</td> <td>0 = undefined 1 = 8 VDC 2 = 12 VDC 3 = 24 VDC</td> </tr> <tr> <td>28 - 31 (MSB)</td> <td>Print head type identification</td> <td>0 = undefined 1 = R/T - 80 mm – 640 dot 2 = <TBD> 3 = <TBD></td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0 - 3	Reserved for future use	N/A	4 - 7	Presenter unit identification	0 = none	8 - 11	Scanner unit identification	0 = none 1 = barcode scanner	12 - 15	Feed unit identification	0 = none 1 = dual feed unit	16 - 19	Cutter identification	0 = none 1 = pizza cutter	20 - 23	Communication port identification	0 = undefined 1 = RS-232 2 = USB 1.1	24 - 27	Operating voltage identification	0 = undefined 1 = 8 VDC 2 = 12 VDC 3 = 24 VDC	28 - 31 (MSB)	Print head type identification	0 = undefined 1 = R/T - 80 mm – 640 dot 2 = <TBD> 3 = <TBD>
Bit #	Definition	Value																											
(LSB) 0 - 3	Reserved for future use	N/A																											
4 - 7	Presenter unit identification	0 = none																											
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28 - 31 (MSB)	Print head type identification	0 = undefined 1 = R/T - 80 mm – 640 dot 2 = <TBD> 3 = <TBD>																											
System Sensors	4	This 32 bit value identifies the sensors within the printer according to following bit mask:																											

Bit #	Definition	Value
0 (LSB) - 15	Reserved for future use	N/A
16 – 19	Paper entry sensor #1	0 = reflex sensor 1 = through-beam/light sensor
20 - 23	Paper entry sensor #2	0 = none 1 = reflex sensor 2 = through-beam/light sensor
24 – 27	Head up sensor	0 = switch
28 - 31 (MSB)	Paper exit sensor	0 = through-beam/light sensor
System Features	4	This 32 bit value identifies the enabled/disabled system features according to following bit mask:
Bit #	Definition	Value
(LSB) 0 – 11	Reserved for future use	N/A
12 – 15	Firmware features	0 = Advanced configuration 1 = Basic configuration
16 – 19	Maximum print speed	0 = 250 mm/sec 1 = 130 mm/sec
20 – 23	Temperature/humidity ratings	0 = Maximum temp/humidity range 1 = Limited temp/humidity range
24 - 31 (MSB)	Warranty period	00 = undefined 01 = 0.5 years 02 = 1 year 03 = 1.5 years 04 = 2.0 years 05 = 2.5 years 06 = 3.0 years
Firmware Part Number	16+1	The first 16 bytes of this string contain the firmware part number in ASCII format. The last byte is a NUL character, which acts as a string terminator.
Firmware Version Number	10+1	The first 10 bytes of this string contain the firmware version number in ASCII format in the form "Rx-Vy.zzb". The last byte is a NUL character, which acts as a string terminator.
Firmware Date	12+1	The first 12 bytes of this string contain the firmware date in ASCII format in the form "mmm dd yyyy". The last byte is a NUL character, which acts as a string terminator.
Firmware Patch Code	4	Special bit mask used to enable specific firmware patches.
Reserved	4	Reserved for future use.

NOTES regarding PRINTER INFO PACKET

The "Xpm-DiagnosticTool" periodically inquires the PRINTER INFO PACKET and displays most of its contents in the "Info" tab.



Structure `TS_XPM_API_PCKT_PRINTER_INFO` in file "Api.h" of the XPM Windows XP Printer Driver defines the PRINTER INFO PACKET.

PRINTER SENSOR PACKET „[1B] [FF] [04] [m] [d1] ... [dn]“											
Description	# Bytes	Definition									
Header (optional)	4	[1B] [FF] [04] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [04] indicates a Printer Sensor Packet.									
Revision No.	1	This byte contains the data packet revision number.									
Analog Sensor Values	16	These 16 8-bit, unsigned characters contain the analog value of their corresponding sensors. A value of 0 = 0 volts, while a value of 255 = 5 volts. They are transmitted in the sequence analog sensor ADC #00 to ADC #15. Some of these are likely to be unused in any given XPM printer.									
Digital Sensor Values	2	This 16-bit, unsigned integer contains the status of digital sensors DIN #00 to DIN #15 as bits, with DIN #00 being the LSB.									
Printhead Temperature	2	Printhead temperature in degrees Celsius. Note that this is a 16-bit signed integer, allowing for both positive and negative numbers. The bytes are sent LSB, MSB.									
Control Board Voltage	2	Control board supply voltage in tenths of a volt. Note that this is a 16-bit unsigned integer. The bytes are sent LSB, MSB.									
Paper pre-end sensor A state	3 * 1	This bitmask identifies the status of the paper pre end A sensor of up to 3 paper paths (ADC#03/06/--) according to following bitmask: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0 – 3</td> <td>State of the sensor</td> <td>0 = no data 1 = no paper 2 = paper present</td> </tr> <tr> <td>5 – 7 (MSB)</td> <td>Type of sensor</td> <td>0 = no sensor 1 = reflex sensor 2 = through-beam/light sensor 3 = switch</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present	5 – 7 (MSB)	Type of sensor	0 = no sensor 1 = reflex sensor 2 = through-beam/light sensor 3 = switch
Bit #	Definition	Value									
(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present									
5 – 7 (MSB)	Type of sensor	0 = no sensor 1 = reflex sensor 2 = through-beam/light sensor 3 = switch									
Paper pre-end sensor B	3 * 1	This bitmask identifies the status of the paper pre end B sensor of up to 3 paper paths (DIN#06/07/--) according to following bitmask: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0 – 3</td> <td>State of the sensor</td> <td>0 = no data 1 = no paper 2 = paper present</td> </tr> <tr> <td>5 – 7 (MSB)</td> <td>Type of sensor</td> <td>0 = no sensor 3 = switch</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present	5 – 7 (MSB)	Type of sensor	0 = no sensor 3 = switch
Bit #	Definition	Value									
(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present									
5 – 7 (MSB)	Type of sensor	0 = no sensor 3 = switch									
Paper-path-key state	3 * 1	This bitmask identifies the status of the paper path keys of up to 3 paper paths (DIN#04/05/--) in the feed unit according to following bitmask: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0 – 3</td> <td>State of the sensor</td> <td>0 = no data 9 = pressed 10 = released</td> </tr> <tr> <td>5 – 7 (MSB)</td> <td>Type of sensor</td> <td>0 = no sensor 3 = switch</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0 – 3	State of the sensor	0 = no data 9 = pressed 10 = released	5 – 7 (MSB)	Type of sensor	0 = no sensor 3 = switch
Bit #	Definition	Value									
(LSB) 0 – 3	State of the sensor	0 = no data 9 = pressed 10 = released									
5 – 7 (MSB)	Type of sensor	0 = no sensor 3 = switch									

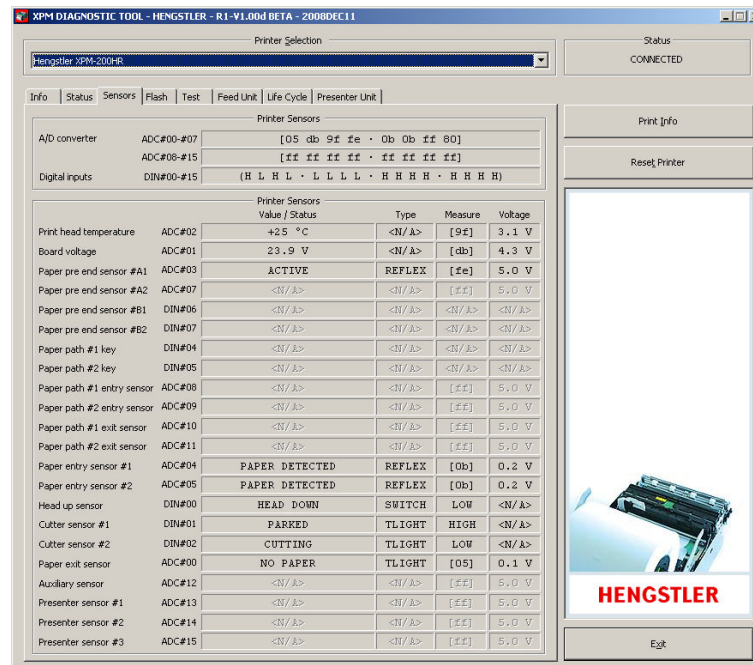
Paper-path-entry sensor state	3 * 1	This bitmask identifies the status of the paper path entry sensors of up to 3 paper paths (ADC#08/09/--) in the feed unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present
	5 – 7 (MSB)	Type of sensor	0 = no sensor 2 = through-beam/light sensor
Paper-path-exit sensor state	3 * 1	This bitmask identifies the status of the paper path exit sensors of up to 3 paper paths (ADC#10/11/--) in the feed unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present
	5 – 7 (MSB)	Type of sensor	0 = no sensor 2 = through-beam/light sensor
Paper-entry sensor #1 state	1	This bitmask identifies the status of the paper entry sensor #1 (ADC#04) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present
	5 – 7 (MSB)	Type of sensor	1 = reflex sensor 2 = through-beam/light sensor
Paper-entry sensor #2 state	1	This bitmask identifies the status of the paper entry sensor #2 (ADC#05) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present
	5 – 7 (MSB)	Type of sensor	0 = no sensor 1 = reflex sensor 2 = through-beam/light sensor
Print-head-up sensor state	1	This bitmask identifies the status of the print-head-up sensor (DIN#00) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 5 = print head down 6 = print head up
	5 – 7 (MSB)	Type of sensor	3 = switch

