

Chapter 7

SOFTWARE CONTROL OF THE PRINTER

7.1 PRINTER CONTROL CODES

Using the DOS commands, 'COPY' or 'PRINT', you can send data to the printer. Also you can use the print ability of any application program to send data to the printer.

However, if you want a documentation format that suits your special needs, or if you want a new character that is not defined in the printer, you need to know what is the printer code and how it works.

To communicate with the printer, only the predefined codes that the printer understands are to be used. Generally, with minor differences from computer to computer, the ASCII code is used as the predefined communication code.

The ASCII code consists of printable characters(alphabets, symbols, numbers, and mathematical notes) and control codes. The 33 control codes of the ASCII code system are not usually sufficient, so several codes are used together to make up control code sequences. The control code sequences usually start with "ESC"(ASCII code number 27).

The ASCII Code

The control codes in the ASCII code system have the code numbers of 0 through 31 and 127. Not all of these codes are used in computer-printer communication, but only part of the control codes are used. Even though the selected control code set differs between the printer manufacturers, the functions of the control codes are very similar. Each ASCII control code has a abbreviated name that explains its function. Some examples of the ASCII control code are shown below.

Dec.	Hex.	Name	Function
8	08	BS	Backspace
9	09	HT	Horizontal Tab
10	0A	LF	Line Feed
11	0B	VT	Vertical Tab
12	0C	FF	Form Feed

ESC Code Sequence

ESC code sequence consists of "ESC"(ASCII code number 27) and one or more ASCII alphabets or numbers. ESC code sequence, unlike the ASCII control code, has some differences between the printers. Following is some examples of ESC code sequences.

Code Sequence	Function
ESC 0	1/8 Inch Line Spacing
ESC 1	1/10 Inch Line Spacing
ESC 2	1/6 Inch Line Spacing
ESC 3 <i>n</i>	<i>n</i> /180 Inch Line Spacing
ESC A <i>n</i>	<i>n</i> /60 Inch Line Spacing

Now, let's see how to send the control code or code sequence to the printer.

Sending the Control Code

ASCII control codes and ESC code sequences are sent to the printer by sending their ASCII code numbers. For example, to send a code sequence of "ESC 1", you need to send its number sequentially, "2731"(Here, '\ ' separates the code number).

You can use decimal notation or hexadecimal notation in writing control code. The decimal notation is a very popular base-10 notation where 10 numbers, 0 through 9, are used. The hexadecimal notation is a base-16 notation where 16 numbers, 0 through 9 and A(or a) through F(or f), are used. In this manual the hexadecimal numbers are marked with '&H'. For example hexadecimal number 1F is notated as '&H1F'.

Using the Control Key

Using the control key on the computer's keyboard, the control codes can be entered conveniently. ASCII code 0 through 31 can be entered by pressing the control key on the keyboard and a key which has ASCII code number 64 (A) through 95(underscore, underline) respectively. For example, CTRL A(pressing the control key and 'A' key at the same time) corresponds to ASCII code 0, and CTRL B corresponds to ASCII code 1.

7.2 CONTROLLING THE CHARACTER PRINTING

You have various options in printing a character, such as the quality(draft or LQ), font, size, enhancement, super or subscription. Character printing control can be done in two ways:

by pressing the buttons on the printer control panel or sending control codes from the computer.

Now we will see the example programs and their results to learn how to control the printer using control codes. The programs are written in the GW-BASIC and all control codes are from the LQ1050 code.

Printing Quality and Character Fonts

Basically the printer has several character sets for different fonts and prints the characters in two different qualities. Following is an example program to show how to select one of the printing qualities and its result (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x0";
30 LPRINT "This is the draft mode"
40 LPRINT CHR$(27);"x1";
50 LPRINT "This is the LQ mode"
```

```
This is the draft mode
This is the LQ mode
```

Following is an example program to show how to select character font and its result (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x1";
30 LPRINT CHR$(27);"k";CHR$(0);
40 LPRINT "This is Roman"
50 LPRINT CHR$(27);"k";CHR$(1);
60 LPRINT "This is Sans Serif"
```

```
This is Roman
This is Sans Serif
```

Character Size

You can adjust the character's size that is to be printed. The character size is represented by the numbers of characters that are printed in 1 inch width (CPI). Usually the character sizes of 10, 12, and 15 CPI are supported. Following is an example program that shows how to change the character size that is to be printed (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x1";
30 LPRINT CHR$(27);"P";
40 LPRINT "This is 10 Pitch"
50 LPRINT CHR$(27);"M"
60 LPRINT "This is 12 Pitch"
70 LPRINT CHR$(27);"g";
80 LPRINT "This is 15 Pitch"
```

```
This is 10 Pitch
This is 12 Pitch
This is 15 Pitch
```

Some characters have less width than the others. For example, 'i' is narrower than 'W'. If you want to give proper spaces around each character according to its width, you can use the proportional printing option.

The effect of the proportional printing can be seen in the following example very clearly (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x1";
30 LPRINT CHR$(27);"p1";
40 LPRINT "Proportional mode is turned ON"
50 LPRINT CHR$(27);"p0";
50 LPRINT "Proportional mode is turned OFF"
```

```
Proportional mode is turned ON
Proportional mode is turned OFF
```

The size of the character can be changed in the user chosen directions. Namely, you can reduce or enlarge the character's width and/or height. Following example program shows how to control the character size in specific direction and the results (This example is for XL24 mode).

```
100 LPRINT "This is normal mode"
110 LPRINT CHR$(15)
120 LPRINT "This is condensed mode"
130 LPRINT CHR$(18);
140 LPRINT CHR$(27);"W1"
150 LPRINT "This is double-wide mode"
160 LPRINT CHR$(27);"["@";CHR$(4);CHR$(0);CHR$(0);
    CHR$(0);CHR$(34);CHR$(1);
170 LPRINT "This is double-high mode"
180 LPRINT CHR$(27);"["@";CHR$(4);CHR$(0);CHR$(0);
    CHR$(0);CHR$(34);CHR$(2);
190 LPRINT "This is double-wide-high mode"
```

