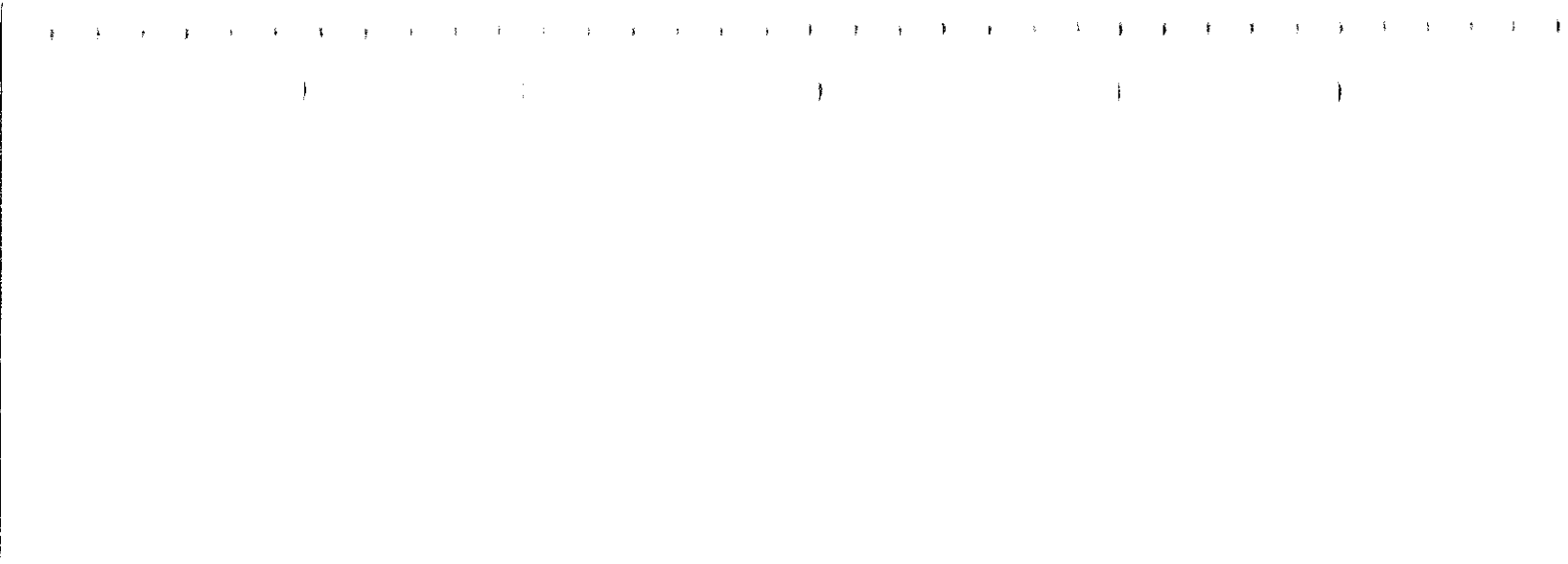
FUJITSU PRINTERS
PROGRAMMER'S MANUAL

TYPE: DPL24C Emulation

FOR: DL2400
DL2600
DL3300
DL3400
DL5600



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PREFACE

This manual provides details of printer command functions under the FUJITSU DPL24C emulation mode and programming examples for users or programmers who want to modify software packages or write their own programs.

In the DPL24C emulation mode, this printer can emulate the command functions of the following printers:

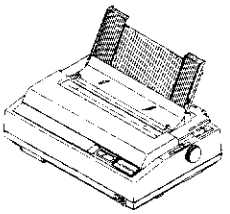
FUJITSU DPL24C color printer
FUJITSU Dotmax 24C printer
FUJITSU DPL24 type I printer
FUJITSU Dotmax 24I printer
IBM Graphic printer
EPSON FX-80/100 printer
EPSON JX-80 color printer

These command functions in this emulation mode are equivalent to those for the IBM Graphics printer, except for the commands that have been added to emulate a 24-pin letter quality printer, such as the 24-pin image graphics and font control commands. In addition, color commands compatible with the EPSON JX-80 printer have been added for the color models. So, you don't need to modify the programs for general use.

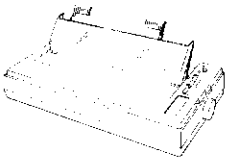
The emulation mode commands of this printer are also equivalent to those of the EPSON FX-80/100 or JX-80 printer. But, you may need to modify the program of your software package because several commands of the FX-80/100 and JX-80 printers are not supported by this printer.

These special features are enabled by control codes (function codes and extended control commands) sent from the computer to the printer. You can instruct your computer to send these codes to your printer by entering these control codes with a certain statement defined in your software package. For example, if your software package is written in a BASIC programming language, use an LPRINT statement. Note that not all versions of BASIC use L PRINT as a print statement. Whether it is BASIC or not, read your software package manual to find out how to send control codes to the printer.

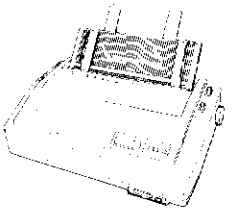
Most of the descriptions in this manual commonly apply to the following Fujitsu Printers; however, there are small differences between them. So, these printers are divided into some categories called Model Revisions. And it or they are shown at the relevant points in the text. Also the summary of the differences is written in the following:



DL2400ID/DL2600ID



DL3300/DL3400



DL5600

Summary specification of the DL series printers

Model Rev.	Printer	Speed (Letter Qty.)	Width (at 10CPI)
M1.0	DL2400ID	60 CPS	136 columns
	DL2600ID	80	136
M2.0	DL3300	60	80
	DL3400	60	136
M2.1	DL3300 NEW	60	80
	DL3400 NEW	60	136
M3.0	DL5600	135	136

Differences in Each version of the printer

Item	Difference	Model Revision			
		M1.0	M2.0	M2.1	M3.0
1	Two-pass printing characters such as ╬, ▀, ∫ can be enlarged vertically.	No	Yes	Yes	Yes
2	Vertically enlarged characters can be printed with an underline.	No	Yes	Yes	Yes
3	The Boldface PS Font is resident in the printer.	(*1)	No	No	Yes
4	The High-speed Draft Font is resident in the printer.	No	Yes	Yes	No
5	Optional Fonts are supplied with the "Font Cartridge".	Yes	No	No	No
6	Optional Fonts are supplied with the "Font Card".	No	Yes	Yes	Yes
7	A triple bin type cut sheet feeder is ready as an option.	Yes	No	No	Yes
8	FX-80 character set is available in FX-80 and JX-80 emulations.	No	No	Yes	Yes
9	Bar code pattern printing.	No	No	No	Yes

*1: DL2600ID printer has and DL2400ID does not.

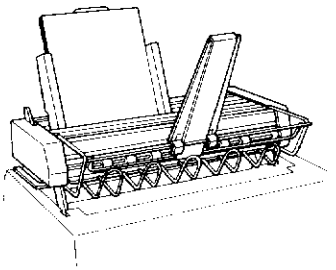
OPTIONS

Programmers may as well know about the availability of the following options to control the printer.

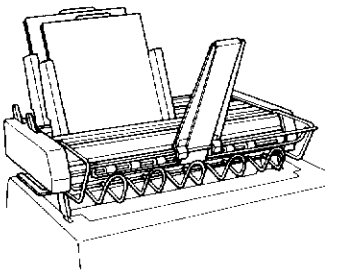
1. Cut Sheet Feeder
   Many kinds of cut sheet feeders are available for the printer. They have 1 thru 3 paper bins.

Cut Sheet Feeder		Printer			
Type	Part Number	DL2400 DL2600	DL3300	DL3400	DL5600
Single bin	ASF521-FUJITSU	X	–	–	–
Double bin	ASF522-FUJITSU	X	–	–	–
Triple bin	ASF523-FUJITSU	X	–	–	–
Single bin	ASF300-FJDL01	X	–	–	–
Double bin	ASF300-FJDL11	X	–	–	–
Single bin	SF220C	X	–	–	–
Single bin	ASF300-FJ3301	–	X	–	–
Double bin adapter	ASF300-FJ3311	–	X	–	–
Single bin	ASF300-FJ3401	–	–	X	–
Double bin adapter	ASF300-FJ3411	–	–	X	–
Single bin	ASF300-L5601	–	–	–	X
Double bin adapter	ASF300-L5611	–	–	–	X
Envelope adapter	ASF300-L5621	–	–	–	X
Single bin	SF231	–	–	–	X
Double bin adapter	SF232	–	–	–	X
Triple bin adapter	SF233	–	–	–	X

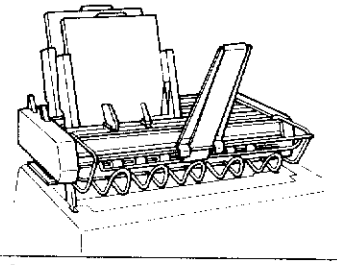
ASF521-FUJITSU



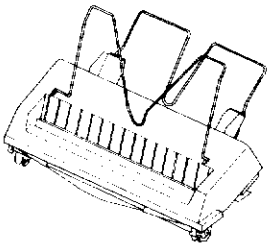
ASF522-FUJITSU



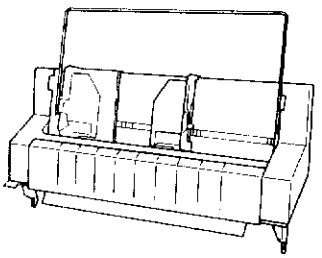
ASF523-FUJITSU



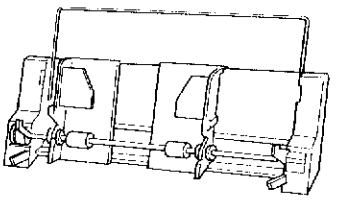
SF220C



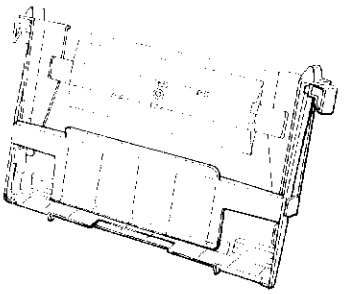
ASF300-FJDL01,
ASF300-FJ3301 and
ASF300-FJ3401
ASF300-L5601



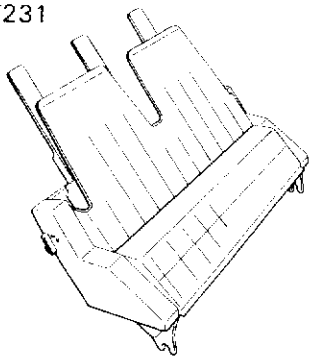
ASF300-FJDL11
ASF300-FJ3311 and
ASF300-FJ3411 and
ASF300-L5611



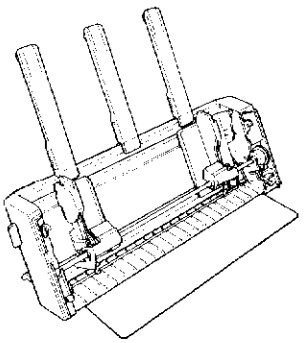
ASF300-L5621



SF231



SF232 and SF233

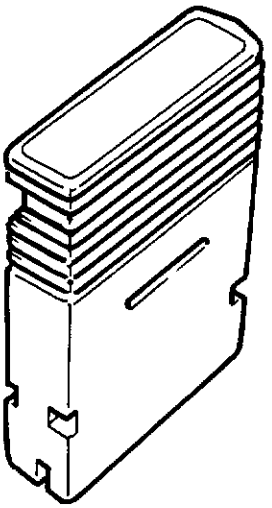


2. Font

Many optional Fonts are available in addition to the printer-resident Fonts. They are as follows:

Font				Printer				
Type	Pitch (CPI*)	Part Number	Media	DL2400	DL2600	DL3300	DL3400	DL5600
Courier 10	10	–	Printer-Resident	X	X	X	X	X
Prestige Elite 12	12	–	"	X	X	X	X	X
Boldface PS	Proportional	–	"	–	X	–	–	X
Draft	10, 12	–	"	X	X	X	X	X
High-speed Draft	10, 12	–	"	–	–	X	X	–
Letter Gothic 12	12	DO58-2610-C500	Font Cartridge	X	X	–	–	–
Scientific 12	12, 15, 17, 20	DO58-2610-C501	"	X	X	–	–	–
Orator	10	DO58-2610-C502	"	X	X	–	–	–
Light Italic 12	12	DO58-2610-C503	"	X	X	–	–	–
Boldface PS	Proportional	DO58-2610-C504	"	X	X	–	–	–
Boldface PS/Light Italic 12	Prop./12	DO58-2610-C710	Font Card	–	–	X	X	–
Orator/Light Italic 12	10/12	DO58-2610-C711	"	–	–	X	X	X
Scientific 12/Letter Gothic 12	12, 15, 17, 20/12	DO58-2610-C712	"	–	–	X	X	X

*CPI: Character Per Inch



Font Cartridge

Font Card

ORGANIZATION OF MANUAL

This manual is organized as follows:

Section 1, Compatibility, describes command compatibility of this printer in the DPL24C emulation mode.

Section 2, Programming with BASIC, briefly explains how to specify the various print operations of your printer, and gives information on how to program with Microsoft BASIC. If you are familiar with it, you can skip this section.

Section 3, Control codes, describes the functions of control codes, control characters, and control sequences so that you can control your printer's various functions or change operation modes when you write your own programs.

Appendix contains some convenient reference tables such as Command set, Character set, and Fonts.

TABLE OF CONTENTS

ILLUSTRATIONS AND TABLES

SECTION 1
COMPATIBILITY

1.1 General

The DPL24C emulation-type printer is based on the IBM Graphic printer. The original IBM Graphic printer is a 9 wire – 80 column dot matrix printer but this printer is a 24 wire – 136 column printer. So the IBM's 80 column limit on data length is expanded to 136 columns. The IBM Graphics printer has 1/216 inch vertical increment and 1/240 inch horizontal increments, but this printer has 1/180 inch vertical increments and 1/360 inch horizontal increments. This 24-wire printer provides a variety of high quality printing and thus the corresponding control commands.

This printer emulates most commands for the Epson FX-80/100 printer, and it is useful as an FX-80 printer for normal usage. But some commands are not available and the character set is different from the original for this printer, remember these when some troubles occur in the FX-80 or JX-80 emulations.

1.2 Command Compatibility

The DPL24C emulation consists of the following 5 emulations. Most of them are the same but some points described below are different.

DPL24C
FUJITSU DPL24C printer full compatible which is based on the IBM graphics printer and EPSON FX-80 printer. Some extended commands including color command are added. The image printing and line spacing commands are emulated to keep 1.2 times the horizontal and vertical size against the original IBM graphics printer.

DPL24I
Same as the DPL24C. DPL24I is the monochrome model of FUJITSU DPL24C printer.

IBM GPH

IBM graphics printer full compatible (including the size of the image graphics) and many extended commands are added.

FX-80

ESPON FX-80 and FX-100 almost compatible (including the size of the image graphics) and some extended commands are added. A few rarely used commands are not available. The character set is different for M1.0 and M2.0 printers.

For print mode commands, the original FX-80 printer has some restrictions for the possibility of complex of different types of commands but this printer does not have any restrictions. For example, this printer can do shadow printing (emphasized printing) by ESC E regardless of the Elite pitch mode (ESC M).

JX-80

Same as the FX-80. JX-80 is the color model of EPSON FX-80 printer.

The following Figures and tables show the relationship between the commands of the above original printer and their emulations by this printer.

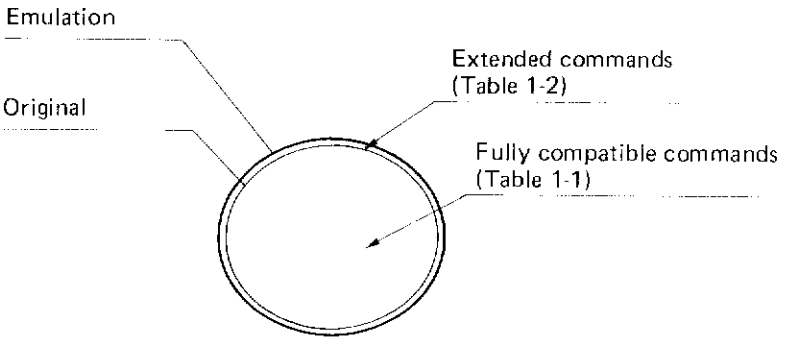


Figure 1 DPL24C — Original vs Emulation

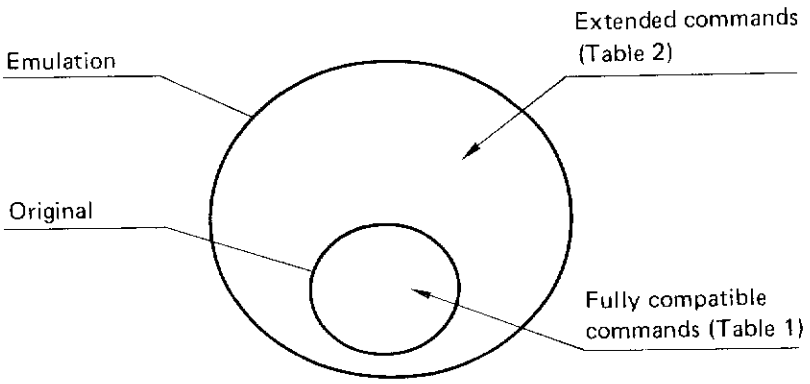


Figure 2 IBM GPH – Original vs Emulation

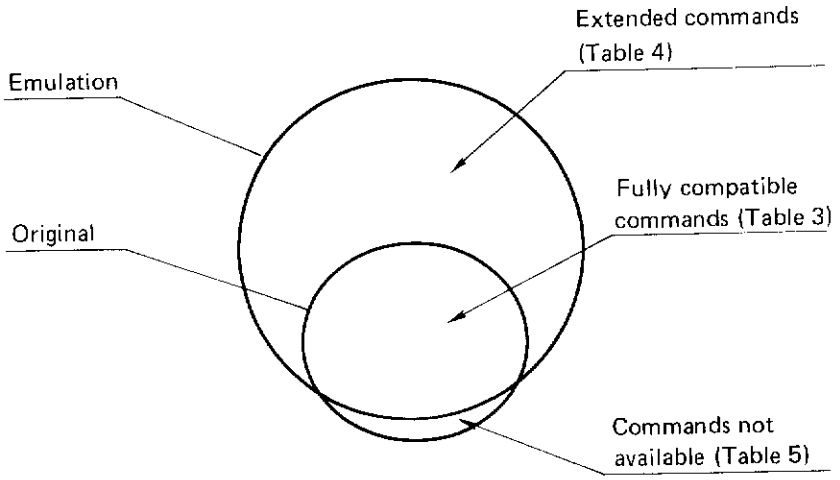


Figure 3 FX-80 – Original vs Emulation

Table 1-1 Fully compatible commands in DPL24C emulation

ASCII	Function
BEL	Bell
BS	Backspace
HT	Horizontal tab execution
LF	Linefeed
LF	Reset one-line double width mode
VT	Vertical tab execution
VT	Reset one-line double width mode
FF	Form feed
FF	Reset one-line double width mode
CR	Carriage return
CR	Reset one-line double width mode
CR	Cancel offset selection
SO	Set one-line double width mode
SI	Set condensed mode
DC1	Select the printer
DC2	Reset condensed mode
DC3	Deselect the printer
DC4	Reset one-line double width mode
CAN	Cancel line buffer
ESC HT (n)	Absolute horizontal tab execution
ESC LF	Negative linefeed
ESC LF	Reset one-line double width mode
ESC VT (n)	Absolute vertical tab execution
ESC VT (n)	Reset one-line double width mode
ESC FF NUL (n)	Set form length by inches
ESC FF (n)	Set form length by lines
ESC CR P	Remote reset
ESC SO	Set one-line double width mode
ESC SI	Set condensed mode
ESC DC1 (n)	Character offset selection
ESC EM 1	Feed from bin 1
ESC EM 2	Feed from bin 2
ESC EM E	Feed from bin 3 (envelope)
ESC EM R	Remove paper
ESC SUB I	Printer initialize
ESC US (n)	Horizontal spacing to (n-1)/120 inch

Table 1-1-continued

ASCII	Function
ESC ! (0)	Reset condensed mode
ESC ! (0)	Reset double width mode
ESC ! (0)	Reset one-line double width mode
ESC ! (n)	Various print modes
ESC #	Cancel MSB control
ESC $ (n1)(n2)	Absolute print position
ESC % (m) (n)	Font select
ESC & (m)(Cs)(Ce)(data)	Down loading (24-pin format)
ESC * (m)(n1)(n2)(data)	Various image modes
ESC - (0)	Reset underline mode
ESC - (1)	Set underline mode
ESC 0	Set line spacing to 1/8 inch
ESC 1	Set linespacing to 7/60 inch
ESC 2	Mainly set line spacing *
ESC 2	Set line spacing to 1/6 inch **
ESC 3 (n)	Set linespacing to n/180 inch
ESC 4	Set italic print mode
ESC 5	Reset italic print mode
ESC 6	Set character set to set 2
ESC 7	Set character set to set 1
ESC 8	Ignore paper end sensor
ESC 9	Detect paper end sensor
ESC : NUL (m)(n)	Font copy
ESC <	Set home head
ESC =	Force MSB to 0
ESC >	Force MSB to 1
ESC @	Remote reset
ESC A (n)	Preset line spacing to n/60 inch *
ESC A (n)	Set line spacing to n/60 inch **
ESC B NUL	Reset all vertical tabs
ESC B (n1)...(nk) NUL	Set vertical tabs
ESC C NUL (n)	Set form length by inches
ESC C (n)	Set form length by lines
ESC D NUL	Reset all horizontal tabs
ESC D (n1)...(nk) NUL	Set horizontal tabs
ESC E	Set shadow print mode

* This is available where the "GRPH LF:" item is set to "IBM-GPH".
** This is available where the "GRPH LF:" item is set to "FX-80".

Table 1-1-continued

ASCII	Function
ESC F	Reset shadow print mode
ESC G	Set bold print mode
ESC H	Reset bold print mode
ESC J (n)	Single linefeed (n/180 inch)
ESC J (n)	Reset one-line double width mode
ESC K (n1)(n2)(data)	Single density image
ESC L (n1)(n2)(data)	Double density image
ESC M	Set Elite pitch
ESC N (n)	Set skip perforations
ESC O	Reset skip perforations
ESC P	Set Pica pitch
ESC Q (n)	Set right margin
ESC R (n)	International characters
ESC S (0)	Set superscript mode
ESC S (1)	Set subscript mode
ESC T	Reset subscript mode
ESC T	Reset superscript mode
ESC U (0)	Bidirectional printing
ESC U (1)	Unidirectional printing
ESC V 0	Reset double height mode
ESC V 1	Set double height mode
ESC W (0)	Reset double width mode
ESC W (0)	Reset one-line double width mode
ESC W (1)	Set double width mode
ESC Y (n1)(n2)(data)	Double speed double density image
ESC Z (n1)(n2)(data)	Quadruple density image
ESC h (n)	Horizontal spacing to n/180 inch
ESC i (0)	Reset typewriter mode
ESC i (1)	Set typwriter mode
ESC j (n)	Single linefeed backward (n/180 inch)
ESC j (n)	Reset one-line double width mode
ESC l (n)	Set left margin
ESC m	Enter auto justify mode
ESC p (0)	Reset proportional spacing mode
ESC p (1)	Set proportional spacing mode
ESC r (n)	Select print color

Table 1-1-continued

ASCII	Function
ESC x	Exit auto justify mode
ESC x	Reset underline mode
ESC x	Cancel offset selection
ESC x	Reset shadow print mode
ESC x	Reset bold print mode
SP	Space
//1//	Select bin 1
//2//	Select bin 2
//C//	Select change bins
//E//	Select bin 3 (envelope)
//R//	Select remove
-----	IBM-GPH character set*

* This is not a command, but is there to show that the fully IBM-GPH character set is compatible.