Cutter-sensor #1 state	1	This bitmask identifies the status of the cutter sensor #1 (right sensor) (DIN#01) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 3 = parked 4 = cutting
	5 – 7 (MSB)	Type of sensor	0 = no sensor 2 = through-beam/light sensor
Cutter-sensor #2 state	1	This bitmask identifies the status of the cutter sensor #2 (left sensor) (DIN#02) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 3 = parked 4 = cutting
	5 – 7 (MSB)	Type of sensor	0 = no sensor 2 = through-beam/light sensor
Paper-exit sensor state	1	This bitmask identifies the status of the paper entry exit sensor (ADC#00) in the print unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = no paper 2 = paper present
	5 – 7 (MSB)	Type of sensor	2 = through-beam/light sensor
Auxiliary sensor state	1	This bitmask identifies the status of the auxiliary sensor (ADC#12) according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 7 = active 8 = inactive
	5 – 7 (MSB)	Type of sensor	0 = no sensor 1 = reflex sensor 2 = through-beam/light sensor 3 = switch
Presenter sensor #1 state	1	This bitmask identifies the status of the presenter sensor #1 (ADC#13) in the presenter unit according to following bitmask:	
	Bit #	Definition	Value
	(LSB) 0 – 3	State of the sensor	0 = no data 1 = not active 2 = active
	5 – 7 (MSB)	Type of sensor	2 = through-beam/light sensor

Presenter sensor #2 state	1	This bitmask identifies the status of the presenter sensor #2 (ADC#14) in the presenter unit according to following bitmask:		
		Bit #	Definition	Value
		(LSB) 0 – 3	State of the sensor	0 = no data 1 = not active 2 = active
	5 – 7 (MSB)	Type of sensor	2 = through-beam/light sensor	
Presenter sensor #3 state	1	This bitmask identifies the status of the presenter sensor #3 (ADC#15) in the presenter unit according to following bitmask:		
		Bit #	Definition	Value
		(LSB) 0 – 3	State of the sensor	0 = no data 1 = not active 2 = active
	5 – 7 (MSB)	Type of sensor	2 = through-beam/light sensor	
Reserved	5	Reserved for future use		

NOTES regarding PRINTER SENSOR PACKET

The “Xpm-DiagnosticTool” periodically inquires the PRINTER SENSOR PACKET and displays most of it’s contents in the “Sensors” tab.



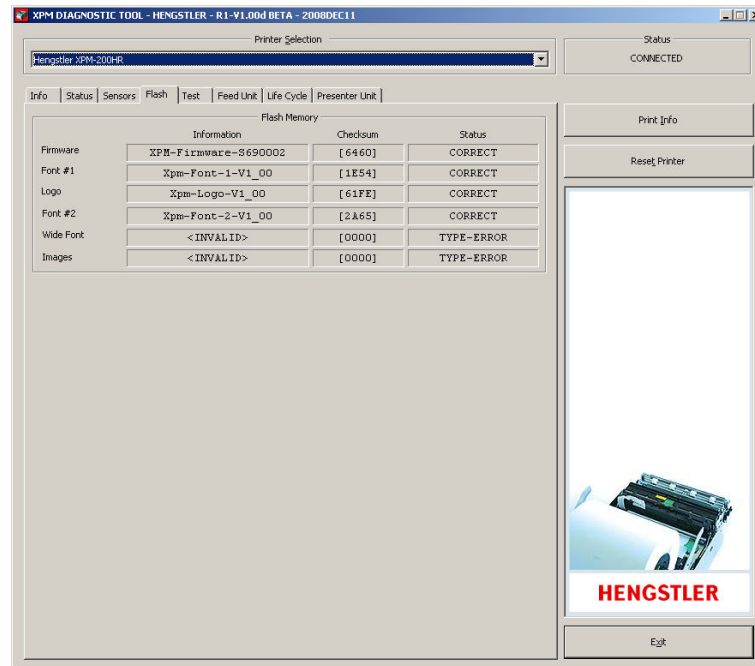
Structure `TS_XPM_API_PCKT_PRINTER_SENSOR` in file “Api.h” of the XPM Windows XP Printer Driver defines the PRINTER INFO PACKET.

FLASH INFO PACKET „[1B] [FF] [05] [m] [d1] ... [dn]“																
Description	# Bytes	Definition														
Header (optional)	4	[1B] [FF] [05] [m], where [m] is the number of bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [05] indicates a Flash Info Packet.														
Revision No.	1	This byte contains the data packet revision number.														
Flash area info	6 * (20+1)	This data field contains plain zero terminated text describing the contents of following flash areas:														
		<table border="1"> <thead> <tr> <th>Offset</th> <th>Flash Area</th> </tr> </thead> <tbody> <tr> <td>0 * (20+1)</td> <td>Firmware area</td> </tr> <tr> <td>1 * (20+1)</td> <td>Font area #1</td> </tr> <tr> <td>2 * (20+1)</td> <td>Firmware logo area</td> </tr> <tr> <td>3 * (20+1)</td> <td>Font area #2</td> </tr> <tr> <td>4 * (20+1)</td> <td>Wide font area (e.g. chinese / korean)</td> </tr> <tr> <td>5 * (20+1)</td> <td>Image area</td> </tr> </tbody> </table>	Offset	Flash Area	0 * (20+1)	Firmware area	1 * (20+1)	Font area #1	2 * (20+1)	Firmware logo area	3 * (20+1)	Font area #2	4 * (20+1)	Wide font area (e.g. chinese / korean)	5 * (20+1)	Image area
		Offset	Flash Area													
		0 * (20+1)	Firmware area													
		1 * (20+1)	Font area #1													
		2 * (20+1)	Firmware logo area													
		3 * (20+1)	Font area #2													
		4 * (20+1)	Wide font area (e.g. chinese / korean)													
5 * (20+1)	Image area															
Flash area checksum	6 * 2	This data field contains the 16 bit checksum of each following flash areas:														
Flash area status	6 * 1	This data field contains the status of each following flash areas:														
		<table border="1"> <thead> <tr> <th>Offset</th> <th>Flash Area</th> </tr> </thead> <tbody> <tr> <td>0 * 2</td> <td>Firmware area</td> </tr> <tr> <td>1 * 2</td> <td>Font area #1</td> </tr> <tr> <td>2 * 2</td> <td>Firmware logo area</td> </tr> <tr> <td>3 * 2</td> <td>Font area #2</td> </tr> <tr> <td>4 * 2</td> <td>Wide font area (e.g. chinese / korean)</td> </tr> <tr> <td>5 * 2</td> <td>Image area</td> </tr> </tbody> </table>	Offset	Flash Area	0 * 2	Firmware area	1 * 2	Font area #1	2 * 2	Firmware logo area	3 * 2	Font area #2	4 * 2	Wide font area (e.g. chinese / korean)	5 * 2	Image area
		Offset	Flash Area													
		0 * 2	Firmware area													
		1 * 2	Font area #1													
		2 * 2	Firmware logo area													
		3 * 2	Font area #2													
		4 * 2	Wide font area (e.g. chinese / korean)													
5 * 2	Image area															
... whereas the status of a flash area can be one of following:																
<table border="1"> <thead> <tr> <th>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Flash area contains no data (undefined)</td> </tr> <tr> <td>1</td> <td>All data within the flash area is validated and regarded correct</td> </tr> <tr> <td>2</td> <td>Data in the flash area is regarded corrupted (checksum error)</td> </tr> <tr> <td>4</td> <td>Type of data stored within the flash area is incorrect</td> </tr> </tbody> </table>	Value	Status	0	Flash area contains no data (undefined)	1	All data within the flash area is validated and regarded correct	2	Data in the flash area is regarded corrupted (checksum error)	4	Type of data stored within the flash area is incorrect						
Value	Status															
0	Flash area contains no data (undefined)															
1	All data within the flash area is validated and regarded correct															
2	Data in the flash area is regarded corrupted (checksum error)															
4	Type of data stored within the flash area is incorrect															

	5	Size of data stored within the flash area is incorrect.
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NOTES regarding FLASH INFO PACKET

The “Xpm-DiagnosticTool” periodically inquires the FLASH INFO PACKET and displays most of it’s contents in the “Flash” tab.

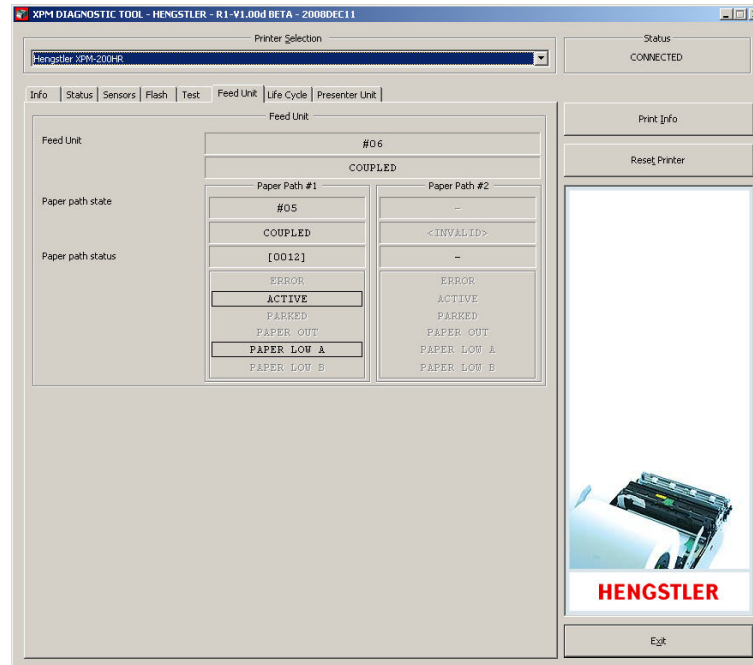


Structure `TS_XPM_API_PCKT_PRINTER_FLASH` in file “Api.h” of the XPM Windows XP Printer Driver defines the FLASH INFO PACKET.