This is normal mode

This is condensed mode

This is double-wide mode

This is double-high mode

This is double-wide-high mode

Character Enhancements

If you want to make the characters more striking, you can use the emphasized or double-striking mode. In the emphasized mode, same characters are printed to the right of the original characters, and in the double-striking mode, they are printed to the below. By combining these two modes, you can get even more thickened characters. The following shows how to select the character enhancement features and its result (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x1"
30 LPRINT "This is normal mode"
40 LPRINT CHR$(27);"E";
50 LPRINT "This is emphasized mode"
60 LPRINT CHR$(27);"F";
70 LPRINT CHR$(27);"G";
80 LPRINT "This is double-strike mode"
```

```
This is normal mode
This is emphasized mode
This is double-strike mode
```

Underlining some specific characters is also possible. When the underlining mode is turned on, the spaces are also underlined. Following shows how to turn on the underlining mode and its result (This example is for LQ1050 mode).

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"x1";
30 LPRINT "This is ";
40 LPRINT CHR$(27);"-";CHR$(1);
50 LPRINT "very important";
60 LPRINT CHR$(27);"-";CHR$(0);
70 LPRINT " character."
```

```
This is very important character.
```

Subscripts and superscripts are useful when writing mathematical expressions and footnote numbers. Following shows how to use subscripts or superscripts (This example is for LQ1050 mode).

```

100 LPRINT CHR$(27);"@";
110 LPRINT CHR$(27);"x1";
120 LPRINT "1"
130 LPRINT "- ( d";
140 LPRINT CHR$(27);"S1";"ij";
150 LPRINT CHR$(27);"S0";"2";
160 LPRINT CHR$(27);"T";" + d";
170 LPRINT CHR$(27);"S1";"ik";
180 LPRINT CHR$(27);"S0";"2"
190 LPRINT CHR$(27);"T";" - d";
200 LPRINT CHR$(27);"S1";"jk";
210 LPRINT CHR$(27);"S0";"2";
220 LPRINT CHR$(27);"T";" )"
230 LPRINT "2"

```

$$\frac{1}{2} (d_{ij}^2 + d_{ik}^2 - d_{jk}^2)$$

7.3 USER-DEFINED CHARACTERS

The printer stores its character data in two memory devices: ROM(Read Only Memory) and RAM(Random Access Memory). ROM retains its contents permanently even when no electricity is supplied. In the contrast, RAM loses its contents once the printer is turned off. However, the user can not change the ROM's contents while the data in the RAM can be changed as wanted. This feature can be utilized to define new characters.

In this section, it is explained how to design new characters and store the newly designed character patterns. Following examples are for LQ1050.

Designing Character Pattern

The printhead has 24 pins in a column. Each pin strikes the print ribbon as controlled by electric signal and makes a small dot on the paper. For example, if all the 24 pins are fired, a short vertical line is printed. By controlling the pins you can print many patterns. Now let's design a new character and print it.

The grid pattern is useful in designing a new character. The height of the grid pattern is the number of printhead pins and the width varies with the character printing quality. For draft character, we use 9 columns, and 29 and 37 columns for letter quality and proportional characters respectively.

Following figures show the grid patterns for draft and letter quality characters. Normally it gives more nice looking characters leaving some spaces around them.

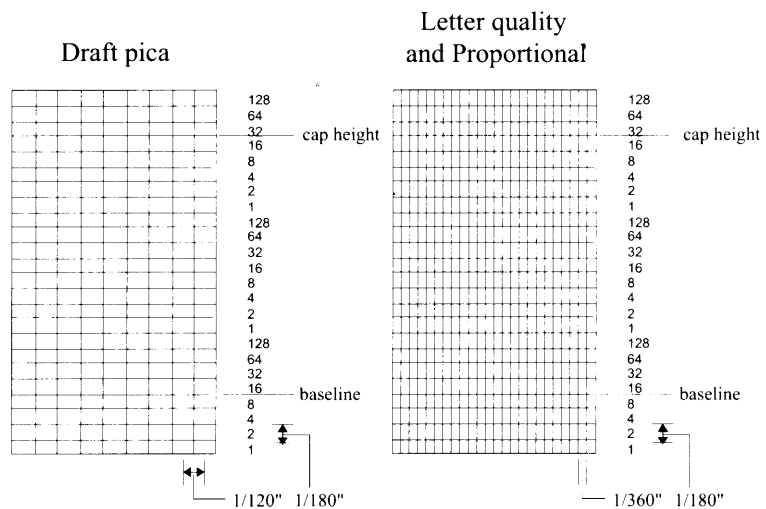


Fig. 7-1

From now on, we will design a draft character. Letter Quality and proportional characters can be designed in the same way. First, put down the character pattern on the grids as follows.



Horizontally continuous dots can not be used.

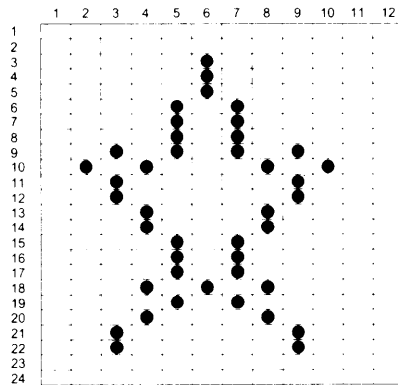


Fig. 7-2

The grids marked by '●' represent the dot that constitutes the character.

Next step is converting the pattern into the control codes that are to be transmitted to the printer.

Composing character data

Each column of the character pattern has 24 dots which can be represented by a data of 24 bits. So 3 bytes data are required for 1 column of character. The bits within each byte have values of 1, 2, 4, 8, 16, 32, 64, 128 starting from the bottom to the top. The data numbers are calculated by adding the values of the bits which are to be printed. For example, the following figure explains how to calculate the 3 byte data number from the '●' marked 1 column pattern.

