PRINTRONIX PSA3

Programmer's Reference Manual

LQ-1600K Emulation For
P8000 H-Series Line Matrix Printers

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PRINTRONIX® PSA3

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1 *Introduction*

About this Manual

This manual is designed so you can quickly find the information you need to use the LQ-1600K emulation.

This book does not explain how to operate the printer. For printer operation, see the *User's Manual.*

Warnings and Special Information

Read and comply with all information highlighted under special headings:

WARNING **Conditions that could harm you.**

CAUTION **Conditions that could damage the printer or related equipment.**

IMPORTANT **Information vital to proper operation of the printer.**

NOTE: Information affecting printer operation.

Software Features

The LQ-1600K emulation software provides the following features:

- Graphics and print quality. You can enable graphics mode and specify a density mode (dots per inch) for either 8-pin/24-pin images.
- Print Attributes. Characters can be bold, italic, double high, double wide, etc.
- Page Formatting. Commands which allow you to set line spacing, page length, and vertical tabbing.
- Font Typefaces. Also referred to as print modes. There are six typefaces that can print both SBCS and DBCS characters: LQ, Near LQ, Normal, Hi-Speed, Super Hi-Speed, and Ultra Hi-Speed.

2 *LinePrinter Plus LQ-1600K Emulation*

LQ-1600K Emulation

"Emulation" refers to the ability of a printer to execute the commands of other printer control languages. In LQ-1600K emulation mode, your printer prints files coded for Epson LQ series printers, particularly the LQ-1600K.

Exceptions and Differences

Because Of Mechanical Differences Between Your Printer (A Line Matrix Printer) And Moving Printhead Serial Matrix Printers, Some Features Are Approximated Or Not Supported.

Commands not supported by our printer:

1. Control paper loading/ejecting (ESC EM *n*)
2. Select user-defined set (ESC % *n*)
3. Define user-defined characters (ESC k NUL *n m*)
4. Copy ROM to RAM (ESC : NUL *n m*)
5. Select justification (ESC *a n*)
6. Set MSB to 1 (ESC >)
7. Set MSB to 0 (ESC =)
8. Cancel MSB Control (ESC #)
9. Reassign bit-image mode (ESC ?)

Default Values and States

Your printer stores a set of typical operating states and conditions in the flash memory. The first time you power up the printer, the factory settings in Table 1 are automatically invoked.

Table 1. Factory Settings for Hanzi GB

Characteristic	Default Setting
Select CPI	10.0
Select LPI	6.0
DBCS CPI	6.7
Host Command	Ignore Unidir.
Typeface	Near LQ
Styling Type	SONG
High Density	Disable
Proportional Spacing	Disable
Bold Print	Disable
Italic Print	Disable
Slashed Zero	Disable
Text Position	Bottom of Line
DBCS/ASCII Mode	DBCS Mode
DBCS ASCII Style	Normal
Compressed Mode	Disable
DBCS Compressed	Disable
Font Scale	Standard
Encoding	Address Table
Taller 15 CPI	Disable
Graphics Spd Up	Normal
Left Margin	0 columns
Right Margin	0 columns
Bottom Margin	0 lines
Perforation Skip	Disable
Form Length	11.0 inches 279.4 millimeters 66 lines
Form Width	13.6 inches 345.4 millimeters 136 characters
Reset Cmd CFG Ld	Disable
Illegal Code Pt.	Normal

Table 1. Factory Settings (continued) for Hanzi GB

Characteristic	Default Setting
Define CR Code	CR = CR
Auto LF	Enable
Define LF Code	LF = CR + LF
Printer Select	Disable
Character Set	Standard Sets (Epson Set; ASCII)
20 CPI Condensed	Enable
Alt Set 80-9F	Printable
Currency Sign	RMB Select
AR3240 Compat.	Disable

Table 2. Factory Settings for Kanji SJIS

Characteristic	Default Setting
Select CPI	15.0
Select LPI	8.0
DBCS CPI	7.5
Host Command	Ignore Unidir.
Typeface	Near LQ
Styling Type	Mincho
High Density	Disable
Proportional Spacing	Disable
Bold Print	Disable
Italic Print	Disable
Slashed Zero	Disable
Text Position	Bottom of Line
DBCS/ASCII Mode	DBCS Mode
DBCS ASCII Style	Normal
Compressed Mode	Disable
DBCS Compressed	Disable
Encoding	Address Table
Taller 15 CPI	Disable
Graphics Spd Up	Normal
Left Margin	0 columns
Right Margin	0 columns

Table 2. Factory Settings (continued) for Kanji SJIS

Characteristic	Default Setting
Bottom Margin	0 lines
Perforation Skip	Disable
Form Length	8.5 inches 215.9 millimeters 68 lines
Form Width	13.6 inches 345.4 millimeters 204 characters
Reset Cmd CFG Ld	Disable
Illegal Code Pt.	Normal
Define CR Code	CR = CR
Auto LF	Enable
Define LF Code	LF = CR + LF
Printer Select	Disable
Character Set	Standard Sets (Epson Set; ASCII)
20 CPI Condensed	Enable
Alt Set 80-9F	Printable
Currency Sign	$ Select
AR3240 Compat.	Disable

Table 3. Factory Settings for Hanzi Big5

Characteristic	Default Setting
Select CPI	10.0
Select LPI	6.0
DBCS CPI	6.7
Host Command	Ignore Unidir.
Typeface	LQ
Styling Type	MING
High Density	Disable
Proportional Spacing	Disable
Bold Print	Disable
Italic Print	Disable
Slashed Zero	Disable
Text Position	Bottom of Line
DBCS/ASCII Mode	DBCS Mode

Table 3. Factory Settings (continued) for Hanzi Big5

Characteristic	Default Setting
DBCS ASCII Style	Normal
Compressed Mode	Disable
DBCS Compressed	Disable
Encoding	Address Table
Taller 15 CPI	Disable
Graphics Spd Up	Match Typeface
Left Margin	0 columns
Right Margin	0 columns
Bottom Margin	0 lines
Perforation Skip	Disable
Form Length	11.0 inches 279.4 millimeters 66 lines
Form Width	13.6 inches 345.4 millimeters 136 characters
Reset Cmd CFG Ld	Current Config
Illegal Code Pt.	As Space
Define CR Code	CR = CR
Auto LF	Enable
Define LF Code	LF = CR + LF
Printer Select	Disable
Character Set	Standard Sets (Epson Set; ASCII)
20 CPI Condensed	Enable
Alt Set 80-9F	Printable

Epson Character Sets

The LQ-1600K printer uses two character sets: the IBM PC set and the Epson set. The Epson set is the ASCII character set with the upper, non-ASCII set defined as italics and the usually unprintable codes designed as international characters. (See Table 4.)

Table 4. Epson Character Set

Hex	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	à	§	SP	0	@	P	‘	p	*à*	*§*	*SP*	*0*	*@*	*P*	*‘*	*p*
1	è	ß	!	1	A	Q	a	q	*è*	*ß*	*!*	*1*	*A*	*Q*	*a*	*q*
2	ù	DC2	"	2	B	R	b	r	*ù*	*Æ*	*"*	*2*	*B*	*R*	*b*	*r*
3	ò	DC3	#	3	C	S	c	s	*ò*	*æ*	*#*	*3*	*C*	*S*	*c*	*s*
4	ì	DC4	$	4	D	T	d	t	*ì*	*ø*	*$*	*4*	*D*	*T*	*d*	*t*
5	°	ø	%	5	E	U	e	u	*°*	*ø*	*%*	*5*	*E*	*U*	*e*	*u*
6	£	¨	&	6	F	V	f	v	*£*	*¨*	*&*	*6*	*F*	*V*	*f*	*v*
7	BEL	Ä	‘	7	G	W	g	w	*i*	*Ä*	*’*	*7*	*G*	*W*	*g*	*w*
8	BS	CAN	(	8	H	X	h	x	*¿*	*Ö*	*(*	*8*	*H*	*X*	*h*	*x*
9	HT	Ü	)	9	I	Y	i	y	*Ñ*	*Ü*	*)*	*9*	*I*	*Y*	*i*	*y*
A	LF	ä	*	:	J	Z	j	z	*ñ*	*ä*	*	*:*	*J*	*Z*	*j*	*z*
B	VT	ESC	+	;	K	[	k	{	*¤*	*ö*	+	*;*	*K*	*[*	*k*	*{*
C	FF	ü	’	<	L	\	l	|	*Pt*	*ü*	,	<	*L*	**	*l*	|
D	CR	É	–	=	M	]	m	}	*Å*	*É*	–	=	*M*	*]*	*m*	*}*
E	SO	é	.	>	N	^	n	~	*å*	*é*	.	>	*N*	^	*n*	~
F	SI	¥	/	?	O	_	o	DEL	*Ç*	*¥*	*/*	*?*	*O*	*_*	*o*	*ø*

Escape Sequences

Some LQ-1600K control codes consisting of more than one character are called escape sequences because the first character in the sequence is the ASCII ESCape character. ESC alerts the printer that a special function command—not printable characters—follows.

The format for an escape sequence is:

ESC (parameter 1)(parameter 2)...(parameter *n*)

For example, to select emphasized (offset) print, send the ESC character immediately followed by the E character (do not add a space character):

ASCII: ESC E **Hex**: 1B 45**Dec**: 27 69

FS Sequences

Another type of control code which consists of more than one character is called an “FS sequence,” because the first character is the ASCII FS character. This control code is used when the printer is printing Double Byte Character Set (DBCS) characters. The FS alerts the printer that a special function command (not printable characters) follows. Most FS commands work only on DBCS characters.

The format for an FS sequence is:

FS (parameter 1)(parameter 2)...(parameter *n*)

For example, to rotate DBCS characters by 90° counter-clockwise, send an FS character immediately followed by the J character:

ASCII: FS J **Hex**: 1C 4A**Dec**: 28 74

Super-Set Commands

The unique control code sequence for both SSCC and ASSC commands are defined in the table below:

Control Code	ASCII Value	Hex Value	Dec Value
SSCC	ESC l } ;	1B 7C 7D 3B	27 124 125 59
ASSC	ESC l } ; q	1B 7C 7D 3B 71	27 124 125 59 113

Set And Reset Codes

Set and reset are other ways of saying turn on and “turn off; select and deselect; or enable” and disable.”

Some printer features are set and reset with an escape sequence and the numbers 1 or 0. In those cases you can represent 1 and 0 as hexadecimal codes 01 and 00 or as the ASCII codes for the numerals 1 and 0 (hexadecimal 31 and 30).

DBCS Mode

When the printer is in DBCS mode, it can print double byte characters—characters that require two bytes to define. It can also print a limited number of single byte ASCII characters. If a form hex 0x20 through hex 0x7F is sent to the printer, it will be printed as a standard ASCII character. If a character is larger that 0x7F, it will be combined with the next character to produce one DBCS character.

DBCS characters are only available in the LQ, Near LQ, Normal, Hi-Speed, Super Hi-Speed, and Ultra Hi-Speed typefaces. The command to select DBCS mode (FS &) switches the printer to one of these typefaces. Near LQ is the default typeface, but if another print quality has been selected previously through the FS x command, then that print quality is the DBCS typeface selected.

The character printed when the printer combines two characters into one double byte character depends on the character set of your particular printer.

Configuring the LQ-1600K Emulation with Control Codes

The remainder of this chapter describes the LQ-1600K printer control language codes that may be sent from a host computer attached to the printer in order to invoke and configure numerous LQ-1600K emulation functions.

Format for Control Code Descriptions

The following information is listed for each code (where applicable and possible) in this chapter:

ASCII Mnemonic. The ASCII name for the control code.

Hex Code. The hexadecimal equivalent of the code. (For octal equivalents, refer to Appendix A.)

Dec Code. The decimal equivalent of the code.

Purpose. The function(s) of the control code.

Expression. The control codes used in the BASIC programming language.

Comment. A description of exceptions or limitations to normal use.

Example. A sample expression written in the BASIC programming language is provided for some control codes to illustrate how the code is used.

Control Code Index

The following index lists the control codes by function, ASCII mnemonic, and page number. Some control code functions can also be selected at the control panel.

DBCS Command Set

Adjust Half-Width Characters to Fit into DBCS Character Spacing

ASCII Code FS U

Hex Code 1C 55

Dec Code 28 85

Purpose Aligns two half-width characters to fit the space normally occupied by a single full-width DBCS character.

Comment This control code does not function while in non-DBCS mode.

Adjust Table Characters

ASCII Code FS v *n*

Hex Code 1C 76 *n*

Dec Code 28 118 *n*

Purpose Extends the table (line draw) characters in the following ranges:

GB: A854~A870, A9A4~A9A7, A9B0~A9EF

SJIS: 849F~84BE

BIG5:

BIG5	A271~A275, A277~A278, A27A~A27E, A2A1~A2A7, F9DD~F9FD
CNS	A3B3~A3B7, A3B9~A3BA, A3BC~A3C7
TCA	8249~824D, 824F~8250, 8252~825A, 8261~8263
ETEN	8249~824D, 824F~8250, 8252~825A, 8261~8263
IBM5550	8A6E~8A72, 8A74~8A75, 8A77~8A7E, 8A80~8A83
TELETEXT	NIL
WANG	8E58~8E5A, 8E61~8E62, 8E64~8E65, 8E67~8E72
BIG5+	A271~A275, A277~A278, A27A~A27E, A2A1~A2A7, F9DD~F9FD
BIG5E	A271~A275, A277~A278, A27A~A27E, A2A1~A2A7, F9DD~F9FD
HKSCS-2001	A271~A275, A277~A278, A27A~A27E, A2A1~A2A7, F9DD~F9FD

They are extended so they touch in both horizontal and vertical directions.

Where:
n = 0 to turn off this function
n = 1 to turn on this function

Align Two Half-Width Rotated Characters in DBCS Mode

ASCII Code FS D

Hex Code 1C 44

Dec Code 28 68

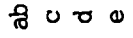
Purpose Aligns two half-width rotated characters to fit the space occupied by a normal size rotated character.

Comment Right after the control code sequence, two characters are paired. The characters are not required to be half-width to be aligned, because the command automatically takes care of that. It is only necessary for the characters to be rotated in order for the command to take effect. Only two characters are combined at a time.

This command does not function while in non-DBCS mode.

Example The following program demonstrates the function of the command.

```
10 LPRINT CHR$(28); "&";
20 LPRINT CHR$(28); "J";
30 LPRINT CHR$(28); "D"; "abcde"
999 LPRINT CHR$(12);
```



Backspace

ASCII Code BS

Hex Code 08

Dec Code 08

Purpose Moves the simulated print head to the left, one-byte space toward the first character column. In DBCS mode, the movement is two one-byte spaces.

Comment Moves the character position indicator one-byte space (two one-byte spaces in DBCS mode) to the left at the current character pitch setting. The code is ignored if the simulated print head is positioned at the first character column.