FEEDER STATUS PACKET „[1B] [FF] [06] [m] [d1] ... [dn]“				
Description	# Bytes	Definition		
Header (optional)	4	[1B] [FF] [06] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [06] indicates a Feeder Status Packet.		
Revision No.	1	This byte contains the data packet revision number.		
Presenter Type	1	Type of presenter (0 = none)		
Presenter Status	1	Internal feed unit control state (undocumented).		
Number of Paper Paths	1	Total number of available paper paths in the feed unit. Note that this value will be 2 for a dual feed unit and 1 if no feed unit is available.		
Paper Path Status Summary	3 * 2	Each of the 16 bits of the Paper Path Status Summary (WORD) is available as a flag for the following purposes.		
		Bit #	Definition	Value
		(LSB) 0	Path error flag	0 = no paper error 1 = paper error
		1	Paper active indicator	0 = paper is not active 1 = paper is active
		2	Paper parked indicator	0 = paper is not parked 1 = paper is parked
		3	Paper out indicator	0 = paper is available 1 = paper is out
		4	Paper low A detected	0 = sensor A does not detect paper low 1 = sensor A detects paper low
		5	Paper low B detected	0 = sensor B does not detect paper low 1 = sensor B detects paper low
		6 - 15 (MSB)	Reserved for future use	N/A
Paper Path State	3 * 1	Internal paper path control state (undocumented).		
Reserved	8	Reserved for future use		

NOTES regarding the FEEDER STATUS PACKET

The “Xpm-DiagnosticTool” periodically inquires the FEEDER STATUS PACKET and displays most of its contents in the “Feed Unit” tab.



Structure TS_XPM_API_PCKT_PRINTER_FEED in file “Api.h” of the XPM Windows XP Printer Driver defines the PRINTER INFO PACKET.

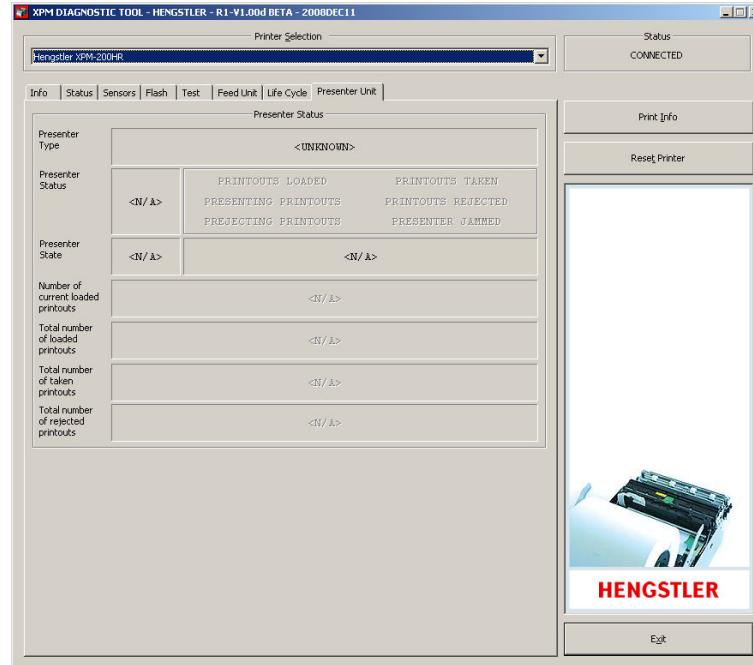
BARCODE DATA PACKET „[1B] [FF] [07] [m] [d1] ... [dn]“

Description	# Bytes	Definition
Header (optional)	4	[1B] [FF] [07] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [07] indicates a Barcode Data Packet.
Barcode	0-N	This variable length data field represents the oldest barcode which is stored within the barcode read buffer. The barcode is automatically removed from the barcode buffer when the barcode has send in this data packet. This data field will be empty (e.g. [m] is 0), when the barcode buffer is empty.

PRESENTER STATUS PACKET „[1B] [FF] [08] [m] [d1] ... [dn]“				
Description	# Bytes	Definition		
Header (optional)	4	[1B] [FF] [08] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [08] indicates a Presenter Status Packet.		
Revision No.	1	This byte contains the data packet revision number.		
Presenter Status Summary	2	Each of the 16 bits of the Presenter Status Summary (WORD) is available as a flag for the following purposes.		
		Bit #	Definition	Value
		(LSB) 0	Printouts loaded	0 = no printouts loaded 1 = printouts loaded
		1	Presenting printouts	0 = not presenting printouts 1 = presenting printouts
		2	Rejecting printouts	0 = not rejecting printouts 1 = rejecting printouts
		3	Printouts taken	0 = last printouts not taken 1 = last printouts regarded taken
		4	Printouts rejected	0 = last printouts not rejected 1 = last printouts rejected
		5	Presenter jammed	0 = presenter not jammed 1 = presenter jammed
		6 - 15 (MSB)	Reserved for future use	N/A
Presenter Unit State	1	Internal presenter unit control state (undocumented).		
Number Of Loaded Printouts	1	Total number of currently loaded printouts		
Total Number Of Loaded Printouts	4	Total number of printouts loaded since power on		
Total Number Of Taken Printouts	4	Total number of taken printouts since power on		
Total Number Of Rejected Printouts	4	Total number of rejected printouts since power on		
Reserved	3	Reserved for future use		

NOTES regarding the PRESENTER STATUS PACKET

The "Xpm-DiagnosticTool" periodically inquires the PRESENTER STATUS PACKET and displays most of it's contents in the "Presenter Unit" tab.

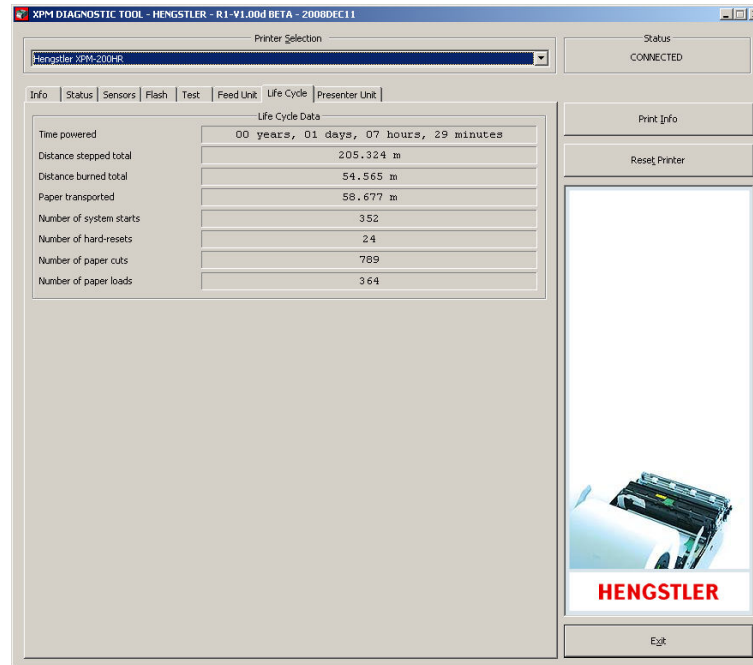


Structure `TS_XPM_API_PCKT_PRINTER_PRESENTER` in file "Api.h" of the XPM Windows XP Printer Driver defines the PRESENTER STATS PACKET.

LIFE DATA PACKET „[1B] [FF] [09] [m] [d1] ... [dn]“		
Description	# Bytes	Definition
Header (optional)	4	[1B] [FF] [09] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [08] indicates a Life Data Packet.
Revision No.	1	This byte contains the data packet revision number.
Total Time Powered	4	Total time that the printer was powered in seconds
Total Distance Stepped	4	Total distance that the printer has stepped it's print unit motor both forward and backward in millimeter
Total Distance Burned	4	Total distance that the printer has stepped it's print unit motor whereas the printhead was powered (printing) in millimeter
Total Paper Transported	4	Total length of paper that the printer has transported in forward direction in millimeter
Total Number Of System Starts	4	Total number of system starts (power on / hard reset / watchdog)
Total Number Of Hard Resets	4	Total number of hard resets issued by the host system
Total Number Of Paper Cuts	4	Total number of performed paper cuts
Total Number Of Paper Loads	4	Total number of performed paper loads
Reserved	3	Reserved for future use

NOTES regarding the LIFE DATA PACKET

The "Xpm-DiagnosticTool" periodically inquires the LIFE DATA PACKET and displays most of its contents in the "Life Cycle" tab.



Structure `TS_XPM_API_PCKT_PRINTER_LIFE` in file "Api.h" of the XPM Windows XP Printer Driver defines the LIFE DATAPACKET.

Note that the cycle life data is stored in the EEPROM of the controller board and that it is valid only when both printer and controller remain in the originally manufactured condition. If, for example, a repair of a printer requires a replacement of the controller, then the life cycle data in the controllers EEPROM will definitely not match the condition of the printer.