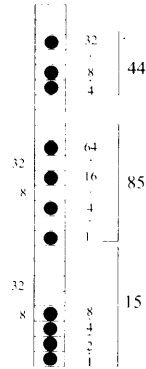


Fig. 7-3

The following figure shows how to convert a newly designed character pattern into the data.

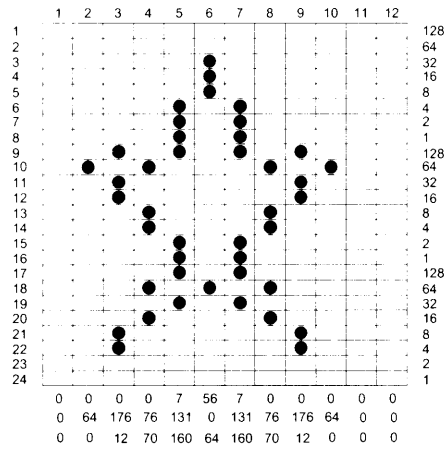


Fig. 7-4

Sending the Character Data

Once a new character is designed, the next step is sending the data to the printer in a proper format. Following is the control code that sends the data.

ESC & 0 n_1 n_2 d_0 d_1 d_2 *data*

n_1 and n_2 specify the first and last character codes to be defined. To define only one character, set n_1 and n_2 to be same. n_1 and n_2 is a one-byte value from 32 to 127. For example, to define A through Z, n_1 would be 65 and n_2 would be 90. d_0 , d_1 , and d_2 specify the width of the character and the space around it. d_0 specifies the left space and d_2 specifies the right space. d_1 specifies the character width. The base units of d_0 , d_1 , and d_2 are all columns with the current pitch. The following table summarizes the maximum values for the character width and spaces.

Pitch	d_1	$d_0 + d_1 + d_2$
Draft	9	12
LQ 12 CPI	23	30
LQ 10 CPI	29	36
Proportional	37	42

Since the data has three bytes per column, there should be $d_1 \times 3$ bytes of data for a character with d_1 columns.

The following program sends the data of the newly designed character to the printer to print it. Be sure that the item Download Buffer in menu list is set to PCG before running this program.

```

100 LPRINT CHR$(27);"@";
110 LPRINT CHR$(27);"x0";
120 LPRINT CHR$(27);": ";CHR$(0);CHR$(0);CHR$(0);
130 LPRINT CHR$(27);"&";CHR$(0);
140 LPRINT "***";
150 LPRINT CHR$(1);CHR$(9);CHR$(2);
160 FOR I=1 TO 9*3
170   READ A:LPRINT CHR$(A);
180 NEXT I
190 LPRINT "---*--"
200 LPRINT CHR$(27);"%";CHR$(1);
210 LPRINT "---*--"
220 LPRINT CHR$(27);"%";CHR$(0);

```

```

230 LPRINT "--*--"
240 END
250 '----- PATTERN -----
260 DATA 0,64,0,0,176,12,0,76,80,7,131,160
270 DATA 56,0,64,7,131,160,0,76,80,0,176,12,0,64,0
    
```

Following is the result of the above program. We can see that same character code prints different characters.

```

-- * * --
-- * * --
-- * * --
    
```

Copying ROM Characters into RAM

Normally most of the predefined characters are used as defined while some characters need to be changed. In this case, it is very convenient to copy the characters in the ROM into RAM so that only specific characters can be redefined. "ESC : " control code sequence does this job. See the explanation in the command description section of the manual for more information.

Sub/Super Scripts

Subscripts and superscripts can also be redesigned. The procedure is same as before, except the size of the grid pattern is reduced to 16. As a result, 2 bytes data corresponds to 1 column of character. Following figure shows the grid patterns for draft and letter quality sub/super script characters.

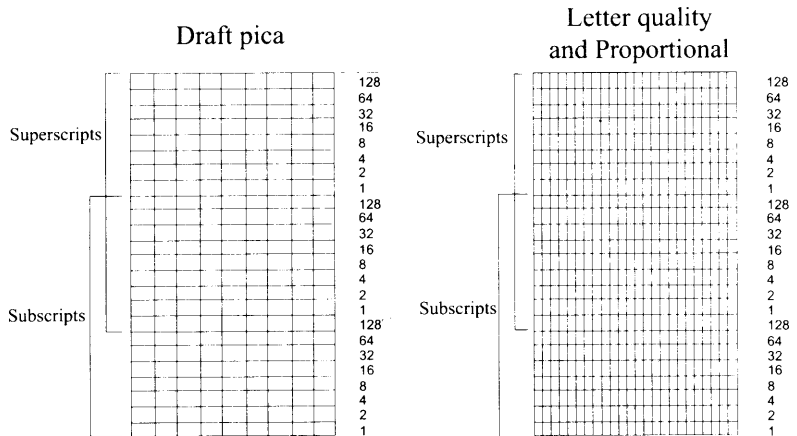


Fig. 7-5

The following table summarizes the maximum values for the character width and spaces.

Pitch	d_1	$d_0 + d_1 + d_2$
Draft	7	12
Letter Quality	23	36
Proportional	23	42

You should select subscript or superscript before the sending the character data.

7.4 GRAPHICS

The easiest way to print a bit image graphics is to use a application program. There are lots of commercially available programs that print the image that is appeared on the computer screen. But when some simple graphics need to be printed, it is more handy using the control codes. In this section, we describe how to print bit image graphics (Following examples are for LQ1050).

Composing the image data

The image graphics printing is done by controlling each pin of the print as in the character printing. Both 8 pin and 24 pin printing modes are supported. The image data is composed in the similar way to the character data composing, except the length of the data. The length of the image data is variable and can be very long.

Following shows how to compose the image data.