Example Print and send two backspaces in ASCII and DBCS mode.

```
10 LPRINT CHR$(28); "."; "Backspace in ASCII mode."
20 LPRINT "TTTTT";
30 LPRINT CHR$(8); CHR$(8);
40 LPRINT "=="
50 LPRINT CHR$(28); "&"; "Backspace in DBCS mode."
60 LPRINT "TTTTT";
70 LPRINT CHR$(8); CHR$(8);
80 LPRINT "=="
```

```
Backspace in ASCII mode.
TTT##
Backspace in DBCS mode.
T##TT
```

Barcode Printing

ASCII Code SSCC c *t; d data d* [; N *n* ; *xxxx* ; *yyyy*] [; X *mmmm*] [; P *p*] [; C] [; H *hh*] [; D] [; F *q data q*]

Hex Code SSCC 63 *t; d data d* [; 4E *n* ; *xxxx* ; *yyyy*] [; 58 *mmmm*] [; 50 *p*] [; 43] [; 48 *hh*] [; 44] [; 46 *q data q*]

Dec Code SSCC 99 *t; d data d* [; 78 *n* ; *xxxx* ; *yyyy*] [; 88 *mmmm*] [; 80 *p*] [; 67] [; 72 *hh*] [; 68] [; 70 *q data q*]

Where:
t = type of Barcode

t (ASCII)	t (hex)	Selects Barcode
B	42	Codabar
C	43	Code 39
9	39	Code 93
D	44	Code 128
8	38	EAN-8
1	31	EAN-13
F	46	FIM
G	47	German I-2/5
I	49	Interleaved 2/5
M	4D	MSI
4	34	PDF 417
O	4F	PostBar
P	50	POSTNET
R	52	Royal Mail
T	54	Telepen
V	56	UCC/EAN-128
A	41	UPC-A
E	45	UPC-E
S	53	UPC Shipping
U	55	UPS 11

Where:
d = barcode delimiter, which can be any character not used in the barcode data field.
data = variable length printable data field (PDF); character set is Alphanumeric

The following parameters are optional:

where:
N = activates the offset
n = the x and y coordinate unit system

***n* (ASCII)**	**Selects Value**
0	Use current cpi and lpi values
1	Use 1/4 inch value
2	Use 1/2 centimeter value : 1/(2.54x2)
3	Use 1 mm value : 1/(25.4)
4	Use target barcode dot (refer to table immediately below)

when:
n = 4

Front Panel Typeface	**X Offset Unit (Inch)**	**Y Offset Unit (Inch)**
LQ	1/180	1/180
Near LQ	1/120	1/120
Normal	1/180	1/144
Hi-Speed	1/180	1/120
Super Hi-Speed	1/180	1/90
Ultra Hi-Speed	1/180	1/90

Where:
xxxx = 4-digit upper left corner x (horizontal axis)
yyyy = 4-digit upper left corner y (vertical axis)
X = activates magnification
mmmm = bar code magnification

The possible magnification is as follows:

Barcode Type	Magnification
Code 39	X4 X3 X2 X1 X1.5 X1A X1B *X1C *X1D *X1E X4 X3 X2 X2A X1 X1A X1B
Interleaved 2/5	X4 X3 X2 X2A X1 X1A X1B
German I-2/5	X4 X3 X2 X2A X1 X1A X1B
UPC Shipping	X4 X3 X2 X1 X1.5 X1A X1B *X1C *X1D *X1E
Telepen	X4 X3 X2 X1 X4 X3 X2 X1 X1.5
MSI	X4 X3 X2 X1 X1.5
Code 128	X4 X3 X2 X1 X1.5
UCC/EAN-128	X4 X3 X2 X1 X1.5
Code 93	X2 X1
UPS 11	X2 X1
UPC-A	X2 X1
UPC-E	X2 X1
EAN 8	X4 X3 X2 X1
EAN 13	X1
Codabar	X1 X1A
POSTNET	X1 X1A
Royal Mail	X1
Postbar	X3 X2 X1
FIM	
PDF 417	
* The X1C, X1D, and X1E values can only be printed for a 180 dpi horizontal barcode. If these values are sent for a 120 dpi horizontal barcode, it will print as value X1.	

Where:
P = activates printable data field variable
p = location of PDF (“A” {above}, “B” {below,default}, “N” {none})

NOTE: FIM, Postbar, and PDF417 do not support this parameter.

C = Calculate and plot check digit (if the check digit is optional)

H = activates the height variable
hh = 2-digit barcode height in 1/10”

D = Dark barcode
(Note: This parameter does not take effect under any DBCS typefaces.)

[;F *q data q*] = secondary data field (optional). The secondary data field is only used to specify the barcode data when the primary data field is empty (two delimiters without any data). When the primary data field is not empty, the secondary data field is ignored.

Bell

ASCII Code BEL

Hex Code 07

Dec Code 07

Purpose Sounds the printer's buzzer/beeper.

Comment The BEL function will sound the buzzer/beeper for 0.2 seconds upon receipt of this command

Cancel Character Rotation

ASCII Code FS K

Hex Code 1C 4B

Dec Code 28 75

Purpose Cancels character rotation (horizontal printing mode).

Comment This command cancels the effect of FS J. This control code does not function while in non-DBCS mode.

Cancel Line

ASCII Code CAN

Hex Code 18

Dec Code 24

Purpose Clears all data not yet printed from a line, but does not affect control codes.

Comment You can use this control code to delete a line, but do so with caution to avoid possible misprinting. This control code cancels the double wide attribute set by SO. No other print attributes are affected. The simulated print head goes to the print position it had after the last CR or paper motion command.

Cancel Spacing Adjustment

ASCII Code FS V

Hex Code 1C 56

Dec Code 28 86

Purpose Cancels the spacing adjustment of half-width characters to fit into the full-width DBCS character space.

Comment This command cancels the effect of FS U. This control code does not function while in non-DBCS mode.

Carriage Return

ASCII Code CR

Hex Code 0D

Dec Code 13

Purpose Returns the simulated print head to the left margin.

Comment The CR code may or may not cause printing or paper motion, depending on the configuration as set from the control panel. If CR=CR is set, the characters following the CR are printed over the previous characters on the line. If CR=CR+LF is set, the paper is also moved one line at the current line spacing. This automatic LF will also cancel all single line print attributes.

CC DOS Control Code

ASCII Code ESC I *n*

Hex Code 1B 49 *n*

Dec Code 27 73 *n*

Table 5. CC DOS Control Code Parameters

Value of *n*	Function
A	Characters print normal size.
B	Characters print double width, in both ASCII and Hanzi mode.
C	Characters print double height, only in Hanzi mode.
D	Characters print double width and double height, but double height only prints in Hanzi mode.

Character Pitch 10 CPI

ASCII Code ESC P

Hex Code 1B 50

Dec Code 27 80

Purpose Sets character pitch to 10 characters per inch (cpi).

Comment This command is available in all print modes except DBCS mode. This command is normally used to cancel 12 cpi. This command affects the front panel setting of cpi.

Character Pitch 12 CPI

ASCII Code ESC M

Hex Code 1B 4D

Dec Code 27 77

Purpose Sets character pitch to 12 characters per inch (cpi).

Comment This command is available in all print modes except DBCS mode. This command affects the front panel setting of cpi.

Character Pitch 15 CPI

ASCII Code ESC g

Hex Code 1B 67

Dec Code 27 103

Purpose Sets character pitch to 15 characters per inch (cpi).

Comment This command is available in all print modes except DBCS mode. This command affects the front panel setting of cpi.

Condensed Print (Set/Reset)

ASCII Code SI ESC SIDC2

Hex Code 0F 1B 0F18

Dec Code 15 27 1512

Purpose Condenses print pitch as close as possible to 60 percent of the former character width.

Comment 10 cpi condenses to 17.1 cpi
12 cpi or 13.3 cpi condenses to 20 cpi
15 cpi will not have condense print

Control code SI affects all subsequent characters. After receiving code SI, all characters are printed condensed until the printer is reset by ESC M, ESC P, DC2, a printer reset, or a new print mode control code. SI code (hex 0F) is equivalent to the ESC SI code. If condensed print is not allowed in the current font, this code is ignored. Proportional spacing overrides condensed printing. This control code does not function while in DBCS mode. 12 cpi will condense to 20 cpi *only* if the menu option “20 CPI Condensed” is enabled.

Example The program below shows condensed character printing and reset.

```
10 LPRINT "Control code"
20 LPRINT "SI selects"
30 LPRINT CHR$(15);
40 LPRINT "condensed character printing."
50 LPRINT "Control code DC2"
60 LPRINT CHR$(18);
70 LPRINT "resets condensed character printing."
```

```
Control code
SI selects
condensed character printing.
Control code DC2
resets condensed character printing.
```

DBCS Mode (Select)

ASCII Code FS &

Hex Code 1C 26

Dec Code 28 38

Purpose Places the printer in DBCS mode.

Comment All data received by the printer with the MSB set will be paired with the next character which may or may not be a DBCS character. If the pair constitutes a 2-byte code which falls within the defined DBCS character set range, a DBCS character will be printed. Otherwise, the characters will be treated individually and printed accordingly. Control codes which normally can be applied to a non-DBCS mode typeface will not have an effect.

This command will set the DBCS/ASCII mode in the front panel to DBCS mode.

DBCS Mode (Cancel)

ASCII Code FS .

Hex Code 1C 2E

Dec Code 28 46

Purpose Cancels the effect of the FS & command and places the printer in single-byte character mode (ASCII). The typeface will remain the same.

Comment Control codes which are not valid for DBCS mode but sent while in DBCS mode will take effect after the changeover.

This command will set the DBCS/ASCII mode in the front panel to ASCII mode.

DBCS Mode Underline

ASCII Code FS – *n*

Hex Code 1C 2D *n*

Dec Code 28 45 *n*

Purpose Turns automatic underlining on and off.

Where:
n = NUL (hex 00) or 0 (hex 30) to turn off underlining
n = SOH (hex 01) or 1 (hex 31) to turn on single underlining
n = STX (hex 02) or 2 (hex 32) to turn on double underlining (only in DBCS 24 and Draft 24 mode)

Comment This control code does not function while in non-DBCS mode.

DBCS Superscript/Subscript Print (Set/Cancel)

ASCII Code FS r *n*

Hex Code 1C 72 *n*

Dec Code 28 114 *n*

Purpose Selects superscript/subscript printing in DBCS mode.

Where:
n = NUL (hex 00) or 0 (hex 30) to enable superscript printing
n = SOH (hex 01) or 1 (hex 31) to enable subscript printing

Comment This command is canceled by FS DC2. This control code does not function while in non-DBCS mode.

Define a Download Character (DBCS)

ASCII Code FS 2 *a1 a2 n1...n72*

Hex Code 1C 32 *a1 a2 n1...n72*

Dec Code 28 50 *a1 a2 n1...n72*

Purpose Defines a DBCS character for downloading. The control code should be followed by 72 bytes of data. *a1* and *a2* together define the code point of the download character where *a1* is the high byte and *a2* is the low byte.

The character can then be printed by sending *a1 a2* to the printer. The character can print in all the DBCS typefaces. It will be available until the printer power is recycled.

The download ranges are different for different types of printers:

GB: AAA1~AFFE, F8A1~FEFE, A140~A7A0, FF40~FF7E, FF80~FFFE

SJIS: High Byte F0~F9, Low Byte 40~FC

BIG5:

BIG5	8140~A07E, 81A1~A0FE, C840~C87E, C8A1~C8FE, FA40~FE7E, FAA1~FEFE, 8100~FE3F, A180~FEAD
CNS	AAA1~C1FE, C3A1~C3FE, F321~FE7E
TCA	DF30~FC39, DF61~FC7A, DF80~FCFD, DF41~FC5A
ETEN	8D30~9039, 8D41~905A, 8D61~907A, 8D80~90FD
IMB5550	D240~E87E, D280~E8FC, F940~FB7E, F980~FBFC
TELETEXT	F7A1~FEFE
WANG	DBA0~F4EE, F9A0~FBEE
BIG5+	NIL

BIG5E 8840~8D7E, 88A1~8DFE, FA40~FE7E, FAA1~FEFE

HKSCS-2001 8140~877E, 81A1~87FE

UTF8 E000~F8FF

Multiple characters from these ranges can be defined as long as the printer does not run out of memory.

Define Pattern for Special Printing Effect

ASCII Code ESC (X *n1 n2 a1 a2 a3*

Hex Code 1B 28 58 *n1 n2 a1 a2 a3*

Dec Code 27 40 88 *n1 n2 a1 a2 a3*

Purpose Defines the pattern to be used in conjunction with outlined characters.

Where:
n1=3 (default), *n2*=0 (default)
a1=0, 1
$0 \leq a2 \leq 4$
a3=0 (default)

Where:
a1=0 background
a1=1 fill pattern
a2=0 black on white, normal
a2=1 white on black
a2=2 dotted
a2=3 slashed
a2=4 meshed

Comment This command will not take effect unless the characters printed are outlined, as set by the ESC q control code.

Example The following program demonstrates the function of the command.

```
100 LPRINT CHR$(27); "@"
110 LPRINT CHR$(28); "&";
120 LPRINT CHR$(27); "3"; CHR$(45);
130 LPRINT CHR$(28); "W"; CHR$(1);
140 LPRINT CHR$(27); "q"; CHR$(1);
150 GOSUB 210
160 LPRINT CHR$(27); "("; "X"; CHR$(3); CHR$(0); CHR$(0); CHR$(1); CHR$(0
170 GOSUB 210
180 LPRINT CHR$(27); "("; "X"; CHR$(3); CHR$(0); CHR$(0); CHR$(2); CHR$(0
190 GOSUB 210
200 END
210 '
220 LPRINT CHR$(&HD6); CHR$(&HD0);
230 LPRINT CHR$(&HD3); CHR$(&HA2);
240 LPRINT CHR$(&HCE); CHR$(&HC4);
250 LPRINT CHR$(&HB4); CHR$(&HF2);
260 LPRINT CHR$(&HD3); CHR$(&HA1);
270 LPRINT CHR$(&HBB); CHR$(&HFA)
280 RETURN
```

Define User-Defined Character

ASCII Code ASSC 0 2 *a1* *a2* *d1...d144*

Hex Code ASSC 30 32 *a1* *a2* *d1...d144*

Dec Code ASSC 48 50 *a1* *a2* *d1...d144*

Purpose Sets the ASCII format data for a user-defined character. The user-defined characters can be printed by sending *a1 a2* to the printer.

Where:
a1 = high byte code point
a2 = low byte code point
d1...d144 = 144 bytes ASCII format data

Comment This command takes effect only in DBCS mode.

Delete Character

ASCII Code DEL

Hex Code 7F

Dec Code 127

Purpose Deletes the previous character on a line.

Comment This command is ignored if it occurs immediately after a CR or a paper motion command. Characters truncated due to line length restrictions are not affected by this code.

Double High Print, Set/Reset

ASCII Code ESC w *n*

Hex Code 1B 77 *n*

Dec Code 27 119 *n*

Purpose Turns double high character printing on and off. Double high characters are standard width but twice as high.

Where:
n = SOH (hex 01) or 1 (hex 31) turns double high printing on
n = NUL (hex 00) or 0 (hex 30) turns double high printing off

Comment This control code does not function while in DBCS mode.

Double Strike (Select)

ASCII Code ESC G

Hex Code 1B 47

Dec Code 27 71

Purpose Makes text bolder by printing each dot twice.

Comment This command makes text bolder by printing each dot twice, the second dot offset to the right of the first by a distance equal to 1/2 the width of a dot, the same as with ESC E.

Double Strike (Cancel)

ASCII Code ESC H

Hex Code 1B 48

Dec Code 27 72

Purpose Turns off the double strike printing set by ESC G or ESC !.

Comment This control code resets only the double strike print attribute. Other print attributes, such as double wide printing, are not affected.

Example The following program illustrates double strike character printing.

```
10 LPRINT "Control code ESC G"
20 LPRINT CHR$(27);"G";
30 LPRINT "selects bold character printing,"
40 LPRINT "for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp."
50 LPRINT "Control code ESC H"
60 LPRINT CHR$(27);"H";
70 LPRINT "cancels bold character printing."
```

```
Control code ESC G
selects bold character printing,
for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp.
Control code ESC H
cancels bold character printing.
```

Double Wide Print

ASCII Code ESC W *n*

Hex Code 1B 57 *n*

Dec Code 27 87 *n*

Purpose Turns double wide print on and off.

Where:
n = SOH (hex 01) or 1 (hex 31) turns double wide print on
n = NUL (hex 00) or 0 (hex 30) turns double wide print off

Comment When ESC W is received, all characters are printed twice as wide until reset. This command overrides SO, ESC SO, and DC4.

Example The following program illustrates double wide character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC W 1 selects"
30 LPRINT CHR$(27);"W";CHR$(1);
40 LPRINT "expanded character printing."
50 LPRINT "Control code"
60 LPRINT "ESC W 0 resets"
70 LPRINT CHR$(27);"W";CHR$(0);
80 LPRINT "expanded character printing."
```

```
Control code
ESC W 1 selects
expanded character printing.
Control code
ESC W 0 resets
expanded character printing.
```

Double Wide Print (One Line)

ASCII Code	SO	ESC	SO
Hex Code	0E	1B	0E
Dec Code	14	27	14

Purpose Selects double wide print for one line only.

Comment This control code is a line-by-line print attribute. When SO or ESC SO is received, the characters on the current line print twice as wide and then reset automatically.

This control code is cancelled by the DC4 or FS DC4 codes, by a paper motion control code (LF, VT, etc.), or by CR.

Example The following program illustrates double wide print for one line only.