Table 1-2 Extended commands in DPL24C emulation

ASCII	Function
ESC DC4 (b)"R"(C) (w)(h)(a)(ch1)...(chn)	Bar code pattern printing (M3.0 printers only)

Table 1 Fully compatible commands in IBM GPH emulation

ASCII	Function
BEL	Bell
HT	Horizontal tab execution
LF	Linefeed
LF	Reset one-line double width mode
FF	Form feed
FF	Reset one-line double width mode
CR	Carriage return
CR	Reset one-line double width mode
SO	Set one-line double width mode
SI	Set condensed mode
DC2	Reset condensed mode
DC4	Reset one-line double width mode
CAN	Cancel line buffer
ESC - (0)	Reset underline mode
ESC - (1)	Set underline mode
ESC 0	Set line spacing to 1/8 inch
ESC 1	Set linespacing to 7/72 inch
ESC 2	Mainly set line spacing
ESC 3 (n)	Set linespacing to n/216 inch
ESC 6	Set character set to set 2
ESC 7	Set character set to set 1
ESC 8	Ignore paper end sensor
ESC 9	Detect paper end sensor
ESC <	Set home head
ESC A (n)	Preset line spacing to n/72 inch
ESC C NUL (n)	Set form length by inches
ESC C (n)	Set form length by lines
ESC D NUL	Reset all horizontal tabs
ESC D (n1)...(nk) NUL	Set horizontal tabs
ESC E	Set shadow print mode
ESC F	Reset shadow print mode
ESC G	Set bold print mode
ESC H	Reset bold print mode
ESC J (n)	Single linefeed (n/216 inch)
ESC J (n)	Reset one-line double width mode
ESC K (n1)(n2)(data)	Single density image

Table 1 – continued

ASCII	Function
ESC L (n1)(n2)(data)	Double density image
ESC N (n)	Set skip perforations
ESC O	Reset skip perforations
ESC S (0)	Set superscript mode
ESC S (1)	Set subscript mode
ESC T	Reset superscript mode
ESC T	Reset subscript mode
ESC U (0)	Bidirectional printing
ESC U (1)	Unidirectional printing
ESC W (0)	Reset double width mode
ESC W (0)	Reset one-line double width mode
ESC W (1)	Set double width mode
ESC Y (n1)(n2)(data)	Double speed double density image
ESC Z (n1)(n2)(data)	Quadruple density image
SP	Space
-----	IBM-GPH character set *

* This is not a command, but is there to show that the fully IBM-GPH character set is compatible.

Table 2 Extended commands in IBM GPH emulation

ASCII	Function
BS	Backspace
VT	Vertical tab execution
VT	Reset one-line double width mode
CR	Cancel offset selection
DC1	Select the printer
DC3	Deselect the printer
ESC HT (n)	Absolute horizontal tab execution
ESC LF	Negative linefeed
ESC LF	Reset one-line double width mode
ESC VT (n)	Absolute vertical tab execution
ESC VT (n)	Reset one-line double width mode
ESC FF NUL (n)	Set form length by inches
ESC FF (n)	Set form length by lines
ESC CR P	Remote reset
ESC SO	Set one-line double width mode
ESC SI	Set condensed mode
ESC DC1 (n)	Character offset selection
ESC DC4 (b)"R"(c) (w)(h)(a)(ch1)...(chn)	Bar code pattern printing (M3.C printers only)
ESC EM 1	Feed from bin 1
ESC EM 2	Feed from bin 2
ESC EM E	Feed from bin 3 (envelope)
ESC EM R	Remove paper
ESC SUB I	Printer initialize
ESC US (n)	Horizontal spacing to (n-1)/120 inch
ESC ! (0)	Reset double width mode
ESC ! (0)	Reset condensed mode
ESC ! (0)	Reset one-line double width mode
ESC ! (n)	Various print modes
ESC #	Cancel MSB control
ESC $ (n1)(n2)	Absolute print position
ESC % (m) (n)	Font select
ESC & (m)(Cs)(Ce)(data)	Down loading (24-pin format)
ESC * (m)(n1)(n2)(data)	Various image modes
ESC 4	Set italic print mode
ESC 5	Reset italic print mode
ESC : NUL (m)(n)	Font copy
ESC =	Force MSB to 0

Table 2 – continued

ASCII	Function
ESC >	Force MSB to 1
ESC @	Remote reset
ESC B NUL	Reset all vertical tabs
ESC B (n1)...(nk) NUL	Set vertical tabs
ESC M	Set Elite pitch
ESC P	Set Pica pitch
ESC Q (n)	Set right margin
ESC R (n)	International characters
ESC V 0	Reset double height mode
ESC V 1	Set double height mode
ESC h (n)	Horizontal spacing to n/180 inch
ESC i (0)	Reset typewriter mode
ESC i (1)	Set typwriter mode
ESC j (n)	Single linefeed backward (n/216 inch)
ESC j (n)	Reset one-line double width mode
ESC l (n)	Set left margin
ESC m	Enter auto justify mode
ESC p (0)	Reset proportional spacing mode
ESC p (1)	Set proportional spacing mode
ESC r (n)	Select print color
ESC x	Exit auto justify mode
ESC x	Reset bold print mode
ESC x	Reset shadow print mode
ESC x	Reset underline mode
ESC x	Cancel offset selection
//1//	Select bin 1
//2//	Select bin 2
//C//	Select change bins
//E//	Select bin 3 (envelope)
//R//	Select remove

Table 3 Fully compatible commands in FX-80 emulation

ASCII	Function
BEL	Bell
BS	Backspace
HT	Horizontal tab execution
LF	Linefeed
LF	Reset one-line double width mode
VT	Vertical tab execution
VT	Reset one-line double width mode
FF	Form feed
FF	Reset one-line double width mode
CR	Carriage return
CR	Reset one-line double width mode
SO	Set one-line double width mode
SI	Set condensed mode
DC1	Select the printer
DC2	Reset condensed mode
DC3	Deselect the printer
DC4	Reset one-line double width mode
CAN	Cancel line buffer
ESC SO	Set one-line double width mode
ESC SI	Set condensed mode
ESC ! (0)	Reset double width mode
ESC ! (0)	Reset condensed mode
ESC ! (0)	Reset one-line double width mode
ESC ! (n)	Various print modes
ESC #	Cancel MSB control
ESC % (m) (n)	Font select
ESC * (m)(n1)(n2)(data)	Various image modes
ESC - (0)	Reset underline mode
ESC - (1)	Set underline mode
ESC 0	Set line spacing to 1/8 inch
ESC 1	Set linespacing to 7/72 inch
ESC 2	Set line spacing to 1/6 inch
ESC 3 (n)	Set linespacing to n/216 inch
ESC 4	Set italic print mode
ESC 5	Reset italic print mode

Table 3 – continued

ASCII	Function
ESC 8	Ignore paper end sensor
ESC 9	Detect paper end sensor
ESC : NUL (m)(n)	Font copy
ESC <	Set home head
ESC =	Force MSB to 0
ESC >	Force MSB to 1
ESC @	Remote reset
ESC A (n)	Set line spacing to n/72 inch
ESC B NUL	Reset all vertical tabs
ESC B (n1)...(nk) NUL	Set vertical tabs
ESC C NUL (n)	Set form length by inches
ESC C (n)	Set form length by lines
ESC D NUL	Reset all horizontal tabs
ESC D (n1)...(nk) NUL	Set horizontal tabs
ESC E	Set shadow print mode
ESC F	Reset shadow print mode
ESC G	Set bold print mode
ESC H	Reset bold print mode
ESC J (n)	Single linefeed (n/216 inch)
ESC J (n)	Reset one-line double width mode
ESC K (n1)(n2)(data)	Single density image
ESC L (n1)(n2)(data)	Double density image
ESC M	Set Elite pitch
ESC N (n)	Set skip perforations
ESC O	Reset skip perforations
ESC P	Set Pica pitch
ESC Q (n)	Set right margin
ESC R (n)	International characters
ESC S (0)	Set superscript mode
ESC S (1)	Set subscript mode
ESC T	Reset subscript mode
ESC T	Reset superscript mode
ESC U (0)	Bidirectional printing
ESC U (1)	Unidirectional printing
ESC W (0)	Reset double width mode

Table 3 – continued

ASCII	Function
ESC W (0)	Reset one-line double width mode
ESC W (1)	Set double width mode
ESC Y (n1)(n2)(data)	Double speed double density image
ESC Z (n1)(n2)(data)	Quadruple density image
ESC i (0)	Reset typewriter mode
ESC i (1)	Set typwriter mode
ESC j (n)	Single linefeed backward (n/216 inch)
ESC j (n)	Reset one-line double width mode
ESC l (n)	Set left margin
ESC p (0)	Reset proportional spacing mode
ESC p (1)	Set proportional spacing mode
SP	Space
------	FX-80 character set*
	(Only M2.1 and M3.0 printers)

* This is not a command, but is there to show that the fully IBM-GPH character set is compatible.

Table 4 Extended commands in FX-80 emulation

ASCII	Function
CR	Cancel offset selection
ESC HT (n)	Absolute horizontal tab execution
ESC LF	Negative linefeed
ESC LF	Reset one-line double width mode
ESC VT (n)	Absolute vertical tab execution
ESC VT (n)	Reset one-line double width mode
ESC FF NUL (n)	Set form length by inches
ESC FF (n)	Set form length by lines
ESC CR P	Remote reset
ESC DC1 (n)	Character offset selection
ESC DC4 (b)"R"(c) (w)(h)(a)(ch1)...(cnn)	Bar code pattern printing (M3.0 printers only)
ESC EM 1	Feed from bin 1
ESC EM 2	Feed from bin 2
ESC EM E	Feed from bin 3 (envelope)
ESC EM R	Remove paper
ESC SUB I	Printer initialize
ESC US (n)	Horizontal spacing to (n-1)/120 inch
ESC $ (n1)(n2)	Absolute print position
ESC & (m)(Cs)(Ce)(data)	Down loading (24-pin format)
ESC 6	Set character set to set 2
ESC 7	Set character set to set 1
ESC V 0	Reset double height mode
ESC V 1	Set double height mode
ESC h (n)	Horizontal spacing to n/180 inch
ESC m	Enter auto justify mode
ESC r (n)	Select print color
ESC x	Exit auto justify mode
ESC x	Reset bold print mode
ESC x	Reset shadow print mode
ESC x	Cancel offset selection
ESC x	Reset underline mode
//1//	Select bin 1
//2//	Select bin 2
//C//	Select change bins
//E//	Select bin 3 (envelope)
//R//	Select remove
-----	IBM-GPH character set *

* This is not a command, but is there to show that the fully IBM-GPH character set is compatible.

Table 5 Commands not available in FX-80 emulation

ASCII	Function
ESC & (m)(Cs)(Ce)(data)	Down loading (8-pin format)
ESC / (n)	VFU channel selection
ESC 6	Printable code area expansion
ESC 7	Cancel printable code area
ESC ? (1)(m)	Assign bit image modes
ESC I (0)	Disable expanded characters
ESC I (1)	Enable expanded characters
ESC ^ (m)(n1)(n2)(data)	9-pin bit image printing
ESC b (n)(data) NUL	VFU position setting
ESC s (0)	End half speed printing
ESC s (1)	Start half speed printing
-----	FX-80 character set* (Only M1.0 and M2.0 printers)
DEL	Delete last printable character

* This is not a command, but is there to show that the FX-80 character set is not available for the emulation.

SECTION 2
PROGRAMMING WITH BASIC

This section briefly explains how to specify the various print operations of your printer. It also gives information on how to program with Microsoft BASIC. If you are familiar with it, you can skip this section.

2.1 Sending Control Codes to Your Printer

To specify various print features provided in your printer when using a software package, you have to learn the trick of instructing your computer to send control codes according to your software package manual because different printers have different print features and control code systems and your software package program may not use the same control code system as your printer. Of course, you don't need to specify the print features if your software package supports your printer, that is, if the "system configuration menu" of your software package includes FUJITSU DPL24C, FUJITSU DPL24 type I, EPSON FX-80/100, or EPSON JX-80 as the printer. You have only to specify that on the menu, and the software package will automatically send the proper control codes to your printer.

If you want to specify some print features for the entire document and your computer runs BASIC, you can use another simple way, as follows:

1. Load BASIC.

2. Using LPRINT statements, enter the control codes corresponding to the print features you want. For example, if you want to print 8 lines per inch key in the following and press ENTER or CR.

   ```
   10 LPRINT CHR$(27); "0";
   ```

> **NOTE:**
> Some BASICs use print statements different from LPRINT.

3. Run the program, and your printer will become ready with the specified print features.

4. Load and run your software package program without turning your printer off.

Note that this way is valid only if your computer does not send the $\overline{\text{INPRM}}$ signal (Centronics interface pin 31 for printer initialization) or any initialization commands (ESC@, ESC CR P, and ESC SUB I) to the printer when a program is loaded.

2.2 Programming with BASIC

This manual gives you several points about programming. We'll use simple program examples written in Microsoft BASIC because we assume that BASICs are the most generally understood languages. The fundamental rules are similar for other programming languages.

To send any command or data to the printer, a print statement is used. This manual uses the LPRINT statement, but for some versions of BASICs you may have to use the PRINT 1 statement instead (in this case you have to put PRINT and accompanying statements between an OPEN "O", 1, "LPTO" statement and CLOSE 1 statement) or other print statements in different form. Refer to your computer manual when changing the program examples for your BASIC.

The LPRINT statement can use the following three formats to send information to the printer.

```
LPRINT "A"          'Character as it is

LPRINT CHR$(65)     'Decimal

LPRINT CHR$(&H41)   'Hexadecimal, two digits
```

This example shows how to send or print character "A" on your printer. (When a character string is included in quotes, the leftmost character (including a space) is located at the home position or the left margin.) We use ASCII (American Standard Code for Information Interchange) as our printer standard code system. Appendix B shows the ASCII character set and the corresponding code numbers in decimal,

hexadecimal, and binary. If your computer uses another code system, you have to prepare proper hardware or software for converting codes.

You can use any of the above three formats, but you have to use the second (or third) format to send control codes to your printer because the printer control codes include "non-printable" characters used as function codes, most of which have no key on the keyboard. The function codes, ASCII codes 0 (NUL) to 31 (US), do not make the printer print any characters, but they make the printer enable the corresponding features. For example, if you want to print character "A" at double width, you use the CHR$ function to enter the Shift Out (SO) code as follows:

```
10 LPRINT CHR$(14); "A"
```

Of course, you can use CHR$(&H0E) instead of CHR$(14), and CHR$(65) or CHR$(&H41) instead of "A", but we will use the above form in this manual. Remember to use a semicolon as the delimiter. If the LPRINT line ends without a semicolon, a line feed is performed at the end of execution. If the line ends with a semicolon, it continues to the next LPRINT line without a line feed.

Once you have selected a feature like the above double-width printing feature, it is kept enabled until you send another control code to disable it or your computer sends the $\overline{\text{INPRM}}$ ($\overline{\text{RESET}}$) signal to your printer. Of course, this does not apply to some features such as form feeding on demand of control codes.

So far, we have explained some printer control codes consisting of a single function code. There is another type of printer control codes which consist of a ESCAPE code, CHR$(27), followed by a sequence of characters. The ESCAPE code changes the nature of the characters that follow it: the first character indicates a command and the next and succeeding characters, if present, indicate variables or constants in some commands; they are not printed as characters. For example, if you want to set the right margin to column 10, you can specify this as follows:

```
10 LPRINT CHR$(27); "Q"; CHR$(10)
```

After this program is executed, you printer will feed a line each time ten characters (including spaces) are printed on one line.

Now we give some rules of Microsoft BASIC Programming.

(1) 10 LPRINT "ABC";

- The number at the first of each line is a program number and must increment for each line. In the following example, don't worry about the program number.
- The LPRINT statement with a character string between double quotation marks prints out the characters as they are. For this example, ABC is printed out.
- The character (including a space) just after the first quotation mark is printed at the left margin.
- An LPRINT statement ending with a semicolon does not cause a line feed; one ending without a semicolon causes a line feed after execution of the statement.

(2) 20 'XYZ

- A character string beginning with an apostrophe (single quotation) is not a statement, but a memo for the programmer or others.
- BASIC does not interpret any characters after the apostrophe.

(3) 30 LPRINT

- The LPRINT statement followed by no characters performs only a line feed.

(4) 40 LPRINT CHR$(27); "D"; CHR$(10);
50 LPRINT CHR$(20); CHR$(0);

- One command can be written on two or more lines or vice versa.
- Each piece of information within a command must be marked off by a semicolon, which indicates that information for a statement continues following it. Of course, the continuation line must also end with a semicolon.

(5) 60 FOR I=1 TO 10
70 LPRINT "ABC"
80 NEXT I

- The FOR statement is always used together with the NEXT statement and repeats execution of the statement(s) between them the specified number of times. In this example, ABC is printed on 10 lines.

- The variable, I in this case, in incremented each time ABC prints. In this example, when the variable reaches, 10, the program line following the NEXT statement is executed.

(6) 90 GOSUB 200

- The GOSUB statement causes program execution to jump to the specified program line, 200 in this case, which should be the start line of the subroutine.

- The subroutine must end with the RETURN statement, which causes program execution to jump to the program line following the GOSUB statement that called the subroutine.

(7) 100 I=10

- The variable, I in this case, is set to 10 in this case. It can be used later in another statement.

(8) 110 LPRINT "T"; I;

- When a previously defined variable, I in this case, is to be printed out, it is not put between quotation marks.

(9) 120 LPRINT: LPRINT: LPRINT

- One program line can include several statements if they are separated by colons.

- This is useful when you have to add certain statements after writing a program.

- Statement interpretation stops each time a colon is encountered, and execution starts.

SECTION 3
CONTROL CODES

3.1 General

Control codes fall, roughly, into the following categories, but are introduced, in this manual, generally in order of increasing difficulty.

- 3.2 Print mode control
- 3.3 Horizontal movement controls
- 3.4 Vertical movement controls
- 3.5 Tabbing
- 3.6 Page formatting
- 3.7 Miscellaneous
- 3.8 Word processing
- 3.9 Font control and downloading
- 3.10 Bit image graphics
- 3.11 Cut sheet feeder control
- 3.12 Reset and sense control

Before the above types of control codes are described, the following figure shows the page formatting structure.

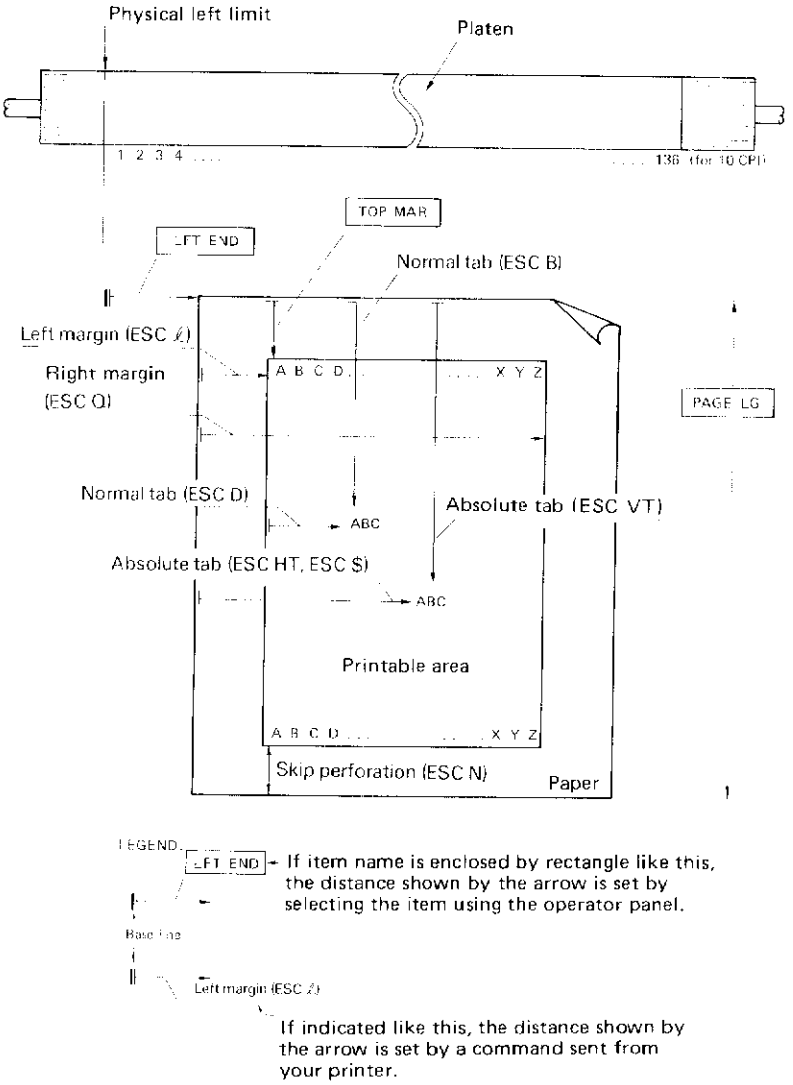


Figure 4 Page formatting structure

3.2 Print Mode Control

Code	Decimal	Hex	Function
SO	14	0E	Set double-width printing
ESC SO	27 14	1B 0E	Set double-width printing
DC4	20	14	Reset double-width printing

Using character string 14 (decimal) or strings 27 and 14 (decimal) sets the double-width printing mode. Double-width printing set in this way is effective for one line only, because the next line-feed resets it. It can also be reset, even in mid-line, by character string 20 (decimal). To do consecutive lines of double-width printing, see the ESC W(n) code. Note that control characters, such as SO and DC4, are not printed and only sent to the printer to change its print mode.

This mode can also be reset by ESC !(0), ESC W(0), CR, and line feed codes such as LF, FF, VT, ESC J(n), ESC j(n), ESC LF and ESC VT(n).

Program example:

```
100 WIDTH "LPT1:",255
110 LPRINT "SO & DC4"
120 LPRINT "(Set and reset ";
130 LPRINT "double-width printing)"
140 LPRINT
150 LPRINT CHR$(14);"Use this"
160 LPRINT "for normal and"
170 LPRINT CHR$(14);"double-width";
180 LPRINT CHR$(20);" print"
190 LPRINT "on the ";
200 LPRINT CHR$(14);"same line."
210 LPRINT CHR$(27);"@";
```

Print example:

```
SO & DC4
(Set and reset double-width printing)

Use this
for normal and
double-width print
on the same line.
```

Code	Decimal	Hex	Function
ESC W(1)	27 87 1	1B 57 01	Set double-width printing
	27 87 49	1B 57 31	
ESC W(0)	27 87 0	1B 57 00	Reset double-width
	27 87 48	1B 57 30	printing

Double-width printing set using ESC W(n), where n=1, is effective until reset. To reset, use ESC W(n), where n=0. Unlike the double-width print mode set by SO or ESC SO, this mode is not reset by the line feed command. ESC !(0) can reset this mode. The horizontal spacing is automatically doubled or halved by these commands.

Program example:

```
100 LPRINT "ESC W (n)"
110 LPRINT "(Set double-width ";
120 LPRINT "printing)"
130 LPRINT
140 LPRINT "Line feed"
150 LPRINT CHR$(27);"W";CHR$(1);
160 LPRINT "does not affect"
170 LPRINT "double-width ";
180 LPRINT CHR$(27);"W";CHR$(0);
190 LPRINT "or"
200 LPRINT "normal printing."
210 LPRINT CHR$(27);"@"
220 END
```

Print example:

```
ESC W (n)
(Set double-width printing)

Line feed
does not affect
double-width or
normal printing.
```

Code	Decimal	Hex	Function
SI	15	0F	Set condensed printing
ESC SI	27 15	1B 0F	Set condensed printing
DC2	18	12	Reset condensed printing

Condensed printing can be set on this printer using either the SI code or the ESC SI code. The result is the same. If you are used to software or printers which set condensed printing using the ESC SI code, you can

continue to set it this way, if you profer the simpler SI code, you can set it this way, too. Unlike SO or ESC SO, this mode is not reset by the line feed command. The horizontal spacing is automatically halved and added for 1/180 inch with setting condensed. And it is simplly doubled with resetting condensed.

Program example:

```
100 LPRINT "SI & DC2"
110 LPRINT "(Set and reset ";
120 LPRINT "condensed printing)"
130 LPRINT
140 LPRINT CHR$(15);
150 LPRINT "Use condensed printing"
160 LPRINT "for complicated tables"
170 LPRINT "with lots of entries."
180 LPRINT
190 LPRINT CHR$(18);
200 LPRINT "Normal printing"
210 LPRINT CHR$(27);"@";
220 END
```

Print example:

```
SI & DC2
(Set and reset condensed printing)

Use condensed printing
for complicated tables
with lots of entries.

Normal printing
```

Code	Decimal	Hex	Function
ESC V 1	27 86 49	1B 56 31	Set double-height mode
ESC V 0	27 86 48	1B 56 30	Reset double-height mode

Double-height printing set using ESC V 1 is effective until reset. To reset, use ESC V 0.

Characters printed in the double-height mode occupies 2 times the area of normal characters. Therefore line spacing must be set to "LINE SPACE:3LPI" using control panel setting or ESC sequence commands such as ESC 3(n).

Block characters (e.g., ■ , ■ , ▒), frame characters (e.g., ╔ , ╫ , ┌), and integrals (⌠ and ⌡) which are printed in two passes cannot be printed in the double-height for M1.0 and M2.0 printers.

For M1.0 and M2.0 printers in the double-height mode, the underlining enabled by the ESC -(n) command is canceled and then stored. So, when the double-height mode is disabled, underlining is enabled again.