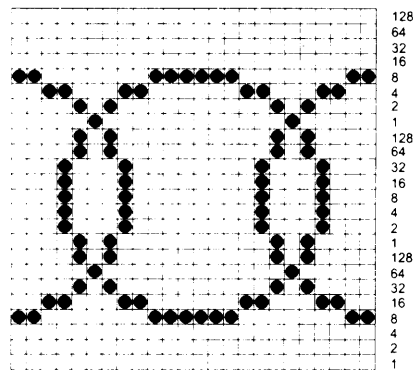


Fig. 7-6

Sending the image data

There are 3 ways to send the image data to the printer.

◁ The first one is the most general way.

ESC * m n_1 n_2 data

In this code, m specifies one of the 11 print modes.

◁ The second one is the designated code for $m = 0, 1, 2, 3$ for "ESC *" code. They are "ESC K", "ESC L", "ESC Y", "ESC Z" codes.

- ◁ The third one is reassigning one of the "ESC K, L, Y, Z" to other one. The code looks like this:

```
ESC ? s m
```

s is one of the letters, K, L, Y, and Z, that you wish to change the assignment. *m* is the number of that graphics mode that you want to assign to it. This is a quick way to change the aspect ratio of the image graphics that is to be printed. See command description section for more detailed explanation.

Following is an example program that prints the bit image graphics that was designed above.

```
100 LPRINT CHR$(27);"@";
110 WIDTH "LPT1:",255
120 FOR C=0 TO 20:RESTORE
130   LPRINT CHR$(27);"*";CHR$(39);CHR$(24);CHR$(0);
140   FOR X=1 TO 72
150     READ N:LPRINT CHR$(N);
160   NEXT X
170 NEXT C
180 LPRINT
190 END
200 '----- PATTERN -----
210 DATA 8,0,8,8,0,8,4,0,16,4,62,16,2,193,160,1,0,64
220 DATA 2,193,160,4,62,16,4,0,16,8,0,8,8,0,8,8,0,8
230 DATA 8,0,8,8,0,8,8,0,8,4,0,16,4,62,16,2,193,160,1
240 DATA 0,64,2,193,160,4,62,16,4,0,16,8,0,8,8,0,8
```

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```



Appendix A

CHARACTER TABLE

A.1 EPSON CHARACTER TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	·	p			SP	0	@	P	·	p
1		DC1	!	1	A	Q	a	q		DC1	!	1	A	Q	a	q
2		DC2	"	2	B	R	b	r		DC2	"	2	B	R	b	r
3		DC3	#	3	C	S	c	s		DC3	#	3	C	S	c	s
4		DC4	\$	4	D	T	d	t		DC4	\$	4	D	T	d	t
5			%	5	E	U	e	u			%	5	E	U	e	u
6			&	6	F	V	f	v			&	6	F	V	f	v
7	BEL		'	7	G	W	g	w	BEL		'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y	HT	EM	)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z	LF		*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
C	FF		,	<	L	\	l	:	FF		,	<	L	\	l	:
D	CR		-	=	M	]	m	}	CR		-	=	M	]	m	}
E	SO		.	>	N	^	n	~	SO		.	>	N	^	n	~
F	SI		/	?	O	_	o	DEL	SI		/	?	O	_	o	DEL

A.2 EPSON INTERNATIONAL CHARACTER TABLE

Hex. Dec.	23 35	24 36	40 64	5B 91	5C 92	5D 93	5E 94	60 96	7B 123	7C 124	7D 125	7E 126
USA	#	\$	@	[	\	\]	^	'	{	|	}	~
France	#	\$	à	°	ç	§	^	'	é	ú	è	¨
Germany	#	\$	§	Ä	Ö	Ü	^	'	ä	ö	ü	ß
ENGLAND	£	\$	@	[	\	\]	^	'	{	|	}	~
DENMARK I	#	\$	@	Æ	Ø	Å	^	'	æ	ø	å	~
SWEDEN	#	□	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	\$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN I	Pt	\$	@	í	Ñ	¿	^	'	ñ	ñ	}	~
JAPAN	#	\$	@	[	¥	]	^	'	{	|	}	~
NORWAY	#	□	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN II	#	\$	á	í	Ñ	¿	é	'	í	ñ	ó	ú
LATIN AMERICA	#	\$	á	í	Ñ	¿	é	ü	í	ñ	ó	ú

A.3 IBM CHARACTER SET 1 TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	.	p			á	⋮	L	⊥	α	≡
1		DC1	!	1	A	Q	a	q		DC1	í	⋮	⊥	⊥	β	±
2		DC2	"	2	B	R	b	r		DC2	ó	⋮	T	T	Γ	≥
3		DC3	#	3	C	S	c	s		DC3	ú	|	†	⊥	π	≤
4		DC4	\$	4	D	T	d	t		DC4	ñ	†	-	⊥	Σ	∫
5			%	5	E	U	e	u			Ñ	†	†	F	σ	
6			&	6	F	V	f	v			ã	†	†	π	μ	+
7	BEL		'	7	G	W	g	w	BEL		ü	†	†	†	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	†	⊥	†	ø	°
9	HT	EM	)	9	I	Y	i	y	HT	EM	ƒ	†	†	⊥	θ	•
A	LF		*	:	J	Z	j	z	LF		ƒ	||	⊥	†	∞	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	†	†	■	δ	√
C	FF	FS	,	<	L	\	l	|	FF	FS	¼	†	†	■	∞	ⁿ
D	CR		-	=	M	]	m	}	CR		ı	⊥	=	■	ø	ˆ
E	SO		.	>	N	^	n	~	SO		<<	†	†	■	ε	■
F	SI		/	?	O	_	o		SI		>>	†	⊥	■	∩	