TICKET MONITORING PACKET „[1B] [FF] [0A] [m] [d1] ... [dn]“																										
Description	# Bytes	Definition																								
Header (optional)	4	[1B] [FF] [0A] [m], where [m] is the number of data bytes following the [m]. Note that the first two header bytes are the same for all data packets, while byte 3 defines the type of packet. Here, the [0A] indicates a Ticket Monitoring Packet.																								
Revision No.	1	This byte contains the data packet revision number.																								
Ticket Identifier	1	Identifier of the current or previous ticket printed in domain [0..15]. The ticket identifier can be set with use of the “page header” command. The ticket identifier is automatically increased at start of print when no page header command has been received. The ticket identifier is stored in EEPROM and will be loaded from EEPROM at power on.																								
Ticket Length	2	Length of the current or previous ticket in mm or -1 if undefined. The ticket length is specified with use of the “page header” command. The ticket length is reset to -1 (undefined) when no page header command has been received or when power has been turned on.																								
Printed Length	2	Length of the printed area in the current or previous ticket in mm or -1 if undefined. The printed length is reset to 0 at start of printout and constantly updated. The ticket length is reset to -1 when power has been turned on.																								
Printed Area Min	1	Minimum percentage of the current or previous ticket that has been printed or -1 if undefined. The printed area is reset to -1 (undefined) when no page header command has been received previously. The ticket identifier is stored in EEPROM (only 0%, 1%, 20%, 40%, 60%, 80% and 100%)and will be loaded from EEPROM at power on.																								
Printed Area Max	1	Maximum percentage of the current or previous ticket that has been printed or -1 if undefined. The printed area is reset to -1 (undefined) when no page header command has been received previously. The ticket identifier is stored in EEPROM (only 0%, 1%, 20%, 40%, 60%, 80% and 100%)and will be loaded from EEPROM at power on.																								
Ticket Status	2	Each of the 16 bits of the Ticket Status Summary (WORD) is available as a flag for the following purposes.																								
		<table border="1"> <thead> <tr> <th>Bit #</th> <th>Definition</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>(LSB) 0</td> <td>Busy</td> <td>0 = not printing, not cutting and not presenting 1 = printing, cutting or presenting</td> </tr> <tr> <td>1</td> <td>Completed</td> <td>0 = no data or busy 1 = printing, cutting and presenting of previous ticket was successful</td> </tr> <tr> <td>2</td> <td>Failed</td> <td>0 = no data or busy 1 = printing, cutting or presenting of previous ticket failed</td> </tr> <tr> <td>3</td> <td>Printed</td> <td>0 = no data or printing 1 = ticket printing succeeded</td> </tr> <tr> <td>4</td> <td>Cuttet</td> <td>0 = no data, printing or cutting 1 = ticket cutting succeeded</td> </tr> <tr> <td>5</td> <td>Loaded (presenter)</td> <td>0 = no data, printing, cutting or loading 1 = ticket successfully loaded into the presenter</td> </tr> <tr> <td>6</td> <td>Presented (presenter)</td> <td>0 = no data, printing, cutting, loading or ejecting</td> </tr> </tbody> </table>	Bit #	Definition	Value	(LSB) 0	Busy	0 = not printing, not cutting and not presenting 1 = printing, cutting or presenting	1	Completed	0 = no data or busy 1 = printing, cutting and presenting of previous ticket was successful	2	Failed	0 = no data or busy 1 = printing, cutting or presenting of previous ticket failed	3	Printed	0 = no data or printing 1 = ticket printing succeeded	4	Cuttet	0 = no data, printing or cutting 1 = ticket cutting succeeded	5	Loaded (presenter)	0 = no data, printing, cutting or loading 1 = ticket successfully loaded into the presenter	6	Presented (presenter)	0 = no data, printing, cutting, loading or ejecting
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		5	Loaded (presenter)	0 = no data, printing, cutting or loading 1 = ticket successfully loaded into the presenter																						
6	Presented (presenter)	0 = no data, printing, cutting, loading or ejecting																								

			1 = ticket successfully presented
	7	Ejected or Taken	0 = no data, printing, cutting, loading, ejecting or presenting 1 = ticket successfully ejected or taken
	8	Rejected (Presenter)	0 = no data, printing, cutting, loading, ejecting, presenting or rejecting 1 = ticket successfully rejected
	9 - 15 (MSB)	Reserved for future use	N/A
Reserved	4	Reserved for future use	

4. There may be a delay between reception of the GS A [n1] [n2] command and the transmission of the status information.
5. A temperature alert will occur when print head temperature exceeds 70°C. In this case no printing should be done until the printhead temperature drops below 70°C. If a printout is initiated when the printhead temperature is above 70°C, there could be serious damage to the printer.
6. Customer flags are specified with the customer flags setting command.

2.2.36 Set status parameter**FS 'r' [n]**

[Name] Set status parameter

[Function] This command specifies a character which will be sent back to the host as part of the status information.

[Code] [1C]₁₆ [72]₁₆ [n]
[28]₁₀ [114]₁₀ [n]

[Description]

1. Command "FS 'r' [n]" is used to transmit a status parameter to the printer, which is sent back as part of the response to a "request printer status data" command („GS a [00]¹⁶ [01]¹⁶”).
2. This status parameter is specified by parameter [n].
3. The initial value for parameter [n] is [0]¹⁰.
4. The range of values for parameter [n] is $[0]^{10} \leq [n] \leq [255]^{10}$.
5. As soon as the status parameter is transmitted back to the host in response to the "Request printer status" command („GS A [00]¹⁶ [01]¹⁶”), the value of the status parameter is reset to [0]¹⁰.
6. This parameter can also be transmitted using the End of Page command.
7. Typically, this command is used at the end of a print job to verify that the printout has been completed successfully. First, FS r [n] is sent to set the status parameter, then GS A [00]¹⁶ [01]¹⁶ is used to generate a printer status packet response. If the value of the returned status parameter matches [n], then the print job has been successfully completed. If not, then the print job has been lost.
8. It is also common to increment the value of [n] with each print job so that the host can identify which print job was lost.

2.2.37 Print uncompressed graphics**ESC [F0] [02] [n]
[d1] ... [dn]**

[Name]	Print uncompressed graphics				
[Function]	This command generates a printout of a single dot line as uncompressed graphics.				
[Code]	[1B] ¹⁶	[F0] ¹⁶	[02] ¹⁶	[n] ¹⁶	[d1] ... [dn]
	[27] ¹⁰	[240] ¹⁰	[2] ¹⁰	[n] ¹⁰	[d1] ... [dn]

[Description]

1. Command „ESC [F0] [02] [n] [d1] ... [dn]“ defines and causes the printing of a single graphic dot line the full width of the printhead.
2. Parameter “n” specifies the number of bytes needed to fully define the graphic dot line. In the data that follows ([d1] ... [dn]), dn is therefore the last data byte of the encoded data. The values for “n” are as follows.

Printer Type	n ¹⁰	n ¹⁶
XPM-80, 203 dpi	80	50
XPM-200, 203 dpi	200	<TBD>
XPM-200HR, 300 dpi	324	<TBD>

3. Each bit of the data bytes [d1] to [dn] represents a dot on the thermal printhead. A dot is on if its corresponding bit is a “1” and off if it is a “0”.
4. The leftmost dot in a dot line is represented by the MSB of byte d1 (first data byte).
5. The rightmost dot in a dot line is represented by the LSB of byte dn (last data byte).
6. Any other print format settings (E.G., inverse, double width, etc.) have no effect on this command.

2.2.38 Print RLE8 compressed graphics

ESC [F0] [03] [n]
[d1] ... [dn]

[Name]	Print RLE8 compressed graphics				
[Function]	This command allows printout of a single graphic dot line that is RLE8 compressed.				
[Code]	[1B] ¹⁶	[F0] ¹⁶	[03] ¹⁶	[n] ¹⁶	[d1] ... [dn]
	[27] ¹⁰	[240] ¹⁰	[3] ¹⁰	[n] ¹⁰	[d1] ... [dn]

[Description]

1. Command „ESC [F0] [03] [n] [d1] ... [dn]“ specifies a single RLE8 compressed dot line of 640 dots (for an XPM-80, 203 dpi printer), <TBD> dots (for an XPM-200, 203 dpi printer) or <TBD> dots (for an XPM-200HR, 300 dpi printer).
2. RLE8 is an 8-bit, run length encoded compression method, where the dot lines are compressed into a repeated sequence of one header byte and one or more data bytes. The most significant bit of the header byte indicates if the data byte(s) represent a run - multiple occurrence of the same character - (bit raised), or a repeated sequence of characters (bit lowered). The lower 7 bits of the header byte represents the number of characters in the run or sequence. “n” represents the total number of bytes needed to encode the entire 80, <TBD> or <TBD> byte dot line, including the header byte(s). It is possible to have more than one header byte in a single command; if the first header byte and the number of data bytes defined by it are fewer in total than “n”, then the next byte will be interpreted as a header byte.

Header Byte	Bit 7 = 0	Bit 7 = 1
Bit 7 (MSB)	Data is a “sequence”; the following series of data characters are printed once	Data is a “run”; the same character repeated “Y” times
Bits 6 – 0	The number of characters that make up the sequence	The number of times the character will be repeated; “Y”

Examples:

- Header [83]¹⁶, followed by a single data byte [44]¹⁶, indicates that the data byte is to interpreted as run of 3 of the same bytes. ([83]¹⁶ has the MSB high, indicating a multiple occurrence of the same character, and the lower seven bits equal “3”.) The data byte [44]¹⁶ will print the dot pattern associated with it three times in a row.
 - Header [03]¹⁶, followed by three data bytes [44]¹⁶ [45]¹⁶ [46]¹⁶, indicates that the following data bytes are a 3 byte sequence. ([03]¹⁶ has the MSB low, indicating a sequence of characters, and the lower seven bits equal “3”.) The data bytes [44]¹⁶ [45]¹⁶ [46]¹⁶ will print the dot pattern associated with each once.
3. The uncompressed dot line contains 80, <TBD> or <TBD> bytes (XPM-80, XPM-200 or XPM-200HR, respectively), whereas the leftmost dot is represented by the most significant bit of the first byte. The rightmost dot in a dot line is represented by the least significant bit of the last byte.
 4. [n] represents the number of bytes that are required to RLE8 compress the 80, <TBD> or <TBD> bytes dot line, including header byte(s). If, for example, an RLE8 compressed dot line results in 10 bytes, then the RLE8 compression command becomes: [1B]¹⁶ [F0]¹⁶ [03]¹⁶ [0A]¹⁶ [d1] ... [d10].
 5. If the number of bytes required for RLE8 compression exceeds 80, <TBD> or <TBD> (XPM-80, XPM-200 or XPM-200HR, respectively), then it is faster to use the “Print uncompressed graphics” command „ESC [F0] [02] [n] [d1] ... [dn]“ instead.
 6. A dot is considered to be on (black) if its corresponding bit is 1 and off if the bit is 0.
 7. Any character settings like inverse, double width, etc. have no effect on this command.