```
10 LPRINT "Control code"
20 LPRINT "SO selects"
30 LPRINT CHR$(14);
40 LPRINT "expanded character printing"
50 LPRINT "for one line only."
```

```
Control code
SO selects
expanded character printing
for one line only.
```

Double Wide Print (One Line), Cancel

ASCII Code DC4

Hex Code 14

Dec Code 20

Purpose Cancels the double wide print for one line only selected by SO, ESC SO, or FS SO.

Comment This command cancels the double wide print selected by SO, ESC SO, or FS SO, but does not cancel double wide printing selected by ESC W or ESC !.

Double Wide Print (One Line)

ASCII Code FS SO

Hex Code 1C 0E

Dec Code 28 14

Purpose Selects double wide print for one line only.

Comment This control code is a line-by-line print attribute. When FS SO is received, the characters on the current line print twice as wide and then reset automatically.

This control code is cancelled by the DC4 or FS DC4 codes, by a paper motion control code (LF, VT, etc.), or by CR.

NOTE: This control code does not function while in non-DBCS mode.

Double Wide Print (One Line), Cancel

ASCII Code FS DC4

Hex Code 1C 14

Dec Code 28 20

Purpose Cancels the double wide print for one line only selected by FS SO.

Comment This command cancels the double wide print selected by SO, ESC SO, or FS SO, but does not cancel double wide printing selected by ESC W or ESC !.

NOTE: This control code does not function while in non-DBCS mode.

Double Wide, Double High (2x2) Print

ASCII Code FS W *n*

Hex Code 1C 57 *n*

Dec Code 28 87 *n*

Purpose Turns on double wide, double high (2x2) printing in DBCS mode.

Comment In a non-DBCS mode, this command will function like ESC W.

Download Chinese Font (For Hanzi Big5 Printer Only)

ASCII Code	ASSC	0	T	2	[X]	0	[c1]c2c3	data
Hex Code	ASSC	30	54	32	[X]	30	[c1]c2c3	data
Dec Code	ASSC	48	84	50	[X]	48	[c1]c2c3	data

Purpose To download the user defined characters with 24x24 cell size.

Where

- [X] is an optional parameter:
  without X: the data is 72 byte binary data
  with X: the data is 144 byte ASCII data
- [c1]c2c3 is code point:
  c2c3 is 2 byte code point in normal code page
  c1c2c3 is byte code point in UTF8 code page
- data: download data in 72/144 byte which is arranged in horizontal sequence.

Comment This control code does not function while in non-DBCS mode.

Download Chinese Font: Unicode Position (For Hanzi Big5 Printers Only)

ASCII Code	ASSC	0	T	d	$X_1X_2X_3X_4X_5$	data
Hex Code	ASSC	30	54	64	$X_1X_2X_3X_4X_5$	data
Dec Code	ASSC	48	84	100	$X_1X_2X_3X_4X_5$	data

Purpose To download the user defined characters with 24x24 cell size in unicode position.

Where

- $X_1X_2X_3X_4X_5$ is the unicode character position in ASCII value representation.
- data: Download data in 144 bytes that are arranged in horizontal sequence.

Comment This control code does not function while in non-DBCS mode, and only takes effect when the printer is set to UTF-8 Encoding mode.

Emphasized Print (Select)

ASCII Code ESC E

Hex Code 1B 45

Dec Code 27 69

Purpose Selects emphasized character print format.

Comment Emphasized print makes text bolder by printing each dot twice, the second dot offset to the right of the first by a distance equal to 1/2 the width of a dot.

Example The following program illustrates emphasized character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC E selects"
30 LPRINT CHR$(27);"E";
40 LPRINT "emphasized character printing."
42 LPRINT "Control code ESC F"
50 LPRINT CHR$(27);"F";
60 LPRINT "cancels emphasized character printing."
```

```
Control code
ESC E selects
emphasized character printing.
Control code ESC F
cancels emphasized character printing.
```

Emphasized Print (Cancel)

ASCII Code ESC F

Hex Code 1B 46

Dec Code 27 70

Purpose Cancels emphasized character printing selected by ESC E or ESC !.

Enable Printing of Control Codes

ASCII Code ESC I *n*

Hex Code 1B 49 *n*

Dec Code 27 73 *n*

Purpose Tells the printer to treat codes 0x00 through 0x1F and 0x80 through 0x9F as either printable characters or control codes.

Where:
n = 1, codes 0x00 through 0x1F and 0x80 through 0x9F are treated as printable characters
n = 0, codes 0x00 through 0x1F and 0x80 through 0x9F are treated as control codes

Comment This command has no effect when the italic character table is selected; no characters are defined for these codes in the italic character table.

Font Expansion

ASCII Code	ASSC	0	e	n1	n2
Hex Code	ASSC	30	65	n1	n2
Dec Code	ASSC	48	101	n1	n2

Purpose Expand the DBCS characters up to the size of 72.

For this command to work, n1 must be the same value as n2 (i.e. n1=n2). When n1 and n2 = 25 to 72, this set font expansion mode is ON. The value of n1 and n2 determines the bitmap size. For example, if the size of n1 is 50, then the size of the bitmap will be set to 50x50. For n1 and n2 = 24, the font expansion mode resets to OFF and the bitmap size reverts to the default, 24x24.

Inter-line spacing and inter-character spacing calculations are based on standard setting as if the bitmap is 24x24. This command only increases the size of the bitmap and does not affect the inter-character spacing or inter-line spacing. For example, if inter-line spacing is 6 dot rows, when the bitmap is expanded from 24x24 to 72x72, the inter-line spacing still remains as 6 dot rows. The same is true for inter-character spacing.

Other commands, such as double height, double width, 2x2 times, left/right margin etc., will not function when the font expansion mode is set on. For different typefaces, the characters will expand based on the appropriate typeface resolution. All commands affecting LPI and CPI still takes effect and is set as if the bitmap is 24x24 as mentioned above.

Where
n1 = 24 - 71
n2 = 24 - 72

Comment This control code does not function while in non-DBCS mode.

Form Feed

ASCII Code FF

Hex Code 0C

Dec Code 12

Purpose Prints the data in the buffer, if any, then moves the paper to the top of the next form.

Comment The simulated print head moves to the left margin. This code cancels all single line print attributes.

Graphic Printing

ASCII Code ASSC 0 * m nL nH d1...dk

Hex Code ASSC 30 2A m nL nH d1...dk

Dec Code ASSC 48 42 m nN nH d1...dk

Purpose Prints dot-grphics in 16 or 24-dot columns, depending on the following parameters:

Where:
m specifies the dot density
nL, nH specifies the total number of columns or graphics data that follow (number of dot columns) = ((nHx256) + nL)
d1...dk specifies bytes of graphics data; k is determined by multiplying the total number of columns times the number of bytes required for each column.

Parameter m is ASSC*	Horizontal Density (dpi)	Vertical Density (dpi)	Dots Per Column	Bytes Per Column
0	180	180	24	3
1	90	180	24	3
2	120	120	16	2
3	90	144	24	3
4	90	120	16	2
5	90	90	16	2

Graphics, Double Density

ASCII Code ESC L *n1 n2 d1 d2...dk*

Hex Code 1B 4C *n1 n2 d1 d2...dk*

Dec Code 27 76 *n1 n2 d1 d2...dk*

Purpose Selects double density bit image graphics of 120 dpi horizontally and 72 dpi vertically.

Expression CHR$(27);“L”;CHR$(*n1*);CHR$(*n2*);“*DATA*”

Where:
n1 = 0 through 255
n2 = 0 through 31
n1 + (256 x *n2*) defines the number of data bytes to follow.
d1 d2...dk = ASCII characters for the dot pattern bytes.

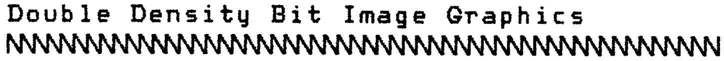
NOTE: *d1 d2...dk (DATA*) consists of 8-bit dot columns, with the MSB at the top and “1” bits producing dots. (0 < = *d* < = 255)

Comment Double density printing reduces print speed.

Example The following example produces double density bit-image graphics of the pattern used in the standard density bit-image mode example. The amount of data must be doubled for double density (the data is used 54 times rather than 27).

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Bit Image Graphics"
30 LPRINT CHR$(27);"L";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Bit Image Graphics
```



Graphics, Double Density, Double Speed

ASCII Code ESC Y *n1 n2 d1 d2...dk*

Hex Code 1B 59 *n1 n2 d1 d2...dk*

Dec Code 27 89 *n1 n2 d1 d2...dk*

Purpose Selects double density, double speed bit-image graphics of 120 dpi horizontally and 72 dpi vertically.

Expression CHR$(27);“Y”;CHR$(*n1*);CHR$(*n2*);“*DATA*”

Where:
n1 = 0 through 255
n2 = 0 through 31
n1 + (256 x *n2*) defines the number of data bytes to follow.
d1 d2...dk = ASCII characters for the dot pattern bytes.

NOTE: *d1 d2...dk (DATA*) consists of 8-bit dot columns, with the MSB at the top and “1” bits producing dots. (0 < = *d* < = 255)

Comment This mode prints double density with no adjacent dots. It is similar to ESC L, except that if the graphics data contain horizontally adjacent dots, the data may print incorrectly. This feature is widely used to move the print head precisely by printing blank dot columns.

Example The following example produces a double density, double speed graphic image of the pattern used in the standard density example. The amount of data must be doubled for double density (the data is used 54 times rather than 27).

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Double Speed Bit Image Graphics"
30 LPRINT CHR$(27);"Y";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Double Speed Bit Image Graphics
```

Graphics, Quadruple Density

ASCII Code ESC Z *n1 n2 d1 d2...dk*

Hex Code 1B 5A *n1 n2 d1 d2...dk*

Dec Code 27 90 *n1 n2 d1 d2...dk*

Purpose Selects Quadruple Density Bit Image graphics of 240 dpi horizontally and 72 dpi vertically.

Expression CHR$(27);"Z";CHR$(*n1*);CHR$(*n2*);"*DATA*"

Where:
n1 = 0 through 255
n2 = 0 through 31
n1 + (256 x *n2*) defines the number of data bytes to follow.
d1 d2...dk = ASCII characters for the dot pattern bytes.

NOTE: *d1 d2...dk (DATA*) consists of 8-bit dot columns, with the MSB at the top and "1" bits producing dots. (0 < = *d* < = 255)

Comment This mode is similar to ESC L, except that four dot columns are printed in the space normally taken by two columns.

Example The following example produces quadruple density graphics of the pattern used in the standard density example. The amount of data must be quadrupled for quadruple density (the data is used 108 times rather than 27).

```
10 WIDTH "lpt1:",255
20 LPRINT "Quad Density Bit Image Graphics"
30 LPRINT CHR$(27);"Z";CHR$(205);CHR$(3);
40 FOR N=1 TO 108
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Quad Density Bit Image Graphics
```

Graphics, Standard Density

ASCII Code ESC K *n1 n2 d1 d2...dk*

Hex Code 1B 4B *n1 n2 d1 d2...dk*

Dec Code 27 75 *n1 n2 d1 d2...dk*

Purpose Selects normal density bit image graphics of 60 dpi horizontally and 72 dpi vertically.

Expression CHR$(27);"K";CHR$(*n1*);CHR$(*n2*);"*DATA*"

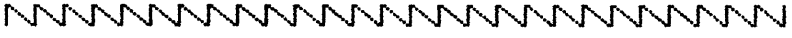
Where:
n1 = 0 through 255
n2 = 0 through 31
n1 + (256 x *n2*) defines the number of data bytes to follow.
d1 d2...dk = ASCII characters for the dot pattern bytes.

NOTE: *d1 d2...dk (DATA*) consists of 8-bit dot columns, with the MSB at the top and "1" bits producing dots. (0 < = *d* < = 255)

Example The following example produces a pattern of standard density bit image graphics. The 9 data-bit pattern is repeated 27 times. Compare this example to the double density and quadruple density examples.

```
10 WIDTH "lpt1:",255
20 LPRINT "Single Density Bit Image Graphics"
30 LPRINT CHR$(27);"K";CHR$(244);CHR$(0);
40 FOR N=1 TO 27
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Single Density Bit Image Graphics
```



Half-Width Print

ASCII Code FS SI

Hex Code 1C 0F

Dec Code 28 15

Purpose Sets the printing of DBCS characters as half-width. SBCS characters maintain at their normal width.

Comment This command takes effect only for DBCS characters and is canceled by FS DC2.

Half-Width Print Cancel

ASCII Code FS DC2

Hex Code 1C 12

Dec Code 28 18

Purpose Resets half-width/superscript/subscript printing of DBCS characters to normal size.

Comment This command cancels the effect of FS SI and FS r.

Home Print Head

ASCII Code ESC <

Hex Code 1B 3C

Dec Code 27 60

Purpose Moves the print head to the extreme left position so the next line prints left to right.

Horizontal Tab Execute

ASCII Code HT

Hex Code 09

Dec Code 09

Purpose Moves the simulated print head to the next horizontal tab stop.

Comment Power-on default horizontal tabs are set at every eighth character at the current character spacing. Tab positions are not affected by a change of font or character width. Underline will not be printed between the current print position and the next tab position.

Horizontal Tab Set/Release

ASCII Code ESC D *n1...nk* NUL

Hex Code 1B 44 *n1...nk* 00

Dec Code 27 68 *n1...nk* 0

Purpose Sets up to 32 horizontal tab positions.

Expression CHR$(27);“D”;CHR$(*n1*);...CHR$(*n32*);CHR$(0);
n = 1-255; *k* = 1-32

Where:
n1 through *n32* specify the character column of the tab positions. NUL is the sequence terminator. ESC D NUL clears all tabs.

Comment The values of *n* must be listed in ascending order or they are ignored. Tabs greater than 32 or those positioned beyond the right margin are ignored. The physical tab position is the product of *n* and the current cell width (1/pitch), excluding double wide.

After tabs are set, HT moves the simulated print head to the next tab stop. Sending ESC @ initializes the printer and resets the tabs to every eighth character column (which is the default).

In proportional mode, the size of 10 CPI characters determines tab positions.

Example The following example illustrates how to set horizontal tabs.

```
10 LPRINT "Control code"
20 LPRINT "ESC D CHR$(4);CHR$(10);CHR$(0)"
30 LPRINT "sets tab stops at columns 4 and 10."
40 LPRINT "Control code HT"
50 LPRINT "accesses the tab stops as follows:"
60 LPRINT CHR$(27);"D";CHR$(4);CHR$(10);CHR$(0);
70 LPRINT CHR$(9);
80 LPRINT "column 4"
90 LPRINT CHR$(9);CHR$(9);
100 LPRINT "column 10"
```

```
Control code
ESC D CHR$(4);CHR$(10);CHR$(0)
sets tab stops at columns 4 and 10.
Control code HT
accesses the tab stops as follows:
    column 4
          column 10
```

Initialize Printer

ASCII Code ESC @

Hex Code 1B 40

Dec Code 27 64

Purpose Resets all print-related parameters to the power-up configuration values.

Comment Restores the power-up configuration. The print buffer is cleared of printable data on the line preceding the command. Current position is set as top-of-form.

All settings, such as font, international language selection, etc., are reset to the power-up default values. Character-by-character and line-by-line attributes are canceled. All channels of the vertical format unit are cleared. This command resets the horizontal tabs to every eighth character column. Interface parameters and printer protocol selection are *not* affected.

Italic Printing (Select)

ASCII Code ESC 4

Hex Code 1B 34

Dec Code 27 52

Purpose Turns on italic character printing.

Comment Character graphics (IBM graphic set hex B0 through DF) cannot be italicized. Italic printing will reduce throughput.

Italic Printing (Cancel)

ASCII Code ESC 5

Hex Code 1B 35

Dec Code 27 53

Purpose Turns off italic character printing.

Line Feed

ASCII Code LF

Hex Code 0A

Dec Code 10

Purpose Prints the data in the buffer (if any) and advances the vertical character position a distance of one line at the current line spacing.

Comment If configured for LF equals newline (LF=CR+LF), the simulated print head is moved to the left margin, otherwise it is not moved from its current position. The current line is printed, and the simulated printhead moves down a distance equal to the current line spacing. If there are no dots, the paper is moved but no printing occurs. When possible, successive line feeds are accumulated and moved at once. The amount of paper advanced by the LF code can be set by any of the line spacing control codes: ESC 0, ESC 2, ESC 3, ESC A, or ESC +.

This code cancels all single line print attributes such as double high and double wide characters.

Line Feed *n*/180 Inch

ASCII Code ESC J *n*

Hex Code 1B 4A *n*

Dec Code 27 74 *n*

Purpose Immediately advances the paper *n*/180 inch.

Where:
n = 0 through 255

Comment *n* = 0 is ignored. This command produces an immediate line feed but does not affect line spacing or produce a carriage return. Any one-line-only print attributes in effect are canceled.