A.4 IBM CHARACTER SET 2 TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	·	p	Ç	É	á	⋮	L	⊥	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	i	⋮	⊥	⊥	β	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	⋮	⊥	⊥	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	|	⊥	⊥	π	≤
4	♦	DC4	\$	4	D	T	d	t	ä	ö	ñ	⊥	—	⊥	Σ	∫
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⊥	⊥	⊥	σ	
6	♠		&	6	F	V	f	v	â	û	ä	⊥	⊥	⊥	μ	+
7	BEL		'	7	G	W	g	w	ç	ù	ü	⊥	⊥	⊥	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	⊥	⊥	⊥	ø	○
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⊥	⊥	⊥	⊥	θ	●
A	LF		*	:	J	Z	j	z	è	Ü	⊥	⊥	⊥	⊥	ϱ	•
B	VT	ESC	+	;	K	[	k	{	ï	φ	½	⊥	⊥	■	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	⊥	⊥	■	∞	"
D	CR		—	=	M	]	m	}	ï	¥	ï	⊥	=	■	ø	z
E	SO		.	>	N	^	n	-	Ä	Pt	<<	⊥	⊥	■	ε	■
F	SI		/	?	O	_	o	NUL	Á	f	>>	⊥	⊥	■	∩	

A.5 IBM ALL CHARACTER SET TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	ø	▶	SP	0	@	P	·	p	ç	É	á	⋮	L	⊥	α	≡
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⋮	⊥	⌈	β	±
2	☹	↓	"	2	B	R	b	r	é	Æ	ó	⋮	⊥	⌈	Γ	≥
3	♥	!!	#	3	C	S	c	s	â	ô	ú	|	⊥	⌈	π	≤
4	♦	⌈	\$	4	D	T	d	t	ä	ö	ñ	⊥	-	E	Σ	∫
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⊥	⊥	F	σ	
6	♠	-	&	6	F	V	f	v	â	û	ä	⊥	⊥	⌈	μ	+
7	•	⌈	'	7	G	W	g	w	ç	ù	ö	⊥	⊥	⊥	τ	
8	■	↑	(	8	H	X	h	x	ê	ÿ	¿	⊥	⊥	⊥	ø	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌈	⊥	⊥	⊥	θ	·
A	◻	→	*	:	J	Z	j	z	è	Ü	⌈	⊥	⊥	⌈	ρ	·
B	♂	←	+	:	K	[	k	{	ï	φ	½	⊥	⊥	■	δ	√
C	♀	⌈	,	<	L	\	l	|	î	£	↓	⊥	⊥	■	∞	"
D	♪	↔	-	=	M	]	m	}	ï	¥	↓	⊥	=	■	ø	'
E	♫	▲	.	>	N	^	n	~	Ä	Pt	<<	⊥	⊥	■	ε	■
F	⊛	▼	/	?	O	_	o	△	À	f	>>	⊥	⊥	■	∩	

A.6 CYRILLIC FONT TABLE (OPTION)

Cyrillic Character Set 1 (Mode 1)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P		p			a	⋮	Л	л	р	Ѣ
1		DC1	!	1	A	Q	a	q		DC1	б	⋮	Л	л	с	ѐ
2		DC2	"	2	B	R	b	r		DC2	в	⋮	Т	т	т	Ѣ
3		DC3	#	3	C	S	c	s		DC3	г	|	Т	л	у	ѐ
4		DC4	\$	4	D	T	d	t		DC4	д	†	—	л	џ	ї
5			%	5	E	U	e	u			е	†	†	Ф	х	Ѣ
6			&	6	F	V	f	v			ж	†	†	л	ш	Ѣ
7	BEL		'	7	G	W	g	w	BEL		з	†	†	†	ч	Ѣ
8	BS	CAN	(	8	H	X	h	x	BS	CAN	н	†	л	†	ш	°
9	HT		)	9	I	Y	i	y	HT		Ѣ	†	†	л	ш	•
A	LF		*	:	J	Z	j	z	LF		к	†	л	л	ъ	•
B	VT	ESC	+	;	K	[	k	{	VT	ESC	л	†	†	■	Ѣ	√
C	FF		,	<	L	\	l	|	FF		м	†	†	■	ъ	Ѣ
D	CR		-	=	M	]	m	}	CR		н	†	=	■	э	□
E	SO		.	>	N	^	n	~	SO		о	†	†	■	ю	■
F	SI		/	?	O	_	o	DEL	SI		п	†	†	■	я	

Cyrillic Character Set 2 (Mode 1)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P		р	А	Р	а	⋮	Л	л	р	Ѣ
1		DC1	!	1	А	Q	а	q	В	С	б	⋮	Л	л	с	ѐ
2		DC2	"	2	В	R	в	г	В	Т	в	⋮	Т	т	т	Ѣ
3		DC3	#	3	С	S	с	с	Г	У	г	|	Т	т	у	ѐ
4		DC4	\$	4	D	T	d	t	Д	Ф	д	†	—	Е	ф	ї
5			%	5	E	U	e	u	Е	X	e	‡	†	Ф	x	Ѣ
6			&	6	F	V	f	v	Ж	Ц	ж	‡	‡	Г	ц	Ѣ
7	BEL		'	7	G	W	g	w	З	Ч	з	‡	‡	‡	ч	Ѣ
8	BS	CAN	(	8	H	X	h	x	И	Ш	и	‡	‡	‡	ш	°
9	HT		)	9	I	Y	i	y	Й	Щ	я	‡	‡	‡	щ	°
A	LF		*	:	J	Z	j	z	К	Ъ	к	‡	‡	‡	ъ	°
B	VT	ESC	+	;	K	[	k	{	Л	Ы	л	‡	‡	█	ы	√
C	FF		,	<	L	\	l	|	М	Ь	м	‡	‡	█	ь	№
D	CR		-	=	M	]	m	}	Н	Э	н	‡	=	█	э	□
E	SO		.	>	N	^	n	~	О	Ю	о	‡	‡	█	ю	■
F	SI		/	?	O	_	o	DEL	П	Я	п	‡	=	█	я	