2.2.39 Repeat graphics line**ESC [F0] [04] [01] [n]
[d1] ... [dn]**

[Name]	Repeat graphics line					
[Function]	This command automatically reprints the previously printed graphic dot line a specified number of times.					
[Code]	[1B] ¹⁶	[F0] ¹⁶	[04] ¹⁶	[01] ¹⁶	[n]	[d1] ... [dn]
	[27] ¹⁰	[240] ¹⁰	[4] ¹⁰	[1] ¹⁰	[n]	[d1] ... [dn]

[Description]

1. Command „ESC [F0] [04] [01] [n] [d1] ... [dn]” automatically reprints the previously printed graphic dot line a specified number of times.
2. The parameter [n] specifies how many adjacent bytes are used to define the repeat count. The valid range for [n] is $[1]^{10} \leq [n] \leq [2]^{10}$.
3. The parameter [d1]..[dn] specifies the number of times that the previous dot line will be reprinted. If [n] is $[1]^{10}$, then the number of repeated lines equals [d1]. If [n] is $[2]^{10}$, then the number of repeated graphic lines equals $[d1] * 256 + [d2]$.

2.2.40 RS-232 Communication Parameter Setting ESC [F1] [01] [08] [00] [d1] ... [d7]

[Name]	RS-232 communication parameter setting					
[Function]	This command is used to specify the RS-232 communication parameters such as baud rate, stop bits, data bits, parity and flow control.					
[Code]	[1B] ¹⁶ [27] ¹⁰	[F1] ¹⁶ [241] ¹⁰	[01] ¹⁶ [1] ¹⁰	[08] ¹⁶ [8] ¹⁰	[00] ¹⁰ [0] ¹⁰	[d1] ... [d7] [d1] ... [d7]

[Description]

1. The „ESC [F1] [01] [08] [00] [d1] ... [d7]“ command specifies the serial communication parameters for RS-232 versions of the XPM printer.
2. Following serial communication parameters are specified in [d1]...[d7] as follows: baud rate in [d1], parity on/off in [d2], parity odd/even in [d3], data bits in [d4], stop bits in [d5], flow control in [d6] and an additional block host TX (CTS signal low) on paper out flag [d7].
3. Parameter [d1] specifies the baud rates as follows:
 - [0]¹⁰ = 4800
 - [1]¹⁰ = 9600
 - [2]¹⁰ = 19200
 - [3]¹⁰ = 38400
 - [4]¹⁰ = 57600
 - [5]¹⁰ = 115200
 - [6]¹⁰ = 230400 (unsupported at this time)
 - [7]¹⁰ = 460800 (unsupported at this time)
 Choosing an unsupported or undefined value will cause the printer to select 115200 baud.
4. Parameter [d2] specifies the parity on/off as follows:
 - [0]¹⁰ = PARITY OFF
 - [1]¹⁰ = PARITY ON
 An unsupported or undefined value will select PARITY OFF.
5. Parameter [d3] specifies the parity even/odd as follows:
 - [0]¹⁰ = PARITY ODD
 - [1]¹⁰ = PARITY EVEN
 An unsupported or undefined value will select PARITY ODD.
 Parity even/odd is ignored unless parity is ON.
6. Parameter [d4] specifies the data bits as follows:
 - [0]¹⁰ = 7 DATA BITS (unsupported at this time)
 - [1]¹⁰ = 8 DATA BITS
 Any value for d4 will select 8 DATA BITS.
7. Parameter [d5] specifies the stop bits as follows:
 - [0]¹⁰ = 1 STOP BIT
 - [1]¹⁰ = 2 STOP BITS
 An unsupported or undefined value will select 1 STOP BIT.
8. Parameter [d6] specifies the control flow as follows:
 - [0]¹⁰ = NO FLOW CONTROL (unsupported)
 - [1]¹⁰ = HARDWARE FLOW CONTROL – RTS / CTS
 - [2]¹⁰ = SOFTWARE FLOW CONTROL - XON/XOFF (unsupported at this time)
 An unsupported or undefined value will select HARDWARE FLOW CONTROL – RTS / CTS.
 (RTS = Ready To Send, CTS = Clear To Send)

9. Parameter [d7] specifies if the host transmission (TX) must be blocked if the XPM detects out-of-paper.

[0]¹⁰ = HOST TX NOT BLOCKED ON PAPER OUT

[1]¹⁰ = HOST TX BLOCKED ON PAPER OUT

An unsupported or undefined value will select HOST TX NOT BLOCKED ON PAPER OUT. This feature is used in combination with the hardware flow control only. For hardware flow control, the host is blocked by lowering the CTS signal.

Note that it does not explicitly indicate paper-out when the host detects TX blocked (CTS low/XOFF). The XPM also blocks the host TX when its internal buffers are full or when it is processing data.

Also note that most host computers (e.g. MS-Windows, Linux) will stop RS-232 communication if they detect host TX blocked. Note that, if Host TX Block on Paper Out is enabled, these computers are not able to communicate with the XPM (e.g. inquire printer status) in cases of paper out. Therefore it is strongly recommended that the full ramifications of using this feature be evaluated before enabling it. The most common use for this feature is with unsophisticated host equipment that cannot evaluate the data returned after a printer status inquiry.

10. The new RS-232 communication parameters become effective only after performing a hardware reset. This can be accomplished through the interface via the ESC [F2] [03] [00] command, or by removing and then restoring power to the XPM.
11. The XPM serial communications default settings are 115200 baud, parity on, parity even, 8 data bits, 1 stop bit, hardware flow control and host TX not blocked on paper-out.

2.2.41 Set print density**ESC [F0] [05] [01] [n]**

[Name]	Set print density				
[Function]	This command allows adjustment of the print density by changing the burn time (on time) of the thermal printhead.				
[Code]	[1B] ¹⁶	[F0] ¹⁶	[05] ¹⁶	[01] ¹⁶	[n]
	[27] ¹⁰	[240] ¹⁰	[5] ¹⁰	[1] ¹⁰	[n]

[Description]

1. Command „ESC [F0] [04] [01] [n]“ allows adjustment of the print density by changing the burn time (on time) of the thermal printhead.
2. The parameter [n] specifies the amount of adjustment to the burn time that will be implemented. Please note the following regarding [n].
 - a. The value of [n] is a two's complement number, representing both positive and negative numbers.
 - b. The range of [n] is -100% to +100%. This number represents the **percentage** of the maximum adjustment possible. The maximum adjustment is 250 µs, so the adjustment range is from -250 µs to +250 µs.
 - c. The actual range of [n] is then [9C]¹⁶ to [FF]¹⁶ ([-100]¹⁰ to [-1]¹⁰) and [00]¹⁶ to [64]¹⁶ ([0]¹⁰ to [+100]¹⁰).
3. Please note that other factors, (dot history compensation, voltage compensation, etc.), also impact total burn time.
4. Please note that excessively long burn times have a negative impact on thermal printhead life. Therefore, values of [n] should be kept to the minimum possible to achieve the desired print results.

2.2.42 Print speed setting**ESC [F0] [01] [01] [n]**

[Name] Sets target print speed

[Function] This extended command sets the target printing speed.

[Code]	[1B] ¹⁶	[F0] ¹⁶	[01] ¹⁶	[01] ¹⁶	[n]
	[27] ¹⁰	[240] ¹⁰	[1] ¹⁰	[1] ¹⁰	[n]

[Description]

5. Command „ESC [F0] [01] [01] [n]“ sets the target printing speed in mm/s.
6. Print speed may be lower depending upon other settings (dot history, multi-strobe, etc.), available voltage, etc.
7. The end-of-page command should precede the printing speed command to assure, that all data in the print buffer is flushed before print speed change becomes effective.
8. When the same printing speed as the current printing speed is specified with this command, no change occurs.
9. Parameter [n] defines the required printing speed in mm/s. The range for parameter [n] is $[60]^{10} \text{ mm/s} \leq [n] \leq [250]^{10} \text{ mm/s}$. If the printer has been purchased with a maximum print speed of 130 mm/s, values of [n] over 130 mm/s will result in a maximum print speed of 130 mm/s.
10. The default printing speed is 130 mm/sec.

2.2.43 Paper path control**ESC [F0] [0D] [02] [n] [m]**

[Name] Paper path control

[Function] This extended command is used to control the paper paths.

[Code] [1B]¹⁶ [F0]¹⁶ [0D]¹⁶ [02]¹⁶ [n] [m]
[27]¹⁰ [240]¹⁰ [13]¹⁰ [2]¹⁰ [n] [m]

[Description]

1. Command „ESC [F0] [0D] [02] [n] [m]“ is used to load, eject, activate and park the paper for a specific paper path.
2. Parameter [n] defines the paper path control request:

Parameter [n]	Paper path control request	Comments / Conditions
0	Activates the paper in the selected paper path	Paper in the selected paper path is parked in the feed unit. The printer must have a feed unit.
1	Parks the paper in the selected paper path	Paper in the selected paper path is active. The printer must have a feed unit.
2	Ejects the paper from the selected paper path	Paper is available in the selected paper path.
3	Loads paper into the selected paper path	The selected paper path does not contain paper.