Small values of *n* may result in overlapping lines. Overlapping lines may also occur if print attributes such as double high, superscript, or subscript characters are used on the same line.

Example The following example illustrates *n*/180-inch line spacing.

```
10 LPRINT "Control code ESC J 132"
20 LPRINT CHR$(27); "J"; CHR$(132);
30 LPRINT "performs a 132/180 inch"
40 LPRINT "line feed function for one line only."
```

```
Control code ESC J 132
```

```
performs a 132/180 inch
line feed function for one line only.
```

Line Spacing 1/6 Inch (6 lpi)

ASCII Code ESC 2

Hex Code 1B 32

Dec Code 27 50

Purpose Sets the line spacing to 1/6 inch (6 lpi) for subsequent line feeds.

Comment The 2 is ASCII character 2, not hex 2. When ESC 2 is received, all lines are printed at 6 lpi until a new line spacing is selected or the printer is reset.

This control code overrides line spacing set at the control panel.

Example The following example illustrates 1/6-inch line spacing.

```
10 LPRINT "Control code ESC 2 sets"
20 LPRINT CHR$(27);"2";
30 LPRINT "line spacing at"
40 LPRINT "6 lpi for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 2 sets
line spacing at
6 lpi for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing 1/8 Inch (8 lpi)

ASCII Code ESC 0

Hex Code 1B 30

Dec Code 27 48

Purpose Sets the line spacing to 1/8 inch (8 lpi) for subsequent line feeds.

Comment The 0 is ASCII character 0, not hex 0. When ESC 0 is received, all lines are printed at 8 lpi until a new line spacing is selected or the printer is reset. This control code overrides line spacing set at the control panel.

Example The following example illustrates 1/8-inch line spacing.

```
10 LPRINT "Control code ESC 0 sets"
20 LPRINT CHR$(27);"0";
30 LPRINT "line spacing at"
40 LPRINT "1/8 (8 lpi) inch for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 0 sets
line spacing at
1/8 (8 lpi) inch for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing *n*/60 Inch

ASCII Code ESC A *n*

Hex Code 1B 41 *n*

Dec Code 27 65 *n*

Purpose Sets a line spacing of *n*/60 inch for subsequent line feeds.

Where:
n = 0 through 85 (all other values are ignored)

Comment When this control sequence is received, all subsequent line feeds are *n*/60-inch until a new line spacing is selected or the printer is reset. This setting overrides line spacing set at the control panel. When *n* = 0, the current line spacing is printed.

Small values of *n* may result in overlapping lines. Overlapping lines may also occur if print attributes such as Elongated (Double High), Superscript, or Subscript characters are used on the same line. If lines overlap, printing speed is reduced. Any values set by ESC 3 (line spacing *n*/180 inch) are replaced.

Example The following example illustrates 20/60-inch line spacing.

```
10 LPRINT "Control code ESC A 20 sets"
20 LPRINT CHR$(27); "A"; CHR$(20);
30 LPRINT "line spacing at 20/60 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected.
```

```
Control code ESC A 20 sets
line spacing at 20/60 inch

increments for all subsequent lines

until reset or another spacing is selected.
```

Line Spacing *n*/180 Inch

ASCII Code ESC 3 *n*

Hex Code 1B 33 *n*

Dec Code 27 51 *n*

Purpose Specifies the line spacing at *n*/180-inch increments.

Where:
n = 0 through 255

Comment The 3 is an ASCII character 3, not hex 3. All line feeds following receipt of this code are at *n*/180-inch line spacing until a new line spacing is selected or the printer is reset. Line spacing set by this control code overrides the line spacing setting set at the control panel. When *n* = 0, the current line spacing is printed.

If the vertical distance to move is other than a multiple of the *n*/180 inch, the remainder is added to the next paper motion command.

Use caution when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript, because overlapping lines may occur. Print speed is reduced if lines overlap.

Example The following example illustrates *n*/180-inch line spacing.

```
10 LPRINT "Control code ESC 3 50 sets"
20 LPRINT CHR$(27); "3"; CHR$(50);
30 LPRINT "line spacing at 50/180 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 3 50 sets
line spacing at 50/180 inch

increments for all subsequent lines

until reset or another spacing is selected.
```

Line Spacing *n*/360 Inch

ASCII Code ESC + *n*

Hex Code 1B 2B *n*

Dec Code 27 43 *n*

Purpose Specifies the line spacing at *n*/360-inch increments.

Where:
n = 0 through 255

Comment All line feeds following receipt of this code are at *n*/360-inch line spacing until a new line spacing is selected or the printer is reset. Line spacing set by this control code overrides line spacing set at the control panel. When *n* = 0, the current line spacing is printed.

If the vertical distance to move is other than a multiple of *n*/360 inch, the remainder is added to the next paper motion command.

Use caution when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript, because overlapping lines may occur. Print speed is reduced if lines overlap.

Example The following example illustrates *n*/360-inch line spacing.

```
10 LPRINT "Control code ESC + 50 sets"
20 LPRINT CHR$(27); "+"; CHR$(50);
30 LPRINT "line spacing at 50/360 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."

Control code ESC + 50 sets
line spacing at 50/360 inch
increments for all subsequent lines
until reset or another spacing is selected.
```

Make Hex 80-9F Control Codes

ASCII Code ESC 7

Hex Code 1B 37

Dec Code 27 55

Purpose Makes codes hex 80-9F control codes.

Comment This is the default when the Epson italic character set is selected as the default set at the control panel.

Make Hex 80-9F Printable

ASCII Code ESC 6

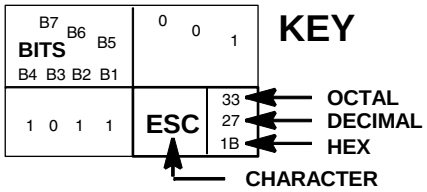
Hex Code 1B 36

Dec Code 27 54

Purpose Makes codes hex 80-9F printable characters.

Comment The 6 is an ASCII character 6, not hex 6. This is the default when the IBM PC graphics character set (Code Page 437) is selected as the default set at the control panel.

The characters printable in the Epson italic character set are shown in Figure 1.



B8 B7 B6 B5 / BITS B4 B3 B2 B1	ROW	1 0 0 0 COLUMN 8		1 0 0 1 9	
0 0 0 0	0	à	200 128 80	§	220 144 90
0 0 0 1	1	è	201 129 81	ß	221 145 91
0 0 1 0	2	ù	202 130 82	Æ	222 146 92
0 0 1 1	3	ò	203 131 83	æ	223 147 93
0 1 0 0	4	ì	204 132 84	Ø	224 148 94
0 1 0 1	5	ö	205 133 85	ø	225 149 95
0 1 1 0	6	£	206 134 86	¨	226 150 96
0 1 1 1	7	¡	207 135 87	Ä	227 151 97
1 0 0 0	8	¿	210 136 88	Ö	230 152 98
1 0 0 1	9	Ñ	211 137 89	Ü	231 153 99
1 0 1 0	10	ñ	212 138 8A	ä	232 154 9A
1 0 1 1	11	¤	213 139 8B	ö	233 155 9B
1 1 0 0	12	Pt	214 140 8C	ü	234 156 9C
1 1 0 1	13	Å	215 141 8D	É	235 157 9D
1 1 1 0	14	å	216 142 8E	é	236 158 9E
1 1 1 1	15	ç	217 143 8F	¥	237 159 9F

Figure 1. LQ-1600K Printable Codes (Hex 80-9F)

Master Print Select

ASCII Code ESC ! *n*

Hex Code 1B 21 *n*

Dec Code 27 33 *n*

Purpose Selects or changes print attributes in a single command.

Where:
n = an 8-bit number with the bits set to specify print attributes, as shown in Table 6. (0 < = *n* < = 255)

Table 6. Master Print Select Bit Values

Bit No.	Bit = 0	Bit = 1
0	10 cpi	12 cpi
1	Monospaced	Proportional
2	Normal	Condensed
3	Normal	Emphasized
4	Normal	*Double Strike
5	Normal	Double Wide
6	Normal	Italic
7	Normal	Underlined

For example, to specify 10 cpi, proportional spacing, and italics,
n = 0 1 0 0 0 0 1 0

Where:
bit 0 = 0 (10 cpi)
bit 1 = 1 (proportional)
bit 2, 3, 4, 5 = 0 (normal)
bit 6 = 1 (italic)
bit 7 = 0 (normal)
n = a binary number (0 1 0 0 0 0 1 0), which equals hex 42.
The hex command sequence is 1B 21 42.

Comment Emphasized is substituted for double strike.

Master Print Select in DBCS Mode

ASCII Code FS ! *n*

Hex Code 1C 21 *n*

Dec Code 28 33 *n*

Purpose Selects or changes DBCS print attributes in a single command.

Where:
n = an 8-bit number with the bits set to specify print attributes, as shown below. (0 < = *n* < = 255)

Table 7. Master Print Select Bit Values

Bit No.	Bit = 0	Bit = 1
0	Normal	Vertical print (rotated)
1	Normal	Half-width
2	Normal	Double width
3	Normal	Double height
4	Normal	1/4 size
5	Superscript	Subscript
6	-	-
7	Normal	Underlined

Master Select One-Line Attribute in DBCS Mode

ASCII Code ASSC 0 ! *n*

Hex Code ASSC 30 21 *n*

Dec Code ASSC 48 33 *n*

Purpose Where:
0 < = *n* < = 255

Select any combination of several one-line attributes by setting or clearing the appropriate bit in the *n* parameter, as shown in Table 8.

Table 8

Bit	On/Off	Hex	Dec	Function
2	Off On	00 04	0 4	Cancel double width Select double width
3	Off On	00 08	0 8	Cancel double height Select double height

Comment These attributes are canceled when the printer receives the following commands: LF, FF, VT, and CR.

This command takes effect only in DBCS mode.

Orientation of Downloaded Character

ASCII Code ASSC 0 o *n*

Hex Code ASSC 30 6F *n*

Dec Code ASSC 48 111 *n*

Purpose Sets the orientation of downloaded characters.

Where:
0 = 0 or 48 vertical (same as LQ1600K FS2 format)
n = 1 or 49 horizontal function

Comment Takes effect before FS 2 and ASC 0 2 commands.

Printer Deselect

ASCII Code DC3

Hex Code 13

Dec Code 19

Purpose Places printer in the deselected state.

Comment The configuration parameter Printer Select must be set to Enable.

When the printer receives this command, it ignores data until a DC1 (Printer Select) command is received.

Printer Select

ASCII Code DC1

Hex Code 11

Dec Code 17

Purpose Places printer in the selected state.

Comment The configuration parameter Printer Select must be set to Enable.

This control code allows the printer to receive and print data from the host if it was deselected by DC3. If the printer was not deselected by DC3, this code is ignored.

Proportional Spacing, Select/Deselect

ASCII Code ESC p *n*

Hex Code 1B 70 *n*

Dec Code 27 112 *n*

Where:
n = NUL (hex 00) or 0 (hex 30) turns proportional mode off
n = SOH (hex 01) or 1 (hex 31) turns proportional mode on

Purpose Turns proportional mode on and off.

Comment This command only affects the character printing in ASCII mode. This command affects the “Prop. Spacing” setting in the front panel.

Rotate Character 90 Degrees Counter-Clockwise

ASCII Code FS J

Hex Code 1C 4A

Dec Code 28 74

Purpose Rotates characters while in DBCS mode (vertical printing mode).

Comment This control code does not function while in non-DBCS mode.

Select Autowrap Mode (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T m n

Hex Code ASSC 30 54 6D n

Dec Code ASSC 48 84 109 n

Purpose To set Auto Line Feed

Where
n = 0x30: reset auto LF (default)
n = 0x31: set auto LF

Comment This control code does not function while in non-DBCS mode.

Save Downloaded Character into Flash

ASCII Code ASSC 0 w

Hex Code ASSC 30 77

Dec Code ASSC 48 119

Purpose Saves the downloaded character into flash.

Comment The same functionality with control panel selection “DBCS Download” -> Save to Flash.

Static Barcode Function

ASCII Code	ASSC	0	T	c	t [;d data d][;0 $n_1n_2n_3$][;# p]
Hex Code	ASSC	30	54	63	t [;d data d][;30 $n_1n_2n_3$][;23 p]
Dec Code	ASSC	48	84	99	t [;d data d][;48 $n_1n_2n_3$][;35 p]

Purpose Sets the static barcode

Where

- t: barcode type
  t = @: Interleaved 2/5
  t = A: Code 39
  t = B: Interleaved 2/5
  t = C: Code 39
  t = D: Interleaved 2/5
  t = E: Codabar
  t = F: EAN-13
  t = G: EAN-8
  t = H: Codabar
  t = I: UPC_A
- 0: barcode height
  $n_1n_2n_3$ are in ASCII value; the height is dot by 300 dpi, and converted to dot by 180 dpi,
  $n_1n_2n_3$ = 0x30 ~ 0x39
- #: PDF enable/disable
  p = 0x30: disable
  p = 0x31: enable

Select Bit Image

ASCII Code SSCC * *m* *nL* *nH* *d1...dk*

Hex Code SSCC 2A *m* *nL* *nH* *d1...dk*

Dec Code SSCC 42 *m* *nL* *nH* *d1...dk*

Purpose Prints dot graphics in 12- or 16-dot columns, depending on the following parameters:

Where:
0 < = *nL* < = 255
0 < = *nH* < = 31
m = 30, 31, 32
m specifies the dot density.
nL nH specifies the total number of columns of graphics data that follow (number of dot columns) = (*nH* x 256 + *nL*)
d1...dk bytes of graphics data; *k* is determined by multiplying the total number of columns times the number of bytes required for each column.

Parameter *m* in ESC *	Horizontal Density (dpi)	Vertical Density (dpi)	Dots per Column	Bytes per Column
30	90	90	12	2
31	120	120	16	2
32	90	90	16	2

Select DBCS ASCII Character Type

ASCII Code FS k *n*

Hex Code 1C 6B *n*

Dec Code 28 107 *n*

Purpose This selects a DBCS ASCII character:
n = 0 or 40 Selects normal DBCS ASCII characters
n = 1 or 49 Selects oversized DBCS ASCII characters.

Where
n = 0, 1, 48, 49
The default is *n* = 0, normal DBCS ASCII character.

Comment This command affects the front panel setting of “DBCS ASCII Style.”

Select DBCS Character Bitmap

ASCII Code FS e *n1* *n2*

Hex Code 1C 65 *n1* *n2*

Dec Code 28 101 *n1* *n2*

Purpose Sets the character bitmap to 24 x 24.

Where:
n1, *n2* = 0 or 8 < = *n1*, *n2* < = 232

Comment The vertical cell size is *n1* dots; the horizontal cell size is *n2* dots.

Select DBCS Character Font

ASCII Code ESC u *n*

Hex Code 1A 75 *n*

Dec Code 27 117 *n*

Purpose This selects a DBCS character font:

Where:
n = 0 or 49 to select 24x24 DBCS character.

Select DBCS Print Quality

ASCII Code FS x *n*

Hex Code 1C 78 *n*

Dec Code 28 120 *n*

Purpose Selects the typeface for printing in DBCS mode.

Where:
n = NUL (hex 00) or 0 (hex 30) selects LQ print quality
n = SOH (hex 01) or 1 (hex 31) selects Hi-Speed print quality
n = STX (hex 02) or 2 (hex 32) selects Near LQ print quality
n = ETX (hex 03) or 3 (hex 33) selects Super Hi-Speed print quality
n = EOT (hex 04) or 4 (hex 34) selects Normal print quality
n = ENQ (hex 05) or 5 (hex 35) selects Ultra Hi-Speed print quality

Comment This command overrides control panel print quality selections.

Select Graphics Mode

ASCII Code ESC * *m n1 n2*

Hex Code 1B 2A *m n1 n2*

Dec Code 27 42 *m n1 n2*

Purpose Turns on 8-pin/24-pin bit image graphics mode *m.* Table 9 shows the graphics modes available.

Comment *n1* = 0 through 255;
n2 = 0 through 31;
n = *n1* + (*n2* x 256), the total number of columns or data bytes to follow.
For example, to specify 257 columns: 1 + (1 x 256) = 257.