Appendix B

COMMANDS SUMMARY LIST

FUNCTION	EPSON LQ-1050			IBM XL24		
	Name	Hex.	Page	Name	Hex.	Page
Printer Control	Bell	BEL 07	6-9	BEL 07		6-9
	Select Printer	DC1 11	6-14	DC1 11		6-14
	Deselect Printer	DC3 13	6-15	DC3 13		6-15
	Select Cut Sheet Feeder	ESC EM 1B 19	6-18			
	Automatic Line Feed			ESC 5 1B 35		6-26
	Unidirectional Mode(one line)	ESC < 1B 3C	6-28			
	Initialize Printer	ESC @ 1B 40	6-30			
	Deselect Printer			ESC Q 1B 51		6-40
	Set Print Direction	ESC U 1B 55	6-42	ESC U 1B 55		6-42
	Stop Printing			ESC j 1B 6A		6-52
	Select Half Speed Mode	ESC s 1B 73	6-54			
Data Control	Null	Null 00	6-9	NUL 00		6-9
	Cancel Data	CAN 18	6-16	CAN 7F		6-16
	Space			SP 20		6-16
	Delete Character	DEL 7F	6-16			
	Cancel MSB Control	ESC # 1B 23	6-19			
	Set MSB to 0	ESC = 1B 3D	6-29			
Set MSB to 1	ESC > 1B 3E	6-29				
Horizontal Motion	Backspace	BS 08	6-10	BS 08		6-10
	Horizontal Tab	HT 09	6-10	HT 09		6-10
	Carriage Return	CR 0D	6-12	CR 0D		6-12
	Select Absolute Horizontal Tab	ESC \$ 1B 24	6-20			
	Set Horizontal Tabs	ESC D 1B 44	6-33	ESC D 1B 44		6-33
	Set All Tabs Power-On Settings			ESC R 1B 52		6-41
	Move Print Head	ESC \ 1B 5C	6-47			
	Relative Move Inline Forward			ESC d 1B 64		6-50
	Set Relative Tabs	ESC e 1B 65	6-50			
Set Print Position	ESC f 1B 66	6-51				
Vertical Motion	Line Feed	LF 0A	6-11	LF 0A		6-11
	Vertical Tab	VT 11	6-11	VT 11		6-11
	Form Feed	FF 12	6-12	FF 12		6-12
	Select Vertical Tab Channel	ESC / 1B 2F	6-23			
	1/8-inch Line Spacing	ESC 0 1B 30	6-23	ESC 0 1B 30		6-23
	7/72-inch Line Spacing	ESC 1 1B 31	6-24	ESC 1 1B 31		6-24
	1/6-inch Line Spacing	ESC 2 1B 32	6-24			
	Start Text Line Spacing			ESC 2 1B 32		6-24
	n/180-inch line Spacing	ESC 3 1B 33	6-25			
	Graphics Line Spacing			ESC 3 1B 33		6-25
	n/60-inch Line Spacing	ESC A 1B 41	6-31			
	Set Text Line Spacing			ESC A 1B 41		6-31
	Set Vertical Tabs	ESC B 1B 42	6-31	ESC B 1B 42		6-31
	Perform n/180-inch Line Feed	ESC J 1B 4A	6-36			
	Graphics Variable Line Spacing			ESC J 1B 4A		6-36
	Set Vertical Units			ESC [\ 1B 5B 5C		6-46
Set Vertical Tabs in Channel	ESC b 1B 62	6-49				

Appendix B

FUNCTION		EPSON LQ-1050			IBM XL24		
		Name	Hex.	Page	Name	Hex.	Page
Page Format	Set Top of Form				ESC 4	1B 34	6-25
	Set Form Length in Lines	ESC C	1B 43	6-32	ESC C	1B 43	6-32
	Set Form Length in Inches	ESC C 0	1B 43 30	6-32	ESC C 0	1B 43 30	6-32
	Set Automatic Perforation Skip	ESC N	1B 4E	6-39	ESC N	1B 4E	6-39
	Cancel Automatic Perforation Skip	ESC O	1B 4F	6-39	ESC O	1B 4F	6-39
	Set Right Margin	ESC Q	1B 51	6-40			
	Set Horizontal Margins				ESC X	1B 58	6-43
	Select Justification	ESC a	1B 61	6-49			
	Set Left margin	ESC l	1B 6C	6-53			
Character Size	Double-wide Printing by Line	SO	0E	6-13	SO	0E	6-13
	Condensed Printing	SI	0F	6-13	SI	0F	6-13
	Cancel Condensed Mode	DC2	12	6-14			
	Print 10 Characters per Inch				DC 2	12	6-14
	Cancel Double-wide printing by Line	DC4	14	6-15	DC4	14	6-15
	Double-wide Printing by Line	ESC SO	1B 0E	6-17			
	Condensed Printing	ESC SI	1B 0F	6-17			
	12 Characters per Inch Printing				ESC :	1B 3A	6-27
	Select Elite Width	ESC M	1B 4D	6-38			
	Select Pica Width	ESC P	1B 50	6-39			
	Turn Double-wide Mode On/Off	ESC W	1B 57	6-43			
	Continuous Double-wide Printing				ESC W	1B 57	6-43
	Double-high Printing				ESC [@	1B 5B 40	6-45
Select 15 Pitch	ESC g	1B 67	6-51				
Character Type	Select Character Space	ESC SP	1B 20	6-18			
	Master Select	ESC !	1B 21	6-19			
	Select/Cancel Underlining	ESC -	1B 2D	6-23			
	Continuous Underscore				ESC -	1B 2D	6-23
	Select Italic Mode	ESC 4	1B 34	6-25			
	Cancel Italic Mode	ESC 5	1B 35	6-26			
	Set Emphasized Printing	ESC E	1B 45	6-33	ESC E	1B 45	6-33
	Cancel Emphasized Printing	ESC F	1B 46	6-34	ESC F	1B 46	6-34
	Select Double-strike Mode	ESC G	1B 47	6-34	ESC G	1B 47	6-34
	Cancel Double-strike Mode	ESC H	1B 48	6-34	ESC H	1B 48	6-34
	Select Print Mode				ESC I	1B 49	6-35
	Proportional Space Mode				ESC P	1B 50	6-40
	Start Sub/Superscript Printing	ESC S	1B 53	6-42	ESC S	1B 53	6-42
	Cancel Sub/Superscript Printing	ESC T	1B 54	6-42	ESC T	1B 54	6-42
	Continuous Overscore				ESC _	1B 5F	6-48
	Turn Proportional Mode On/Off	ESC p	1B 70	6-53			
	Select Letter Quality or Draft	ESC x	1B 78	6-54			
Character Set	Select User-defined Characters	ESC %	1B 25	6-20			
	Define User-defined Characters	ESC &	1B 26	6-21			
	Select Character Set 2	ESC 6	1B 36	6-26	ESC 6	1B 36	6-26
	Select Character Set 1	ESC 7	1B 37	6-27	ESC 7	1B 37	6-27
	Copy ROM Characters into RAM	ESC :	1B 3A	6-28			
	Downloading Printer Characters				ESC =	1B 3D	6-29
	Select International Character Set	ESC R	1B 52	6-41			
	Print Continuously from All Characters Table				ESC \	1B 5C	6-47
	Print Single Character from the All Characters Table				ESC ^	1B 5E	6-48
	Select Font	ESC k	1B 6B	6-52	ESC k	1B 6B	6-52
	Select Graphics or Italics Character Set	ESC t	1B 74	6-54			