3. Parameter [m] selects the paper path which must handle the control request:

Parameter [m]	Paper path selection	Comments / Conditions
0	Do not select a paper path	The current selected path is used for the control command
1	Select paper path number 0	-
2	Select paper path #1	The feed unit must have at least two paper paths
3	Select paper path #2	The feed unit must have at least three paper paths
4	Automatically select a paper path	If required, then the printer automatically selects a paper path

4. The paper path control command is ignored if the control request does not match the conditions.
5. Condition $[0]^{10} \leq [n] \leq [3]^{10}$ and $[0]^{10} \leq [m] \leq [4]^{10}$ must be satisfied.

2.2.44 Forward paper feed**ESC [F0] [0E] [02] [n1] [n2]**

[Name]	Forward paper feed				
[Function]	This command feeds paper in the forward direction.				
[Code]	[1B] ¹⁶	[F0] ¹⁶	[0E] ¹⁶	[02] ¹⁶	[n1] [n2]
	[27] ¹⁰	[240] ¹⁰	[14] ¹⁰	[2] ¹⁰	[n1] [n2]

[Description]

6. Command „ESC [F0] [0E] [02] [n1] [n2]“ feeds paper in the forward direction by a specified number of lines dot lines.
7. Parameter [n1] and [n2] specifies the feed length in dot lines. Together they form a 16-bit, unsigned integer with a valid range up to 65,535. Parameter [n1] is the MSB and parameter [n2] the LSB of this value.
8. Condition $[0]^{10} \leq [n1] \leq [255]^{10}$ and $[0]^{10} \leq [n2] \leq [255]^{10}$ must be satisfied.
9. Buffered print data will be printed before the secified amount of paper is fed.
10. If parameter [n1] and [n2] equals $[0]^{10}$, the data contained in the buffer is printed but paper is not fed.
11. With this command it is possible feed a length of approx. 7 meters of paper (approx. 22 feet). Care should be taken to avoid the paper wasted associated with accidentally setting the page length so long.

2.2.45 Printout cancellation request**ESC [F0] [0F] [01] [n]**

[Name] Printout cancellation request
 [Function] This command requests cancellation of a printout.
 [Code] [1B]¹⁶ [F0]¹⁶ [0F]¹⁶ [01]¹⁶ [n]
 [27]¹⁰ [240]¹⁰ [15]¹⁰ [1]¹⁰ [n]

[Description]

1. Command „ESC [F0] [0F] [01] [n]“ cancels the current printout.
2. Parameter [n] specifies in which way the printout is to be cancelled:

Parameter [n]	Printout cancellation request	Comments / Conditions
1	Cancellation of printout without paper invalidation	Paper will be cut at the current print position and presented.
2	Cancellation of printout with paper invalidation using top of paper	Paper will be retracted from the current print position until the last registered top of paper is underneath the printhead. Subsequently, paper will be forwarded and invalidated until the original print position has been reached. Finally the paper will be cut at this position and presented.
3	Cancellation of printout with paper invalidation finding top of paper	Paper will be retracted from the current print position until the top of paper is detected by the exit sensor of the print unit (max. 1 meter), after which this top of form is retracted until it is underneath the printhead. Subsequently, paper will be forwarded and invalidated until the original print position has been reached. Finally the paper will be cut at this position and presented.

3. Condition $[1]^{10} \leq [n] \leq [3]^{10}$ must be satisfied.
4. Buffered print data will be printed before the printout is cancelled.

2.2.46 Position stamp set**ESC [F2] [04] [00]**

[Name] Position stamp set

[Function] This command sets a position stamp for the current position

[Code] [1B]¹⁶ [F2]¹⁶ [04]¹⁶ [00]¹⁶
[27]¹⁰ [242]¹⁰ [4]¹⁰ [0]¹⁰

[Description]

1. Command „ESC [F2] [04] [00]“ sets a position stamp of the current position in millimetres. This position stamp is used as a reference position for subsequent commands such as position stamp feed or retract.
2. Buffered print data will be printed before the printer processes this command.
3. The position stamp set command is to be placed at start of the printout. The command will interrupt fluent printout if placed elsewhere.

2.2.47 Position stamp feed**ESC [F2] [05] [02] [n1] [n2]**

[Name] Position stamp feed

[Function] This command initiates a forward feed to an offset relative to the latest position stamp

[Code]	[1B] ¹⁶	[F2] ¹⁶	[05] ¹⁶	[02] ¹⁶	[n1] [n2]
	[27] ¹⁰	[242] ¹⁰	[5] ¹⁰	[2] ¹⁰	[n1] [n2]

[Description]

1. Command „ESC [F2] [05] [02] [n1] [n2]“ feeds paper in the forward direction to an offset relative to the latest position stamp set.
2. Parameter [n1] and [n2] specifies a target position in millimetres from the latest position stamp. Together they form a 16-bit, unsigned integer with a valid range up to 65,535. Parameter [n1] is the MSB and parameter [n2] the LSB of this value.
3. Condition $[0]^{10} \leq [n1] \leq [255]^{10}$ and $[0]^{10} \leq [n2] \leq [255]^{10}$ must be satisfied.
4. Buffered print data will be printed before the printer processes this command.
5. The position stamp feed command will have no effect when the requested position has already been passed.
6. By using the “position stamp set” command at start of a printout and the “position stamp feed” command at the end of the printout, an application is able to assure a minimum printout length.

2.2.48 Position stamp retract**ESC [F2] [06] [02] [n1] [n2]**

[Name] Position stamp retract

[Function] This command initiates a backward feed to an offset relative to the latest position stamp

[Code]	[1B] ¹⁶	[F2] ¹⁶	[06] ¹⁶	[02] ¹⁶	[n1] [n2]
	[27] ¹⁰	[242] ¹⁰	[6] ¹⁰	[2] ¹⁰	[n1] [n2]

[Description]

1. Command „ESC [F2] [06] [02] [n1] [n2]“ feeds paper backwards to an offset relative to the latest position stamp set.
2. Parameter [n1] and [n2] specifies a target position in millimetres from the latest position stamp. Together they form a 16-bit, unsigned integer with a valid range up to 65,535. Parameter [n1] is the MSB and parameter [n2] the LSB of this value.
3. Condition $[0]^{10} \leq [n1] \leq [255]^{10}$ and $[0]^{10} \leq [n2] \leq [255]^{10}$ must be satisfied.
4. Buffered print data will be printed before the printer processes this command.
5. By using the “position stamp set” command at start of a printout and the “position stamp retract” command at the end of the printout, an application is able to retract to the start of the printout and invalidate it afterwards (e.g. print “VOID” to invalidate the printout).

2.2.49 Barcode scanner command ESC [F1] [05] [n] [m1] [mn]

[Name] Barcode scanner command

[Function] This command is used to send an embedded command to the integrated barcode scanner

[Code] [1B]¹⁶ [F1]¹⁶ [05]¹⁶ [n] [m1] [mn]
 [27]¹⁰ [241]¹⁰ [05]¹⁰ [n] [m1] [mn]

[Description]

1. Command „ESC [F1] [05] [n] [m1] [mn]“ is used for sending an embedded command to the integrated barcode code scanner, which is an optional component.
2. Parameter [n] defines the number of ASCII characters in the embedded barcode scanner command.
3. Parameter [m1] to [mn] contains the embedded barcode scanner command as ASCII string, which is transmitted to the barcode scanner without modification.
4. The communication between the integrated barcode scanner and the printer controller is fixed to 9600 baud, 8 data bits, no parity and 1 stop bit.
5. Some barcode scanners will require an <escape> character at the start and an <carriage return> character at the end of each command. If, in this case, the character “B” would cause the barcode scanner to sound a beep, then the barcode scanner should receive “[1B]¹⁶ ‘B’ [0D]¹⁶”. The corresponding barcode scanner command that is to be send to the printer would then be “ESC [F1]¹⁶ [05]¹⁶ [03]¹⁶ [1B]¹⁶ ‘B’ [0D]¹⁶”.

2.2.50 Presenter control command**ESC [F0] [10] [04]
[d1] [d2] [d3] [d4]**

[Name] Presenter control command

[Function] This command is used to control a mounted presenter or bundler.

[Code] [1B]¹⁶ [F0]¹⁶ [10]¹⁶ [04]¹⁶ [d1] [d2] [d3] [d4]
[27]¹⁰ [240]¹⁰ [16]¹⁰ [04]¹⁰ [d1] [d2] [d3] [d4]

[Description]

1. Command „ESC [F0] [10] [04] [d1] [d2] [d3] [d4]“ is used for controlling the presenter or bundler, which is an optional component of the printer.
2. Parameter [d1] defines the required presenter control:

Parameter [d1]	Presenter control	Comments / Conditions
0	No control	No effect
1	Present loaded printouts	The presenter will present loaded or bundled printouts
2	Reject loaded or presented printouts	The presenter will retract loaded or presented printouts into the reject bin
3	Present loaded printouts if full	The presenter will present loaded printouts only if the capacity of the bundler is exhausted
4	Reject loaded printouts if full	The presenter will retract loaded printouts into the reject bin only if the capacity of the bundler is exhausted

3. Parameter [d2] defines the presentation timeout in seconds after which presented printouts are automatically rejected.
4. Parameter [d3] defines the maximum bundle capacity, whereas this capacity is set to default when the parameter is 0.
5. Parameter [d4] is reserved and must be 0.”.