Program example:

```
100 LPRINT "ESC V 1 & ESC V 0"
110 LPRINT "(Set and reset ";
120 LPRINT "double-height modes)"
130 OPEN "LPT1:" AS #1
140 WIDTH #1,255
150 PRINT #1, CHR$(27);"V1";
160 PRINT #1,CHR$(10);CHR$(13);
170 PRINT #1,"Set double-height printing";
180 PRINT #1,CHR$(10);CHR$(10);CHR$(13);
190 PRINT #1,CHR$(27);"-";CHR$(49);
200 PRINT #1,CHR$(27);"V0";
210 PRINT #1,"Double-height characters";
220 PRINT #1,CHR$(27);"V1";
230 PRINT #1," can not be";
240 PRINT #1,CHR$(27);"V0";
250 PRINT #1," under lined";
260 PRINT #1,CHR$(27);"V1";
270 PRINT #1,CHR$(27);"-";CHR$(48);
280 PRINT #1,CHR$(12);
290 PRINT #1,CHR$(27);"@";
300 CLOSE #1
310 END
```

Print example:

```
ESC V 1 & ESC V 0
(Set and reset double-height modes)
Set double-height printing
Double-height characters can not be under
```

Code	Decimal	Hex	Function
ESC E	27 69	1B 45	Set shadow printing
ESC F	27 70	1B 46	Reset shadow printing
ESC x	27 120	1B 78	Reset shadow printing

Shadow printing mode (Emphasized printing) is set and reset by the above commands.

Program example:

```
100 LPRINT "ESC E & ESC F"
110 LPRINT "(Set and reset ";
120 LPRINT "shadow printing)"
130 LPRINT
140 LPRINT CHR$(27);"E";
150 LPRINT "Shadow printing"
160 LPRINT "is useful for posters."
170 LPRINT
180 LPRINT CHR$(27);"F";
190 LPRINT "So is normal printing."
200 LPRINT CHR$(27);"@";
210 END
```

Print example:

```
ESC E & ESC F
(Set and reset shadow printing)

Shadow printing
is useful for posters.

So is normal printing.
```

Code	Decimal	Hex	Function
ESC G	27 71	1B 47	Set bold printing
ESC H	27 72	1B 48	Reset bold printing
ESC x	27 120	1B 78	Reset bold printing

Bold printing mode (Double-strike printing) is set and reset by the above commands.

Program example:

```
100 LPRINT "ESC G & ESC H"
110 LPRINT "(Set and reset bold printing)"
120 LPRINT
130 LPRINT CHR$(27);"G";
140 LPRINT "Bold printing"
150 LPRINT "is good for headlines."
160 LPRINT
170 LPRINT CHR$(27);"H";
180 LPRINT "Normal printing"
190 LPRINT CHR$(27);"@";
200 END
```

Print example:

```
ESC G & ESC H
(Set and reset bold printing)

Bold printing
is good for headlines.

Normal printing
```

Code	Decimal	Hex	Function
ESC -(1)	27 45 1	1B 2D 01	Set underlining
	27 45 49	1B 2D 31	
ESC -(0)	27 45 0	1B 2D 00	Reset underlining
	27 45 48	1B 2D 30	
ESC x	27 120	1B 78	Reset underlining

Underlining set using ESC -(n), where n=1, is effective until reset. To reset, use ESC -(n), where n=0.

Note that even in the underline mode, the blank area preceding the first printable character and the blank area following the last by SP or tab, are not underlined.

Program example:

```
100 LPRINT "ESC - (n)"
110 LPRINT "(Set and reset underlining)"
120 LPRINT
130 LPRINT CHR$(27);"-";CHR$(1);
140 LPRINT "Underlining is good ";
150 LPRINT CHR$(27);"-0";
160 LPRINT "for headlines."
170 LPRINT CHR$(27);"@";
180 END
```

Print example:

```
ESC - (n)
(Set and reset underlining)

Underlining is good for headlines.
```

Code	Decimal	Hex	Function
ESC S(0)	27 83 0	1B 53 00	Set superscript
	27 83 48	1B 53 30	
ESC T	27 84	1B 54	Reset superscript

Program example:

```
100 LPRINT
110 LPRINT "ESC S (0) & ESC T"
120 LPRINT "(Set and reset ";
130 LPRINT "superscript printing)"
140 LPRINT
150 LPRINT "From normal ";
160 LPRINT CHR$(27);"S";CHR$(0);
170 LPRINT "to superscript for"
180 LPRINT "notations"
190 LPRINT
200 LPRINT CHR$(27);"S0";
210 LPRINT "From superscript ";
220 LPRINT CHR$(27);"T";
230 LPRINT "back to normal"
240 LPRINT CHR$(27);"@";
250 END
```

Print example:

```
ESC S (0) & ESC T
(Set and reset superscript printing)

From normal to superscript for
notations

From superscript back to normal
```

Code	Decimal	Hex	Function
ESC S(1)	27 83 1	1B 53 01	Set subscript
	27 83 49	1B 53 31	
ESC T	27 84	1B 54	Reset subscript

Program example:

```
100 LPRINT "ESC S (1) & ESC T"
110 LPRINT "(Set and reset ";
120 LPRINT "subscript printing)"
130 LPRINT
140 LPRINT "Normal ";
150 LPRINT CHR$(27);"S";CHR$(1);
160 LPRINT "subscript for formulas"
170 LPRINT
180 LPRINT CHR$(27);"S1";
190 LPRINT "From subscript";
200 LPRINT CHR$(27);"T";
210 LPRINT " to normal"
220 LPRINT CHR$(27);"@";
230 END
```

Print example:

```
ESC S (1) & ESC T
(Set and reset subscript printing)

Normal subscript for formulas

From subscript to normal
```

Code	Decimal	Hex	Function
ESC 4	27 52	1B 34	Set Italics
ESC 5	27 53	1B 35	Reset Italics

NOTE:

ESC 4 is not effective for block characters (e.g., ▉ , ■ , ▒), frame characters (e.g., ╔ , ╫ , ┬), and integrals (⌠ and ⌡) which are printed in two passes cannot be printed in the Italics style.

Program example:

```
100 LPRINT
110 LPRINT "ESC 4 & ESC 5"
120 LPRINT "(Set and reset ";
130 LPRINT "Italics)"
140 LPRINT
150 LPRINT CHR$(27);"4";
160 LPRINT "ITALICS FOR FOREIGN"
170 LPRINT "LANGUAGES AND EMPHASIS"
180 LPRINT "Italics for foreign"
190 LPRINT "languages and emphasis"
200 LPRINT
210 LPRINT CHR$(27);"5";
220 LPRINT "NORMAL PRINTING"
230 LPRINT "FOR ENGLISH"
240 LPRINT "Normal printing"
250 LPRINT "for English"
260 LPRINT
270 LPRINT CHR$(27);"@";
280 END
```

Print example:

```
ESC 4 & ESC 5
(Set and reset Italics)

ITALICS FOR FOREIGN
LANGUAGES AND EMPHASIS
Italics for foreign
languages and emphasis

NORMAL PRINTING
FOR ENGLISH
Normal printing
for English
```

Code	Decimal	Hex	Function
ESC p(1)	27 112 1	1B 70 01	Set proportional
	27 112 49	1B 70 31	printing
ESC p(0)	27 112 0	1B 70 00	Reset proportional
	27 112 48	1B 70 30	spacing

Normal printing depends on the character spacing included in the horizontal spacing value. In this method, each character, space, and backspace is given a common equal value regardless of the physical image width of individual characters. In Proportional Space Printing, an individual PS value for each character is used instead of the common horizontal spacing value to calculate the caracter by character carriage movement.

PS values of all characters for all fonts are shown in APPENDIX C.

Program example:

```
100 WIDTH "LPT1:",255
110 LPRINT
120 LPRINT "ESC p (n)"
130 LPRINT "(Set and reset ";
140 LPRINT "proportional printing)"
150 LPRINT
160 LPRINT CHR$(27);"p1";
170 LPRINT "Proportional on by ESC p (1)"
180 LPRINT CHR$(27);"p";CHR$(0);
190 LPRINT "Proportional off by ESC p (0)"
200 LPRINT CHR$(27);"@";
210 END
```

Print example:

```
ESC p (n)
(Set and reset proportional printing)

Proportional on by ESC p (1)
Proportional off by ESC p (0)
```

Code	Decimal	Hex	Function
ESC !(n)	27 33 n	1B 21 n	Set and reset print
	0≤n≤127	0≤n≤7F	modes

Print modes are set according to the value of n. Table 6 gives the correspondence between the print modes and the value of (n) that is expressed with 8 bits. All print modes shown in the table below can be used in any combination.

Table 6 Bit assignment of print modes

Value of n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
When 1	Unused	Set proportional print mode	Set double-width print mode	Set bold print mode	Set shadow print mode	Set condensed print mode	Unused	Set Elite pitch
When 0		Reset proportional print mode	Reset double-width print mode	Reset bold print mode	Reset shadow print mode	Reset condensed print mode		Set Pica pitch

For the FX-80 printer, some parts of the bit definitions of (n) are different from the original as follows:

Table 7 Defference of bit assignment

Bit	FX-80 printer	Emulation by this printer
Bit 1	Set/reset proportional	Unused
Bit 6	Set/reset Italics	Set/reset proportional
bit 7	Set/reset Underline	Unused
Others	Same as the originals	

Program example:

```
100 LPRINT "ESC ! (n)"
110 LPRINT "(Set or reset various print modes)"
120 LPRINT
130 OPEN "LPT1:" AS #1:WIDTH #1,255
140 FOR MODE=0 TO 127
150   IF MODE MOD 4=2 OR MODE MOD 4=3 GOTO 190
160   PRINT #1, CHR$(27);"!";CHR$(MODE+128);
170   PRINT #1,"Print mode ";HEX$(MODE);"(hex)";
180   PRINT #1, CHR$(13);CHR$(10);
190 NEXT MODE
200 PRINT #1, CHR$(27);"!";CHR$(0);
210 PRINT #1, CHR$(27);"@";
220 CLOSE #1
230 END
```

Print example:

```
ESC ! (n)
(Set or reset various print modes)

Print mode 0(hex)
Print mode 1(hex)
Print mode 4(hex)
Print mode 5(hex)
Print mode 8(hex)
Print mode 9(hex)
Print mode C(hex)
Print mode D(hex)
Print mode 10(hex)
Print mode 11(hex)
Print mode 14(hex)
Print mode 15(hex)
Print mode 18(hex)
Print mode 19(hex)
Print mode 1C(hex)
Print mode 1D(hex)
Print mode 20(hex)
Print mode 21(hex)
Print mode 24(hex)
Print mode 25(hex)
Print mode 28(hex)
Print mode 29(hex)
Print mode 2C(hex)
Print mode 2D(hex)
Print mode 30(hex)
```

Print mode 31(hex)
Print mode 34(hex)
Print mode 35(hex)
Print mode 38(hex)
Print mode 39(hex)
Print mode 3C(hex)
Print mode 3D(hex)
Print mode 40(hex)
Print mode 41(hex)
Print mode 44(hex)
Print mode 45(hex)
Print mode 48(hex)
Print mode 49(hex)
Print mode 4C(hex)
Print mode 4D(hex)
Print mode 50(hex)
Print mode 51(hex)
Print mode 54(hex)
Print mode 55(hex)
Print mode 58(hex)
Print mode 59(hex)
Print mode 5C(hex)
Print mode 5D(hex)
Print mode 60(hex)
Print mode 61(hex)
Print mode 64(hex)
Print mode 65(hex)
Print mode 68(hex)
Print mode 69(hex)
Print mode 6C(hex)
Print mode 6D(hex)
Print mode 70(hex)
Print mode 71(hex)
Print mode 74(hex)
Print mode 75(hex)
Print mode 78(hex)
Print mode 79(hex)
Print mode 7C(hex)
Print mode 7D(hex)

3.3 Horizontal Motion Control

3.3.1 Horizontal motion commands

Code	Decimal	Hex	Function
SP	32	20	Space

This command moves the print position one character forward in the same way as the space bar on a typewriter.

In the double-width print mode, the space is also double-width.

Code	Decimal	Hex	Function
BS	8	08	Backspace

This command moves the print position one character backward after preceding data is printed, just like the backspace key on a typewriter.

In the double-width print mode, the backspace is also double-width.

The BS code after bit image printing sets the next print position to the starting point of the bit image printing.

Code	Decimal	Hex	Function
CR	13	0D	Carriage return

This command prints data entered for the current line.

A line feed occurs after the data is printed if parameter "CR & LF" is selected for item "CR-CODE" from the control panel.

A CR code resets the double-width print mode set by the SO code.

3.3.2 Horizontal spacing change commands

Code	Decimal	Hex	Function
ESC M	27 77	1B 4D	Set Elite pitch
ESC P	27 80	1B 50	Set Pica pitch

Program example:

```
100 LPRINT
110 LPRINT "ESC M & ESC P"
120 LPRINT "(Elite pitch set ";
130 LPRINT "and Pica pitch set)"
140 LPRINT
150 LPRINT CHR$(27);"M";
160 LPRINT "Up to 152 characters ";
170 LPRINT "per line"
180 LPRINT "can be printed with"
190 LPRINT "Elite pitch."
200 LPRINT
210 LPRINT CHR$(27);"P";
220 LPRINT "Pica can print up to"
230 LPRINT "136 characters ";
240 LPRINT "per line."
250 LPRINT CHR$(27);"@";
260 END
```

Print example:

```
ESC M & ESC P
(Elite pitch set and Pica pitch set)

Up to 152 characters per line
can be printed with
Elite pitch.

Pica can print up to
136 characters per line.
```

Code	Decimal	Hex	Function
ESC US(n)	27 31 n (1≤n≤127)	1B 1F n (01≤n≤7F)	Set horizontal spacing ((n-1)/120 inch)

This command sets horizontal spacing as follows:

$$\text{Horizontal spacing} = \frac{n-1}{120} \text{ inch}$$

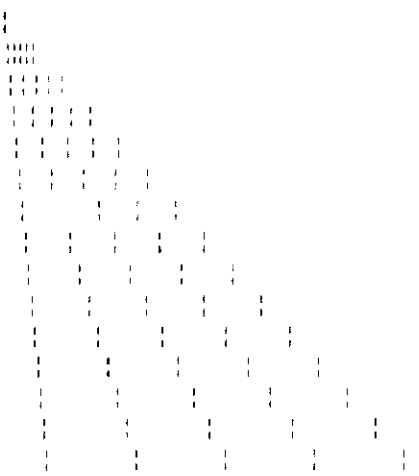
If horizontal spacing is set to 0 (n=1) the subsequent print data prints one character on top of another.

Program example:

```
100 LPRINT "ESC US (n)"
110 LPRINT "(Set character spacing)"
120 LPRINT
130 OPEN "LPT1:" AS #1
140 WIDTH #1,255
150 FOR I=1 TO 60 STEP 4
160   PRINT #1, CHR$(27);CHR$(31);CHR$(I);
170   PRINT #1,"!!!.!";
180   PRINT #1, CHR$(13);CHR$(10);
190 NEXT I
200 LPRINT CHR$(12);
210 LPRINT
220 LPRINT CHR$(27);"@";
230 END
```

Print example:

```
ESC US (n)
(Set character spacing)
```



Code	Decimal	Hex	Function
ESC h(n)	27 104 n (0≤n≤255)	1B 68 n (00≤n≤FF)	Set horizontal spacing (n/180 inch)

This command sets horizontal spacing as follows:

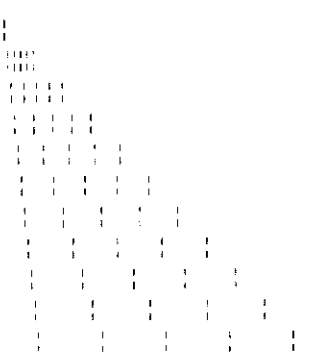
$$\text{Horizontal spacing} = \frac{n}{180}\ \text{inch}$$

Program example:

```
100 LPRINT "ESC h (n)"
110 LPRINT "(n/180 inch spacing)"
120 LPRINT
130 OPEN "LPT1:" AS #1:WIDTH #1,255
140 FOR N=0 TO 60 STEP 6
150   PRINT #1, CHR$(27);"h";CHR$(N);
160   PRINT #1,"! !!!";
170   LPRINT
180 NEXT N
190 PRINT #1, CHR$(27);"@"
200 CLOSE #1
210 END
```

Print example:

```
ESC h (n)
(n/180 inch spacing)
```



If horizontal spacing is set to 0 (n=0) the subsequent print data prints one character on top of another.

Code	Decicmal	Hex	Function
ESC DC1 (n)	27 17 n (0≤n≤127)	1B 11 n (00≤n≤7F)	Character offset selection
ESC x	27 120	1B 78	Cancel offset selection
CR	13	0D	Cancel offset selection

All modes of printing require that some space be left between each character. This is called letter space or offset. Offset is calculated in 1/120 inch increments, and may be set to any value from 0 to ± 63/120 inch maximum.

Normal printing depends on the character spacing included in the horizontal spacing value. In this method, each character, space, and backspace is given a common equal value regardless of the physical image width of individual characters. In Proportional Space Printing, an individual PS value for each character is used instead of the common horizontal spacing value to calculate the character by character carriage move. Offset is added in this mode as the only way to obtain letter spacing.

A value for offset is established by sending the command sequence ESC DC1 (n) "n" is from 00 to 7F (Hex) whose binary value is the desired offset value, defined as follows:

Bits 0 to 5 = Offset value (0 minimum to 63 maximum at 1/120")
Bit 6 = Sign of offset (1 = negative)

The value of HMI is unchanged by offset. Once set, the offset value remains in effect until change by another ESC DC1 (n) command sequence, or cleared to 0 by either a CR or an ESC x command sequence.

Program example:

```
100 LPRINT "ESC DC1 (n)"
110 LPRINT "(Character ";
120 LPRINT "offset selection)"
130 LPRINT
140 OPEN "LPT1:" AS #1
150 WIDTH #1, 255
160 LPRINT "Offset at steps";
170 LPRINT " of 8/120 inch"
180 FOR I=0 TO 63 STEP 8
190   PRINT #1, CHR$(27);CHR$(17);
200   PRINT #1, CHR$(I);
210   PRINT #1,"AA";CHR$(13);CHR$(10);
220 NEXT I
230 LPRINT
240 LPRINT "Negative offset at ";
250 LPRINT "steps of 2/120 inch"
260 FOR I=64 TO 79 STEP 2
270   PRINT #1, CHR$(27);CHR$(17);
280   PRINT #1, CHR$(I);
290   PRINT #1,"AA";CHR$(13);CHR$(10);
300 NEXT I
310 CLOSE #1
320 LPRINT
330 LPRINT CHR$(27);"@";
340 END
```

Print example:

```
ESC DC1 (n)
(Character offset selection)

Offset at steps of 8/120 inch
AA
A A
A  A
A   A
A    A
A     A
A      A
A       A

Negative offset at steps of 2/120 inch
AA
AA
AA
AA
AA
AA
```

3.4 Vertical Motion Control

3.4.1 Vertical motion commands

Code	Decimal	Hex	Function
LF	10	0A	Line feed

This command specifies a line feed after data is printed for the current line.

When the printer is first turned on, the line spacing is set to the value specified by item "LINE SPACE" from the control panel, but it may be it changed by ESC 0, ESC 1, ESC 2 or ESC 3(n).

An LF code resets the double-width print mode set by the SO (Shift Out) code.

A carriage return occurs if parameter "LF & CR" is selected for item "LF-CODE" from the control panel.

Code	Decimal	Hex	Function
ESC LF	27 10	1B 0A	Negative line feed

This command moves the form down one line.

Program example:

```
100 LPRINT "LF & ESC LF "
110 LPRINT "(Line feed normal and negative)"
120 LPRINT
130 OPEN "LPT1:" AS #1
140 PRINT #1,"Normal LF";
150 PRINT #1,CHR$(10);CHR$(10);
160 PRINT #1,"Negative LF";
170 PRINT #1,CHR$(27);CHR$(10);
180 PRINT #1,"---------";
190 LPRINT CHR$(27);"@";
200 END
```

Print example:

```
LF & ESC LF
(Line feed normal and negative)

Normal LF
---------
Negative LF
```

It rests the double-width print mode set by the SO (Shift Out) code.

A carriage return occurs if parameter "CR & LF" is selected for item "LF-CODE" from the control panel.

If performs the same operation as LF, except that the paper moves down instead of up.

Code	Decimal	Hex	Function
FF	12	0C	Form feed

This command moves the paper to the top of form (top margin) or first print line on the next page.

When the printer is first turned on, the page length is set to the value specified by item "PAGE LENGTH" (page length) from the control panel, but it can be changed by ESC C(n), ESC C NUL, ESC FF(n) or ESC FF NUL(n).

Code	Decimal	Hex	Function
ESC J(n)	27 74 n (0≤n≤255)	1B 4A n (00≤n≤FF)	Single line feed (n/180 or n/216 inch)

This command moves the print position down n/180 inch after data is printed on the current line for DPL24C emulation. For IBM GPH and FX-80 emulations, it moves the print position down n/216 inch.

A carriage return occurs if parameter "CR & LF" is selected for item "LF-CODE" from the control panel.

Code	Decimal	Hex	Function
ESC j(n)	27 106 n (0≤n≤255)	1B 6A n (00≤n≤FF)	Single line feed backward (n/180 or n/216 inch)

This command moves the print position up n/180 inch after data is printed on the current line for DPL24C emulation. For IBM GPH and FX-80 emulations, it moves the print position up n/216 inch.

It performs the same operation as ESC J(n), except that the form moves down instead of up.

A carriage return occurs if parameter "CR & LF" is selected for item "LF-CODE" from the control panel.

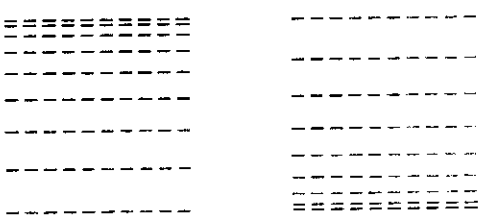
CAUTION:
To prevent paper jams, avoid use of this command in any area where backward feed is prohibited.

Program example:

```
100 LPRINT "ESC J (n) & ESC j (n)"
110 LPRINT "(Single line feed ";
120 LPRINT "& single line feed ";
130 LPRINT "backward)"
140 LPRINT
150 OPEN "LPT1:" AS #1
160 WIDTH #1,255
170 FOR I=0 TO 40 STEP 5
180   PRINT #1, CHR$(27);"J"CHR$(I);
190   PRINT #1, "----------";CHR$(13);
200 NEXT I
210 FOR I=0 TO 40 STEP 5
220   PRINT #1, CHR$(27);"j"CHR$(I);
230   PRINT #1, "                ";
240   PRINT #1, "----------";CHR$(13);
250 NEXT I
260 CLOSE #1
270 LPRINT CHR$(27);"@";
280 END
```

Print example:

```
ESC J (n) & ESC j (n)
(Single line feed & single line feed
backward)
```



3.4.2 Vertical spacing change commands

Code	Decimal	Hex	Function
ESC 0	27 48	1B 30	Set line spacing (1/8 inch)

This command sets the line spacing to 1/8 inch per line. After this command is received, subsequent line spacing performed by an LF code is set to 1/8 inch per line.

Program example:

```
100 LPRINT "ESC 0 "
110 LPRINT "(Set line spacing to 1/8 inch)"
120 LPRINT
130 LPRINT CHR$(27);"0";
140 FOR I=1 TO 3
150   LPRINT "ABCDEFGhijklmn -----"
160 NEXT I
170 LPRINT
180 LPRINT CHR$(27);"2";
190 FOR I=1 TO 3
200   LPRINT "ABCDEFGhijklmn -----"
210 NEXT I
220 END
```

Print example:

```
ESC 0
(Set line spacing to 1/8 inch)

ABCDEFGhijklmn -----
ABCDEFGhijklmn -----
ABCDEFGhijklmn -----

ABCDEFGhijklmn -----
ABCDEFGhijklmn -----
ABCDEFGhijklmn -----
```

Code	Decimal	Hex	Function
ESC 3(n)	27 51 n (0≤n≤255)	1B 33 n (00≤n≤FF)	Set line spacing (n/180 or n/216 inch)

This command sets the line spacing to n/180 inch per line for DPL24C emulation

For IBM GPH and FX-80 emulations, it sets the line spacing to n/216 inch per line

CAUTION:
Line spacing accuracy is not guaranteed when n < 3.

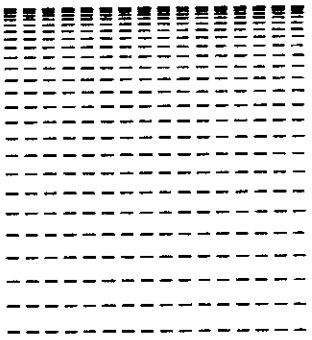
Program example:

```
100 LPRINT "ESC 3 (n)"
110 LPRINT "(Set line spacing";
120 LPRINT " to n/180 inch"
130 LPRINT " for DPL24C emulation)"
140 LPRINT
150 LPRINT "n=1 to 25"
160 OPEN "LPT1:" AS #1: WIDTH #1,255
170 FOR N=1 TO 25
180   PRINT #1, CHR$(27);"3";CHR$(N);
190   PRINT #1," ----------";
200   PRINT #1, CHR$(10);CHR$(13)
210 NEXT N
220 PRINT #1, CHR$(27);"@";
230 CLOSE #1
240 END
```

Print example:

```
ESC 3(n)
(Set line spacing to n/180 inch
 for DPL24C emulation)

n=1 to 25
```



Code	Decimal	Hex	Function
ESC 1	27 49	1B 31	Set line spacing (7/60 or 7/72 inch)

This command sets the line spacing to 7/60 inch/line for DPL24C emulation and 7/72 inch per line for IBM GPH and FX-80 emulations.