Commands Summary List

FUNCTION		EPSON LQ-1050			IBM XL24		
		Name	Hex.	Page	Name	Hex.	Page
Graphics	Select Graphics Mode	ESC *	1B 2A	6-22	ESC *	1B 2A	6-22
	Reassign Graphics Mode	ESC ?	1B 3F	6-30			
	Normal Density Bit-image Graphics	ESC K	1B 4B	6-37	ESC K	1B 4B	6-37
	Double Density Bit-image Graphics	ESC L	1B 4C	6-38	ESC L	1B 4C	6-38
	Select Double Density Bit-Image Graphics	ESC Y	1B 59	6-44	ESC Y	1B 59	6-44
	Select Quadruple Density Bit-Image Graphics	ESC Z	1B 5A	6-44	ESC Z	1B 5A	6-44
	High-Resolution Graphics				ESC [g	1B 5B 67	6-46

Appendix C

PRINT AREA

C.1 CUT-SHEET PAPER

136-Column Paper

- Form length(L) is between 6 and 14 inches(152.4 - 355.6 mm).
- Form width(W) is between 4 and 16 inches(101.6 - 406.4 mm).
- Print start column(A) is at 0.41 inches(10.55 mm) from the left edge of 14 inches wide paper. Printable area is the shaded part in the following figure.
- Base line pitch(B) is 1/6 inch(4.23 mm). This base line pitch can be changed in multiples of 1/72 inch(0.3528 mm) or 1/216 inch(0.118 mm).
- Multipart paper can not be used.
- Paper has the following specifications:
 - weight : 13 - 22 lbs/m² (52 - 81 g/m²)
 - thickness : Max. 0.008 inches (0.2 mm)

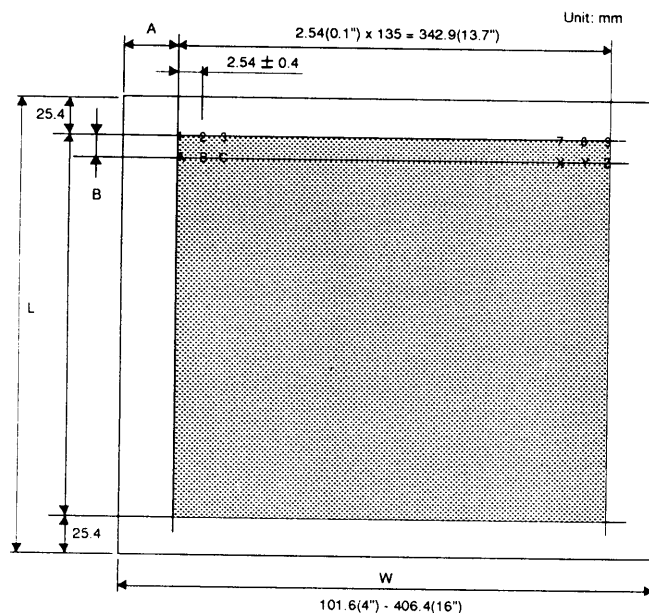


Fig. C-1

80-Column Paper

- Form length(L) is between 6 and 14 inches(152.4 - 355.6 mm).
- Form width(W) is between 4 and 8.5 inches(101.6 - 216.0 mm).
- Print start column(A) is at 0.3 inches(7.62 mm) from the left edge of 8.5 inches wide paper. Printable area is the shaded part in the following figure.
- Base line pitch(B) is 1/6 inch(4.23 mm). This base line pitch can be changed in multiples of 1/72 inch(0.3528 mm) or 1/216 inch(0.118 mm).
- Multipart paper can not be used.
- Paper has the following specifications:
 - weight : 13 - 22 lbs/m² (52 - 81 g/m²)
 - thickness : Max. 0.008 inches (0.2 mm)