2.2.51 Horizontal alignment setting**ESC 'a' + [n]**

[Name] Horizontal alignment setting command
 [Function] This command is used to specify the horizontal alignment
 [Code] [1B]¹⁶ [61]¹⁶ [n]
 [27]¹⁰ [97]¹⁰ [n]

[Description]

1. Command „ESC a [n]“ is used for setting the alignment mode for printing objects such as text, wide text, bitmaps, images and barcodes.
2. Parameter [n] defines the alignment setting:

Parameter [n]	Alignment	Position
0	Left alignment	Paper left + left margin
1	Center alignment	Paper center
2	Right alignment	Paper right.

3. The horizontal alignment setting will automatically reset the current reference position to the left, center or right of the paper.
4. The set position command “ESC '\$' [n1] [n2] [m1] [m2]” can be used to align one or more objects at other positions.
5. The default horizontal alignment setting is left.
6. The horizontal alignment setting has no influence on graphic printing.

2.2.52 Bitmap header **ESC [F0] [0F] [05] [w1] [w2] [h1] [h2] [a]**

[Name] Bitmap header
 [Function] This command is used to initiate the printing of a bitmap and define its size
 [Code] [1B]¹⁶ [F0]¹⁶ [0F]¹⁶ [05]¹⁶ [w1] [w2] [h1][h2][a]
 [27]¹⁰ [240]¹⁰ [15]¹⁰ [05]¹⁰ [w1] [w2] [h1][h2][a]

[Description]

7. Command „ESC [F0] [0F] [05] [w1] [w2] [h1] [h2] [a]“ is used to initiate bitmap printing and will create a white bitmap with specified width and height.
8. The bitmap content is defined by one or more consecutive “bitmap body” commands.
9. Parameter [w1] [w2] defines the width of the bitmap in pixels as follows:
 “bitmap width” = [w1] * [256]¹⁰ + [w2]
10. Parameter [h1] [h2] defines the height of the bitmap in pixels as follows:
 “bitmap height” = [h1] * [256]¹⁰ + [h2]
11. Parameter [a] defines the attributes for printing the bitmap. The following figure shows the possible values of parameter [a]:

Parameter [a], bit	Value	Printing mode
(LSB) b1 – b10	[00] ²	No magnification
	[01] ²	Double width
	[10] ²	Double height
	[11] ²	Double width and double height
b7 – b2 (MSB)	Reserved for future use; must be set to “0”	

2.2.53 Bitmap body**ESC [F0] [10] [n] [d1]..[dn]**

[Name]	Bitmap body				
[Function]	This command is used to provide the pixel data for a previously created bitmap.				
[Code]	[1B] ¹⁶	[F0] ¹⁶	[10] ¹⁶	[n]	[d1]..[dn]
	[27] ¹⁰	[240] ¹⁰	[16] ¹⁰	[n]	[d1]..[dn]

[Description]

1. Command „ESC [F0] [10] [n] [d1]..[dn]“ is used to provide the pixel data for a bitmap that was previously created with the “bitmap header” command.
2. Parameter [n] defines the number of bitmap bytes which are included in the command.
3. Parameter [d1]..[dn] contains up to bitmap 256 bytes.
4. Each bitmap byte specifies 8 monochrome pixels, whereas 0 indicates white and 1 indicates black. The most significant bit in a bitmap byte is the left most pixel.
5. The bitmap is sent to the printer in one or more consecutive bitmap body commands. The first byte of the first bitmap body command transmitted is the left upper-row byte of the bitmap. The last byte is the last bitmap body command transmitted and is the right lower-row byte of the bitmap. The bitmap rows are sent on a one-byte boundary (e.g. 1-8 pixel per row is 1 byte, 9-16 pixel is 2 bytes, etc.). All pixels in the last byte of a row, which are outside the defined bitmap width, must be zero.

2.2.54 Customer data upload ESC [FF] [2A] [n] [d1].. [dn]

[Name] Customer data upload request

[Function] This command is used to upload up to 256 bytes of customer data.

[Code] [1B]¹⁶ [FF]¹⁶ [2A]¹⁶ [n] [d1]..[dn]
[27]¹⁰ [255]¹⁰ [42]¹⁰ [n] [d1]..[dn]

[Description]

1. Command „ESC [FF] [2A] [n] [d1]..[dn]“ is used upload up to 256 bytes of customer data into the flash memory..
2. After reception of the command, the printer will store the received data in flash memory and send a customer data upload response, which has code “[1B]¹⁶ + [FF]¹⁶ + [2B]¹⁶ + [00]¹⁶”.
3. Uploaded customer data can be inquired with use of the customer data download request.

2.2.55 Customer data download**ESC [FF] [4A] [01] [n]**

[Name] Customer data download request

[Function] This command is used to download up to 256 bytes of customer data.

[Code]	[1B] ¹⁶	[FF] ¹⁶	[4A] ¹⁶	[01] ¹⁶	[n]
	[27] ¹⁰	[255] ¹⁰	[76] ¹⁰	[01] ¹⁰	[n]

[Description]

1. Command „ESC [FF] [4A] [01] [n]“ is used download up to 256 bytes of customer data from the flash memory.
2. After reception of the command, the printer will load the requested data from flash memory and send a customer data download response, which has code “[1B]¹⁶ + [FF]¹⁶ + [4A]¹⁶ + [n] + [d1]..[dn]”. Here [n] is the number of adjacent bytes and [d1]..[dn] contain the requested bytes.
3. Customer data can be uploaded with use of the customer data upload request.

2.2.56 Print correction offset**ESC [F1] [01] [04] [0D]
[m] [n1] [n2]**

[Name] Print correction offset

[Function] This command is used to correct the start of print position

[Code] [1B]¹⁶ [F1]¹⁶ [01]¹⁶ [04]¹⁶ [0D]¹⁶ [m] [n1] [n2]
[27]¹⁰ [255]¹⁰ [01]¹⁰ [04]¹⁰ [13]¹⁰ [m] [n1] [n2]

[Description]

1. Command „ESC [F1] [01] [04] [0D] [m] [n1] [n2]“ is used specify the print correction offset in 1/10 of mm.
2. The print correction is used only at start of print to correct the position of the initial dot line with respect to the top of paper. The distance of the initial line to the top of paper will increase when the print correction offset is positive and decrease when it is negative.
3. The print correction is part of the printer configuration and will be saved into flash memory. The print correction will be come effective immediately.
4. Parameter [m] defines the paper path(s) for which the print correction is to be set. Condition $[0]^{10} \leq [m] \leq [2]^{10}$ or $[m] == [FF]^{16}$ must be satisfied. If [m] is $[0]^{10}$, then the 1st (upper most) path is set. If [m] is $[1]^{10}$, then the 2nd paper path. If [m] is $[FF]^{16}$ then all paper paths are set. Note that all paths are automatically set if the configuration option for the paper path equals “all paths are identical”.
5. Parameter [n1] [n2] defines the print correction in 1/10 mm as follows:
 “print correction in 1/10 mm” = $[n1] * [256]^{10} + [n2]$
 Condition $[0]^{10} \leq [n1] \leq [255]^{10}$ and $[0]^{10} \leq [n2] \leq [255]^{10}$ must be satisfied.
 Note that the print correction can be negative (two complement's system).

2.2.57 Mark cut correction offset

ESC [F1] [01] [04] [0E]
[m] [n1] [n2]

[Name] Mark cut correction offset

[Function] This command is used to correct the cut position for mark control

[Code] [1B]¹⁶ [F1]¹⁶ [01]¹⁶ [04]¹⁶ [0E]¹⁶ [m] [n1] [n2]
[27]¹⁰ [255]¹⁰ [01]¹⁰ [04]¹⁰ [14]¹⁰ [m] [n1] [n2]

[Description]

1. Command „ESC [F1] [01] [04] [0E] [m] [n1] [n2]“ is used specify the mark cut correction offset in 1/10 of mm.
2. The mark cut correction is used only to correct the cut position for mark control after. The distance of the cut position to the end of mark will increase when the mark cut correction offset is positive and decrease when it is negative.
3. The mark cut correction is part of the printer configuration and will be saved into flash memory. The mark cut correction will be come effective immediately.
4. Parameter [m] defines the paper path(s) for which the mark cut correction is to be set. Condition $[0]^{10} \leq [m] \leq [2]^{10}$ or $[m] == [FF]^{16}$ must be satisfied. . If [m] is $[0]^{10}$, then the 1st (upper most) path is set. If [m] is $[1]^{10}$, then the 2nd paper path. If [m] is $[FF]^{16}$ then all paper paths are set. Note that all paths are automatically set if the configuration option for the paper path equals “all paths are identical”.
5. Parameter [n1] [n2] defines the mark cut correction in 1/10 mm as follows:
 “mark cut correction in 1/10 mm” = $[n1] * [256]^{10} + [n2]$
 Condition $[0]^{10} \leq [n1] \leq [255]^{10}$ and $[0]^{10} \leq [n2] \leq [255]^{10}$ must be satisfied.
 Note that the print correction can be negative (two complement's system).

2.2.58 Print Character 1-255**ESC ‘^’ [n]**

[Name] Print character 1-255

[Function] This command is used to print a specific character within the selected character set.

[Code] [1B]¹⁶ [5E]¹⁶ [n]
[27]¹⁰ [94]¹⁰ [n]

[Description]

1. Command „ESC [5E] [n]“ is used to print character [n] of the selected character set within domain 1 to 255.
2. Parameter [n] specifies the [n]th character in the selected character set.
3. The selected character [n] must be within domain 1 - 255.
4. The selected character [n] will not be interpreted as control character nor will it be mapped to country code characters.
5. Example: [1b 5E 0A]¹⁶ will print the 10th character of the current selected font.

2.2.59 Print Character 1-351**ESC ‘\’ [n1] [n2]**

[Name] Print character 1-351

[Function] This command is used to print a specific character within the selected character set.