Program example:

```
100 LPRINT "ESC 1 "
110 LPRINT "(Set line spacing to 7/60 inch"
120 LPRINT " for DPL24C emulation)"
130 LPRINT
140 LPRINT CHR$(27);"1";
150 FOR I=1 TO 3
160   LPRINT "ABCDEFGhijklmn";
170   LPRINT " ----------"
180 NEXT I
190 LPRINT CHR$(27);"@";
200 END
```

Print example:

```
ESC 1
(Set line spacing to 7/60 inch
 for DPL24C emulation)

ABCDEFGhijklmn ----------
ABCDEFGhijklmn ----------
ABCDEFGhijklmn ----------
```

Code	Decimal	Hex	Function
ESC A(n)	27 65 n (0≤n≤127)	1B 41 n (0≤n≤7F)	Preset or set line spacing
ESC 2	27 50	1B 32	Set line spacing

The above two commands have different definitions depending on the emulation as shown in the following table.

Table 8 Definitions of ESC A (n) and ESC 2 commands

Setup items		ESC commands	
EMULATE:	GRPH LF:	ESC A (n)	ESC 2
DPL24C	IBM GPH	Preset line spacing to n/60 inch	Set line spacing to preset value
	FX-80	Set line spacing to n/60 inch	Set line spacing to 1/6 inch
IBM GPH	*1	Preset line spacing to n/72 inch	Set line spacing to preset value
FX-80	*1	Set line spacing to n/72 inch	Set line spacing to 1/6 inch

*1 In IBM GPH or FX-80 emulation mode, "GRAPH LF:" item is not shown in the display.

In IBM GPH mode (including IBM GPH mode under the DPL24C) the line spacing is preset by the ESC A (n) command in the above unit. However, subsequent line feeding continues using the previously set value, ignoring this newly set value, until the ESC 2 command is received.

When ESC 2 command is received, the value preset is set, and subsequent line feeding uses this value. If no ESC A (n) command has

been received, the ESC 2 command sets line spacing to 1/6 inch per line.

In FX-80 mode (including FX-80 mode under the DPL24C) the line spacing is directly set by the ESC A (n) and ESC 2 commands to the above values. Subsequent lines are fed by the amount.

Program example (IBM GPH mode):

```
100 WIDTH "LPT1:", 255
110 LPRINT "ESC A (n) & ESC 2 (GRPH LF:IBMGPH)"
120 LPRINT "(Set line spacing to n/60 inch"
130 LPRINT "and 1/6 inch for DPL24C emulation)
140 LPRINT
150 LPRINT "ESC A (n)  n=1 to 10"
160 FOR N=1 TO 10
170   LPRINT CHR$(27);"A";CHR$(N);
180   LPRINT CHR$(27);"2";
190   LPRINT "  --------------------"
200 NEXT N
210 LPRINT CHR$(27);"@";
220 END
```

Print example (IBM GPH mode):

```
ESC A (n) & ESC 2 (GRPH LF:IBMGPH)
(Set line spacing to n/60 inch
and 1/6 inch for DPL24C emulation)

ESC A (n)  n=1 to 10
   ====================
   --------------------
   --------------------
   --------------------
   --------------------
   --------------------
   --------------------
```

Program example (FX-80 mode):

```
100 WIDTH "LPT1:", 255
110 LPRINT "ESC A (n) & ESC 2 (GRPH LF:FX-80)"
120 LPRINT "(Set line spacing to n/60 inch"
130 LPRINT "and 1/6 inch for DPL24C emulation)
140 LPRINT
150 LPRINT "ESC A (n)  n=1 to 10"
160 FOR N 1 TO 10
170   LPRINT CHR$(27);"A";CHR$(N);
180   LPRINT "  --------------------"
190 NEXT N
200 LPRINT
210 LPRINT "ESC 2"
220 LPRINT CHR$(27);"2";
230 FOR N=1 TO 5
240   LPRINT "  --------------------"
250 NEXT N
260 LPRINT CHR$(27);"@";
270 END
```

Print example (FX-80 mode):

```
ESC A (n) & ESC 2 (GRPH LF:FX-80)
(Set line spacing to n/60 inch
and 1/6 inch for DPL24C emulation)

ESC A (n)  n=1 to 10
  ====================
  --------------------
  --------------------
  --------------------
  --------------------
  --------------------
  --------------------

ESC 2
  --------------------
  --------------------
  --------------------
  --------------------
  --------------------
```

3.5 Tabbing

Two methods are available for both horizontal and vertical tabbing. The first is normal tabbing, in which the carriage or paper is moved sequentially to previously set tab stops on command. The second is absolute tabbing, in which the carriage or paper is moved in either direction directly to any one of 255 possible positions from any other position.

Both of these methods provide horizontal and vertical positioning for standard print positions (pitches) and print lines. This permits data to be printed in a desired format regardless of subsequent changes in the index settings; i.e. data formatted at 10 CPI for print characters can be printed at 12 CPI while maintaining the same relative positions of the various parts of the text.

3.5.1 Horizontal tab

Code	Decimal	Hex	Function
ESC D(n1) ...(nk) NUL	27 68 n1 ...nk 0 (1 ≤n≤255) (n1 ≤... ≤nk) (1 ≤k≤160)	1B 44 n1 ...nk 00 (01 ≤n ≤FF)	Set horizontal tabs

This command sets horizontal tab (HT) positions as follows:

- Up to 160 horizontal tab positions can be set, with the first print position as 0.
- Set n (number of positions) in ascending order. A horizontal tab setting beyond the maximum print width is ignored.
- The setting must be terminated by the NUL code ((00)H).
- Horizontal tabbing is performed by the HT code ((09)H).
- Horizontal tabbing is performed using the horizontal spacing value in proportional-spacing mode.

- Value 1 of n is the character position next to the left margin. (See Figure 4.)

- Tab setting cleared by a set left margin command (ESC ℓ(n)).

- ESC D NUL clears all horizontal tabs.

Code	Decimal	Hex	Function
HT	9	09	Execute horizontal tab

This command advances the print position to a horizontal tab position set by ESC D(n1)(n2)...(nk) NUL and starts printing at the position next to it. Tabs are set at intervals of eight characters when the printer is first turned on and when no tab stops have been set by ESC D command.

- HT codes received after the last tab setting are ignored.

- After tabs are set, tab positions remain unchanged even if the print mode is changed.

- Advances the print position by the width of normal-size character at a time regardless of the double-width print mode.

- Setting the left margin by ESC ℓ(n) resets the horizontal tab positions to the initial default settings.

Program example:

```
100 LPRINT "ESC D... & HT"
110 LPRINT "(Horizontal tab set and execution)"
120 LPRINT
130 LPRINT CHR$(27);"D";CHR$(10);
140 LPRINT CHR$(20);CHR$(30);CHR$(0);
150 GOSUB 230 : '                Pica
160 LPRINT CHR$(27);"M";
170 GOSUB 230 : '                Elite
180 LPRINT CHR$(27);"P";CHR$(15);
190 GOSUB 230 : '                Condensed
200 LPRINT CHR$(27);"@";CHR$(18);
210 END
220 ' ***  Subroutine  ***
230 LPRINT "12345678901234567890";
240 LPRINT "123456789012345"
250 FOR I=1 TO 3
260   LPRINT CHR$(9);"TAB";I*10;
270 NEXT I
280 LPRINT : LPRINT
290 RETURN
```

Print example:

```
ESC D... & HT
(Horizontal tab set and execution)

12345678901234567890123456789012345
          TAB 10     TAB 20     TAB 30

12345678901234567890123456789012345
         TAB 10     TAB 20     TAB 30

12345678901234567890123456789012345
       TAB 10    TAB 20    TAB 30
```

Code	Decimal	Hex	Function
ESC HT (n)	27 9 n (1 ≤n≤255)	1B 09 n (01 ≤n≤FF)	Execute horizontal tab (absolute position)

The carriage is positioned directly at any of the first 255 print positions without previous tab stop setting. The Absolute Tab Stop must be specified each time it is used, because it is not stored in memory. ESC HT(n) is used, and the value of n shows the desired print position.

When the printer is first turned on, the leftmost print position is set to the value specified for item "LEFT END" from the control panel, and it is easy to change.

If the specified position is beyond the left or right margin, this command is ignored. Different from the normal HT, this command is based on not the left margin but the left end. See Figure 4.

Program example:

```
100 OPEN "LPT1:" AS #1
110 WIDTH #1,255
120 PRINT #1,"ESC HT (n)    ";
130 PRINT #1,CHR$(10);CHR$(13);
140 PRINT #1,"(Absolute horizontal tab)";
150 PRINT #1,CHR$(10);CHR$(10);CHR$(13);
160 PRINT #1,"12345678901234567890";
170 PRINT #1,"123456789012345";
180 PRINT #1,CHR$(10);CHR$(13);
190 FOR M=10 TO 30 STEP 10
200   PRINT #1,CHR$(27);CHR$(9);CHR$(M+1);
210   PRINT #1,"TAB";M;
220 NEXT M
230 PRINT #1,CHR$(12);
240 PRINT #1,CHR$(27);CHR$(13);"P";
250 PRINT #1,CHR$(27);"@";
260 CLOSE #1
270 END
```

Print example:

```
ESC HT (n)
(Absolute horizontal tab)

123456789012345678901234567890123456789012345
          TAB 10    TAB 20    TAB 30
```

Code	Decimal	Hex	Function
ESC $(n1)(n2)	27 36 n1 n2 (0≤n1≤255) (0≤n2≤19) (0≤n2×256 +n1≤4895)	1B 24 n1 n2 (00≤n1≤FF) (00≤n2≤13) (00≤n2×FF +n1≤13FF)	Set print position (absolute position) by n/360 inch

When the printer is first turned on, the leftmost print position is set to the value specified for item "LEFT END" from the control panel. This command specifies the next character start position in 1/360-inch units. (n2) × 256 + (n1) specifies the horizontal print position in 1/360-inch units. In this command, specify the low-order digit (n1) prior to (n2).

Upper digit Lower digit

$$\text{Horizontal print dot column position} = \frac{n2 \times 256 + n1}{360} \text{ inch}$$

Program example:

```
100 LPRINT "ESC $ (n1)(n2)"
110 LPRINT "(Set absolute print position)"
120 LPRINT
130 LPRINT CHR$(27);"$";CHR$(0);CHR$(0);
140 LPRINT "LEFT END"
150 LPRINT CHR$(27);"$";CHR$(5);CHR$(1);
160 LPRINT "(256*1+5)/360"
170 LPRINT CHR$(27);"$";CHR$(0);CHR$(2);
180 LPRINT "(256*2+0)/360"
190 LPRINT CHR$(27);"@";
200 END
```

Print example:

```
ESC $ (n1)(n2)
(Set absolute print position)

LEFT END
        (256*1+5)/360
                (256*2+0)/360
```

3.5.2 Vertical tab

Code	Decimal	Hex	Function
ESC B(n1) ...(nk) NUL	27 66 n1...nk 0 (01 ≤n1 ≤255) (n1 ≤...≤nk) (1 ≤k ≤64)	1B 42 n1...nk 00 (01 ≤n ≤FF)	Set vertical tabs

This command sets vertical tab positions as follows:

- Tab positions are set in ascending order until the NUL code ((00)H) is found.
- The VT code is used to perform vertical tabbing.
- Vertical tab settings beyond the page length are ignored.
- Set n (number of positions) in ascending order.
- Value 1 of n is the line next to the top of the form. (See Figure 4.)
- ESC B NUL clears all vertical tabs.

Code	Decimal	Hex	Function
VT	11	OB	Execute horizontal tab

This command advances the print position vertically to the specified line.

When the printer is first turned on and no tab stops have been set by ESC B command, tabs are set at 10-line intervals.

- When a VT code is received, the printer advances to a tab position set by a vertical tab set command (ESC B) after previous data is printed.
- Performs the same operation as an LF code for which no vertical tab position has been set.
- Resets the double-width print mode set by the SO code.
- A carriage return occurs if parameter "CR & LF" is selected for item "LF-CODE" from the control panel.

Program example:

```
100 LPRINT "ESC B (n) & VT"
110 ' Set Vertical TAB and Execution
120 LPRINT "(Vertical tab set and execution)"
130 LPRINT
140 LPRINT CHR$(27);"@";
150 LPRINT CHR$(27);"B";CHR$(0);
160 LPRINT CHR$(27);"B";
170 LPRINT CHR$(3);CHR$(5);CHR$(9);CHR$(0);
180 LPRINT "------- Top of Page -------"
190 LPRINT CHR$(11);"  1st Vertical TAB Point"
200 LPRINT CHR$(11);"  2nd Vertical TAB Point"
210 LPRINT CHR$(11);"  3rd Vertical TAB Point"
220 LPRINT CHR$(27);"@";
230 END
```

Print example:

```
ESC B (n) & VT
(Vertical tab set and execution)

------- Top of Page -------

  1st Vertical TAB Point

  2nd Vertical TAB Point


  3rd Vertical TAB Point
```

Code	Decimal	Hex	Function
ESC VT (n)	27 11 n (1≤n≤255)	1B 0B n (01≤n≤FF)	Execute vertical tab (absolute position)

This command executes absolute vertical tab.

The form can be moved to any of the 255 lines on the page. The Absolute Vertical Tab is set entering code ESC VT (n). The value of the selected n determines the line number to which the form is to be moved.

You can feed paper not only forward but also backward by this command, but with backward feeding you must take care to avoid paper jams.

The top print line is specified by the value 1 of n. (See Figure 4.)

Even if the number of lines on the page is fewer than 255, tabbing cannot be performed beyond the end of the page.

If an Absolute Vertical Tab exceeding the specified page length is specified, the command is ignored. Therefore, the subsequent print data is printed on the same line.

Program example:

```
100 LPRINT "ESC VT (n)"
110 LPRINT "(Execute absolute vertical tab)";
120 LPRINT
130 LPRINT CHR$(27);"C";
140 LPRINT CHR$(0);CHR$(11);
150 FOR I=2 TO 12 STEP 5
160   LPRINT CHR$(27);CHR$(11);
170   LPRINT CHR$(I);
180   LPRINT I;"VTAB"
190 NEXT I
200 LPRINT CHR$(27);"@";
210 END
```

Print example:

```
ESC VT (n)
(Execute absolute vertical tab)

 2 VTAB



 7 VTAB



12 VTAB
```

3.6 Page Formatting

Code	Decimal	Hex	Function
ESC Q(n)	27 81 n (1 ≤n≤255)	1B 51 n (01 ≤n ≤FF)	Set right margin

This command sets the right margin (number of print positions) based on the current character-size setting and left end position (See Figure 4).

n specifies the number of print positions. The maximum number is based on the character size set. A specification beyond the maximum is ignored.

Specify 2 ≤n when the double-width print mode; otherwise, specify 1 ≤n.

In proportional-spacing mode, n is specified by using the value of the horizontal spacing.

When first turned on, the printer is set to print up to 136 normal characters per line.

The right margin must be set before print data is sent to the printer.

CAUTION:
For changing character size, note that settings less than the width of a character are not specifiable.

Program example:

```
100 LPRINT "ESC Q (n)"
110 LPRINT "(Set right margin)"
120 LPRINT
130 LPRINT CHR$(27);"Q";CHR$(10);
140 LPRINT "12345678901234567890123456789O"
150 LPRINT CHR$(27);"@";
160 END
```

Print example:

```
ESC Q (n)
(Set right margin)

1234567890
1234567890
1234567890
```

Code	Decimal	Hex	Function
ESC ℓ(n)	27 108 n (0≤n≤255)	1B 6C n (00≤n≤FF)	Set left margin

This command sets the left margin (print starting position) based on the current character size setting and left end position (See Figure 4).

n specifies the number of print positions. The maximum number is based on the character size set. A specification beyond the maximum is ignored.

The left margin must be set before print data is sent to the printer.

This command clears the all of the horizontal tabs.

Program example:

```
100 LPRINT "ESC l (n)"
110 LPRINT "(Set left margin)"
120 LPRINT
130 LPRINT "12345678901234567890123456789O"
140 FOR I=5 TO 15 STEP 5
150   LPRINT CHR$(27);"l";CHR$(I);
160   LPRINT "ABCDEFGHIJKLMN"
170 NEXT I
180 LPRINT CHR$(27);"l";CHR$(0);
190 LPRINT CHR$(27);"@";
200 END
```

Print example:

```
ESC l (n)
(Set left margin)

12345678901234567890123456789O
     ABCDEFGHIJKLMN
          ABCDEFGHIJKLMN
               ABCDEFGHIJKLMN
```

Code	Decimal	Hex	Function
ESC N(n)	27 78 n	1B 4E n	Set skip perforations
ESC O	(1≤n≤127)	(01≤n≤7F)	Reset skip perforations
	27 79	1B 4F	

This command makes the printer skip the last n lines on the current page and advance the print head to the first print position on the next page. (See Figure 4).

It can prevent the print head from hitting perforations.

The number of lines skipped can be reset by a page length set command (ESC C(n), ESC C NUL(n)).

If parameter "YES" is selected for item "PERFORATION SKIP" from the control panel, the print head skips 1 inch at perforations.

Program example:

```
100 LPRINT "ESC N (n) & ESC O"
110 LPRINT "(Set and reset skip perforations)"
120 LPRINT
130 LPRINT CHR$(27);"C";CHR$(5);
140 LPRINT CHR$(27);"N";CHR$(2);
150 LPRINT "Page Length 5 Lines,";
160 LPRINT "Skip Lower 2 Lines"
170 GOSUB 260
180 LPRINT
190 LPRINT CHR$(27);"C";CHR$(5);
200 LPRINT CHR$(27);"O";
210 LPRINT "Page Length 5 Lines"
220 GOSUB 260
230 LPRINT CHR$(27);"@";
240 END
250 ' ***  Subroutine  ***
260 FOR I=1 TO 5
270   LPRINT "Skip Perforation  : No.";I
280 NEXT I
290 RETURN
```

Print example:

```
ESC N (n) & ESC O
(Set and reset skip perforations)

Page Length 5 Lines,Skip Lower 2 Lines
Skip Perforation  : No. 1
Skip Perforation  : No. 2


Skip Perforation  : No. 3
Skip Perforation  : No. 4
Skip Perforation  : No. 5



Page Length 5 Lines
Skip Perforation  : No. 1
Skip Perforation  : No. 2
Skip Perforation  : No. 3
Skip Perforation  : No. 4
Skip Perforation  : No. 5
```

Code	Decimal	Hex	Function
ESC C(n)	27 67 n (1≤n≤127)	1B 43 n (01≤n≤7F)	Set page length (by lines)
ESC FF(n)	27 12 n	1B 0C n	

The ESC C(n) command sets the page length in lines. (See Figure 4).

ESC FF(n) command functions the same as ESC C(n).

The page length is stored as an absolute length determined by multiplying the current single-line spacing by the number of lines (n) specified by this command.

The number of skipped lines set by ESC N(n) or control panel setting "PERFORATION SKIP: YES" is reset using this command.

Program example:

```
100 LPRINT "ESC C (n)"
110 LPRINT "(Set page length in lines)"
120 LPRINT
130 LPRINT CHR$(27);"C";CHR$(6);
140 LPRINT " ---Top of Page (6 Lines)"
150 LPRINT CHR$(12);
160 LPRINT " ---Top of Page (6 Lines)"
170 LPRINT CHR$(27);"@";
180 END
```

Print example:

```
ESC C (n)
(Set page length in lines)

 ---Top of Page (6 Lines)




 ---Top of Page (6 Lines)
```

Code	Decimal	Hex	Function
ESC C NUL(n)	27 67 0 n (1≤n≤22)	1B 43 00 n (01≤n≤16)	Set page length (by inches)
ESC FF NUL(n)	27 12 0 n	1B 0C 00 n	

The ESC C NUL(n) command sets the page length in inches.

ESC FF NUL(n) command functions the same as ESC C NUL(n).

n indicates the page length in inches.

The number of skipped lines set by ESC N(n) or control panel setting "PERFORATION SKIP: YES" is reset using this command.

3.7 Miscellaneous

3.7.1 Input data control

Code	Decimal	Hex	Function
ESC 7	27 55	1B 37	Select character set 1
ESC 6	27 54	1B 36	Select character set 2

ESC 7 selects Character Set 1 and ESC 6 selects Character Set 2.

Character set 2 has all printable characters, but set 1 does not.

The difference between the two character sets is shown in Appendix B.

Program example:

```
100 LPRINT "ESC 6 & ESC 7"
110 LPRINT "(Select character set 1 and 2)"
120 LPRINT
130 LPRINT CHR$(27);"7";
140 LPRINT "SET 1 ";CHR$(3);CHR$(4);CHR$(5);CHR$(6)
150 LPRINT
160 LPRINT CHR$(27);"6";
170 LPRINT "SET 2 ";CHR$(3);CHR$(4);CHR$(5);CHR$(6)
180 LPRINT CHR$(27);"@";
190 END
```

Print example:

```
ESC 6 & ESC 7
(Select character set 1 and 2)

SET 1

SET 2 ♥♦♣♠
```

Code	Decimal	Hex	Function
ESC R(n)	27 82 n (0≤n≤7) (48≤n≤55)	1B 52 n (00≤n≤07) (30≤n≤37)	Select international character

This command selects the character set for the country specified by the value of n. The international characters are shown in Appendix B.

When the ESC R(n) code is input, all data following this code is printed out in characters of the country specified by n. The specified country character set is valid until another character set is selected by the ESC R(n) code.

The value of (n) represents the character set for one of the following countries.

Table 9 International character set selection

Value of n		Country
Decimal	Hex	
0 or 48	00 or 30	U.S.A
0 or 49	01 or 31	France
2 or 50	02 or 32	Germany
3 or 51	03 or 33	U.K.
4 or 52	04 or 34	Denmark/Norway
5 or 53	05 or 35	Sweden/Finland
6 or 54	06 or 36	Italy
7 or 55	07 or 37	Spain

Program example:

```
100 LPRINT "ESC R (n)"
110 LPRINT "(Select international characters)"
120 LPRINT
130 LPRINT "HEX: 23 24 40 5B 5C 5D 5E 60 7B 7C 7D 7E"
140 FOR I=0 TO 7
150   LPRINT CHR$(27);"R";CHR$(I);
160   LPRINT I;"   #  $  @  [  \  ]  ^  `  {  |  }  ~  "
170 NEXT I
180 LPRINT CHR$(27);"@";
190 END
```

Print example:

```
ESC R (n)
(Select international characters)

HEX: 23 24 40 5B 5C 5D 5E 60 7B 7C 7D 7E
 0    #  $  @  [  \  ]  ^  `  {  |  }  ~
 1    £  $  à  °  ç  §  ^  `  é  ù  è  ¨
 2    #  $  §  Ä  Ö  Ü  ^  `  ä  ö  ü  ß
 3    £  $  @  [  \  ]  ^  `  {  |  }  ~
 4    #  $  É  Æ  Ø  Å  Ü  é  æ  ø  å  ü
 5    #  ¤  É  Ä  Ö  Å  Ü  é  ä  ö  å  ü
 6    £  $  §  °  ç  é  ^  ù  à  ò  è  ì
 7    £  $  §  ¡  Ñ  ¿  ^  `  °  ñ  ç  ~
```

Code	Decimal	Hex	Function
CAN	24	18	Cancel

This command cancels all previous data on the same line as the CAN code in the printer buffer.

Program example:

```
100 LPRINT "CAN"
110 LPRINT "(Cancel line buffer)":LPRINT
120 LPRINT "ABCDEFG";CHR$(24);
130 LPRINT "HIJKLMN"
140 LPRINT CHR$(27);"@";
150 END
```

Print example:

```
CAN
(Cancel line buffer)

HIJKLMN
```

Code	Decimal	Hex	Function
DC1	17	11	Select printer
DC3	19	13	Deselect printer

DC1 selects printer and DC3 deselects the printer.

After the printer is deselected, all subsequently received data is invalid until the DC1 code is input.

The DC1/DC3 code functions are enabled if parameter "ENABLE" is selected from item "DC3-CODE" from the control panel. The SLCT signal and ONLINE Indication are not changed by the DC1/DC3 codes.

The table below summarizes the relationship between the control panel ONLINE switch, the parameter, DC1/DC3 codes, and the interface processing.