Table 9. LQ-1600K Graphics Modes

m	Mode	Density* (dots per inch)	Pins used
0	Single density	60	8
1	Double density	120	8
2	Double density double speed	120	8
3	Quadruple density	240	8
4	Monitor graphics I	80	8
6	Monitor graphics II	90	8
32	Single density	60	24
33	Double density	120	24
38	Monitor graphics III	90	24
39	Triple density	180	24
40	Sextuple density	360	24

Select Italic Character Set

ASCII Code ESC t *n*

Hex Code 1B 74 *n*

Dec Code 27 116 *n*

Purpose Selects the italics character set from hex 80 through hex FF.

Where:
n = SOH (hex 01) or 1 (hex 31) selects the graphics character set
n = NUL (hex 00) or 0 (hex 30) selects the italics character set

Comment The graphics character set is assumed to be the IBM Graphics Code.

Select Print Quality

ASCII Code ESC x *n*

Hex Code 1B 78 *n*

Dec Code 27 120 *n*

Purpose Selects print quality.

Where:
n = NUL (hex 00) or 0 (hex 30) selects Hi-Speed
n = SOH (hex 01) or 1 (hex 31) selects LQ
n = STX (hex 02) or 2 (hex 32) selects Near LQ
n = ETX (hex 03) or 3 (hex 33) selects Super Hi-Speed
n = EOT (hex 04) or 4 (hex 34) selects Normal
n = ENQ (hex 05) or 5 (hex 35) selects Ultra Hi-Speed

Comment This command overrides control panel print quality selections.

Select Special Printing Effect

ASCII Code ESC q *n*

Hex Code 1B 71 *n*

Dec Code 27 113 *n*

Purpose Select the desired effect for printing.

Where:
n=0 (normal)
n=1 (outline)
n=2 (shadow)
n=3 (outline and shadow)

Comment This command does not affect graphics characters.

Example The following program demonstrates the function of the command.

```
10 LPRINT CHR$(28); "&";
20 LPRINT CHR$(27); "q"; CHR$(0);
30 GOSUB 200
40 LPRINT CHR$(27); "q"; CHR$(1);
50 GOSUB 200
60 LPRINT CHR$(27); "q"; CHR$(2);
70 GOSUB 200
80 LPRINT CHR$(27); "q"; CHR$(3);
90 GOSUB 200
100 LPRINT CHR$(28); "."
110 LPRINT CHR$(12);
120 END
200 '
210 LPRINT CHR$(&HD6); CHR$(&HD0);
220 LPRINT CHR$(&HD3); CHR$(&HA2);
230 LPRINT CHR$(&HCE); CHR$(&HC4);
240 LPRINT CHR$(&HB4); CHR$(&HF2);
250 LPRINT CHR$(&HD3); CHR$(&HA1);
260 LPRINT CHR$(&HBB); CHR$(&HFA)
270 RETURN
```

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Select Super/Subscript Printing (For Hanzi BIG5 Printer only)

ASCII Code SSCC ~ *n*

Hex Code SSCC 7E *n*

Dec Code SSCC 126 *n*

Purpose Prints characters that follow at about 1/2 their normal width and 1/2 their normal height; the printing location depends on the value of *n* as follows:

n = 0 or 48	Upper part of the character space
n = 1 or 49	Lower part of the character space
n = 2 or 50	Normal character

Where:
n = 0, 1, 2, 48, 49, 50

Comment Setting *n* =2 returns the character back to its normal height.

Select Typeface (For Hanzi BIG5 Printer only)

ASCII Code ESC k *n*

Hex Code 1B 6B *n*

Dec Code 27 107 *n*

Purpose This is to select DBCS ASCII typeface:

n = 0	Normal
n = 5	OCRB

Where:
n = 0, 5

Comment This command only takes effect in DCBS mode.

Select Underline Printing (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T - n

Hex Code ASSC 30 54 2D n

Dec Code ASSC 48 84 45 n

Purpose To set underline printing.

Where:
n = 0x30: reset (default)
n = 0x31: underline for all characters
n = 0x32: underline for all characters except space (0x20).

Comment This control code does not function while in non-DBCS mode.

Select Vertical Printing (for Hanzi BIG5 Printer only)

ASCII Code SSCC + *n*

Hex Code SSCC 2B *n*

Dec Code SSCC 43 *n*

Purpose The character is printed with different degrees of rotation in the counter-clockwise direction under DBCS mode.

n = 0 or 48	90 degrees rotation
n = 1 or 49	180 degree rotation
n = 2 or 50	270 degree rotation
n = 3 or 51	rotate DBCS full width character 90 degrees
n = 4 or 52	normal character

Where:
n = 0, 1, 2, 3, 4, 48, 49, 50, 51, 52

Comment The default value is *n* = 4, normal character.

NOTE: This command is only supported in the Hanzi TW printer.

Select Vertical Tab Channel

ASCII Code ESC / *c*

Hex Code 1B 2F *c*

Dec Code 27 47 *c*

Purpose Selects a vertical tab channel set by ESC b.

Where:
c = 0 through 7

Comment Subsequent VT (hex 0B) commands use tab table specified by *c.* If no tab table is selected, table 0 is used.

Set 0-dot Intercharacter Spacing of DBCS Characters

ASCII Code SUB Q

Hex Code 1A 51

Dec Code 26 81

Purpose Sets 0-dot intercharacter spacing of DBCS characters.

Comment This command affects the front panel setting of “DBCS CPI.”

Set 3-dot Intercharacter Spacing of DBCS Characters

ASCII Code SUB N

Hex Code 1A 4E

Dec Code 26 78

Purpose Sets 3-dot intercharacter spacing of DBCS characters. The left intercharacter space is 0 dots; the right intercharacter space is 3 dots. The dot size is 1/180 inch.

Comment This command also affects an SBCS character if the character is aligned with a DBCS character by an FS U command. If an SBCS character is aligned with a DBCS character, the intercharacter space of an SBCS character is half.

This command affects the front panel setting of “DBCS CPI.”

Set 6-dot Intercharacter Spacing of DBCS Characters

ASCII Code SUB E

Hex Code 1A 45

Dec Code 26 69

Purpose Sets 6-dot intercharacter spacing of DBCS characters. The left intercharacter space is 3 dots; the right intercharacter space is 3 dots. The dot size is 1/180 inch.

Comment This command also affects an SBCS character if the character is aligned with a DBCS character by an FS U command. If an SBCS character is aligned with a DBCS character, the intercharacter space of an SBCS character is half.

This command affects the front panel setting of “DBCS CPI.”

Set 12-dot Intercharacter Spacing of DBCS Characters

ASCII Code SUB P

Hex Code 1A 50

Dec Code 26 80

Purpose Sets 12-dot intercharacter spacing of DBCS characters. The left intercharacter space is 6 dots; the right intercharacter space is 6 dots. The dot size is 1/180 inch.

Comment This command also affects an SBCS character if the character is aligned with a DBCS character by an FS U command. If an SBCS character is aligned with a DBCS character, the intercharacter space of an SBCS character is half.

This command affects the front panel setting of “DBCS CPI.”

Set Absolute Horizontal Print Position in 1/60 Inch

ASCII Code ESC $ *n1 n2*

Hex Code 1B 24 *n1 n2*

Dec Code 27 36 *n1 n2*

Purpose Moves the simulated print head to an absolute horizontal print position using 1/60-inch increments.

Where:
n1 = 0 through 127
n2 = 0 through 255
(*n1* + (*n2* x 256)) / 60 = the unsigned distance in inches from the left margin.

Comment If the distance goes beyond the right margin, the sequence is ignored.

Set Chinese Font Rotate (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T + n

Hex Code ASSC 30 54 2B n

Decimal ASSC 48 84 43 n

Purpose Set rotation as:

n = 0x31: DBCS character in normal (do not rotate, default).
n = 0x32: DBCS character rotate 90 degrees counterclockwise.
n = 0x33: DBCS character rotate 270 degrees counterclockwise.
n = 0x34: DBCS character rotate 180 degrees.
n = 0x35: ASCII character in normal (do not rotate).
n = 0x36: ASCII character rotate 90 degrees counterclockwise.
n = 0x37: ASCII character rotate 270 degrees counterclockwise.
n = 0x38: ASCII character rotate 180 degrees.

Where
n = 0x31 ~ 0x39

Comment This control code does not function while in non-DBCS mode.

Set Chinese Inner Code (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T A n

Hex Code ASSC 30 54 41 n

Dec Code ASSC 48 84 65 n

Purpose Select code page as:
n = 0x30: Big5 (default)
n = 0x31: NS
n = 0x32: DCI
n = 0x36: IBM5550
n = 0x37: UTF8

Comment This control code does not function while in non-DBCS mode.

Set DBCS Compressed Mode

ASCII Code ASSC 0 c n

Hex Code ASSC 30 63 n

Dec Code ASSC 48 99 n

Purpose Turn on/off DBCS Compressed mode

Where
n = 0 or 48 Turns off DBCS Compressed mode.
n = 1 or 49 Turns on DBCS Compressed mode.

Comment This command only works in DBCS mode and have no effect in ASCII mode; this command affects the “DBCS Compressed” front panel setting.

Set Font/Line Gap (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T G m n1 n2 n3 n4

Hex Code ASSC 30 54 47 m n1 n2 n3 n4

Dec Code ASSC 48 84 71 m n1 n2 n3 n4

Purpose To set inter-character and inter-line spacing in dot by 300 dpi, which will convert to dot by 180 dpi. The inter-char spacing is set according to DBCS ASCII character.

Where
m = 0x30: set inter-char spacing
m = 0x31: set inter-line spacing

Comment This control code does not function while in non-DBCS mode.

Set Font Scale (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T W n1 n2

Hex Code ASSC 30 54 57 n1 n2

Dec Code ASSC 48 84 87 n1 n2

Purpose Character expands as: n1-vertical expand, n2-horizontal expand

n1, n2 = 0x30: reset
n1, n2 = 0x31: normal (1x1)
n1, n2 = 0x32: expand twice (double height, double width)
When n1=0x32 (double height), the line spacing will double.

Where
n1, n2 = 0x30~0x32

Comment This control code does not function while in non-DBCS mode.

Set Form Length By Lines

ASCII Code ESC C *n*

Hex Code 1B 43 *n*

Dec Code 27 67 *n*

Purpose Sets the form length by lines.

Where:
n = 1 through 127 to specify the number of lines per form at the current line spacing. 0 < *n* x (current line spacing) < = 22 inches.

Comment The current line becomes the first line of the form. The forms length units are always defined in inches; therefore, subsequent line spacing changes do not affect the result of this command. Changing lpi does not change the forms length.

The forms length is set to the number of lines defined by the quotient of *n* and the current line spacing so that the units are in inches.

If the calculated forms length in lines is not an exact multiple of the target machine dot size, the forms length value will be adjusted down to the next possible multiple.

When forms length is set by an ESC C sequence, the skip-over perforation set by ESC N is cancelled.

This command affects the front panel setting of “Funct. of Lines.”

Set Form Length in Inches

ASCII Code ESC C NUL *n*

Hex Code 1B 43 00 *n*

Dec Code 27 67 0 *n*

Purpose Sets form length to *n* inches.

Where:
n = 1 through 22 to specify the number of inches on a form.

Comment Upon receipt of this code, the current line becomes the first line of the form, and the form length set becomes the current forms length. Vertical tab positions set below the bottom of the form are ignored. Forms length is defined in inches; therefore, subsequent line spacing changes do not affect the result of this command.

Values of *n* greater than 22 are ignored.

When forms length is set by an ESC C sequence, the skip-over perforation set by ESC N is cancelled.

This control code overrides forms length set at the control panel.

Set Font Pitch (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T P n1 n2 n3 n4

Hex Code ASSC 30 54 50 n1 n2 n3 n4

Dec Code ASSC 48 84 80 n1 n2 n3 n4

Purpose To set character spacing by dot in 300 dpi, which will convert to 180 dpi. The character spacing includes character width and inter-character spacing. The character width refers to DBCS single byte character width in normal mode.

Where
n1, n2, n3, n4 = 0x30 ~ 0x39

Comment This control codes does not function while in non-DBCS mode.

Set Intercharacter Spacing

ASCII Code ESC SP *n*

Hex Code 1B 20 *n*

Dec Code 27 32 *n*

Purpose Defines *n* dots for intercharacter spacing.

Comment The valid values of *n* = 0 through 127. This control code defines the space to the right of the printed character in dot positions. Each time a character is printed, *n* number of dots are left blank preceding the next character. For different print modes, the dot resolution varies, e.g. DP=120 dpi, NLQ=180 dpi. If double wide printing is enabled, the dot size adjusts accordingly. This control code does not function while in DBCS mode.

Example The following program illustrates intercharacter space setting.

```
10 LPRINT "Control code ESC SP 0"
20 LPRINT CHR$(27); " "; CHR$(0);
30 LPRINT "selects 0 (standard) character spacing"
40 LPRINT "Control code ESC SP 6"
50 LPRINT CHR$(27); " "; CHR$(6);
60 LPRINT "selects 6 dot character spacing"
```

```
Control code ESC SP 0
selects 0 (standard) character spacing
Control code ESC SP 6
selects 6 dot character spacing
```

Set Intercharacter (One-Byte) Spacing In DBCS Mode

ASCII Code FS T *n1 n2*

Hex Code 1C 54 *n1 n2*

Dec Code 28 84 *n1 n2*

Purpose Defines preceding/succeeding dots for inter-character spacing.

Comment This control code defines the space to the left/right of the printed character in dot positions. The dot size for *n1* and *n2* is equal to 180 dpi. The default for *n1*=0 and *n2*=2. This control code does not function while in non-DBCS mode and only for one-byte characters in DBCS mode.

Set Intercharacter (Two-Byte) Spacing in DBCS Mode

ASCII Code FS S *n1 n2*

Hex Code 1C 53 *n1 n2*

Dec Code 28 83 *n1 n2*

Purpose Defines preceding/succeeding dots for intercharacter spacing.

Comment This control code defines the space to the left/right of the printed character in dot positions. The dot size for *n1 and n2 is* equal to 180 dpi. The default for n1=0 and n2=3. This control code does not function while in non-DBCS mode and only for two-byte characters in DBCS mode.

Set International Character Set

ASCII Code ESC R *n*

Hex Code 1B 52 *n*

Dec Code 27 82 *n*

Purpose Specifies a language overlay that prints the characters shown in Table 10 when the specified code is invoked.

Where:
n = hex 0 through E to determine the language overlay shown in Table 10.

The real Epson only defines character sets through hex C.

Table 10. Epson International Character Sets

(Hex) If *n*=	International Character Set Is:	Hex Codes 23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	$	@	[	\	]	^	`	{	¦	}	~
1	French	#	$	à	º	ç	§	^	`	é	ù	è	¨
2	German	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	English (UK)	£	$	@	[	\	]	^	`	{	¦	}	~
4	Danish I	#	$	@	Æ	Ø	Å	^	`	æ	ø	á	~
5	Swedish	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	á	ü
6	Italian	#	$	@	º	\	é	^	ù	à	ò	è	ì
7	Spanish I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	Japanese	#	$	@	[	¥	]	^	`	{	¦	}	~
9	Norwegian	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	á	ü
A	Danish II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	á	ü
B	Spanish II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
C	Latin American I	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
D	French Canadian	#	$	à	â	ç	ê	î	ô	é	ù	è	û
E	Latin American II	#	$	@	[	Ñ	]	ú	í	ó	á	é	ü

Comment This control code setting overrides a character set selection made at the control panel. Values of *n* not in Table 10 are ignored. This control code does not function while in DBCS mode.

Example The following example compares the Swedish character set to the USA (ASCII) character set.

```
10 LPRINT "Control code ESC R 5 selects"
20 LPRINT "the Swedish character set shown beneath"
30 LPRINT "the USA (ASCII) characters."
40 LPRINT
50 LPRINT "A B C D [ \ ] ^ _ ` { | } ~"
60 LPRINT CHR$(27);"R";CHR$(5);
70 LPRINT "A B C D [ \ ] ^ _ ` { | } ~"
80 LPRINT CHR$(27);"R";CHR$(0);
```

```
Control code ESC R 5 selects
the Swedish character set shown beneath
the USA (ASCII) characters.

A B C D [ \ ] ^ _ ` { | } ~
A B C D Ä Ö Å Ü _ é ä ö å ü
```

Set Left Margin (For Hanzi Big5 Printer Only)

ASCII Code	ASSC 0 T l n1 n2 n3
Hex Code	ASSC 30 54 6C n1 n2 n3
Dec Code	ASSC 48 84 108 n1 n2 n3
Purpose	To set the left margin in 1/10 inch (10 CPI equivalent) according to the number of half-width characters, that is in n1n2n3 from the left most position. Where n1, n2, n3 = 0x30 ~ 0x39
Comment	This control code does not function while in non-DBCS mode.