[Code] [1B]¹⁶ [5C]¹⁶ [n1] [n2]
[27]¹⁰ [91]¹⁰ [n1] [n2]

[Description]

1. Command „ESC [5C] [n1] [n2]“ is used to print character [n] of the selected character set within domain 1 to 351.
2. Parameter [n1] and [n2] specifies the [n]th character in the selected character set, whereas parameter [n1] is the lower byte and parameter [n2] the higher byte ($[n] = [n2] * 256 + [n1]$).
3. The selected character [n] must be within domain 1 - 351.
4. The selected character [n] will not be interpreted as control character nor will it be mapped to country code characters.
5. Example: [1b 5C 0A 01]¹⁶ will print the 266th character of the current selected font.

2.2.60 Page Header**ESC [F0] [11] [0A] [n1]..[n4]
[m1]..[m4] [i] [r]**

[Name] Page header

[Function] This command is specify the page that immediately follows the header.

[Code] [1B]¹⁶ [F0]¹⁶ [11]¹⁶ [0A]¹⁶ [n1]..[n4] [m1]..[m4] [i] [r]
[27]¹⁰ [240]¹⁰ [17]¹⁰ [10]¹⁰ [n1]..[n4] [m1]..[m4] [i] [r]

[Description]

1. Command „ESC [F0] [11] [0A] [n1]..[n4] [m1]..[m4] [i] [r] “ is used to specify size, length and identifier of the page that immediately follows the page header.
2. Parameter [n1]..[n4] specifies the size of the page in bytes.
3. Parameter [m1]..[m4] specifies the length of the page in dot lines.
4. Parameter [i] specifies the 4 bit page identifier which must match domain 0 -15.
5. Parameter [r] is reserved for future use and must be 0.
6. The information in the page header is valid for the current page and will be reset when the next page starts.
7. Currently the information in the page header is used for ticket monitoring only (see command “Request data packet” GS a” [n1] [n2]) and can be omitted if ticket monitoring is not required.

3 List of character sets

The following character sets are available:

- Internal (primary) character set (8X16, 12x24, 16x32, 20x40)
- External (secondary) character set (8X16, 12x24, 16x32, 20x40)
- Wide character set (24X24, 20X20)

Notes:

- The internal character sets are part of the firmware and are loaded into flash memory during firmware upload.
- Although all internal character sets are regarded to be fixed font, a modified set can be integrated in the firmware binary and made effective through upload.
- The external character sets can be uploaded into the flash memory with the appropriate commands.
- The internal character set is also called the “primary font”.
- The external character set is also called the “secondary font”.

3.1 Internal (primary) character set

The internal or primary character set which is included in the firmware contain following characters:

Decimal	Hexadecimal
0-31	00-1F
32-63	20-3F
64-95	40-5F
96-127	60-7F
128-159	80-9F
160-191	A0-BF
192-223	C0-DF
224-255	E0-FF
256-287	100-11F
288-319	120-13F
320-351	140-15F

Internal (primary) character set

Notes:

- Characters 0-255 are available in all firmware versions.
- Characters 256-351 are available from firmware version R2-V1.01f or up.
- Characters 256-319 are country code characters.
- Character 0 is the NULL character and is not printable.
- Characters 1-31 are control characters and can only be printed with use of the “Print character 1-31” command.

- Characters 1-31 and 320-351 are reserved for customer usage and can be printed with use of the “Print character 1-31” and “Print character 1-351” commands.
- The XPM windows XP driver package contains the complete primary character set as bitmap.

3.1.1 Internal 8x16 character set

The internal 8X16 character set has 352 characters, whereas the size of each character is:

- Width: 8 dots
- Height: 16 dots

3.1.2 Internal 12x24 character set

The internal 12x24 character set has 352 characters, whereas the size of each character is:

- Width: 12 dots
- Height: 24 dots

3.1.3 Internal 16x32 character set

The internal 16x32 character set has 352 characters, whereas the size of each character is:

- Width: 16 dots
- Height: 32 dots

3.1.4 Internal 24x40 character set

The internal 24x40 character set has 352 characters, whereas the size of each character is:

- Width: 24 dots
- Height: 40 dots

3.2.2 External 12x24 character set

The external 12x24 character set has 352 characters, whereas the size of each character is:

- Width: 12 dots
- Height: 24 dots

3.2.3 External 16x32 character set

The external 16x32 character set has 352 characters, whereas the size of each character is:

- Width: 16 dots
- Height: 32 dots

3.2.4 External 24x40 character set

The external 24x40 character set has 352 characters, whereas the size of each character is:

- Width: 24 dots
- Height: 40 dots

3.2.5 Wide 24X24 and 20X20 character sets

(Note: Advanced Firmware Set only)

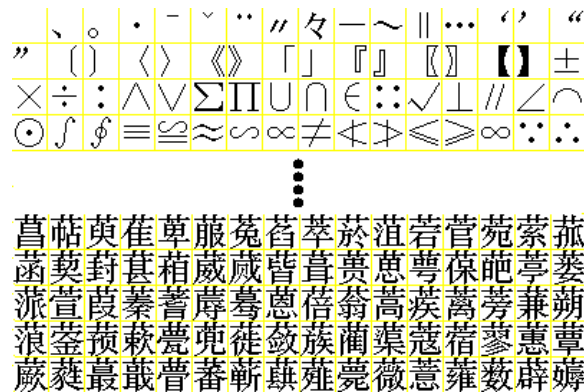
XPM printers can contain a “wide character set” (so called because two bytes are required to index it).

Two different wide character sets types are supported: 24x24 and 20x20. The 24x24 wide character set may contain up to 7280 characters, each 24 x 24 dots. The 20x20 wide character set may contain up to 8640 characters, each 20 x 20 dots

The 24X24 wide character set has been implemented to offer a GB2312-Chinese compatible Chinese character set, but can be used for other 24X24 character sets, as well. Currently there are two ways of indexing the 24X24 wide character set: standard (linear) .and GB2312-Chinese.

The 20X20 wide character set has been implemented to offer a KS5601-Korean compatible Korean character set, but can be used for other 20X20 character sets, as well. Currently there are two ways of indexing the 20X20 wide character set: standard (linear) .and KS5601-Korean

See the command “Wide Font Printing” for more information on wide font indexing.



24X24 wide character set
containing 16 * 455 characters

By default, there is no wide character set provided in the XPM. The XPM driver tools allow the upload of a wide character set, where the character set is imported from a standard windows bitmap.

For the 24X24 type wide characters, this bitmap contains exactly 16 x 455 characters that are separated by a line (yellow in the above sample). Each character is 24 x 24 dots, whereas, due to the separator, the X/Y origin starts on a multiple of 25 dots. The total dimension of the wide character set bitmap is 400 pixels horizontally and 11375 pixels vertically.

For the 20X20 type wide characters, this bitmap contains exactly 16 x 540 characters that are separated by a line (yellow in the above sample). Each character is 20 x 20 dots, whereas, due to the separator, the X/Y origin starts on a multiple of 25 dots. The total dimension of the wide character set bitmap is 336 pixels horizontally and 11340 pixels vertically.

All magnification and other settings that affect the appearance of the internal character set will also affect the appearance of the wide character set (e.g. double width, magnification, rotation, etc.).

4 Additional Information

4.1 Hex/Dec ASCII Table

ASCII		CHAR	ASCII		CHAR	ASCII		CHAR	ASCII		CHAR
HEX	DEC		HEX	DEC		HEX	DEC		HEX	DEC	
00	0	NUL	20	32	SP	40	64	@	60	96	'
01	1	SOH ^A	21	33	!	41	65	A	61	97	a
02	2	STX ^B	22	34	"	42	66	B	62	98	b
03	3	ETX ^C	23	35	#	43	67	C	63	99	c
04	4	EOT ^D	24	36	\$	44	68	D	64	100	d
05	5	ENQ ^E	25	37	%	45	69	E	65	101	e
06	6	ACK ^F	26	38	&	46	70	F	66	102	f
07	7	BEL ^G	27	39	'	47	71	G	67	103	g
08	8	BS ^H	28	40	(	48	72	H	68	104	h
09	9	TAB ^I	29	41	)	49	73	I	69	105	i
0A	10	LF ^J	2A	42	*	4A	74	J	6A	106	j
0B	11	VT ^K	2B	43	+	4B	75	K	6B	107	k
0C	12	FF ^L	2C	44	,	4C	76	L	6C	108	l
0D	13	CR ^M	2D	45	-	4D	77	M	6D	109	m
0E	14	SO ^N	2E	46	.	4E	78	N	6E	110	n
0F	15	SI ^O	2F	47	/	4F	79	O	6F	111	o
10	16	DLE ^P	30	48	0	50	80	P	70	112	p
11	17	DC1 ^Q	31	49	1	51	81	Q	71	113	q
12	18	DC2 ^R	32	50	2	52	82	R	72	114	r
13	19	DC3 ^S	33	51	3	53	83	S	73	115	s
14	20	DC4 ^T	34	52	4	54	84	T	74	116	t
15	21	NAK ^U	35	53	5	55	85	U	75	117	u
16	22	SYN ^V	36	54	6	56	86	V	76	118	v
17	23	ETB ^W	37	55	7	57	87	W	77	119	w
18	24	CAN ^X	38	56	8	58	88	X	78	120	x
19	25	EM ^Y	39	57	9	59	89	Y	79	121	y
1A	26	SUB ^Z	3A	58	:	5A	90	Z	7A	122	z
1B	27	Esc	3B	59	;	5B	91	[	7B	123	{
1C	28	FS	3C	60	<	5C	92	\	7C	124	|
1D	29	GS	3D	61	=	5D	93]	7D	125	}
1E	30	RS	3E	62	>	5E	94	^	7E	126	~
1F	31	US	3F	63	?	5F	95	_	7F	127	DEL

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