Table 10 Online conditions on interface (DC1/DC3 code)

ONLINE switch	DC3-CDE item	DC1/DC3	$\overline{\text{FAULT}}$	BUSY	$\overline{\text{ACKNLG}}$	Input data processing
Offline	ENABLE/ DISABLE	DC1/DC3	LOW	HIGH	No pulses are output.	Data entry is disabled.
Online	ENABLE	DC1	HIGH	H/L	Pulses are output.	Data entry is disabled Normal processing
		DC3	HIGH	H/L	Pulses are output.	Data entry is enabled, but input data is discarded until the DC1 code is received.
	DISABLE	DC1	HIGH	H/L	Pulses are output.	Data entry is enabled. Normal processing
		DC3	HIGH	H/L	Pulses are output	Data entry is enabled. Normal processing

Program example:

```
100 LPRINT "DC1 & DC3 "
110 LPRINT "(Select and deselect printer)"
120 LPRINT
130 LPRINT CHR$(17);
140 LPRINT "Printer select"
150 LPRINT CHR$(19);
160 LPRINT "Printer deselect"
170 LPRINT CHR$(17);
180 LPRINT "Printer select"
190 LPRINT CHR$(19);
200 LPRINT "Printer deselect"
210 LPRINT CHR$(17);
220 LPRINT CHR$(27);"@";
230 END
```

Print example:

```
DC1 & DC3
(Select and deselect printer)

Printer select
Printer select
```

Code	Decimal	Hex	Function
ESC >	27 62	1E 3E	Set MSB to 1
ESC #	27 35	1B 23	Reset MSB control

The ESC > command forcibly sets the most significant bit (MSB) in input data to 1. When this command is received, character set is automatically set to Set 1.

This function is not effective for image data.

Code	Decimal	Hex	Function
ESC =	27 61	1E 3D	Set MSB to 0
ESC #	27 35	1B 23	Reset MSB control

The ESC = command forcibly sets the most significant bit (MSB) input data to 0.

This function is not effective for image data.

Program example:

```
100 LPRINT "ESC >"
110 LPRINT "(Force MSB setting)"
120 OPEN "LPT1:" AS #1
130 WIDTH #1,36:LPRINT
140 LPRINT CHR$(27);">";
150 FOR I=33 TO 126
160   PRINT #1, CHR$(I);
170 NEXT I
180 LPRINT : LPRINT
190 LPRINT CHR$(27);"#";
200 LPRINT "ESC ="
210 LPRINT "(Force MSB resetting)"
220 LPRINT
230 LPRINT CHR$(27);"=";
240 FOR I=161 TO 254
250   PRINT #1, CHR$(I);
260 NEXT I
270 LPRINT : LPRINT
280 LPRINT "ESC #"
290 LPRINT "(Reset MSB control)"
300 LPRINT
310 LPRINT CHR$(27);"#";
320 FOR I=33 TO 126
330   PRINT #1, CHR$(I);
340 NEXT I
350 LPRINT
360 CLOSE #1
370 LPRINT CHR$(27);"@";
380 END
```

Print example:

```
ESC >
(Force MSB setting)

íóúñÑªº¿⌐¬½¼¡«»
ΦΘΩδ∞ØЄ∩≡±≥≤⌠⌡÷≈°∙·√ⁿ²■ αβΓπΣσμτ

ESC =
(Force MSB resetting)

!"#$%&'()*+,-./0123456789:;<=>?@ABC
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
hijklmnopqrstuvwxyz{|}~

ESC #
(Reset MSB control)

!"#$%&'()*+,-./0123456789:;<=>?@ABC
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
hijklmnopqrstuvwxyz{|}~
```

3.7.2 Others

Code	Decimal	Hex	Function
ESC r(n)	27 114 n (0≦n≦6) (48≦n≦54)	1B 72 n (00≦n≦06) (30≦n≦36)	Select printing color

This command is effective only for color printer with color ribbon.

This command selects the printing color. When ESC r(n) code is input, all subsequent data is printed in the color specified by n.

This command is effective not only for characters but also for bit image printing.

When the printer is initially powered on or one of the reset sequences is executed, the printing color is automatically set to black (n=0).

The binary value of n represents one of the following colors.

Table 11 Selection of printing color

Value of n		Color	Ribbon use order	
Decimal	Hex		1st	2nd
0 or 48	0 or 30	Black	Black	–
1 or 49	1 or 31	Magenta	Magenta	–
2 or 50	2 or 32	Cyan	Cyan	–
3 or 51	3 or 33	Violet	Magenta	Cyan
4 or 52	4 or 34	Yellow	Yellow	–
5 or 53	5 or 35	Orange	Yellow	Magenta
6 or 54	6 or 36	Green	Yellow	Cyan

When the colors green, orange or violet are to be printed, two basic colors are mixed together by printing first one and then the other in the order and combinations shown in the table above, using unidirectional printing.

If you want to mix colors on your own, the color mixing sequence should always be yellow, magenta, cyan and black. This is to minimize ribbon stain.

To print colors other than green, orange or violet, specify unidirectional printing by inputting ESC U (1).

Program example:

```
100 REM Use the ESC r (n) code,
110 REM CHR$(27), r, and CHR$(n),
120 REM to select printing color
130 LPRINT "ESC r (n)"
140 LPRINT "(Select printing color)"
150 LPRINT
160 LPRINT CHR$(27);"r";CHR$(0);
170 LPRINT "Black   color printing"
180 LPRINT CHR$(27);"r";CHR$(1);
190 LPRINT "Magenta color printing"
200 LPRINT CHR$(27);"r";CHR$(2);
210 LPRINT "Cyan    color printing"
220 LPRINT CHR$(27);"r";CHR$(3);
230 LPRINT "Violet  color printing"
240 LPRINT CHR$(27);"r4";
250 LPRINT "Yellow  color printing"
260 LPRINT CHR$(27);"r5";
270 LPRINT "Orange  color printing"
280 LPRINT CHR$(27);"r6";
290 LPRINT "Green   color printing"
300 LPRINT CHR$(27);"@";
310 END
```

Print example:

```
ESC r (n)
(Select printing color)

Black   color printing
Magenta color printing

Violet  color printing

Orange  color printing
```

Code	Decimal	Hex	Function
BEL	7	07	Sound alarm

This command sounds an alarm for about 0.25 seconds.

It is disabled if parameter "OFF" is selected for item "BUZZER" from the control panel.

Program example:

```
100 LPRINT "BEL"
110 LPRINT "(Sound alarm)"
120 LPRINT
130 LPRINT CHR$(7);
140 LPRINT"-----Sound alarm-----"
150 LPRINT CHR$(27);"@";
160 END
```

Print example:

```
BEL
(Sound alarm)

-----Sound alarm-----
```

Code	Decimal	Hex	Function
ESC 9	27 57	1B 39	Enable paper-end sensor
ESC 8	27 56	1B 38	Disable paper-end sensor

The ESC 9 command enables the printer to enter the offline state when a paper-end condition occurs.

Selecting parameter "IGNORE" from item "PAPER OUT" from the control panel has the same effect as this command.

The ESC 8 command enables the printer to print data to the end of the paper, ignoring the paper end signal.

Code	Decimal	Hex	Function
ESC i(1)	27 105 1	1B 69 01	Set typewriter mode
	27 105 49	1B 69 31	
ESC i(0)	27 105 0	1B 69 00	Reset typewriter mode
	27 105 48	1B 69 30	

This command sets the printer in the typewriter mode when n=1 is specified.

In this mode, the printer prints characters if the following data does not come for about 0.2 second.

In n=0 is specified, the typewriter mode is reset, enabling the printer to return to the normal mode.

Program example:

```
100 LPRINT "ESC i (n)"
110 LPRINT "(Incremental and view)"
120 LPRINT
130 LPRINT "Input any key ";
140 LPRINT "(Cancel-press ESC key)"
150 LPRINT CHR$(27);"i";CHR$(1);'Set
160 A$=INKEY$
170 IF A$=CHR$(27) THEN 200
180 LPRINT A$;
190 GOTO 160
200 LPRINT CHR$(27);"i";CHR$(0)'Reset
210 LPRINT CHR$(27);"@";
220 END
```

Code	Decimal	Hex	Function
ESC @	27 64	1B 40	Remote reset
ESC CR P	27 13 80	1B 0D 50	Remote reset

The ESC @ command performs a software reset.

ESC CR P command functions the same as ESC @.

The Remote Reset command sequence (ESC @) may be sent to the printer with other data. The command will be queued with the other data and executed when encountered in the print buffer, or executed immediately if sent without other data. This command has the same effect as the power-up reset or initialization. Note that the printer is initialized at power-up or by the execution of the Remote Reset command (ESC @, ESC CR P) or Direct Reset command (ESC SUB I). All the logic circuits, receive buffer, and print buffer are reset to the values set at the factory or set by the setup mode.

Code	Decimal	Hex	Function
ESC <	27 60	1B 3C	Set head home

Program example:

```
100 LPRINT "ESC <"
110 LPRINT "(Home head)":LPRINT
120 LPRINT "        Home head"
130 LPRINT CHR$(27);"<"
140 LPRINT CHR$(27);"@";
150 END
```

Print example:

```
ESC <
(Home head)

        Home head
```

This command moves the print head to the home position on the current line.

Code	Decimal	Hex	Function
ESC U(1)	27 85 1	1B 55 01	Set unidirectional
	27 85 49	1B 55 31	printing
ESC U(0)	27 85 0	1B 55 00	Reset unidirectional
	27 85 48	1B 55 30	printing

This command can specify unidirectional printing.

- When n = 1, unidirectional printing is started.
- When n = 0, bidirectional printing is started.
- Use unidirectional printing when precision alignment is needed, as when printing vertical ruled lines.

Program example:

```
100 LPRINT "ESC U (n)"
110 LPRINT "(Select unidirectional print)"
120 LPRINT
130 LPRINT "Bidirectional print"
140 GOSUB 220
150 LPRINT : LPRINT
160 LPRINT CHR$(27);"U";CHR$(1);
170 LPRINT "Unidirectional print"
180 GOSUB 220
190 LPRINT CHR$(27);"U";CHR$(0);
200 LPRINT CHR$(27);"@";
210 END
220 ' ***  Subroutine  ***
230 LPRINT CHR$(27);"0";
240 FOR I=0 TO 6
250   FOR J 0 TO 25
260     LPRINT "I";
270   NEXT J : LPRINT
280 NEXT I
290 LPRINT CHR$(27);"2";
300 RETURN
```

Print example:

```
ESC U (n)
(Select unidirectional print)

Bidirectional print
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII

Unidirectional print
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
IIIIIIIIIIIIIIIIIIIIIIIII
```

3.8 Word Processing

Code	Decimal	Hex	Function
ESC m	27 109	1B 6D	Enter auto justify mode
ESC x	27 120	1B 78	Exit auto justify mode

The ESC m command automatically performs left and right justification of text.

Justification adjusts character spaces and word spaces so that the right and left margins are contant.

Initiated by the code ESC m, auto justify mode prints subsequent characters left and right justified until the sequence ESC x or Remote Reset is received. This mode is not reset by a CR code. If ESC x is received during justification of a line, the data is not justified and is printed normally. Auto justify also functions with standard or proportional spacing. Justification starts from the First Printable Character (FPC) following the CR, LF, Space, Horizontal Tab or ESC m command. This makes leading spaces and tabs unjustified, and enables lines to be partially justified. (Indents at the beginning of a sentence are usually spaces and need not be justified).

The ESC x (Escape x) command cancels the word processing functions set by ESC m.

Program example:

```
100 WIDTH "LPT1:",255
110 LPRINT "ESC m"
120 LPRINT "(Auto justify)":LPRINT
130 LPRINT "123456789012345678901234567890123456789012345"
140 LPRINT "L";SPACE$(33);
150 LPRINT CHR$(27);"Q";CHR$(35);"R":LPRINT
160 LPRINT "Normal printing "
170 LPRINT CHR$(27);"m"
180 LPRINT "   Justification is calculated"
190 LPRINT "from the first printable character"
200 LPRINT "position after a CR, LF, space"
210 LPRINT "or HT.";CHR$(27);"x":LPRINT
220 LPRINT "Normal printing"
230 LPRINT CHR$(27);"@";
240 END
```

Print example:

```
ESC m
(Auto justify)

123456789012345678901234567890123456
L                                    R

Normal printing

   Justification is calculated
from the first printable character
position after a CR, LF, space
or HT.

Normal printing
```

3.9 Font Control and Downloading

Code	Decimal	Hex	Function
ESC %(m)(n)	27 37 m n	1B 25 m n	Font select

This is the font select command for printing.

The printer supports various type styles (fonts), stored on the interface board (standard) and font cartridges or cards (optional). The type style selected by a parameter of item "FONT" from the control panel is loaded when the printer is turned on or when it is reset. When a Font Select command is sent to the printer, the type style specified by the command is used until another Font Select command is sent or until the printer is reset.

As shown below, there are three locations of Font storage: Resident ROM, Download RAM, and the Font cartridge or Font card. For details about the font cartridge or card, see Appendix B of the User's Manual of your printer.

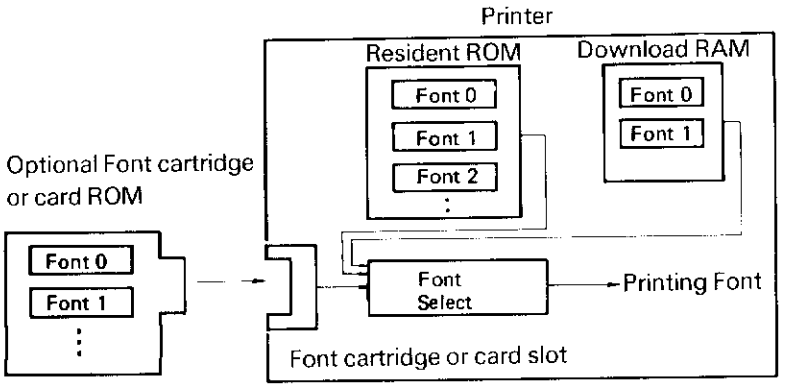


Figure 5 Font selection outline

This command includes m and n. m is equal to the sum of m1 and m2. m1 indicates in which ROM/RAM the font is located (see Table 13), and m2 indicates the density of the printed characters (see Table 14). And n indicates the number of the font to be selected by this command (see Table 12). Font selection to non-existent font on a Font cartridge or card is automatically changed to one to Font 0 on it. And if no font is exist on it, it becomes to Font 0 of the Resident Font (Courier 10).

Table 12 Number of font selected by n

Font	n		Corresponding font for resident ROM
	Hex	Dec	
Font 0	00 or 30	0 or 48	Courier 10
Font 1	01 or 31	1 or 49	Prestige Elite 12
Font 2	02 or 32	2 or 50	Draft
Font 3	03 or 33	3 or 51	Compression
Font 4	04 or 34	4 or 52	Boldface PS*
Font 5	05 or 35	5 or 53	(Courier 10)**
Font 6	06 or 36	6 or 54	(Courier 10)
Font 7	07 or 37	7 or 55	(High-speed Draft)***

* Some models do not have this Font, See PREFACE of this manual.

** Undefined Font is defaulted to Font 0 (Courier 10)

*** M2.0 and M2.1 printers only

Table 13 ROM/RAM selected by m1

ROM/RAM location	m1	
	Hex	Dec
Resident ROM	00 or 30	0 or 48
Download RAM	01 or 31 03 or 33	1 or 49 3 or 51
Font cartridge or card ROM	02 or 32	2 or 50

Table 14 Density code selected by m2

Density	m2	
	Hex	Dec
Font-determined density	00	0
360 dots/inch (Letter quality)	04	4
180 dots/inch	08	8
120 dots/inch (Draft quality)	0C	12

The result of this sum becomes as listed in the following table.

Table 15 Font selected by m (m1 + m2)

ROM/RAM location	Printing density	m	
		Hex	Dec
Resident ROM	Font determined density	00 or 30	0 or 48
Download RAM		01 or 31	1 or 49
Font cartridge or card ROM		02 or 32	2 or 50
Download RAM		03 or 33	3 or 51
Resident ROM	360 DPI (Letter quality)	04 or 34	4 or 52
Download RAM		05 or 35	5 or 53
Font cartridge or card ROM		06 or 36	6 or 54
Download RAM		07 or 37	7 or 55
Resident ROM	180 DPI	08 or 38	8 or 56
Download RAM		09 or 39	9 or 57
Font cartridge or card ROM		0A or 3A	10 or 58
Download RAM		0B or 3B	11 or 59
Resident ROM	120 DPI (Draft quality)	0C or 3C	12 or 60
Download RAM		0D or 3D	13 or 61
Font cartridge or card ROM		0E or 3E	14 or 62
Download RAM		0F or 3F	15 or 63

For the use of a Resident ROM Font, the standard value of m and n is listed in the following table.

Table 16 Resident ROM Font selected by m and n

Resident ROM Font	m		n	
	Hex	Decimal	Hex	Decimal
Courier 10	30	48	30	48
Prestige Elite 12	30	48	31	49
Draft	30	48	32	50
Compression	30	48	33	51
Boldface PS *1	30	48	34	52
High-speed Draft *1	30	48	37	55

*1 Some models do not have this font, See PREFACE of this manual.

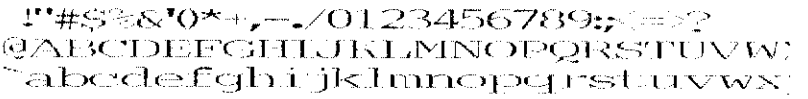
Program example:

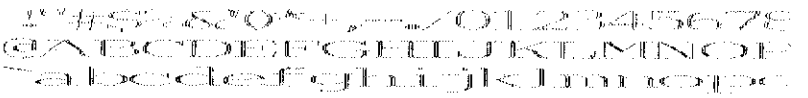
```
100 LPRINT "ESC % (m)(n)"
110 LPRINT "(Font selection)";
120 WIDTH "LPT1:",255
130 LPRINT CHR$(27);"p";CHR$(1);
140 FOR J=4 TO 12 STEP 4
150   LPRINT CHR$(27);"%";CHR$(J);CHR$(0)
160   FOR I=32 TO 126
170     IF I MOD 32=0 THEN LPRINT
180     LPRINT CHR$(I);
190   NEXT I
200 NEXT J
210 FOR J 4 TO 12 STEP 4
220   LPRINT CHR$(27);"%";CHR$(J);CHR$(2)
230   FOR I=32 TO 126
240     IF I MOD 32=0 THEN LPRINT
250     LPRINT CHR$(I);
260   NEXT I
270 NEXT J
280 LPRINT CHR$(27);"@";
290 END
```

Print example:

```
ESC % (m)(n)
(Font selection)

 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
```





```
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
```

```
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
```

```
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
```

Code	Decimal	Hex	Function
ESC : NUL(m) (n)	27 58 0 m n	1B 3A 00 m n	Font copy

This command copies a font from one of the fonts of the Resident ROM specified by m to the Download RAM assigned as font n.

This command and download command (ESC &) enables custom fonts to be made for user needs (see the ESC & command).

The Download RAM Font 0 and font 1 are copied from Resident ROM Fonts 0 and 1 when the printer is first turned on. Any commands and initialization other than turning off the printer do not clear the Download RAM.

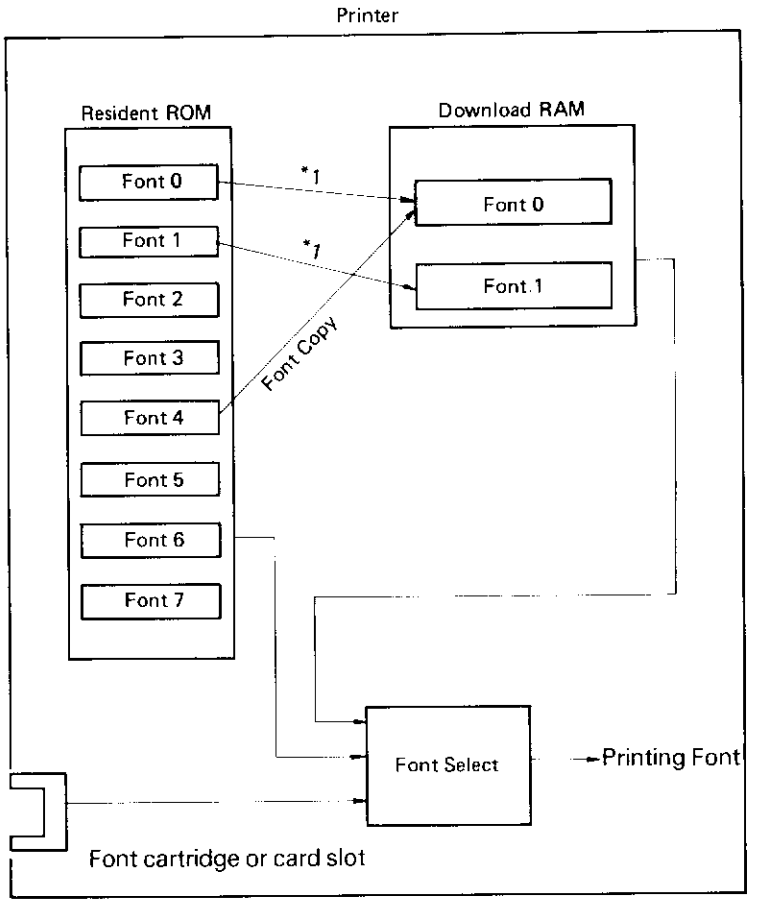
This command also includes m and n, which are determined based on the table below and Figure 6 shows the outline of the font copy.

Table 17 Source font selection for font copy

Source font selected (resident ROM)	m	
	Hex	Decimal
Font 0 (Courier 10)	00 or 30	0 or 48
Font 1 (Prestige Elite 12)	01 or 31	1 or 49
Font 2 (Draft)	02 or 32	2 or 50
Font 3 (Compression)	03 or 33	3 or 51
Font 4 (Bold face PS) *1	04 or 34	4 or 52
Font 5	05 or 35	5 or 53
Font 6	06 or 36	6 or 54
Font 7 (High-speed Draft) *2	07 or 37	7 or 55

*1: Some models do not have this font, See PREFACE of this manual.
*2: M2.0 and M2.1 printers only.

Assign font specification	n	
	Hex	Decimal
Copy as font 0 in the download RAM	00 or 30	0 or 48
Copy as font 1 in the download RAM	01 or 31	1 or 49



*1 These are copied when the printer is first turned on.

Figure 6 Font copy outline

Program example:

```
100 LPRINT "ESC : NUL (m)(n)"
110 LPRINT "(Font copy)"
120 WIDTH "LPT1:",36
130 LPRINT CHR$(27);"%";
140 LPRINT CHR$(5);CHR$(0)
150 FOR I 33 TO 126
160   LPRINT CHR$(I);
170 NEXT I
180 LPRINT CHR$(27);":";CHR$(0);
190 LPRINT CHR$(2);CHR$(0)
200 LPRINT CHR$(27);"%";
210 LPRINT CHR$(5);CHR$(0)
220 FOR I 33 TO 126
230   LPRINT CHR$(I);
240 NEXT I
250 LPRINT CHR$(27);"@";
260 END
```

Print example:

```
ESC : NUL (m)(n)
(Font copy)

!"#$%&'()*+,-./0123456789:;<=>?@ABCD
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
ijklmnopqrstuvwxyz{|}~

!"#$%&'()*+,-./0123456789:;<=>?@ABCD
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
ijklmnopqrstuvwxyz{|}~
```

Code	Decimal	Hex	Function
ESC & (m)(Cs) (Ce) (data)	27 38 0 m Cs Ce data	1B 26 m Cs Ce data	Download

The download command enables the user to replace part of the currently used font with a custom-made character font loaded into the download RAM.

The third character in the code sequence, m, specifies the dot density and the font location to be used. To determine the m value, obtain two values for the density and the font location by using the tables shown below. Then, add the two values. The sum obtained is the number to be used as m.

Table 18 Dot density specification for downloading

Density	Hex	Dec
Letter quality (360 dots/inch)	10	16
180 dots/inch	20	32
Draft quality (120 dots/inch)	30	48

Table 19 Font selection for downloading

Font	Hex/Dec
Font 0	0
Font 1	1

The characters to replace must be continuous in the ASCII code table. The start character of the sequence is specified by Cs; 65 (DEC) for A, for example. The end of the character sequence is specified by Ce, and Ce must be equal to or greater than Cs.

Function codes (ASCII codes 0 to 31 in decimal) can be replaced with down loaded characters if character set 2 is selected. However, the replaced function codes will no longer function as function codes.

Data from (00)HEX to (FF)HEX can be selected, therefore, parameter "8-BIT" must be selected for item "WORD LENGTH:" from the control panel.

The image of a character to be down loaded can be expressed as a matrix with 24 dots in a column and Wi dots in a row. (See Figure 7.) Wi = 36 for the letter quality mode, Wi = 18 for the correspondence mode, and Wi = 12 for the draft mode. Wi must be smaller than 64.