Set Line Pitch (For Hanzi Big5 Printer Only)

ASCII Code	ASSC 0 T 3 n1 n2 n3 n4
Hex Code	ASSC 30 54 30 n1 n2 n3 n4
Dec Code	ASSC 48 84 48 n1 n2 n3 n4
Purpose	To set the line spacing by dot in 300 dpi, which will convert to 180 dpi. n1n2n3 is in ASCII value. Where: n1, n2, n3, n4 = 0x30 ~ 0x39
Comment	This control code does not function while in non-DBCS mode.

Set Logical Right Margin (For Hanzi Big5 Printer Only)

ASCII Code	ASSC 0 T y n1n2n3n4
Hex Code	ASSC 30 54 79 n1n2n3n4
Dec Code	ASSC 48 84 121 n1n2n3n4
Purpose	To set right margin by current right margin - n1n2n3n4. n1n2n3n4 is dot in 300 dpi, and will be converted to 180 dpi Where: n1, n2, n3, n4 = 0x30 ~ 0x39
Comment	This control code does not function while in non-DBCS mode. This will affect the Set Right Margin front panel setting.

Set Logical Left Margin (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T $ n1 n2 n3 n4

Hex Code ASSC 30 54 24 n1 n2 n3 n4

Dec Code ASSC 48 84 36 n1 n2 n3 n4

Purpose To set left margin by current left margin +n1n2n3n4. n1n2n3n4 is dot by 300 dpi, and will be converted in dot by 180 dpi.

Where:
n1, n2, n3, n4 = 0x30 ~ 0x39

Comment This control code does not function while in non-DBCS mode. This will affect the Left Margin front panel setting.

Set Margin (Left)

ASCII Code ESC l *n*

Hex Code 1B 6C *n*

Dec Code 27 108 *n*

Where:
n = 1 though 255; the number of columns from the left edge of the physical page to the beginning of the print line.

Purpose Sets the left margin to *n* columns in the current font.

Comment Be sure to use the alphabetic lowercase “l” (as in “left”) rather than the capital letter “I” (as in “Island”) for this command. The number of inches of margin does not vary if the font, character width, or horizontal dot density changes. The smallest possible space between the left and right margins is the width of one double-wide, 10 cpi character. If a margin control code violates this minimum distance, it is ignored. Settings in proportional mode are treated as 10 CPI.

In DBCS mode, the right margin will be set according to the width of DBCS characters.

This command affects the front panel setting of “Left Margin.”

Set Margin (Right)

ASCII Code ESC Q *n*

Hex Code 1B 51 *n*

Dec Code 27 81 *n*

Where:
n = 1 through 255; number of columns from the left edge of the physical page to the end of the print line.

Purpose Sets the right margin to *n* columns at the current character width.

Comment The number of inches of margin does not vary if the font, character width, or horizontal dot density changes. This command automatically clears and resets horizontal tabs to every eight characters, then performs a CAN operation. The smallest possible space between the left and right margins is the width of one double-wide 10 cpi character. If a margin control code violates this minimum distance, it is ignored. Settings in proportional mode are treated as 10 CPI.

In DBCS mode, the right margin will be set according to the width of DBCS characters.

This command affects the “Right Margin” front panel setting.

Set n/120-inch Line Spacing

ASCII Code ASSC 0 J n

Hex Code ASSC 30 4A n

Dec Code ASSC 48 74 n

Purpose Sets the line spacing to n/120 inch

Where
0 < n <=255

Comment This command affects the “Select LPI” front panel setting.

Set Paper Length (For Hanzi Big5 Printer Only)

ASCII Code ASSC 0 T C n1 n2 n3

Hex Code ASSC 30 54 43 n1 n2 n3

Dec Code ASSC 48 84 67 n1 n2 n3

Purpose To set form length to 1/6 inches.

Where
n1, n2, n3 = 0x30 ~ 0x39

Comment This control code does not function while in non DBCS mode.

Set Relative Horizontal Print Position In 1/120 Inches

ASCII Code ESC \ *n1 n2*

Hex Code 1B 5C *n1 n2*

Dec Code 27 92 *n1 n2*

Purpose Moves the simulated print head to a relative horizontal print position (in dots), using 1/120 inch increments in Near LQ mode and 1/180 inch increments in all other modes.

Where:
n1 = 0 through 127
n2 = 0 through 255

Comment Adds (*n1* + (*n2* x 256)) dots to the horizontal position of the simulated print head. The number sent is two's complement, with negative numbers moving to the left. The command is ignored if it would move the simulated print head beyond the page margins.

Set Right Margin (For Hanzi Big5 Printers Only)

ASCII Code ASSC 0 T Q n1 n2 n3

Hex Code ASSC 30 54 51 n1 n2 n3

Dec Code ASSC 48 84 81 n1 n2 n3

Purpose To set margin in 1/10 inches (10 CPI equivalent) according to the number of half-width characters.

Where
n1, n2, n3 = 0x30 ~ 0x39

Comment This control code does not function while in non-DBCS mode.

Set Vertical Tabs in Channels

ASCII Code ESC b *c n1 n2 n3...n16* NUL

Hex Code 1B 62 *c n1 n2 n3...n16* 00

Dec Code 27 98 *c n1 n2 n3...n16* 0

Purpose Assigns vertical tabs to channels selected by ESC /.

Where:
c = 0 through 7
n = 1 through 255

n1 through *n16* specify the line numbers for each of the vertical tab(s), up to a maximum of 16 tab positions in every channel, with a maximum of eight channels. NUL must end the sequence.

Comment Channels are selected by ESC /. The distance of each tab stop from TOF is the current line spacing times the number of lines given in *n.*

If paper movement is commanded to a value of *n* greater than the page length, the paper movement command is ignored. The values of *n* must be in ascending order. If they are not, the sequence up to and including the out of sequence number is ignored. The rest of the load is processed, and skip over perforation is ignored.

You can clear any channel by sending ESC b *c* NUL, where *c* is the channel number.

The values for *n* must be in ascending order; a value of *n* less than the previous *n* ends tab setting (just like the NUL code).

Skip Over Perforation

ASCII Code ESC N *n*

Hex Code 1B 4E *n*

Dec Code 27 78 *n*

Purpose Selects the number of lines (at the current line spacing) for the paper to skip at the bottom of the perforation.

Where:
n = 1 through 127, *n* < *n* x (current line spacing) < page length.

Comment *n* is the number of lines skipped between the last line printed on one page and the first line on the next page. The actual distance set is the product of *n* and the current line spacing. If the value of *n* exceeds the current form length, the skip is set to one line smaller than the form length or to 0, whichever is greater.

Skip over perforation set by this command overrides control panel settings. This feature is canceled by ESC O, ESC C, or ESC C NUL.

Skip Over Perforation Cancel

ASCII Code ESC O

Hex Code 1B 4F

Dec Code 27 79

Purpose Cancels the skip over perforation set by ESC N and resets the bottom margin to zero.

Comment O is ASCII uppercase o, not zero (0).

Static Barcode Function (For Hanzi Big5 Printer Only)

ASCII Code	ASSC	0	T	c	t	[;d data d]	[;0 n1n2n3]	[;#p]
Hex Code	ASSC	30	54	63	t	[;d data d]	[;30 n1n2n3]	[;23 p]
Dec Code	ASSC	48	84	99	t	[;d data d]	[;48 n1n2n3]	[;35 p]

Purpose To set various barcode types:
t = @: Interleaved 2/5
t = A: Code 39
t = B: Interleaved 2/5
t = C: Code 39
t = D: Interleaved 2/5
t = E: Codabar
t = F: EAN-13
t = G: EAN-8
t = H: Codabar
t = I: UPC_A

Where:

- 0: the height of the barcode
  n1n2n3 is in ASCII value, the height is 300 dpi, and is converted to dot by 180 dpi.
- #: PDF enable/disable
  p = 0x30: disable
  p = 0x31: enable
- t = barcode type
- n1, n2, n3 = 0x30 ~ 0x39

Comment This control code does not function while in non-DBCS mode. The default barcode height is 1/3 inch.

Superscript and Subscript Printing

ASCII Code ESC S *n*

Hex Code 1B 53 *n*

Dec Code 27 83 *n*

Purpose Selects superscript or subscript printing.

Where:
n = NUL (hex 00) or 0 (hex 30) to enable superscript printing
n = SOH (hex 01) or 1 (hex 31) to enable subscript printing

Comment Superscript prints full-sized characters with a baseline higher than the normal characters. Subscript prints full-sized characters with a baseline lower than the normal characters. When the control code is received, all characters are superscript or subscript until reset by ESC T or printer reset.

You can print both superscript and subscript characters in the same character column by using the Backspace (BS) control code, but these characters will not print when double high printing is in effect.

Example The following program illustrates superscript and subscript printing.

```
10 LPRINT "CONTROL CODE ESC S 0 SELECTS";
20 LPRINT CHR$(27); "S"; CHR$(0); "SUPERSCRIPT"; CHR$(27); "T"
30 LPRINT "A"; CHR$(27); "S"; CHR$(0); "2"; CHR$(27); "T";
40 LPRINT "+B"; CHR$(27); "S"; CHR$(0); "2"; CHR$(27); "T";
50 LPRINT "=C"; CHR$(27); "S"; CHR$(0); "2";
60 LPRINT CHR$(27); "T"
70 LPRINT "CONTROL CODE ESC S 1 SELECTS";
80 LPRINT CHR$(27); "S"; CHR$(1); "SUBSCRIPT"; CHR$(27); "T"
90 LPRINT "31"; CHR$(27); "S"; CHR$(1); "HEX"; CHR$(27); "T";
100 LPRINT "=49"; CHR$(27); "S"; CHR$(1); "DEC"; CHR$(27); "T"
120 LPRINT "CONTROL CODE ESC T CANCELS"
130 LPRINT "SUPERSCRIPT/SUBSCRIPT PRINTING"
```

```
CONTROL CODE ESC S 0 SELECTS^SUPERSCRIPT
A^2+B^2=C^2
CONTROL CODE ESC S 1 SELECTS_SUBSCRIPT
31_HEX=49_DEC
CONTROL CODE ESC T CANCELS
SUPERSCRIPT/SUBSCRIPT PRINTING
```

Superscript and Subscript Printing (Cancel)

ASCII Code ESC T

Hex Code 1B 54

Dec Code 27 84

Purpose Cancels superscript and/or subscript printing as set by ESC S *n.*

Turn On/Off Compress Mode

ASCII Code ASSC 0 x *n*

Hex Code ASSC 30 78 *n*

Dec Code ASSC 48 120 *n*

Where:
n = 0, 1, 48, 49
The default is *n* = 0.

Purpose Turn on/off compress mode as follows:

n = 0 or 48 - turns off compress mode
n = 1 or 49 - turns on compress mode

NOTE: When compress mode is turned on, some features, such as double height, double width, two-by-two, etc., are ignored.

Comment This command affects the front panel setting of “Compressed Mode.”

Turn On/Off OCRB Printing

ASCII Code ASSC 0 z *n*

Hex Code ASSC 30 7A *n*

Dec Code ASSC 48 122 *n*

Where:
n = 0, 1, 48, 49
The default is *n* = 0.

Purpose Turn on/off OCRB mode as follows:

n = 0 or 48 - turns off OCRB mode
n = 1 or 49 - turns on OCRB mode

NOTE: When OCRB is turned on, the OCRB character can be printed out.

Comment This command affects the front panel setting of "OCBR Selection."

This command only works in DBCS mode.

Underline

ASCII Code ESC – *n*

Hex Code 1B 2D *n*

Dec Code 27 45 *n*

Purpose Turns automatic underlining on and off.

Where:
n = NUL (hex 00) or 0 (hex 30) to turn off underlining
n = SOH (hex 01) or 1 (hex 31) to turn on underlining

Comment Spaces are underlined, but graphics and grey scale characters are not. This control code does not function while in DBCS mode.

Example The following program illustrates underlining.

```
10 LPRINT "Control code ESC -1"
20 LPRINT CHR$(27);"-";CHR$(1);
30 LPRINT "enables automatic underlining."
40 LPRINT "Control code ESC -0"
50 LPRINT CHR$(27);"-";CHR$(0);
60 LPRINT "disables automatic underlining."
```

```
Control code ESC -1
enables automatic underlining.
Control code ESC -0
disables automatic underlining.
```

Unidirectional Printing For One Line

ASCII Code ESC <

Hex Code 1B 3C

Dec Code 27 60

Purpose Causes printing to occur from left to right for one line only.

Unidirectional Printing, Set/Reset

ASCII Code ESC U *n*

Hex Code 1B 55 *n*

Dec Code 27 85 *n*

Purpose Causes printing to occur in only one direction of shuttle movement (left to right).

Where:
n = NUL (hex 00) or 0 (hex 30) turns unidirectional mode off
n = SOH (hex 01) or 1 (hex 31) turns unidirectional mode on

Comment Printing normally occurs in both directions of shuttle movement. Unidirectional printing slows the printer down approximately 50%, but it is sometimes used when very accurate dot placement is desired in graphics.

Vertical and Horizontal Extension

ASCII Code ESC e *n1* *n2*

Hex Code 1A 65 *n1* *n2*

Dec Code 27 101 *n1* *n2*

Purpose Enables the extension of the character bitmap so that they touch in both horizontal and vertical directions as follows:

- *n1* = 1 or 49, *n2* = 1 or 49 Normal character
- 2 < = *n1* < = 4 or 50 < = *n1* < = 52, *n2* = 1 or 49 Double height character (same with FS ! 8)
- *n1* = 1 or 49, 2 < = *n2* < = 4 or 50 < = *n2* < = 52 Double width character (same with FS ! 4)
- 2 < = *n1* < = 4 or 50 < = *n1* < = 52, 2 < = *n2* < = 4 or 50 <= *n2* < = 52 Double width and double height character (same with FS ! 12)

Where:
1 < = *n1* < = 4 or 49 < = *n1* < = 52
1 < = *n2* < = 4 or 49 < = *n2* < = 52

Comment The default is normal character.

Vertical Tab, Execute

ASCII Code VT

Hex Code 0B

Dec Code 11

Purpose Advances the simulated print head to the next vertical tab position selected by ESC */.*

Comment If no vertical channel was selected, channel 0 is used. If no vertical tabs were set, the paper advances one line.

The simulated print head moves to the left margin. If a tab position is on the current line, the paper is moved to the next tab position. If there are no tab positions between the current line and the end of the form, the paper is moved to the top of the next form. If the printing crosses the page boundary, the VT command causes the paper to move to the top of the next form.

This code cancels all single line print attributes.

Vertical Tab, Set/Clear

ASCII Code ESC B *n1 n2 n3...nk* NUL

Hex Code 1B 42 *n1 n2 n3...nk* 00

Dec Code 27 66 *n1 n2 n3...nk* 0

Purpose Sets up to 16 vertical tab positions.

Where:
n = 1 through 255
k = 1 through 16
n1 through *nk* specify the line number for the vertical tab(s), up to a maximum of 16 tab positions. NUL must end the sequence.

To clear the tab settings, send ESC B NUL (1B 42 00).

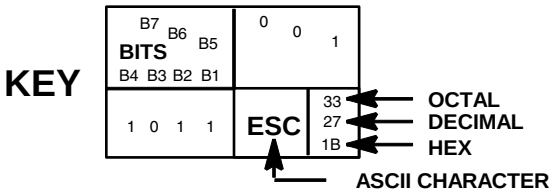
Expression CHR$(27);“B”;CHR$(*n1*);...CHR$(*nk*);CHR$(0);

Comment The values of *n* range from 1 through 255 and must be in ascending order. The distance of each tab stop from TOF is the current line spacing times the number of lines given in *n*. If the value of *n* exceeds the form length, commands to move to that tab position are ignored.

If values of *n* are not in ascending order, the sequence up to and including the out-of-sequence number is ignored, and the rest of the load is processed. Skip over perforation is ignored.

This command always sets channel 0. You can clear channel 0 by sending ESC B NUL. (See also the channel selection command, ESC /, and the channel loading command, ESC b.)

A *Standard ASCII Character Set*



B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 COLUMN 0		0 0 1 1		0 1 0 2		0 1 1 3		1 0 0 4		1 0 1 5		1 1 0 6		1 1 1 7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

Appendix A Standard ASCII Character Set

B *Vertical Page Formatting*

Overview

Rapid vertical paper movement is called “slewing.” You can enable the printer to slew paper to preset locations on a page by loading the vertical tab table.