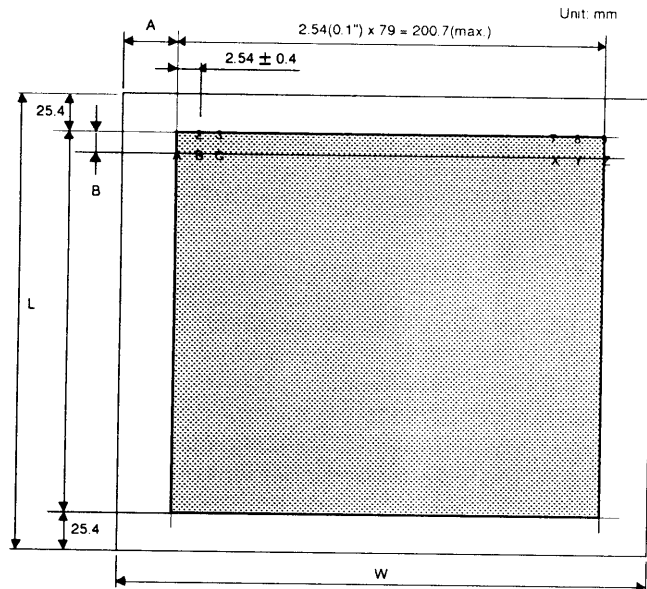


Fig. C-2

C.2 FANFOLD PAPER

136-Column Paper

- Form length is multiple of 1/2 inch(12.7 mm). The maximum length is 12 inches(304.8 mm).
- Top and bottom margins(A) should be greater than 1 inch(25.4 mm) to avoid printing on the perforation.
- Print start column(B) is at 1/2 inch(12.7 mm) from the left edge of 15 inches(381 mm) wide paper. Printable area is the shaded part in the following figure.
- Base line pitch(C) is 1/6 inch(4.23 mm). This base line can be changed in multiples of 1/180 inch(0.141 mm) or 1/216 inch(0.118 mm).
- For multi part paper, the top edge must be adjusted correctly and both the corners(or first few holes) must be aligned exactly. There should be no wrinkles on the paper.
- Paper has the following specifications:
 - weight : 52 - 81g/m²(Single Sheet), 40g/m²(Multipart)
 - thickness : Max. 0.2 mm(Single Sheet), 0.3 mm(Multipart)

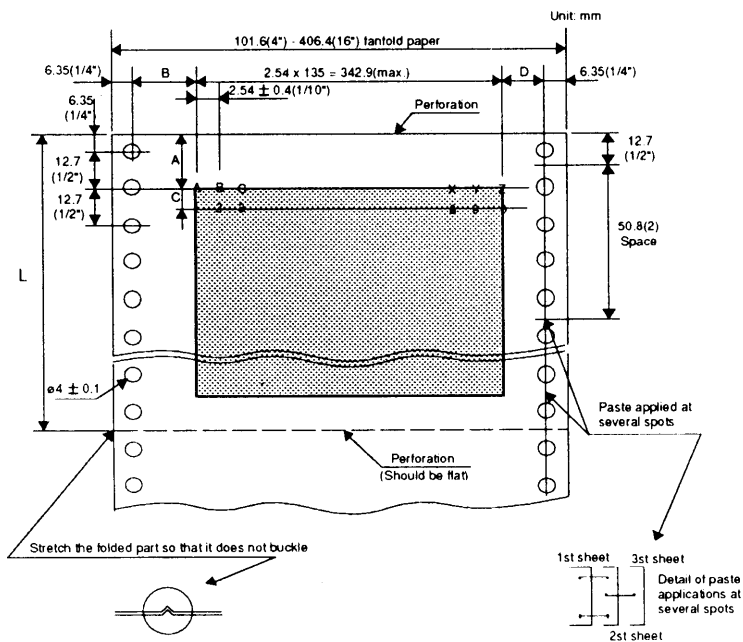


Fig. C-3

Appendix C

80-Column Paper

- Form length is multiple of 1/2 inch(12.7 mm). The maximum length is 12 inches(304.8 mm).
- Top and bottom margins(A) should be greater than 1 inch(25.4 mm) to avoid printing on the perforation.
- Print start column(B) is at 1/2 inch(12.7 mm) from the left edge of 15 inches(381 mm) wide paper. Printable area is the shaded part in the following figure.
- Base line pitch(C) is 1/6 inch(4.23 mm). This base line can be changed in multiples of 1/180 inch(0.141 mm) or 1/216 inch(0.118 mm).
- For multi part paper, the top edge must be adjusted correctly and both the corners(or first few holes) must be aligned exactly. There should be no wrinkles on the paper.
- Paper has the following specifications:
 - weight : 52 - 81 g/m²(Single Sheet), 40g/m²(Multipart)
 - thickness : Max. 0.2 mm(Single Sheet), 0.3 mm(Multipart)

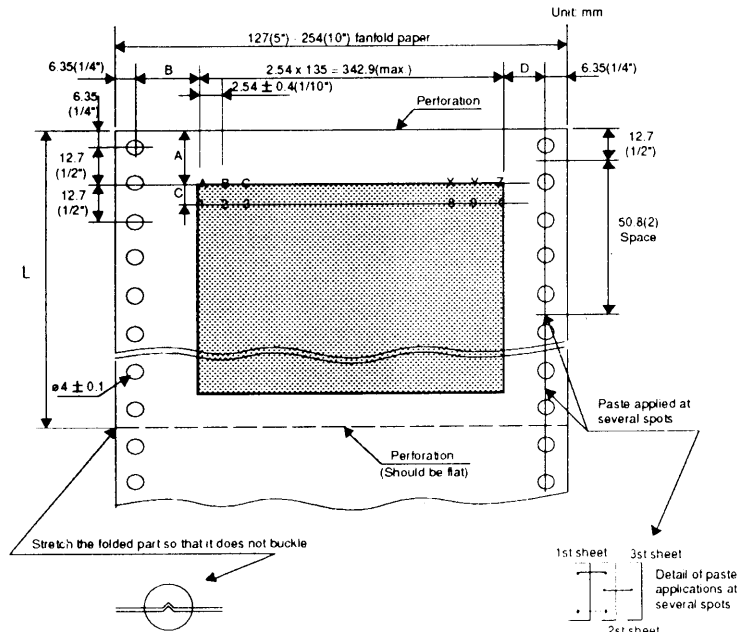


Fig. C-4

Appendix D

LIST OF OPTIONAL SUPPLIES

The printer has some optional features.

You can enhance the reliability of the printer using the following optional items. Contact your local dealer for the purchase.

■ Pinovia 2430

- Automatic Cut-Sheet Feeder
- Serial Interface Card
- Parallel Interface Cable
- Tractor
- Ink Ribbon
- Cyrillic FONT ROM

■ Pinovia 2440

- Automatic Cut-Sheet Feeder
- Serial Interface Card
- Parallel Interface Cable
- Ink Ribbon
- Cyrillic FONT ROM