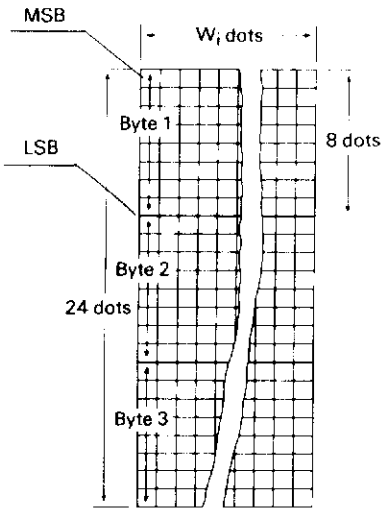


Figure 7 Dot matrix for character

To design a character in the draft mode, write a 24 x 12 dot matrix. (See the figure below.) Darken those dots which construct the character image. Then, encode each eight bits in the sequence numbered in the figure. For example, (00)HEX, (00)HEX, (00)HEX, (02)HEX, (00)HEX,...,(00)HEX, results in the image of letter T shown in the figure below.

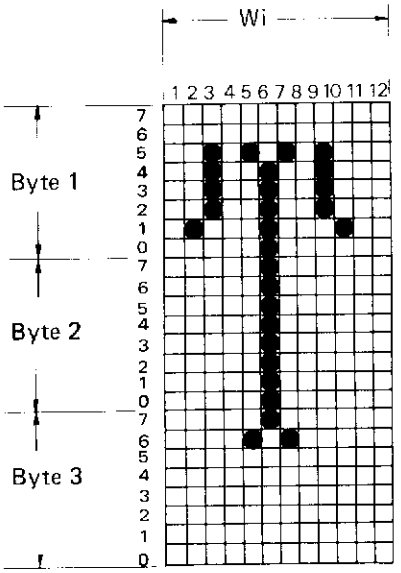


Figure 8 Download image of "T"

Data is sent to the printer byte by byte. Because each column of the image consists of 24 dots or 24 bits of data, 3 bytes are needed to send data for each column of the image. Consequently, sending the image of a character with width Wi requires 3 times Wi bytes in all.

Column 1	Column 2	Colomun Wi
1	4	3 Wi-2
2	5	3 Wi-1
3	6	3 Wi

Figure 9 Byte transfer sequence for downloading image data

The image of a character is sent in the ascending order of byte numbers shown in the figure. As the data format, width Wi must precede the image data of each character as:

Wi, byte 1, byte 2,..., byte 3 × Wi

When a set of characters of a font is to be down loaded, the required data format is a follows:

Wi, byte 1, byte 2,..., byte 3 × Wi (For the first character: Cs)
Wj, byte 1, byte 2,..., byte 3 × Wj (For the second character)

Wz, byte 1, byte 2,..., byte 3 × Wz (For the last character: Ce)

Adjacent dots on a horizontal line must not be two marks. In other words, dots adjacent to a mark must be spaces. To design a horizontal line, mark every second dot, and a continuous line is printed because a dot actually printed overlaps the adjacent dots.

NOTES:

1. When the printer is first turned on, Resident ROM Font 0 is copied to Font 0 in the Download RAM and Resident ROM Font 1 to Font 1.
2. The Font Copy command clears the downloaded characters.
3. This command downloads your characters. To print out your characters, use the item "FONT:" of the control panel or font select command to specify the font you downloaded and send corresponding characters codes.
4. The downloaded fonts are not cleared even if reset command is issued. They are cleared only when the printer is turned off.

Program example:

```
100 LPRINT "ESC & (m)(Cs)(Ce)(data)"
110 LPRINT "(Define download character)"
120 LPRINT
130 LPRINT CHR$(27);"&";CHR$(48);
140 LPRINT CHR$(33);CHR$(33);
150 LPRINT CHR$(9);
160 LPRINT  CHR$(&H2);  CHR$(&H0);  CHR$(&H0);
170 LPRINT CHR$(&H3C);  CHR$(&H0);  CHR$(&H0);
180 LPRINT  CHR$(&H0);  CHR$(&H0);  CHR$(&H0);
190 LPRINT CHR$(&H20);  CHR$(&H0); CHR$(&H40);
200 LPRINT CHR$(&H1F); CHR$(&HFF); CHR$(&H80);
210 LPRINT CHR$(&H20);  CHR$(&H0); CHR$(&H40);
220 LPRINT  CHR$(&H0);  CHR$(&H0);  CHR$(&H0);
230 LPRINT CHR$(&H3C);  CHR$(&H0);  CHR$(&H0);
240 LPRINT  CHR$(&H2);  CHR$(&H0);  CHR$(&H0);
250 LPRINT CHR$(27);"%";
260 LPRINT CHR$(12);CHR$(2);
270 LPRINT "! ! ! ! ! ! ! ! ! "
280 LPRINT CHR$(27);"%";
290 LPRINT CHR$(13);CHR$(0);
300 LPRINT "! ! ! ! ! ! ! ! ! "
310 LPRINT CHR$(27);"@";
320 END
```

Print example:

```
ESC & (m)(Cs)(Ce)(data)
(Define download character)

! ! ! ! ! ! ! ! ! !
T T T T T T T T T T
```

3.10 Bit Image Graphics

The printer can print characters and pictures as a collection of dots. This feature is called bit image graphics, and those commands that print bit images are called bit image commands.

The bit image command can be separated into 3 parts. The first part defines the image mode (8-dot or 24-dot, horizontal and vertical density of dots). The 8-dot or 24-dot stands for number of dots in a column. 8-dot image printing requires 1 data byte for a column and 24-dot requires 3 data bytes. The horizontal and vertical dot densities are specified by choosing from some combinations of them.

The second part gives number of the following image data bytes. Note that for 8-dot mode the number of columns equals the number of data bytes. For the 24-dot mode, the number of data bytes is 3 times the number of columns.

The last part gives image data. All bits of the data define whether each pin is fired or not. Note that 8-BIT must be selected in the WORD LG: item from the operator panel because one-byte data of the data part may be (FF)HEX at a maximum. The following figures help explain this.

ESC Y (n1)(n2)(data)

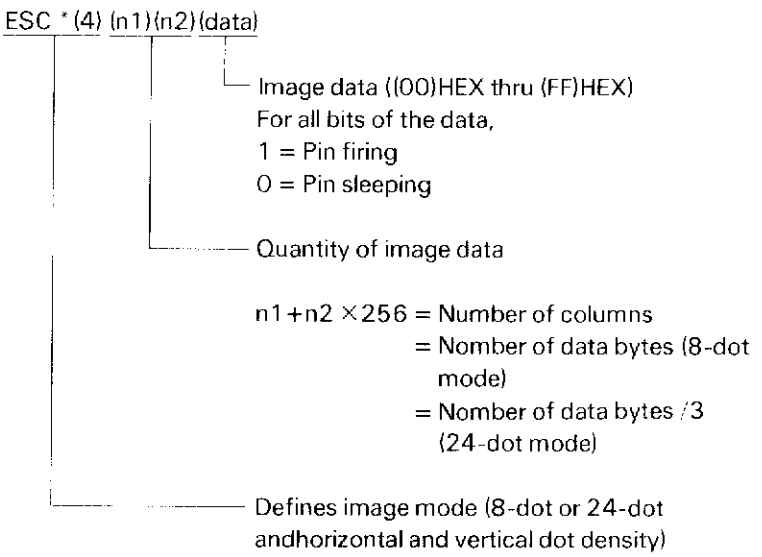


Figure 10 Construction of bit image command

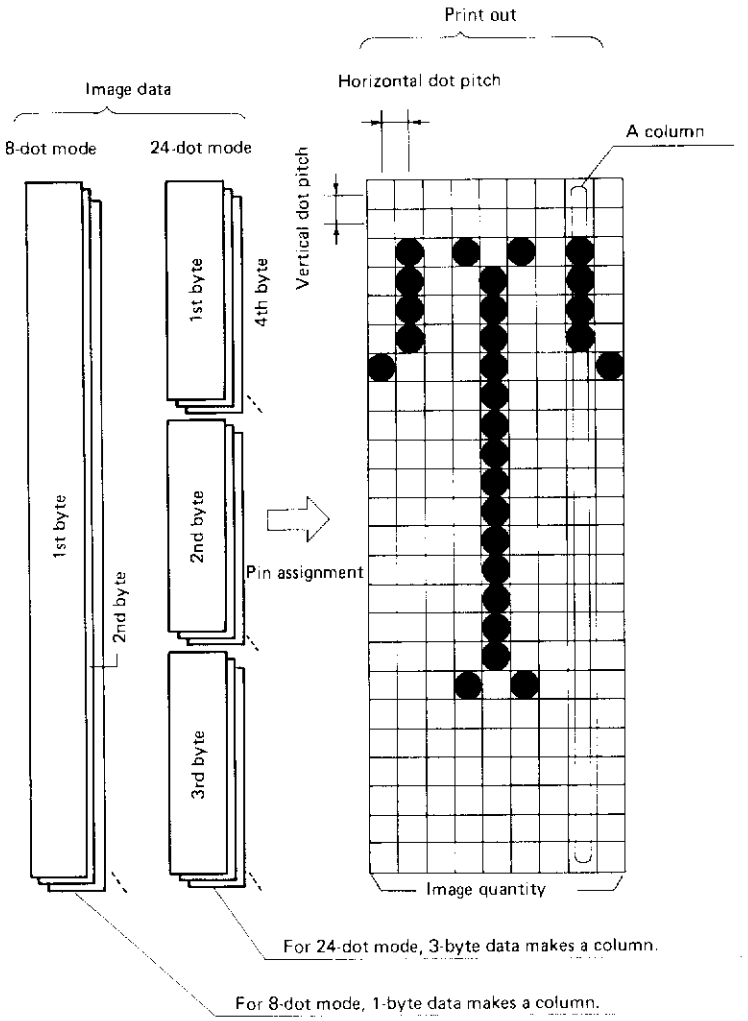
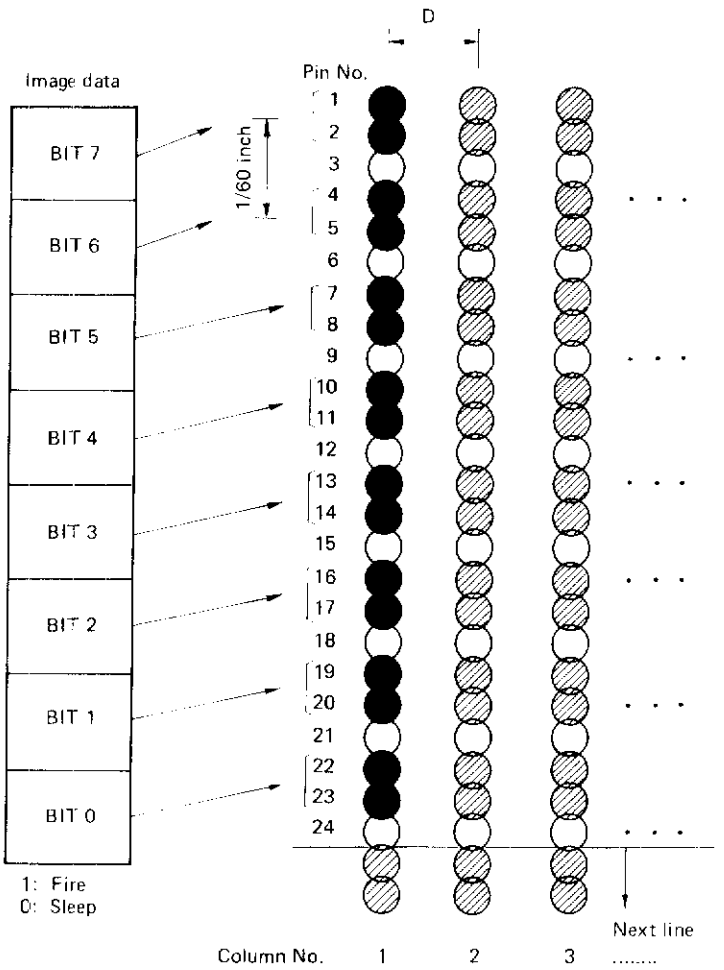
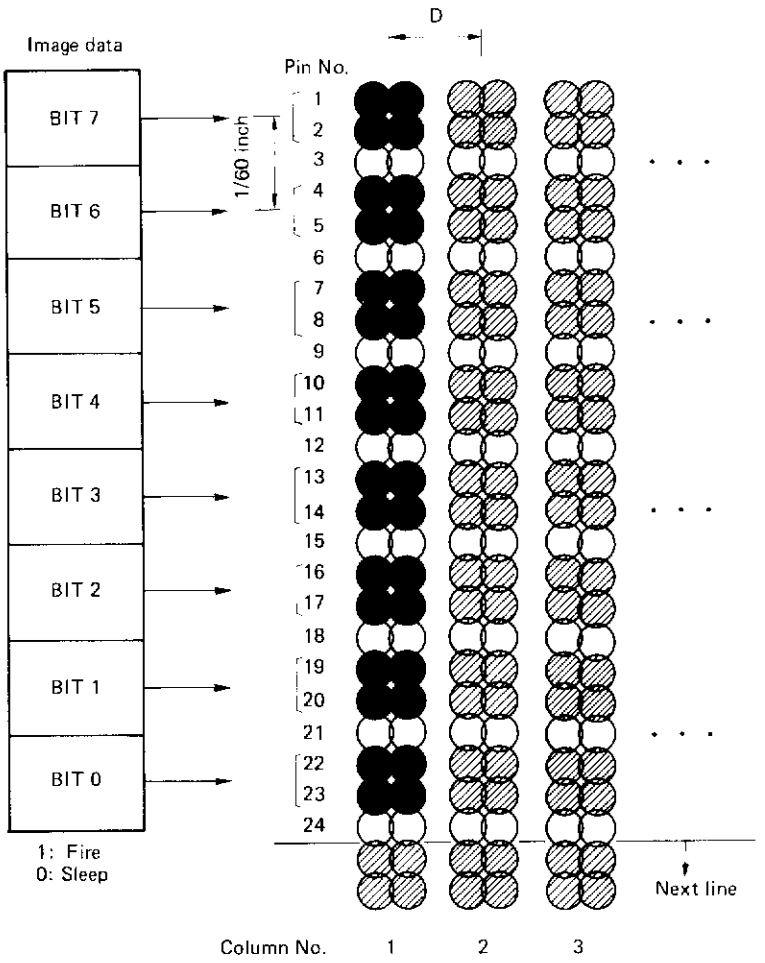


Figure 11 Outline of image printing

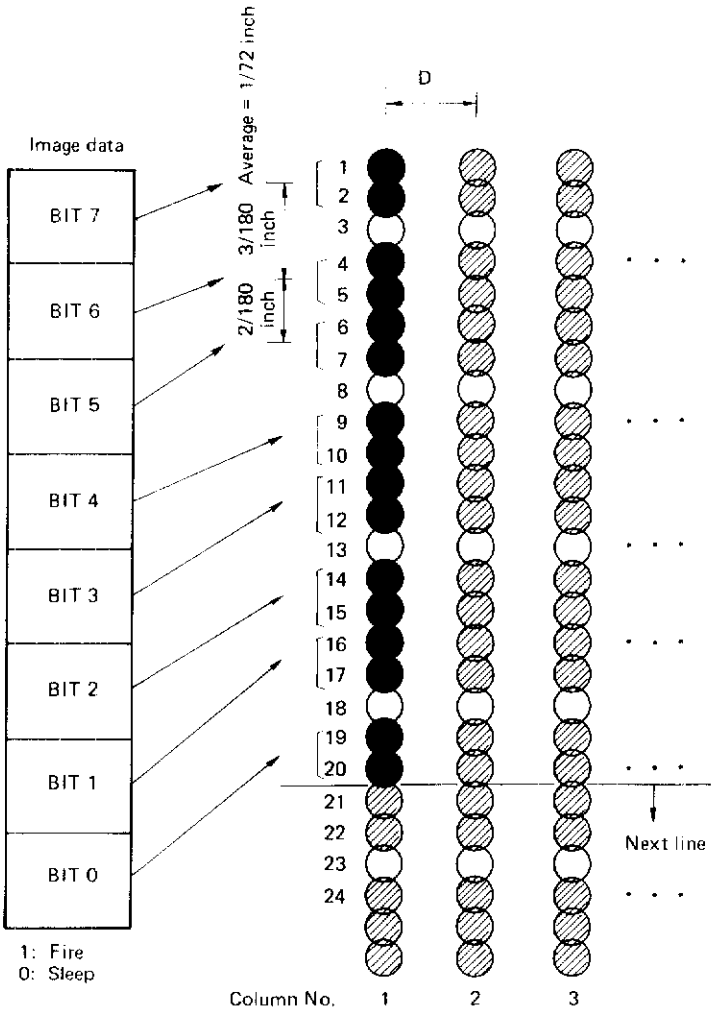


Emulation	Command	D [inch]
DPL24C	ESC K, ESC * (0)	1/50
	ESC L, ESC * (1)	1/100
	ESC Y, ESC * (2)	1/100 half density *1
	ESC Z, ESC * (3)	1/200 half density *1
	ESC * (5)	1/60
	ESC * (6)	1/90

*1 See Figure 12.

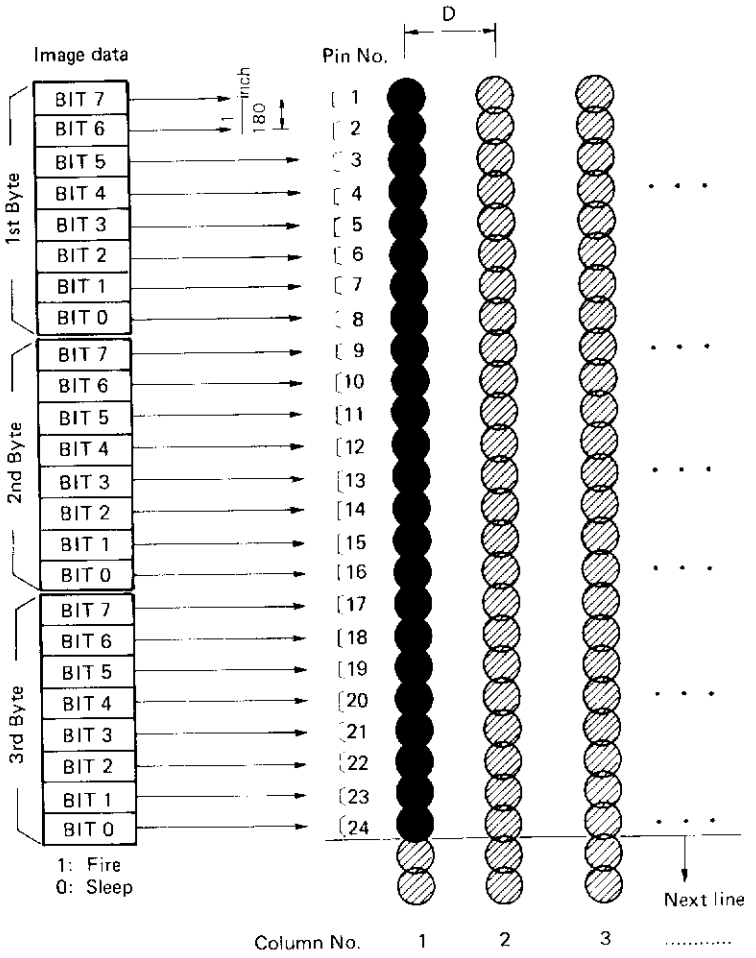


Emulation	Command	D [inch]
DPL24C	ESC * (4)	3/200 = 1/67



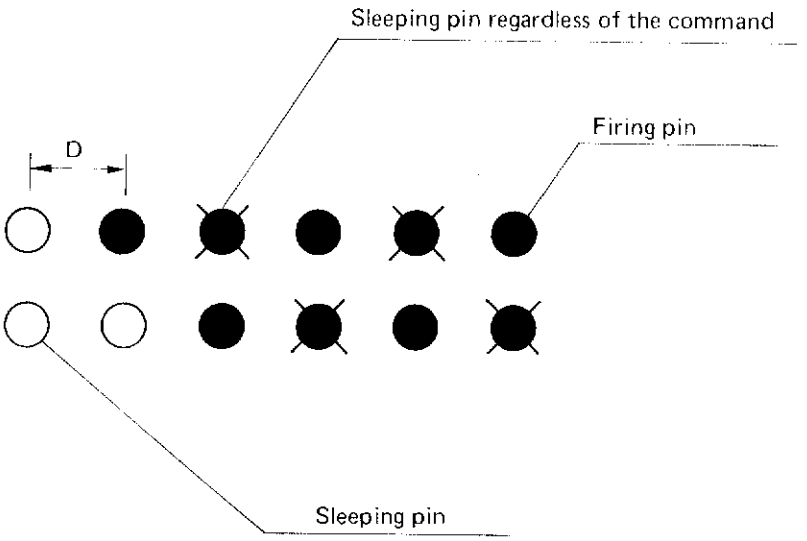
Emulation	Command	D [inch]
IBM GPH and FX-80	ESC K, ESC * (0)	1/60
	ESC L, ESC * (1)	1/120
	ESC Y, ESC * (2)	1/120 half density *1
	ESC Z, ESC * (3)	1/240 half density *1
	ESC * (4)	1/80
	ESC * (5)	1/72
	ESC * (6)	1/90

*1 See Figure 12.



Emulation	Command	D [inch]
DPL24C, IBM GPH, and FX-80	ESC * (32)	1/60
	ESC * (33)	1/120
	ESC * (38)	1/90
	ESC * (39)	1/180
	ESC * (40)	1/360 half density *1

*1 See Figure 12.



Emulation	Command	D [inch]
DPL24C, IBM	ESC Y, ESC * (2)	1/100 or 1/120
GPH, and FX-80	ESC Z, ESC * (3)	1/200 or 1/240
	ESC * (40)	1/360

Figure 12 Half density

If two adjacent dots at a distance of D shown in the above figure are specified to be fired, the right-side dot of the two dots cannot be fired and the dot rightward adjacent to the unfired dot is fired instead of the unfired dot. This half density control is done for high-speed printing.

The following descriptions give details for each command.

Code	Decimal	Hex	Function
ESC * (m) (n1) (n2) (data)	27 42 m n1 n2 data (0≤m≤40) (0≤n1≤255) (0≤n2≤19)	1B 2A m n1 n2 data (0≤m≤28) (0≤n1≤FF) (0≤n2≤13)	Various image mode printing

This command causes the printer to print image data starting from the current position for the quantity of one column to n1+n2×256 columns in the mode specified by m. See Table 21 for m values. This command prints only one line. A picture image may require several commands for printing the entire image.

The horizontal and vertical dot densities depend on the emulation types as shown in Table 20.

Table 20 Dot densities depending on emulation types (DPL24C, IBM GPH, and FX-80 emulations)

Emulation	Command	Mode	8-dot or 24-dot mode	Dot density (dots/inch)		Maximum data (inch)
				Horizontal	Vertical	
DPL24C	ESC *(0)	Single density	8	50	60	13.4
	ESC *(1)	Double density		100		13.4
	ESC *(2)	Double-speed double-density		100		13.4
	ESC *(3)	Quadruple density		200		13.4
	ESC *(4)	CRT graphics I		67(=200/3)		13.6
	ESC *(5)	Plotter image		60		13.6
	ESC *(6)	CRT graphics II		90		13.6
	ESC *(32)	Single density	24	60	180	13.6
	ESC *(33)	Double density		120		
	ESC *(38)	CRT graphics II		120		
	ESC *(39)	Triple density		180		
	ESC *(40)	Quadruple density		360		
IBM GPH, FX-80	ESC *(0)	Single density	8	60	72	13.6
	ESC *(1)	Double density		120		
	ESC *(2)	Double-speed double-density		120		
	ESC *(3)	Quadruple density		240		
	ESC *(4)	CRT graphics I		80		
	ESC *(5)	Plotter image		72		
	ESC *(6)	CRT graphics II		90		
	ESC *(32)	Single density	24	60	180	13.6
	ESC *(33)	Double density		120		
	ESC *(38)	CRT graphics II		90		
	ESC *(39)	Triple density		180		
	ESC *(40)	Quadruple density		360		

Note: The value (m) where ESC *(m) may replaced by one in Table 21.

Table 21 Value (m)

m	Decimal	Hexadecimal
0	0, 48	00, 30
1	1, 49	01, 31
2	2, 50	02, 32
3	3, 51	03, 33
4	4, 52	04, 34
5	5, 53	05, 35
6	6, 54	06, 36
32	32	20
33	33	21
38	38	26
39	39	27
40	40	28

The pin assignments for all modes are shown in the following figures.