The vertical tab table is a set of programmed vertical tabs. Various lines of the form are assigned vertical tabs, which are then accessed by control codes for rapid paper advancement to the tab position.

Two control codes are used for vertical tabbing: ESC B sets single channel vertical tabs, and VT executes a vertical tab. These codes are described in Chapter 3. The Epson emulation also has ESC / to select one of eight tab channels and ESC b to set the tabs in a particular channel.

Executing Vertical Tabs

The vertical tab execute code is VT (hex 0B). It prints the contents of the print buffer (if data is in the buffer) and causes paper movement to the next predefined vertical tab position. If a tab position is not defined, the paper is moved to the next line at the current line spacing. If a tab position is at the current line, the paper is moved to the next tab position. If no tab positions are defined between the current line and the end of the form, the paper moves to the next TOF.

Vertical Tab Positions

Vertical tab positions are set by line number. A maximum of 16 vertical tab positions can be set on the form. A sample format is shown in Figure 2.

The first vertical tab is set at line 6 for part number data, a second tab is set at line 8 for part name data, and a third tab is set at line 14 for quantity data. The ESC B code assigns the vertical tabs to the lines of the form. Once the tab positions are set, sending the vertical tab execute code (VT) causes the paper (currently at the top-of-form position) to advance to the first tab position for PART NUMBER data. Sending another VT moves the paper to the second tab position for PART NAME, followed by a third VT to access the third tab position for QUANTITY data.

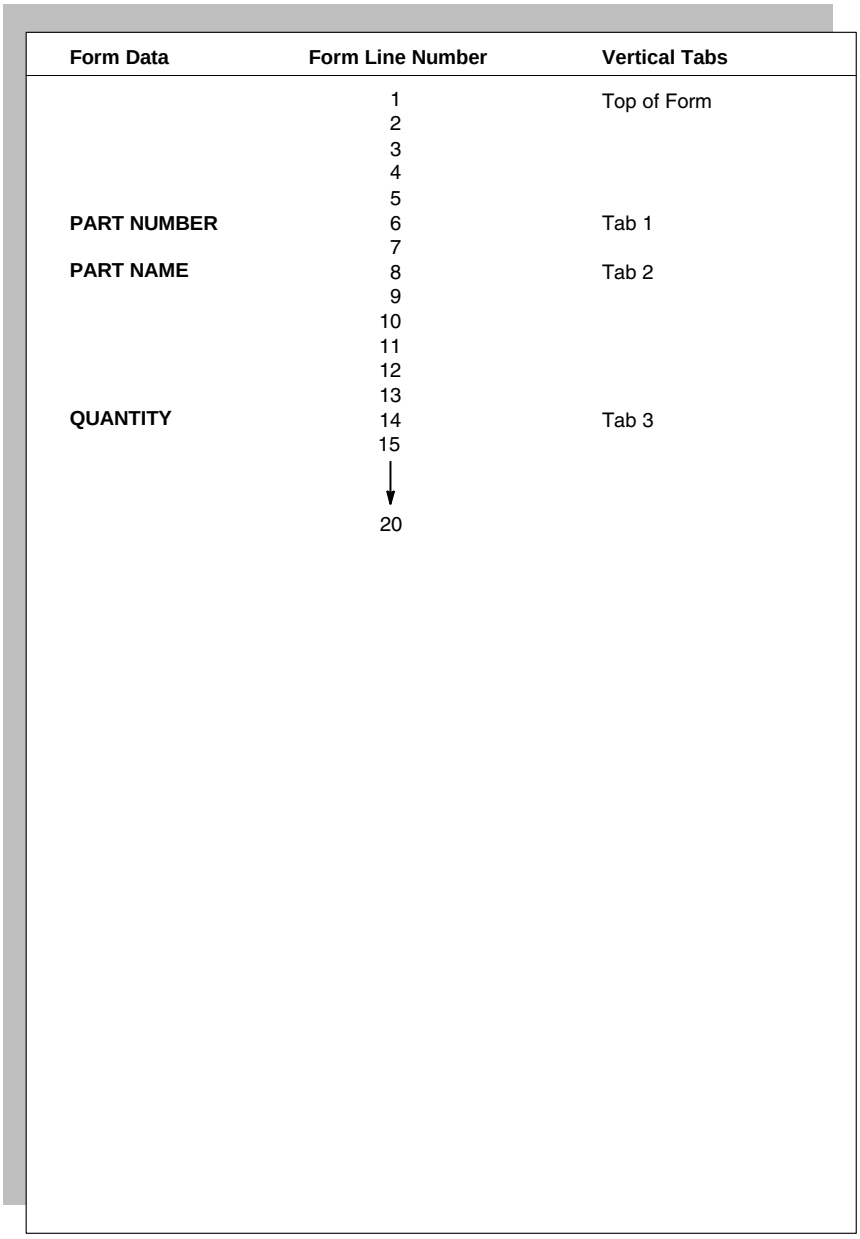


Figure 2. Example of Vertical Tab Positions

C Graphics

Bit Image Graphics

Bit image graphics are created by vertically printing the bit pattern of a series of data bytes. For example, the bit pattern of the ASCII character A (hex 41, decimal 65) is shown in Figure 3. If this data byte is rotated 90 degrees clockwise, the result is a vertical data byte with the most significant bit (MSB) at the top. If each 1 (true) bit is then printed as a dot, the result is a “bit image” plot of the ASCII character A.

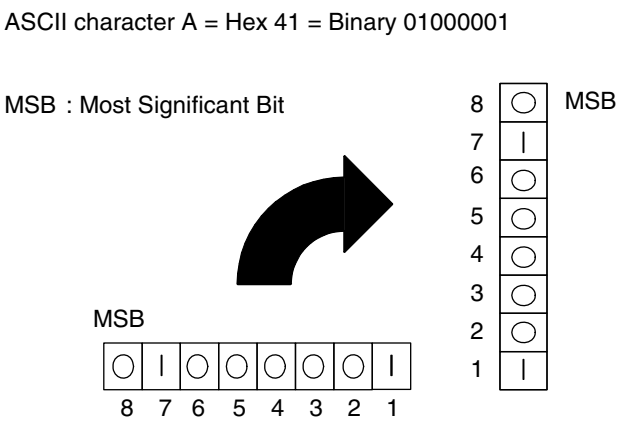


Figure 3. Vertical Data Byte Pattern

The relationship between the ASCII character, its decimal value and its bit image plot is shown in Figure 4. All 8 bits of the data byte are used in all fonts, but some fonts have taller and shorter characters. (You may have to adjust the line spacing in order to print without horizontal gaps.) Data bytes are identified by their binary, octal, hexadecimal, or decimal equivalents. These numeric equivalents are combined in data streams to form graphic patterns such as the one illustrated in Figure 5.

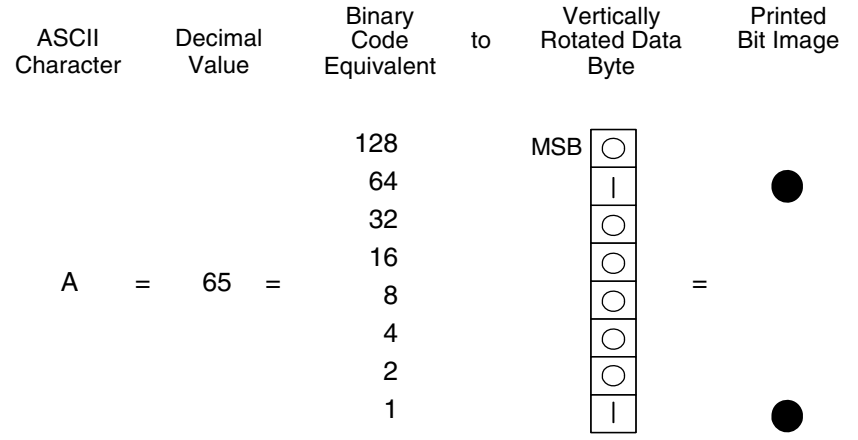


Figure 4. Bit Image Pattern from an ASCII Character

Bit image plotting is not limited to printable ASCII characters. You can print bit image patterns for any 8-bit data byte with decimal values ranging from 0 through 255 (hex 00 through hex FF). (The ASCII character set is charted in Appendix A.)

Designing a Bit Image Pattern

A bit image pattern is produced in four steps:

1. On a quadrille pad or graph paper, lay out the graphic pattern you want to print. (See Figure 5.)
2. Determine the decimal equivalent of each vertical data byte in your pattern. (The sum of the decimal equivalent of each true bit in the vertical data byte is the decimal equivalent of the data byte.)
3. Write a program to generate the pattern.
4. Enter and run the program on the host computer.

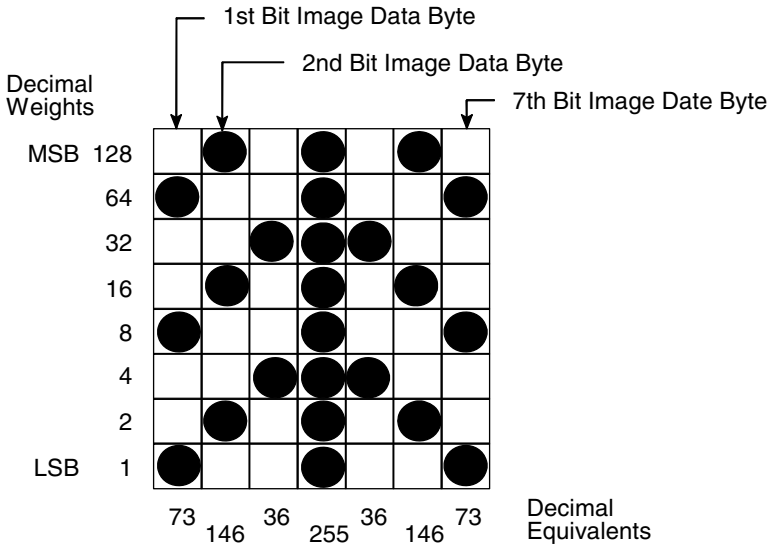


Figure 5. Bit Image Pattern Plan

Bit Image Density

You can print bit image graphics in different dot densities. Select dot densities by sending a control code in the data stream.

NOTE: Every line of graphics data must include the necessary bit image command so the printer can perform the chosen graphics functions.

Single Density Mode: ESC K

Single density bit image graphics in a Data Processing (DP) print quality are printed at 60 dots per inch (dpi) horizontally and 72 dpi vertically. For NLQ print quality, the horizontal dot density is 90 dpi and vertical dot density is 96 dpi. For High Speed (HS) draft print quality, horizontal dot density is 60 dpi and vertical dot density is 48 dpi.

Double Density Mode: ESC L

Double density mode prints up to twice the number of dots per inch horizontally in the same space used for single density. The vertical dot density remains the same as in single density mode. Double horizontal density requires twice the number of input data bytes to print the same length line as single density. Printing double density reduces the printing speed by half.

Double Speed-Double Density Mode: ESC Y

When the double density-double speed control code is received, data bytes print at double the current horizontal dot density, but adjacent dots are not printed. Since double density graphics are printed at half speed, double speed-double density graphics are printed at the same speed as single density graphics. This mode is often used to position a simulated print head precisely by sending blank dot columns.

Quadruple Density Mode: ESC Z

When printing quadruple density graphics, the printer combines adjacent quadruple density bit image bytes. The compounded data is then printed in double density mode.

Bit Image Programming Format

The bit image command format is:

ESC *CC* (*n1*) (*n2*) *DATA*

Where:
ESC = the serial matrix escape sequence
CC = K, L, Y or Z to select dot density
(K = single, L=double, Y=double density, double speed, Z=quadruple density)
n1 = (Number of DATA bytes) - 256(*n2*)
(remainder of division of number of DATA bytes by 256, sometimes referred to as MOD 256)
n2 = (Number of DATA bytes) / 256 (quotient of division)
DATA = the dot pattern bytes

The syntax of the bit image expression must be correct.

The number of data bytes and the *n1*, *n2* definition must be equal.

Any characters following *n1* and *n2* are interpreted and plotted as data until the *n1*, *n2* definition is satisfied.

If *n1* = *n2* = 0, then control codes K, L, Y, or Z are ignored.

The maximum number of data bytes that can be included in the DATA portion of the program statement (when using 132 column paper) varies according to the dot density:

At 60 dpi, single density = 792 bytes
double density = 1584 bytes
quadruple density = 3168 bytes

Data that goes past the right margin is discarded if automatic line feed is disabled. If automatic line feed is enabled, data that goes past the right margin triggers an automatic line feed (LF) and is printed on the next line.

Bit Image Sample Program

The program below, written in BASIC, produces the single density bit image pattern shown in Figure 6. The 7-byte pattern is repeated 40 times.

```
10 WIDTH "LPT1:", 255
20 LPRINT "Single Density Bit Image Graphics"
30 LPRINT CHR$(27);"K";CHR$(24);CHR$(1);
40 FOR N=1 TO 40
50 RESTORE
60 FOR I=1 TO 7
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 DATA 73, 146, 36, 255, 36, 146, 73
120 LPRINT
```

Figure 6. Sample Single-Density Bit Image Graphics

D Contact Information

Printronix Customer Support Center

IMPORTANT **Please have the following information available prior to calling the Printronix Customer Support Center:**

- Model number
- Serial number (located on the back of the printer)
- Installed options (i.e., interface and host type if applicable to the problem)
- Configuration printout:

  Line Matrix Printer
  Press PRT CONFIG on the control panel, then press Enter.
- Is the problem with a new install or an existing printer?
- Description of the problem (be specific)
- Good and bad samples that clearly show the problem (faxing or emailing of these samples may be required)

Americas	(714) 368-2686
Europe, Middle East, and Africa	(31) 24 6489 410
Asia Pacific	(65) 6548 4114
China	(86) 800-999-6836

http://www.printronix.com/support.aspx

Printronix Supplies Department

Contact the Printronix Supplies Department for genuine Printronix supplies.

Americas	(800) 733-1900
Europe, Middle East, and Africa	33 (0) 1 46 25 19 07
Asia Pacific	(65) 6548 4116 or (65) 6548 4182
China	(86) 400-886-5598
India	(800) 102-7869

http://www.printronix.com/supplies-parts.aspx

Corporate Offices

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U.S.A.
Phone: (714) 368-2300
Fax: (714) 368-2600

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Fax: (65) 6546 1588

Printronix Commercial (Shanghai) Co. Ltd
22F, Eton Building East
No.555, Pudong Av.
Shanghai City, 200120, P R China
Phone: (86) 400 886 5598
Fax: (86-21) 5138 0564

Visit the Printronix web site at www.printronix.com

E Glossary

A

A to D	Analog to Digital.
ACK	Acknowledge character. A transmission control character transmitted by the printer as an affirmative response to an inquiry from the host.
active column	The horizontal location on the paper where the next character will print.
active line	The vertical location on the paper where the next character will print.
active position	The position on the paper where the next character will print. The intersection of the active column and the active line.
ASCII	*Abbrev. for* American Standard Code for Information Interchange. A standard character encoding scheme introduced in 1963 and used widely on many computers and printers. It is a 7-bit code with 128 different bit patterns. There is no parity recommendation.
attributes, print	Operations performed on text that alter its appearance but do not change the font. Examples: underlining, superscripting, bold, etc.

B

bar code	A printed code consisting of parallel bars of varied width and spacing and designed to be read by a one-dimensional scanning device.
baud	A unit of speed that measures the rate at which information is transferred. Baud rate is the reciprocal of the length in seconds of the shortest pulse used to carry data. For example, a system in which the shortest pulse is 1/1200 second operates at 1200 baud. On RS-232 serial lines, the baud rate equals the data flow rate in bits per second (bps). To communicate properly, a printer must be configured

	to operate at the same baud rate as its host computer.
bit	*Contraction of* binary digit. A digit in the binary number system, represented by a 0 or a 1. A bit is the smallest unit of storage in a digital computer, where 0 and 1 are represented by different voltages. Groups of bits form other units of storage called nibbles, bytes, and words.
bold	A print attribute specifying text of a heavy line thickness. *See also* character weight.
Boot-up	The start-up procedure which causes a computer operating system to be loaded into main memory.
buffer	A reserved area in memory where data is written to and read from during data transfers.
bus	A circuit for the transfer of data or electrical signals between two devices.
byte	A group of consecutive bits forming a unit of storage in a digital computer and used to represent one alphanumeric character. A byte usually consists of 8 bits but may contain more or fewer bits depending on the computer or protocol.

C

character cell	The invisible rectangular space occupied by a character, including the white space around the character. The height of a cell remains constant even with changes to the current line spacing, and the width is equal to the current character spacing. Used as a unit of spacing.
character proportion	The ratio of character height to character width. *See also* compressed and expanded.
character set	A set of codes, each of which represents a control or printable character, including symbols, punctuation, numbers, diacritical markings, and alphabet characters. Each character is assigned a unique address in memory.
character weight	The degree of lightness and thickness of printed text. For example, “**Bold**” refers to a heavy or thick character weight. “Medium,” “normal,” or “book weight” refer to the character weight used in this sentence.
checksum	A value used to verify microcode correctness.

command	An operating instruction (e.g., form feed or FF) sent from a computer to the printer. Also called a control code or non-printable character. Commands are opposed to data, which is printed.
command delimiter	An ASCII character used to begin a command string. Commonly used command delimiters are ESC (hex 1B) and SOH (hex 01).
command sequence	Two or more bytes that instruct the printer to perform a special function. The first character in the sequence is a special function control character. This character alerts the printer that the string which follows is a command sequence, not a character or graphic code. *See also* escape sequence.
compatibility	The ability of one printer to accept and properly process commands meant for a different printer. *See also* emulation and protocol.
compressed	Refers to a typeface with a font width approximately 60% smaller than normal. Character height is not changed.
configuration	Refers to the operating properties that define how the printer responds to signals and commands received from the host computer at the printer interface. These properties are called configuration parameters and are set to match the operating characteristics of the host computer system.
controller	An independent logic unit in a data processing system that controls data paths between one or more units of peripheral equipment.
cpi	*Abbrev. for* characters per inch. A measurement of monospaced fonts indicating the horizontal character density. For example, 10 cpi means 10 characters can be printed in one horizontal inch. *See also* pitch.
cps	*Abbrev. for* characters per second. A measurement of the print speed of a serial (character) printer.
CPU	*Abbrev. for* Central Processing Unit.
CR	*Abbrev. for* Carriage Return.

D

data bits	Binary information sent to the printer. A character set grouping which contains letters, digits, and punctuation marks to be printed; or which contains control codes to move paper, format text and graphics, and position the text and graphics on the page.

DCD	*Abbrev. for* Data Carrier Detect. Status signal to the printer. The ON condition is required for the printer to receive data.
decipoint	One tenth of a point. A unit of length equal to 1/720 inch. *See also* point.
default	A value, parameter, attribute, or option assigned by a program or system if another is not specified by the user.
descender	The portion of a printed, lowercase character that appears below the base line. For example, “g,” “j,” “p,” “q,” and “y” all are characters with lowercase descenders.
diagnostic	Pertains to the detection and isolation of printer malfunctions or mistakes.
DIP	*Acronym for* Dual In-line Package. A method of packaging semiconductor components in rectangular cases with parallel rows of electrical contacts.
DIP switch	A DIP equipped with switches. A typical DIP switch has from four to ten individual switches mounted in its package. The individual switches are typically toggle, rocker, or slide switches.
disable	To deactivate or set to OFF.
diskette	A thin, flexible magnetic disk containing software such as test and diagnostic programs, initialization files, and all font specifications for the printer.
DP	*Abbrev. for* Data Processing. *See also* HS for Draft Print.
draft	A limited dot font used for rough copy. Low print quality but fast printing speed.
DRAM	*Acronym for* Dynamic Random-Access Memory.
DSR	*Abbrev. for* Data Set Ready. Status signal to the printer indicating the host is in a ready condition.
DTR	*Abbrev. for* Data Terminal Ready. Control signal from the printer indicating it is in a ready condition.

E

ECMA	*Abbrev. for* European Computer Manufacturers Association.
EIA/TIA	*Abbrev. for* Electronic Industries Association/ Telecommunications Industry Association.
Elite	A name indicating a monospaced font with a pitch of 12 cpi (and usually 10 points in height).

em	A unit of measure in typesetting. The width of a piece of type about as wide as it is tall. (Derived from uppercase M, usually the widest character in a set.)
emulation	Refers to the ability of a printer to execute the commands of another printer protocol. When used as a proper noun (e.g., Epson LQ-1600K Emulation), it means printer protocol. *See also* compatibility and protocol.
en	A unit of measure in typesetting equal to half the width of an em.
enable	To activate, make true (1), or set to on.
escape sequence	A command sequence in which the first byte is always the ASCII ESC character. Same as “escape code.” *See also* command sequence.
ETX	*Abbrev. for* End of TeXt. A transmission control character sent from the host to the printer, indicating the end of transmission of a block of data.
EVFU	*Abbrev. for* Electronic Vertical Format Unit. Relates to the ability to slew (skip quickly a specified number of lines).
expanded	A font enhancement referring to larger-than-normal character width with no change in character height.

F

false	Off or zero. *Compare* true.
family (or type)	A set of all variations and sizes of a type style
FF	*Abbrev. for* Form Feed.
FIFO	*Abbrev. for* First In, First Out.
fixed-pitch fonts	*See* font, monospaced.
font	The complete set of a given size of type, including characters, symbols, figures, punctuation marks, ligatures, signs, and accents. To fully describe a font, you must specify seven characteristics: 1) typeface 2) spacing (proportional or monospaced) 3) type size (12 point, 14 point, etc.) 4) scale factor (character height/width ratio) 5) type style 6) character weight 7) character proportion (normal, condensed, expanded)
font, landscape	A font printed parallel to the long edge of a page.

font, monospaced	Also called fixed-pitch fonts. Every character, regardless of horizontal size, occupies the same amount of font pattern space. All monospaced fonts use specific pitch size settings. Monospaced fonts are sometimes used when strict character alignment is desired (tables, charts, spreadsheets, etc.).
font name	*See* typeface.
font pattern	The matrix of pixels which represents a character, symbol, or image.
font, portrait	A font printed parallel to the short edge of a page.
font, proportional	A font in which the width of a character cell varies with the width of the character. For example, [i] takes less space to print than [m]. Using proportional fonts generally increases the readability of printed documents, giving text a typeset appearance.
font weight	The thickness of the lines that make up a character. For example, “bold” and “light” are different font weights.
font width	The measurement of the width of a character cell in dots.

H

hammer	The hammer spring with a hammer tip mounted onto it.
hammer spring	The flat piece of metal, made of spring steel, which supports and pushes the hammer tip.
hammer tip	The small, round point located near the end of the hammer spring which strikes the ribbon and leaves a dot on the paper.
hex codes	Based on a numeral system with a radix of 16.
hex dump	A hex dump is a translation of all host interface data to its hexadecimal equivalent. A hex dump is a printer self-test typically used to troubleshoot printer data reception problems.
host computer	The computer that stores, processes, and sends data to be printed, and which communicates directly with the printer. The term “host” indicates the controlling computer, since modern printers are themselves microprocessor-controlled computer systems.
HS	*Abbrev. for* High Speed or Draft Print characters.
HT	*Abbrev. for* Horizontal Tab.
Hz	*Abbrev. for* Hertz. Cycles per second. Frequency.

I

IEEE	*Abbrev. for* Institute of Electrical and Electronic Engineers, Inc.
initialization	A series of processes and self-tests that set power-up default conditions and parameters.
interface	The hardware components used to link two devices by common physical interconnection, signal, and functional characteristics.
invoke	To put into effect or operation.
ipm	*Abbrev. for* inches per minute. A measurement of the speed of a printer printing in graphics print mode (plotting speed). *See also* lpm.
italic	A slanted type style. *This is an italic type style.*

L

LF	*Abbrev. for* Line Feed.
landscape	Printed perpendicular to the paper motion.
LCD	*Abbrev. for* Liquid-Crystal Display. The LCD is located on the operator panel. Its purpose is to communicate information to the operator concerning the operating state of the printer.
LED	*Abbrev. for* Light Emitting Diode.
logical link	The parameters that specify data transfer, control, or communication operations.
lpi	*Abbrev. for* lines per inch. A measurement indicating the vertical spacing between successive lines of text. For example, 8 lpi means 8 lines of text for every vertical inch.
lpm	*Abbrev. for* lines per minute. A speed measurement indicating the number of lines printed every minute. (lpm usually defines the speed at which text prints.) *See also* ipm.

M

monospaced	*See* font, monospaced.
MM	Millimeter.

N

N/A	Not available or not applicable.
NACK	*Abbrev. for* Negative-Acknowledge reply. A reply from the printer to the host indicating that an exception has occurred. Contrast with acknowledge character.
NAK	*Abbrev. for* Negative-Acknowledge character. A transmission control character transmitted by the printer as a negative response to an enquiry from the host.
nibble	A unit of storage containing half of a byte, usually four bits.
NLQ	*Abbrev. for* Near Letter Quality.
nS	Nanosecond (one billionth of a second).
NVRAM	*Abbrev. for* NonVolatile Random-Access Memory. A type of RAM in which stored data is not lost when the power is interrupted or turned off. A battery supplies power to NVRAM when the system does not. Unlike ROM (another type of nonvolatile memory), NVRAM is accessible and its contents can be altered.

O

OCR	*Abbrev. for* Optical Character Recognition. A process by which a machine can “read” characters printed in a special standardized font. Data is read by a photoelectric optical scanner and recorded on magnetic tape or disk. OCR-A and OCR-B are two widely used OCR fonts.
off-line	An operational state in which the printer cannot accept commands or data from the host computer, but can perform self-tests, form settings, and record configuration changes.
Ohm	A unit of measurement for electrical resistance.
on-line	An operational state in which the printer is under direct control of the host computer. In this state, the printer accepts commands and data sent from the host computer and acts on them immediately.

P

parity (check)	Parity checking is the addition of non-data bits to data, resulting in the number of 1 bits being either

	always even or always odd. Parity is used to detect transmission errors. Parity represents the value in the check digit of the received or transmitted data.
parsing	The process of separating a programming statement into basic units that can be translated into machine instructions. A printer can recover from an erroneous code sequence by performing as much of the function as possible or parsing the valid parameter from the invalid.
PC	*Abbrev. for* Personal Computer.
PCB	*Abbrev. for* Printed Circuit Board. A PCB is an insulating board on which circuit paths have been printed or etched.
PCBA	*Abbrev. for* Printed Circuit Board Assembly. A PCBA is a PCB that has all of the electrical and mechanical components (resistors, capacitors, ICs, sockets, etc.) mounted on it.
PI	*Abbrev. for* Paper Instruction. A signal from the host with the same timing and polarity as the data lines.
pica	A name indicating a monospaced font with a pitch of 10 cpi and usually a 12 point height. Pica is used in typography as a unit of measurement equal to 1/6 inch.
pin configuration	Establishes the physical attachment and protocol conversion connections for the host interface.
pitch	The number of text characters printed per horizontal inch. Specified in characters per inch (cpi).
pixel	*Derived from* picture (PIX) Element. The smallest displayable picture element on a video monitor or printable unit. In printing, a pixel is a dot.
point	A unit of length in printing and typography, used to specify type sizes, heights of font characters, etc. There are 72 points in a vertical inch; thus, one point equals 1/72 inch, or approximately 0.0138 inch. Some examples of point sizes are: This is 8 point type. This manual is printed in 10 point type. This is 14 point type.
port	A channel used for receiving data from or transmitting data to one or more external devices.
portrait	Printed parallel to the short edge of a page.
Postnet	A bar code standard defined by the U.S. Postal Service.
print mode	Synonymous with print attributes. Includes character attributes such as italic, underlining, super/subscript, as well as Draft, NLQ, and DP.
proportion, character	*See* character proportion.

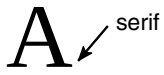
proportional	*See* font, proportional.
protocol	In general, a set of rules governing the exchange of information between computer systems. For printers, a protocol is the coding system used to convey and print characters and graphics. A printer protocol includes character codes, printer function codes, and machine-to-machine communication codes. In this manual, protocol and emulation mean the same thing. *See also* compatibility and emulation.

R

RAM	*Acronym for* Random-Access Memory. Also called “main memory” or “working memory,” this is the active memory of a printer into which programs are loaded. This memory can be read from or written to at any time, hence the term “random-access.” RAM is also termed “volatile” because whatever is in RAM is lost when power is turned off or interrupted. *See also* ROM.
read	To retrieve data from memory (RAM, NVRAM) or mass storage (hard disk, floppy diskette, etc.).
reset	To turn off, deactivate, disable, or return to a previously determined state.
resolution	A measure expressing the number of units in a given range used to create an image. In printing, this is expressed as the number of dots per inch (dpi) horizontally and vertically.
ROM	*Acronym for* Read-Only Memory. Programs, instructions, and routines permanently stored in the printer. ROM is not lost when power is turned off and cannot be written to, hence the term “read-only.” ROM-resident fonts are fonts which are permanently stored in a printer and available at any time. *See also* RAM.
roman	A type style in which the characters are upright. This sentence is printed in a roman type style.
RTS	*Abbrev. for* Request To Send. Control signal from the printer.

S

sans serif	A typeface or font in which the characters do not have serifs. This font is sans serif.

serial communications	The sequential transmission of data, in which each element is transferred in succession.
serial matrix	A type of printing technology used in some impact printers. Data is sent to the printer through either a serial or a parallel interface, but the print head must receive the data serially in order to form each character. The moving print head uses pins to form whole characters one at a time and one after the other. The pins print dots according to programmed matrix patterns. A line matrix printer also forms characters with dots in matrix patterns, but it feeds print data in parallel to many hammers mounted on a rapidly oscillating shuttle. The hammers fire simultaneously to print entire dot rows (hence lines) at a time.
serif	A short line stemming from and at an angle to the upper or lower end of the stroke of a letter or number character. 
set	To turn on, activate, invoke, or enable.
shadow printing	A typeface with a heavy line thickness produced by doublestriking. The printer forms a character then prints it again, but the second position is fractionally offset from the first position. *See also* bold, character weight.
shuttle	The subassembly in a line matrix printer that includes the hammer bank assembly, plus some or all of the drive mechanism.
size, type	*See* point.
slewing	Rapid vertical paper movement.
soft reset	*See* warm start.
SOH	*Abbrev. for* Start Of Header.
spacing	*See* font, proportional and font, monospaced.
start bit	The signal that indicates the start of a character or element in a serial data stream.
stop bit	The signal that indicates the end of a character or element in a serial data stream.
string	Two or more bytes of data or code treated as a unit.
style, type	*See* type style.
symbol set	*See* character set.

T

TOF	*Abbrev. for* Top Of Form. Also written “top-of-form.”
true	On or 1. “High true” refers to a positive relative voltage representing the ON state; “low true” refers to a zero or negative relative voltage representing the ON state.
twinax	Twinaxial cable. An electrical signal conductor consisting of two wires surrounded by insulation and a braided shield. Used to connect computers to input or output devices.
type family	*See* typeface.
type size	*See* point.
type style	Refers to either the upright or italic character style in a specific font family. Roman is upright; *italic is slanted.*
typeface	A descriptive name or brand name that identifies a particular design of type. Also called type family.
typographic font	*See* font, proportional.

U

UPC	*Abbrev. for* Universal Product Code.

V

VFU	*Abbrev. for* Vertical Format Unit.
VGL	*Abbrev. for* Code V Graphics Language. An emulation of the QMS Code V Magnum firmware. The software version of the old hardware based IGP that is used in the Printronix PSA line of printers. It provides the same forms and barcode generation capabilities as the IGP.
VT	*Abbrev. for* Vertical Tab.

W

warm start	A reboot or soft reset, in which the following occurs: 1) data is cleared from all buffers (I/O and internal print buffers); 2) all internal system variables are set to default values, which is transparent to the user; and 3) the power-up configuration values, except the

	host I/O selection, are loaded. If the user has not defined power-up configuration values, the printer resets to the factory default configuration values.
weight	*See* character weight.
word	1. A storage unit consisting of the number of bits that comprise one storage location in main memory. 2. The name used for a variable or constant in a program. 3. The data value occupying a storage location.
write	To place data in memory (RAM, NVRAM) or in mass storage (hard disk, floppy diskette, etc.).

X

X-OFF	A character transmitted by the printer announcing that the printer is off-line or the buffer is almost full.
X-ON	A character transmitted by the printer announcing that the printer is on-line or the buffer is almost empty.

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