Program example:

```
100 LPRINT "ESC *, ESC K, ESC L, ESC Y and ESC Z"
110 LPRINT "(Bit image printing)":LPRINT
120 LPRINT "ESC * (m)(n1)(n2)"
130 LPRINT "(Various image mode printing)":LPRINT
140 OPEN "LPT1:" AS #1: WIDTH #1,255
150 FOR I=0 TO 6
160   PRINT #1,"m= ";I;
170   PRINT #1,CHR$(27);"*";CHR$(I);
180   GOSUB 530
190 NEXT I
200 FOR I=32 TO 33
210   PRINT #1,"m=";I;
220   PRINT #1,CHR$(27);"*";CHR$(I);
230   GOSUB 610
240 NEXT I
250 FOR I=38 TO 40
260   PRINT #1,"m=";I;
270   PRINT #1,CHR$(27);"*";CHR$(I);
280   GOSUB 610
290 NEXT I
300 LPRINT:LPRINT
310 LPRINT "ESC K (n1)(n2)"
320 LPRINT "(Single-density image printing)"
330 PRINT #1, CHR$(27);"K";
340 GOSUB 710
350 LPRINT:LPRINT
360 LPRINT "ESC L (n1)(n2)"
370 LPRINT "(Double-density image printing)"
380 PRINT #1, CHR$(27);"L";
390 GOSUB 710
400 LPRINT:LPRINT
410 LPRINT "ESC Y (n1)(n2)"
420 LPRINT "(Double-speed,double-density image printing)"
430 PRINT #1, CHR$(27);"Y";
440 GOSUB 710
450 LPRINT:LPRINT
460 LPRINT "ESC Z (n1)(n2)"
470 LPRINT "(Quadruple-density image printing)"
480 PRINT #1, CHR$(27);"Z";
490 GOSUB 710
500 CLOSE #1
510 LPRINT CHR$(27);"@";
520 END
530 '--8-Bit image subroutine--
540 PRINT #1, CHR$(100 MOD 256);
550 PRINT #1, CHR$(INT(100/256));
560 FOR J=1 TO 100/2
570   PRINT #1, CHR$(170);CHR$(85);
580 NEXT J
590 PRINT #1, CHR$(13);CHR$(10);
600 RETURN
610 '--24Bit image subroutine--
620 PRINT #1, CHR$(100 MOD 256);
630 PRINT #1, CHR$(INT(100/256));
640 FOR J=1 TO 100/2
650   PRINT #1, CHR$(170);CHR$(170);
660   PRINT #1, CHR$(170);CHR$(85);
670   PRINT #1, CHR$(85);CHR$(85);
680 NEXT J
```

```
690 PRINT #1, CHR$(13);CHR$(10);
700 RETURN
710 '--Image subroutine--
720 PRINT #1, CHR$(100 MOD 256);
730 PRINT #1, CHR$(INT(100/256));
740 FOR I=1 TO 100/2
750   PRINT #1, CHR$(170);CHR$(85);
760 NEXT I
770 RETURN
```

Print example:

ESC *, ESC K, ESC L, ESC Y and ESC Z
(Bit image printing)

ESC * (m)(n1)(n2)
(Various image mode printing)

m= 0
m= 1
m= 2
m= 3
m= 4
m= 5
m= 6
m= 32
m= 33
m= 38
m= 39
m= 40

ESC K (n1)(n2)
(Single-density image printing)

ESC L (n1)(n2)
(Double-density image printing)

ESC Y (n1)(n2)
(Double-speed,double-density image printing)

ESC Z (n1)(n2)
(Quadruple-density image printing)

This part is intentionally left blank.

This part is intentionally left blank.

Code	Decimal	Hex	Function
ESC K (n1)(n2) (data)	27 75 n1 n2 data (0≦n1≦255) (0≦n2≦3)	1B 48 n1 n2 data (00≦n1≦FF) (00≦n2≦03)	Set single density image

This command (single-density image) corresponds to ESC * (0) command.

Code	Decimal	Hex	Function
ESC L(n1)(n2) (data)	27 76 n1 n2 data (0≦n1≦255) (0≦n2≦6)	1B 4C n1 n2 data (00≦n1≦FF) (00≦n2≦06)	Set double density image

This command (double density image) code corresponds to ESC * (1) command.

Code	Decimal	Hex	Function
ESC Y(n1)(n2) (data)	27 89 n1 n2 data (0≦n1≦255) (0≦n2≦6)	1B 59 n1 n2 data (00≦n1≦FF) (00≦n2≦06)	Set double speed double density image

This command (double-speed, double-density image) corresponds to ESC * (2) command.

Code	Decimal	Hex	Function
ESC Z(n1)(n2) (data)	27 90 n1 n2 data (0≦n1≦255) (0≦n2≦12)	1B 5A n1 n2 data (00≦n1≦FF) (00≦n2≦0C)	Set quadruple density image

This command (quadruple-density image) code corresponds to ESC * (3) command.

3.11 Cut Sheet Feeder Control

There are few models of cut sheet feeders available for use with the printer. See OPTIONS page in this manual.

NOTES:

1. For M2.0, M2.1, and M3.0 printers, please check if the setting in the printer matches an installed cut sheet feeder. And set the friction control lever to the cut sheet side to print on the paper in the cut sheet feeder. Otherwize, the continuous paper may be used and any cut sheet feeder commands are ignored.

2. All cut sheet feeder commands are ignored if any cut sheet feeders are not installed to the printer.

All models of cut sheet feeder can be controlled by ESC commands and select commands (//X//) from the host system.

The ESC commands below affect the feeder immediately. However, the select commands select bins only. A subsequent forms feed (FF) or line feed (LF) exceeding a page boundary causes the continuous feeding of paper in the last selected bin. Page size definition is the same, with or without a feeder. The ESC C(n) and ESC FF(n) code specify the number of lines per page. The select commands must start and finish with a CR or LF command. Note that the carriage return (CR) or line feed (LF) commands are executed, but the code //X// ("X" stands for "1", "2", "R" or "C" for the successful commands and the other characters for unsuccessful) is not printed out like 5 space commands.

Code	Decimal	Hex	Function
ESC EM 1	27 25 49	1B 19 31	Feed from bin 1

This command ejects the paper from the platen to the output stacker, and feeds a new sheet from bin 1 to print line 1 (Top of Form).

NOTE:
This command is ignored if no cut sheet feeder is installed.

Code	Decimal	Hex	Function
ESC EM 2	27 25 50	1B 19 32	Feed from bin 2

This command is the same as the ESC EM 1 command, except that it applies to bin 2.

NOTE:
This command is ignored if no double or triple bin type cut sheet feeder is installed.

Code	Decimal	Hex	Function
ESC EM E	27 25 69	1B 19 45	Feed from bin 3

This command is the same as the ESC EM 1 command, except that it applies to bin 3 (envelope magazine).

NOTE:
This command is ignored if no triple bin type cut sheet feeder is installed.

Code	Decimal	Hex	Function
ESC EM R	27 25 82	1B 19 52	Eject paper

This command ejects the paper in the platen to the output stacker without feeding a new sheet.

NOTE:
This command is ignored if no cut sheet feeder is installed.

Program example:

```
100 LPRINT CHR$(27);CHR$(25);"1";
110 LPRINT "CUT SHEET FEEDER  FEED FROM BIN 1"
120 LPRINT CHR$(12);
130 LPRINT CHR$(27);CHR$(25);"2";
140 LPRINT "CUT SHEET FEEDER  FEED FROM BIN 2"
150 LPRINT CHR$(12);
160 INPUT "Please head gap adjustment = D ";A$
170 LPRINT CHR$(27);CHR$(25);"E";
180 LPRINT "CUT SHEET FEEDER  FEED FROM BIN 3"
190 LPRINT "CUT SHEET FEEDER  PAPER EJECT"
200 LPRINT CHR$(27);CHR$(25);"R";
210 LPRINT CHR$(27);"@";
220 END
```

Code	Decimal	Hex	Function
//1//	47 47 49 47 47	2F 2F 31 2F 2F	Select bin 1

This command must enclosed with CR or LF out of the above sequence.

This command selects feeding of a new sheet of paper from bin 1 to top margin for a subsequent FF of LF exceeding a paper boundary.

NOTE:
This command is ignored if no cut sheet feeder is installed.

Code	Decimal	Hex	Function
//2//	47 47 50 47 47	2F 2F 32 2F 2F	Select bin 2

This command must enclosed with CR or LF out of the above sequence.

This command is the same as the //1// command, except that it applies to bin 2.

NOTE:
This command is ignored if no double or triple bin type cut sheet feeder is installed.

See the //1// command for the program example.

Code	Decimal	Hex	Function
//E//	47 47 69 47 47	2F 2F 45 2F 2F	Select bin 3

This command must enclosed with CR or LF out of the above sequence.

This command is the same as the //1// command, except that is applies to bin 3.

NOTE:
This command is ignored if no triple pin type cut sheet feeder is installed.

See the //1// command for the program example.

Code	Decimal	Hex	Function
//R//	47 47 82 47 47	2F 2F 52 2F 2F	Select ejection

This command must enclosed with CR or LF out of the above sequence.

This command makes the printer eject the paper to the output stacker without feeding a new sheet when a subsequent FF or LFs are received exceeding a paper boundary. Note that this function is standard feature without the command, so the user need not use it. It is included only to keep compatibility with the other printers.

NOTE:
This command is ignored if no cut sheet feeder is installed.

Code	Decimal	Hex	Function
//C//	47 47 67 47 47	2F 2F 43 2F 2F	Select change bins

This command must enclosed with CR or LF out of the above sequence.

This command selects bin 1 for first paper feed, then selects bin 2 for subsequent paper feed or until a new command is issued.

This command is convenient for making a letter, that is, this command can print the first page using a letterhead with the company name, set in bin 1, and subsequent pages using usual blank paper set in bin 2.

NOTE:
This command is ignored if no double bin type cut sheet feeder is installed.

See the //1// command for the program example.

```
100 LPRINT CHR$(13);"//1//";CHR$(13);
110 LPRINT "CUT SHEET FEEDER  BIN 1 SELECT"
120 LPRINT "PAGE 1"
130 LPRINT CHR$(12);
140 LPRINT CHR$(13);"//2//";CHR$(13);
150 LPRINT "CUT SHEET FEEDER  BIN 2 SELECT"
160 LPRINT "PAGE 2"
170 LPRINT CHR$(12);
180 LPRINT CHR$(13);"//C//";CHR$(13);
190 LPRINT "CUT SHEET FEEDER  BIN 1 SELECT"
200 LPRINT "PAGE 3"
210 LPRINT CHR$(12);
220 LPRINT "CUT SHEET FEEDER  BIN 2 SELECT"
230 LPRINT "PAGE 4"
240 LPRINT CHR$(12);
250 LPRINT "CUT SHEET FEEDER  BIN 2 SELECT"
260 LPRINT "PAGE 5"
270 LPRINT CHR$(12);
280 INPUT "Please set the head gap adjustment lever to D ";A$
290 LPRINT CHR$(13);"//E//";CHR$(13);
300 LPRINT "CUT SHEET FEEDER  BIN 3 SELECT"
310 LPRINT "PAGE 6"
320 LPRINT CHR$(13);"//R//";CHR$(13);
330 LPRINT CHR$(12);
340 LPRINT CHR$(27);"@";
350 END
```

3.12 Reset and Sense Control

This type of command is called a direct execution command because it is executed immediately after the command is received in the receive buffer.

Code	Decimal	Hex	Function
ESC SUB I	27 26 73	1B 1A 49	Initialize printer

This command forcibly resets the printer, even in an error state. The printer executes this command immediately after receiving the command without queueing it in the buffer, unlike corresponding code ESC @ and ESC CR P.

See ESC @.

Program example:

```
100 LPRINT "ESC SUB I"
110 LPRINT "(Printer initialize)"
120 LPRINT
130 FOR I=0 TO 10000:NEXT I
140 OPEN"LPT1:" AS #1:WIDTH #1,255
150 PRINT #1,"ABCDEFG";
160 PRINT #1,CHR$(27);CHR$(26+128);"I";
170 PRINT #1,"HIJKLMNOPQRSTUVWXYZ";
180 PRINT #1,CHR$(13);CHR$(10);
190 CLOSE #1
200 LPRINT CHR$(27);"@";
210 END
```

Print example:

```
ESC SUB I
(Printer initialize)

HIJKLMNOPQRSTUVWXYZ
```

3.13 Bar Code Pattern Printing (M3.0 printers only)

Code	Decimal	Hex	Function
ESC DC4 (b) "R"(c)	27 20 b 82 c	1B 14 b 52 c	Bar Code
(w)(h)(a)(ch1)...(chn)	w h a ch1...chn	w h a ch1...chn	Pattern printing

This command prints a bar code pattern which is used for POS systems and factory control systems.

The parameters of the command are:

(b): Byte count of the following bytes including this.

"R": Identifier of this command. Must be ASCII "R" (52H).

(c): What kind of the coding system is used.

(c)	Coding System
"1" (31H)	Codabar (nw-7)
"2" (32H)	EAN 13
"3" (33H)	EAN 8
"4" (34H)	Code 3 of 9
"5" (35H)	Industrial 2 of 5
"6" (36H)	Interleaved 2 of 5
"7" (37H)	Matrix 2 of 5
"A" (41H)	UPC type A

(w): Width of the narrow bar.

(w) (Decimal)	Width of the narrow bar (at 180 DPI)
0 to 19	2 dots
20 to 27	3 dots
28 to 255	4 dots

(h): Height of the bar in multiples of (w) above. (1/1440 inch unit)

(a): Atributes of the bar code, assigned bit by bit. Check digit is printed if bit 0 is 0; OCR-B font characters are printed under the bar code pattern if bit 1 is 0; and the flag character of the EAN and UPC coding is printed at the left to the pattern if bit 2 is 0, else left under the pattern. The other bits are all ignored.
Check digit is always printed for Codabar coding, and it is never printed for EAN and UPC coding regardless of the bit 0 above.

(ch1) ... (chn): Characters which will be coded to groups of bars. Character set and allowable number of characters for each conding system are shown below:

(c)	Coding System	Character Set	No. of Chrs
"1" (31H)	Codabar (nw-7)**	0123456789+–.$/ : ABCDETNabcdetn*	1 to 34
"2" (32H)	EAN 13	0123456789	12
"3" (33H)	EAN 8	0123456789	7
"4" (34H)	Code 3 of 9***	0123456789+–.$/ % (sp) ABC ... XYZ	1 to 30*
"5" (35H)	Industrial 2 of 5	0123456789	1 to 32*
"6" (36H)	Interleaved 2 of 5****	0123456789	1 to 32*
"7" (37H)	Materix 2 of 5	0123456789	1 to 32*
"A" (41H)	UPC type A	0123456789	11

* The alphabetical (A-E, T, N, a-e, t, n) and asterisk (*) characters for start and stop code must be added by the programmer. The small letters in the above may be changed to the capital OCR-B font characters.

** Including check digit if any.

*** Two asteriak (*) characters are automatically added at the before and the after the coded characters.

**** Zero character (0) may be automatically added if the number of the characters is odd.

The Bar Code Manual is issued for more detail descriptions.

Program example:

```
100 D$ = "123456789012"
110 B = LEN(D$)*6
120 C$ = "2"
130 W = 24
140 HEIGHT = 1440
150 H = INT(HEIGHT/W)
160 A = &H1
170 LPRINT "A";"  ";
180 LPRINT CHR$(27);CHR$(20);
190 LPRINT CHR$(B);
200 LPRINT "R";
210 LPRINT C$;CHR$(W);
220 LPRINT CHR$(H);CHR$(A);
230 LPRINT D$;
240 LPRINT "  ";"  ";"B";
250 LPRINT CHR$(10);
260 END
```

Print example:

APPENDIX A
COMMAND QUICK REFERENCE TABLES

The following tables show commands and their reference pages in function order and alphabetical order.

A.1 In Function Order

Function	ASCII	Decimal	Hex	DP240/I Org.	DP240/I Edu.	IBM-CPH Org.	IBM-CPH Edu.	PX/JX80 Org.	PX/JX80 Edu.	Page
3.3 Print mode commands										
Set one-line double width mode	SO	14	0E	X	X	X	X	X	X	3–3
Set one-line double width mode	ESC SO	27 14	1B 0E	X	X	-	X	X	X	3–3
Reset one-line double width mode	DC4	20	14	X	X	X	X	X	X	3–3
Reset one-line double width mode	CR	13	0D	X	X	X	X	X	X	3–3
Reset one-line double width mode	ESC 1 (0)	27 33 00	1B 21 00	X	X	-	X	X	X	3–3
Reset one-line double width mode	ESC W (0)	27 87 00	1B 57 00	X	X	X	X	X	X	3–3
Reset one-line double width mode	LF	10	0A	X	X	X	X	X	X	3–3
Reset one-line double width mode	FF	12	0C	X	X	X	X	X	X	3–3
Reset one-line double width mode	ESC LF	27 10	1B 0A	X	X	-	X	-	X	3–3
Reset one-line double width mode	ESC J (n)	27 74 n	1B 4A n	X	X	X	X	X	X	3–3
Reset one-line double width mode	ESC 3 (n)	27 106 n	1B 6A n	X	X	-	X	X	X	3–3
Reset one-line double width mode	VT	11	0B	X	X	-	X	X	X	3–3
Reset one-line double width mode	ESC VT (n)	27 11 n	1B 0B n	X	X	-	X	-	X	3–3
Reset double width mode	CAN	24	18	X	X	-	X	-	X	3–3
Set double width mode	ESC W (1)	27 87 01	1B 57 01	X	X	X	X	X	X	3–4
Reset double width mode	ESC W (0)	27 87 00	1B 57 00	X	X	X	X	X	X	3–4
Reset double width mode	ESC ! (0)	27 33 00	1B 21 00	X	X	-	X	X	X	3–4
Set double height mode	ESC V (1)	27 86 49	1B 56 31	X	X	-	X	-	X	3–5
Reset double height mode	ESC V (0)	27 86 48	1B 56 30	X	X	-	X	X	X	3–5
Set condensed mode	SI	15	0F	X	X	X	X	X	X	3–4
Set condensed mode	ESC SI	27 15	1B 0F	X	X	-	X	X	X	3–4
Reset condensed mode	DC2	18	12	X	X	X	X	X	X	3–4
Reset condensed mode	ESC ! (n)	27 33 n	1B 21 nn	X	X	-	X	X	X	3–4
Set underline mode	ESC - (1)	27 45 01	1B 2D 01	X	X	X	X	X	X	3–8
Reset underline mode	ESC - (0)	27 45 48	1B 2D 00	X	X	X	X	X	X	3–8
Reset underline mode	ESC X	27 120	1B 78	X	X	-	X	-	X	3–8
Set shadow print mode	ESC E	27 69	1B 45	X	X	X	X	X	X	3–6
Reset shadow print mode	ESC F	27 70	1B 46	X	X	X	X	X	X	3–6
Reset shadow print mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3–6
Set bold print mode	ESC G	27 71	1B 47	X	X	X	X	X	X	3–7
Reset bold print mode	ESC H	27 72	1B 48	X	X	X	X	X	X	3–7
Reset bold print mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3–7
Set Italic print mode	ESC 4	27 52	1B 34	X	X	-	X	X	X	3–10

Function	ASCII	Decimal	Hex	DP24C/I Orig.	DP24C/I Emu.	IBM-GPH Orig.	IBM-GPH Emu.	FX/JX80 Orig.	FX/JX80 Emu.	Page
Reset Italic print mode	ESC 5	27 53	1B 35	X	X	-	X	X	X	3-10
Set superscript mode	ESC S (0)	27 83 00	1B 53 00	X	X	X	X	X	X	3-9
Reset superscript mode	ESC T	27 84	1B 54	X	X	X	X	X	X	3-9
Set subscript mode	ESC S (1)	27 83 01	1B 53 01	X	X	X	X	X	X	3-10
Reset subscript mode	ESC T	27 84	1B 54	X	X	X	X	X	X	3-10
Set proportional spacing mode	ESC p (1)	27 112 01	1B 70 01	X	X	-	X	X	X	3-12
Reset proportional spacing mode	ESC p (0)	27 112 00	1B 70 00	X	X	-	X	X	X	3-12
Various print modes	ESC ! (n)	27 33 n	1B 21 n	X	X	-	X	X	X	3-12
3.3.1 Horizontal motion commands										
Space	SP	32	20	X	X	X	X	X	X	3-16
Backspace	BS	08	08	X	X	-	X	X	X	3-16
Carriage return	CR	13	0D	X	X	X	X	X	X	3-16
3.3.2 Horizontal spacing change commands										
Set Pica pitch	ESC P	27 80	1B 50	X	X	-	X	X	X	3-16
Set Elite pitch	ESC M	27 77	1B 4D	X	X	-	X	X	X	3-16
Horizontal spacing to (n-1)/120 inch	ESC SP (n)	27 32 n	1B 1F n	X	X	-	X	-	X	3-17
Horizontal spacing to n/180 inch	ESC h (n)	27 104 n	1B 68 n	X	X	-	X	-	X	3-18
Character offset selection	ESC DC1 (n)	27 17 n	1B 11 n	X	X	-	X	-	X	3-20
Cancel offset selection	ESC x	27 120	1B 78	X	X	-	X	-	X	3-20
Cancel offset selection	CR	13	0D	X	X	-	X	-	X	3-20
3.4.1 Vertical motion commands										
Linefeed	LF	10	0A	X	X	X	X	X	X	3-22
Negative linefeed	ESC LF	27 10	1B 0A	X	X	-	X	-	X	3-22
Form feed	FF	12	0C	X	X	X	X	X	X	3-23
Single linefeed (n/180 inch)	ESC J (n)	27 74 n	1B 4A n	X	X	-	-	-	-	3-23
Single linefeed (n/216 inch)	ESC J (n)	27 74 n	1B 4A n	-	-	X	X	X	X	3-23
Single linefeed backward (n/180 inch)	ESC j (n)	27 106 n	1B 6A n	X	X	-	-	-	-	3-24
Single linefeed backward (n/216 inch)	ESC j (n)	27 106 n	1B 6A n	-	-	-	X	X	X	3-24
3.4.2 Vertical spacing change commands										

	Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPH		FX/EX80		Page
					Org.	Emu.	Org.	Emu.	Org.	Emu.	
	Set line spacing to 1/8 inch	ESC 0	27 48	1B 30	X	X	X	X	X	X	3-25
	Set linespacing to 7/72 inch	ESC 1	27 49	1B 31	-	-	X	X	X	X	3-27
	Set linespacing to 7/60 inch	ESC 1	27 49	1B 31	X	X	-	-	-	-	3-27
	Set linespacing to n/216 inch	ESC 3 (n)	27 51 n	1B 33 n	-	-	X	X	X	X	3-26
	Set linespacing to n/180 inch	ESC 3 (n)	27 51 n	1B 33 n	X	X	-	-	-	-	3-26
	Set line spacing to n/72 inch	ESC A (n)	27 65 n	1B 41 n	-	-	-	-	X	X	3-28
	Set line spacing to n/60 inch	ESC A (n)	27 65 n	1B 41 n	X	X	-	-	-	-	3-28
	Set line spacing to 1/6 inch	ESC 2	27 50	1B 32	X	X	X	-	X	X	3-28
	Preset line spacing to n/72 inch	ESC A (n)	27 65 n	1B 41 n	-	-	X	X	-	-	3-28
	Preset line spacing to n/60 inch	ESC A (n)	27 65 n	1B 41 n	X	X	-	-	-	-	3-28
	Mainly set line spacing	ESC 2	27 50	1B 32	X	X	-	X	-	-	3-28
3.5.1	Horizontal tabbing										
	Set horizontal tabs	ESC D (n1)...(nk) NUL	27 68 n1...nk 00	1B 44 n1...nk 00	X	X	X	X	X	X	3-31
	Reset all horizontal tabs	ESC D NUL	27 68 00	1B 44 00	X	X	X	X	X	X	3-31
	Horizontal tab execution	HT	09	09	X	X	X	X	X	X	3-32
	Absolute horizontal tab execution	ESC HT (n)	27 09 n	1B 09 n	X	X	-	X	-	X	3-33
	Absolute print position (n/360 inch)	ESC $ (n1)(n2)	27 36 n1 n2	1B 24 n1 n2	X	X	-	X	-	X	3-34
3.5.2	Vertical tabbing										
	Set vertical tabs	ESC B (n1)...(nk) NUL	27 66 n1...nk 00	1B 42 n1...nk 00	X	X	X	X	X	X	3-35
	Reset all vertical tabs	ESC B NUL	27 66 00	1B 42 00	X	X	-	X	X	X	3-35
	Vertical tab execution	VT	11	0B	X	X	X	X	X	X	3-36
	VFU channel selection	ESC / (n)	27 47 n	1B 2F n	-	-	-	-	X	-	-
	VFU position setting	ESC b (n)(data) NUL	27 98 n data 0	1B 62 n data 00	-	-	-	-	X	-	-
	Absolute vertical tab execution	ESC VT (n)	27 11 n	1B 0B n	X	X	-	X	-	X	3-37
3.6	Page formatting										
	Set right margin	ESC Q (n)	27 81 n	1B 51 n	X	X	-	X	X	X	3-39
	Set left margin	ESC l (n)	27 108 n	1B 6C n	X	X	-	X	X	X	3-40
	Set skip perforations	ESC N (n)	27 78 n	1B 4E n	X	X	X	X	X	X	3-41

	Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPH		FX/JX80		Page
					Org.	Emu.	Org.	Emu.	Org.	Emu.	
	Reset skip perforations	ESC O	27 79	1B 4F	X	X	X	X	X	X	3-41
	Set form length by lines	ESC C (n)	27 67 n	1B 43 n	X	X	X	X	X	X	3-43
	Set form length by lines	ESC FF (n)	27 12 n	1B 0C n	X	X	-	X	-	X	3-43
	Set form length by inches	ESC C NUL (n)	27 67 00 n	1B 43 00 n	X	X	X	X	X	X	3-43
	Set form length by inches	ESC FF NUL (n)	27 12 00 n	1B 0C 00 n	X	X	-	X	-	X	3-43
3.7.1	Input data controls										
	Set character set to set 2	ESC 6	27 54	1B 36	X	X	X	X	-	X	3-44
	Set character set to set 1	ESC 7	27 55	1B 37	X	X	X	X	-	X	3-44
	Printable code area expansion	ESC 6	27 54	1B 36	-	-	-	-	X	-	-
	Cancel printable code area	ESC 7	27 55	1B 37	-	-	-	-	X	-	-
	Enable expanded characters	ESC I (1)	27 73 01	1B 49 01	-	-	-	-	X	-	-
	Disable expanded characters	ESC I (0)	27 73 00	1B 49 00	-	-	-	-	X	-	-
	International characters	ESC R (n)	27 82 n	1B 52 n	X	X	-	X	X	X	3-45
	Cancel line buffer	CAN	24	18	X	X	X	X	X	X	3-46
	Delete last printable character	DEL	127	7F	-	-	-	-	X	-	-
	Select the printer	DC1	17	11	X	X	-	X	X	X	3-47
	Deselect the printer	DC3	19	13	X	X	-	X	X	X	3-47
	Deselect the printer	ESC Q (3)	27 81 03	1B 51 03	-	-	-	-	-	-	-
	Force MSB to 1	ESC >	27 62	1B 3E	X	X	-	X	X	X	3-49
	Force MSB to 0	ESC =	27 61	1B 3D	X	X	-	X	X	X	3-49
	Cancel MSB control	ESC #	27 35	1B 23	X	X	-	X	X	X	3-49
3.7	Miscellaneous commands										
	Select print color	ESC r (n)	27 114 n	1B 72 n	X(*1)	X(*1)	-	X	X(*1)	X(*1)	3-50
	Bell	BEL	07	07	X	X	X	X	X	X	3-52
	Detect paper end sensor	ESC 9	27 57	1B 39	X	X	X	X	X	X	3-53
	Ignore paper end sensor	ESC 8	27 56	1B 38	X	X	X	X	X	X	3-53
	Start half speed printing	ESC s (1)	27 115 01	1B 73 01	-	-	-	-	X	-	-
	End half speed printing	ESC s (0)	27 115 00	1B 73 00	-	-	-	-	X	-	-
	Set typwriter mode	ESC i (1)	27 105 01	1B 69 01	X	X	-	X	X	X	3-53
	Reset typewriter mode	ESC i (0)	27 105 00	1B 69 00	X	X	-	X	X	X	3-53
	Set home head	ESC <	27 60	1B 3C	X	X	X	X	X	X	3-54

	Function	ASCII	Decimal	Hex	DP24C/E		IBM-GPH		FX/JX80		Page
					Org.	Emu.	Org.	Emu.	Org.	Emu.	
	Unidirectional printing	ESC U (1)	27 85 01	1B 55 01	X	X	X	X	X	X	3-55
	Bidirectional printing	ESC U (0)	27 85 00	1B 55 00	X	X	X	X	X	X	3-55
	Remote reset	ESC @	27 64	1B 40	X	X	-	X	X	X	3-54
	Remote reset	ESC CR P	27 13 80	1B 0D 50	X	X	-	X	-	X	3-54
3.8	Word processing commands										
	Enter auto justify mode	ESC a	27 109	1B 6D	X	X	-	X	-	X	3-57
	Exit auto justify mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3-57
3.9	Font controls and downloading										
	Font select	ESC % (m) (n)	27 37 m n	1B 25 m n	X	X	-	X	X	X	3-58
	Font copy	ESC : NUL (m)(n)	27 58 00 m n	1B 3A 00 m n	X	X	-	X	X	X	3-63
	Down loading (8-pin format)	ESC & (m)(Cs)(Ce)(data)	27 38 m Cs Ce data	1B 26 m Cs Ce data	-	-	-	-	X	-	-
	Down loading (24-pin format)	ESC & (m)(Cs)(Ce)(data)	27 38 m Cs Ce data	1B 26 m Cs Ce data	X	X	-	X	-	X	3-67
3.10	Bit image graphics										3-71
	Single density image (8,60x60)	ESC K (n1)(n2)(data)	27 75 n1 n2 data	1B 4B n1 n2 data	X	X	-	-	-	-	3-86
	Single density image (8,66x72)	ESC K (n1)(n2)(data)	27 75 n1 n2 data	1B 4B n1 n2 data	-	-	X	X	X	X	3-86
	Double density image (8,120x60)	ESC L (n1)(n2)(data)	27 76 n1 n2 data	1B 4C n1 n2 data	X	X	-	-	-	-	3-86
	Double density image (8,126x72)	ESC L (n1)(n2)(data)	27 76 n1 n2 data	1B 4C n1 n2 data	-		X	X	X	X	3-86
	Double speed double density image (8,120x60)	ESC Y (n1)(n2)(data)	27 89 n1 n2 data	1B 59 n1 n2 data	X	X	-	-	-	-	3-86
	Double speed double density image (8,126x72)	ESC Y (n1)(n2)(data)	27 89 n1 n2 data	1B 59 n1 n2 data	-	-	X	X	X	X	3-86
	Quadruple density image (8,200x60)	ESC Z (n1)(n2)(data)	27 90 n1 n2 data	1B 5A n1 n2 data	X	X	-	-	-	-	3-86
	Quadruple density image (8,240x72)	ESC Z (n1)(n2)(data)	27 90 n1 n2 data	1B 5A n1 n2 data	-	-	X	X	X	X	3-86
	Image printing (8,60x60)	ESC * (00)(n1)(n2)(data)	27 42 00 n1 n2 data	1B 2A 00 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,69x72)	ESC * (00)(n1)(n2)(data)	27 42 00 n1 n2 data	1B 2A 00 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (8,100x60)	ESC * (01)(n1)(n2)(data)	27 42 01 n1 n2 data	1B 2A 01 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,120x72)	ESC * (01)(n1)(n2)(data)	27 42 01 n1 n2 data	1B 2A 01 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (8,100x60 M-speed)	ESC * (02)(n1)(n2)(data)	27 42 02 n1 n2 data	1B 2A 02 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,120x72 M-speed)	ESC * (02)(n1)(n2)(data)	27 42 02 n1 n2 data	1B 2A 02 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (8,200x60)	ESC * (03)(n1)(n2)(data)	27 42 03 n1 n2 data	1B 2A 03 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,240x72)	ESC * (03)(n1)(n2)(data)	27 42 03 n1 n2 data	1B 2A 03 n1 n2 data	-	-	-	X	X	X	3-79

	Function	ASCII	Decimal	Hex	DP24C/1		IBM-GPH		FX/JX80		Page
					Org.	Emu.	Org.	Epo.	Org.	Emu.	
	Image printing (8,67x60)	ESC * (04)(n1)(n2)(data)	27 42 04 n1 n2 data	1B 2A 04 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,80x72)	ESC * (04)(n1)(n2)(data)	27 42 04 n1 n2 data	1B 2A 04 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (8,60x60)	ESC * (05)(n1)(n2)(data)	27 42 05 n1 n2 data	1B 2A 05 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,72x72)	ESC * (05)(n1)(n2)(data)	27 42 05 n1 n2 data	1B 2A 05 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (8,90x60)	ESC * (06)(n1)(n2)(data)	27 42 06 n1 n2 data	1B 2A 06 n1 n2 data	X	X	-	-	-	-	3-79
	Image printing (8,90x72)	ESC * (06)(n1)(n2)(data)	27 42 06 n1 n2 data	1B 2A 06 n1 n2 data	-	-	-	X	X	X	3-79
	Image printing (24,60x180)	ESC * (32)(n1)(n2)(data)	27 42 32 n1 n2 data	1B 2A 20 n1 n2 data	X	X	-	X	-	X	3-79
	Image printing (24,120x180)	ESC * (33)(n1)(n2)(data)	27 42 33 n1 n2 data	1B 2A 21 n1 n2 data	X	X	-	X	-	X	3-79
	Image printing (24,90x180)	ESC * (38)(n1)(n2)(data)	27 42 38 n1 n2 data	1B 2A 26 n1 n2 data	X	X	-	X	-	X	3-79
	Image printing (24,180x180)	ESC * (39)(n1)(n2)(data)	27 42 39 n1 n2 data	1B 2A 27 n1 n2 data	X	X	-	X	-	X	3-79
	Image printing (24,360x180)	ESC * (40)(n1)(n2)(data)	27 42 40 n1 n2 data	1B 2A 28 n1 n2 data	X	X	-	X	-	X	3-79
	Assign bit image modes	ESC ? (1)(m)	27 63 1 m	1B 3F 1 m	-	-	-	-	X	-	-
	9-pin bit image printing	ESC ^ (m)(n1)(n2)(data)	27 94 m n1 n2 data	1B 5E m n1 n2 data	-	-	-	-	X	-	-
3.11	Cut sheet feeder controls										3-87
	Feed from bin 1	ESC EM 1	27 25 49	1B 19 31	X	X	-	X	-	X	3-88
	Feed from bin 2	ESC EM 2	27 25 50	1B 19 32	X	X	-	X	-	X	3-88
	Feed from bin 3 (envelope)	ESC EM E	27 25 69	1B 19 45	X	X	-	X	-	X	3-88
	Remove paper	ESC EM R	27 25 82	1B 19 52	X	X	-	X	-	X	3-89
	Select bin 1	//1//	47 47 49 47 47	2F 2F 31 2F 2F	X	X	-	X	-	X	3-89
	Select bin 2	//2//	47 47 50 47 47	2F 2F 32 2F 2F	X	X	-	X	-	X	3-90
	Select bin 3 (envelope)	//E//	47 47 69 47 47	2F 2F 45 2F 2F	X	X	-	X	-	X	3-90
	Select remove	//R//	47 47 82 47 47	2F 2F 52 2F 2F	X	X	-	X	-	X	3-90
	Select change bins	//C//	47 47 67 47 47	2F 2F 43 2F 2F	X	X	-	X	-	X	3-91
3.12	Reset and sense controls										
	Printer initialize	ESC SOH I	27 26 73	1B 1A 49	X	X	-	X	-	X	3-92
	Bar code pattern printing command										
3.13	Bar code pattern printing	ESC DC4 (b) R (c)(w)(h)(a)(ch1)...(chn)	27 20 b 82 c w h a ch1..chn	1B 14 b 52 c w h a ch1..chn	-	X(*2)	-	-	-	-	3-93

Function	ASCII	Decimal	Hex	DR24C/II		IBM-GPM		FX/JX80		Page
				Orig.	Neu.	Orig.	Emu.	Orig.	Emu.	
ESC/P, P Character set										
IBM-GPM character set	ESC 6	27 54	1B 36	X	X	X	X	-	-	
FX-80 character set	ESC 7	27 55	1B 37	-	-	-	-	X	X	

Notes : 1) Color printers only
2) M-10 printer only
3) M-10 and M-15 printers only
4) M-10 and M-15 printers only

A.2 In Alphabetical Order

Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPR		PX/A&80		Page
				Org.	Emu.	Org.	Emu.	Org.	Emu.	
Bell	BEL	07	07	X	X	X	X	X	X	3-92
Backspace	BS	08	08	X	X	-	X	X	X	3-16
Horizontal tab execution	HT	09	09	X	X	X	X	X	X	3-32
Reset one-line double width mode	LF	10	0A	X	X	X	X	X	X	3-3
Linefeed	LF	10	0A	X	X	X	X	X	X	3-22
Reset one-line double width mode	VT	11	0B	X	X	-	X	X	X	3-3
Vertical tab execution	VT	11	0B	X	X	X	X	X	X	3-36
Reset one-line double width mode	FF	12	0C	X	X	X	X	X	X	3-3
Form feed	FF	12	0C	X	X	X	X	X	X	3-23
Reset one-line double width mode	CR	13	0D	X	X	X	X	X	X	3-3
Carriage return	CR	13	0D	X	X	X	X	X	X	3-16
Cancel offset selection	CR	13	0D	X	X	-	X	-	X	3-20
Set one-line double width mode	SO	14	0E	X	X	X	X	X	X	3-3
Set condensed mode	SI	15	0F	X	X	X	X	X	X	3-4
Select the printer	DC1	17	11	X	X	-	X	X	X	3-47
Reset condensed mode	DC2	18	12	X	X	X	X	X	X	3-4
Deselect the printer	DC3	19	13	X	X	-	X	X	X	3-47
Reset one-line double width mode	DC4	20	14	X	X	X	X	X	X	3-3
Reset double width mode	CAN	24	18	X	X	-	X	-	X	3-3
Cancel line buffer	CAN	24	18	X	X	X	X	X	X	3-46
Absolute horizontal tab execution	ESC HT (n)	27 09 n	1B 09 n	X	X	-	X	-	X	3-33
Reset one-line double width mode	ESC LF	27 10	1B 0A	X	X	-	X	-	X	3-3
Negative linefeed	ESC LF	27 10	1B 0A	X	X	-	X	-	X	3-22
Reset one-line double width mode	ESC VT (n)	27 11 n	1B 0B n	X	X	-	X	-	X	3-5
Absolute vertical tab execution	ESC VT (n)	27 11 n	1B 0B n	X	X	-	X	-	X	3-37
Set form length by lines	ESC FF (n)	27 12 n	1B 0C n	X	X	-	X	-	X	3-43
Set form length by inches	ESC FF NUL (n)	27 12 00 n	1B 0C 00 n	X	X	-	X	-	X	3-43
Remote reset	ESC CR P	27 13 80	1B 0D 50	X	X	-	X	-	X	3-54
Set one-line double width mode	ESC SO	27 14	1B 0E	X	X	-	X	X	X	3-3
Set condensed mode	ESC SI	27 15	1B 0F	X	X	-	X	X	X	3-4
Character offset selection	ESC DC1 (n)	27 17 n	1B 11 n	X	X	-	X	-	X	3-20
Bar code pattern printing	ESC DC4 (b) R (c)(w)(h)(a)(chn)...(chn)	27 20 b 82 c w h a chl..chn	1B 14 b 52 c w h a chl..chn	-	X(*2)	-	-	-	-	3-93
Feed from bin 1	ESC EM 1	27 25 49	1B 19 31	X	X	-	X	-	X	3-88
Feed from bin 2	ESC EM 2	27 25 50	1B 19 32	X	X	-	X	-	X	3-88

Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPR		PX7/X80		Page
				Org.	Emu.	Org.	Emu.	Org.	Emu.	
Feed from bin 3 (envelope)	ESC EM E	27 25 69	1B 19 45	X	X	-	X	-	X	3-88
Remove paper	ESC EM R	27 25 82	1B 19 52	X	X	-	X	-	X	3-89
Printer initialise	ESC SUB I	27 26 73	1B 1A 49	X	X	-	X	-	X	3-90
Horizontal spacing to (n/120 inch)	ESC HS (n)	27 31 n	1B 1F n	X	X	-	X	-	X	3-17
Various print modes	ESC ! (n)	27 33 n	1B 21 n	X	X	-	X	X	X	3-12
Reset one-line double width mode	ESC ! (00)	27 33 00	1B 21 00	X	X	-	X	X	X	3-3
Reset double width mode	ESC ! (00)	27 33 00	1B 21 00	X	X	-	X	X	X	3-4
Reset condensed mode	ESC ! (00)	27 33 00	1B 21 00	X	X	-	X	X	X	3-4
Cancel MSB control	ESC #	27 35	1B 23	X	X	-	X	X	X	3-49
Absolute print position (n/360 inch)	ESC $ (n1)(n2)	27 36 n1 n2	1B 24 n1 n2	X	X	-	X	-	X	3-34
Font select	ESC % (n) (n)	27 37 n n	1B 25 n n	X	X	-	X	X	X	3-58
Down loading (8-pin format)	ESC & (n)(Cs)(Ce)(data)	27 38 n Cs Ce data	1B 26 n Cs Ce data	-	-	-	-	X	-	-
Down loading (24-pin format)	ESC & (n)(Cs)(Ce)(data)	27 38 n Cs Ce data	1B 26 n Cs Ce data	X	X	-	X	-	X	3-67
Image printing (8,60x60)	ESC * (00)(n1)(n2)(data)	27 42 00 n1 n2 data	1B 2A 00 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,60x72)	ESC * (00)(n1)(n2)(data)	27 42 00 n1 n2 data	1B 2A 00 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,120x60)	ESC * (01)(n1)(n2)(data)	27 42 01 n1 n2 data	1B 2A 01 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,120x72)	ESC * (01)(n1)(n2)(data)	27 42 01 n1 n2 data	1B 2A 01 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,100x60 M-speed)	ESC * (02)(n1)(n2)(data)	27 42 02 n1 n2 data	1B 2A 02 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,120x72 M-speed)	ESC * (02)(n1)(n2)(data)	27 42 02 n1 n2 data	1B 2A 02 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,200x60)	ESC * (03)(n1)(n2)(data)	27 42 03 n1 n2 data	1B 2A 03 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,240x72)	ESC * (03)(n1)(n2)(data)	27 42 03 n1 n2 data	1B 2A 03 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,67x60)	ESC * (04)(n1)(n2)(data)	27 42 04 n1 n2 data	1B 2A 04 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,80x72)	ESC * (04)(n1)(n2)(data)	27 42 04 n1 n2 data	1B 2A 04 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,60x60)	ESC * (05)(n1)(n2)(data)	27 42 05 n1 n2 data	1B 2A 05 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,72x72)	ESC * (05)(n1)(n2)(data	27 42 05 n1 n2 data	1B 2A 05 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (8,90x60)	ESC * (06)(n1)(n2)(data)	27 42 06 n1 n2 data	1B 2A 06 n1 n2 data	X	X	-	-	-	-	3-79
Image printing (8,90x72)	ESC * (06)(n1)(n2)(data)	27 42 06 n1 n2 data	1B 2A 06 n1 n2 data	-	-	-	X	X	X	3-79
Image printing (24,60x180)	ESC * (32)(n1)(n2)(data)	27 42 32 n1 n2 data	1B 2A 32 n1 n2 data	X	X	-	X	-	X	3-79
Image printing (24,120x180)	ESC * (33)(n1)(n2)(data)	27 42 33 n1 n2 data	1B 2A 21 n1 n2 data	X	X	-	X	-	X	3-79
Image printing (24,90x180)	ESC * (38)(n1)(n2)(data)	27 42 38 n1 n2 data	1B 2A 26 n1 n2 data	X	X	-	X	-	X	3-79
Image printing (24,180x180)	ESC * (39)(n1)(n2)(data)	27 42 39 n1 n2 data	1B 2A 27 n1 n2 data	X	X	-	X	-	X	3-79
Image printing (24,360x180)	ESC * (40)(n1)(n2)(data)	27 42 40 n1 n2 data	1B 2A 28 n1 n2 data	X	X	-	X	-	X	3-79
Reset underline mode	ESC - (0)	27 45 30	1B 2D 00	X	X	X	X	X	X	3-8
Set underline mode	ESC - (1)	27 45 31	1B 2D 01	X	X	X	X	X	X	3-8
VFU channel selection	ESC / (n)	27 47 n	1B 2F n	-	-	-	-	X	-	-

Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPH		FX/JX80		Page
				Org.	Emu.	Org.	Emu.	Org.	Emu.	
Set line spacing to 1/8 inch	ESC 0	27 48	1B 30	X	X	X	X	X	X	3-25
Set linespacing to 7/72 inch	ESC 1	27 49	1B 31	-	-	X	X	X	X	3-27
Set linespacing to 7/60 inch	ESC 1	27 49	1B 31	X	X	-	-	-	-	3-27
Set line spacing to 1/6 inch	ESC 2	27 50	1B 32	X	X	X	-	X	X	3-28
Mainly set line spacing	ESC 2	27 50	1B 32	X	X	-	X	-	-	3-28
Set linespacing to n/216 inch	ESC 3 (n)	27 51 n	1B 33 n	-	-	X	X	X	X	3-26
Set linespacing to n/180 inch	ESC 3 (n)	27 51 n	1B 33 n	X	X	-	-	-	-	3-26
Set Italic print mode	ESC 4	27 52	1B 34	X	X	-	X	X	X	3-10
Reset Italic print mode	ESC 5	27 53	1B 35	X	X	-	X	X	X	3-10
Set character set to set 2	ESC 6	27 54	1B 36	X	X	X	X	-	X	3-44
Printable code area expansion	ESC 6	27 54	1B 36	-	-	-	-	X	-	–
Set character set to set 1	ESC 7	27 55	1B 37	X	X	X	X	-	X	3-44
Cancel printable code area	ESC 7	27 55	1B 37	-	-	-	-	X	-	–
Ignore paper end sensor	ESC 8	27 56	1B 38	X	X	X	X	X	X	3-53
Detect paper end sensor	ESC 9	27 57	1B 39	X	X	X	X	X	X	3-53
Font copy	ESC : NUL (m)(n)	27 58 00 m n	1B 3A 00 m n	X	X	-	X	X	X	3-63
Set home head	ESC <	27 60	1B 3C	X	X	X	X	X	X	3-54
Force MSB to 0	ESC =	27 61	1B 3D	X	X	-	X	X	X	3-49
Force MSB to 1	ESC >	27 62	1B 3E	X	X	-	X	X	X	3-49
Assign bit image modes	ESC ? (n)(m)	27 63 n m	1B 3F n m	-	-	-	-	X	-	–
Remote reset	ESC @	27 64	1B 40	X	X	-	X	X	X	3-54
Set line spacing to n/72 inch	ESC A (n)	27 65 n	1B 41 n	-	-	-	-	X	X	3-28
Set line spacing to n/60 inch	ESC A (n)	27 65 n	1B 41 n	X	X	-	-	-	-	3-28
Preset line spacing to n/72 inch	ESC A (n)	27 65 n	1B 41 n	-	-	X	X	-	-	3-28
Preset line spacing to n/60 inch	ESC A (n)	27 65 n	1B 41 n	X	X	-	-	-	-	3-28
Set vertical tabs	ESC B (n1)...(nk) NUL	27 66 n1...nk 00	1B 42 n1...nk 00	X	X	X	X	X	X	3-35
Reset all vertical tabs	ESC B NUL	27 66 00	1B 42 00	X	X	-	X	X	X	3-35
Set form length by lines	ESC C (n)	27 67 n	1B 43 n	X	X	X	X	X	X	3-43
Set form length by inches	ESC C NUL (n)	27 67 00 n	1B 43 00 n	X	X	X	X	X	X	3-43
Set horizontal tabs	ESC D (n1)...(nk) NUL	27 68 n1...nk 00	1B 44 n1...nk 00	X	X	X	X	X	X	3-31
Reset all horizontal tabs	ESC D NUL	27 68 00	1B 44 00	X	X	X	X	X	X	3-31
Set shadow print mode	ESC E	27 69	1B 45	X	X	X	X	X	X	3-6
Reset shadow print mode	ESC F	27 70	1B 46	X	X	X	X	X	X	3-6
Set bold print mode	ESC G	27 71	1B 47	X	X	X	X	X	X	3-7
Reset bold print mode	ESC H	27 72	1B 48	X	X	X	X	X	X	3-7

Function	ASCII	Decimal	Hex	DP24C/I		ISM-GPH		FX/JX80		Page
				Org.	Emu.	Org.	Emu.	Org.	Emu.	
Disable expanded characters	ESC I (0)	27 73 00	1B 49 00	-	-	-	-	X	-	-
Enable expanded characters	ESC I (1)	27 73 01	1B 49 01	-	-	-	-	X	-	-
Reset one-line double width mode	ESC J (n)	27 74 n	1B 4A n	X	X	X	X	X	X	3-3
Single linefeed (n/180 inch)	ESC J (n)	27 74 n	1B 4A n	X	X	-	-	-	-	3-23
Single linefeed (n/216 inch)	ESC J (n)	27 74 n	1B 4A n	-	-	X	X	X	X	3-23
Single density image (8,60x60)	ESC K (n1)(n2)(data)	27 75 n1 n2 data	1B 4B n1 n2 data	X	X	-	-	-	-	3-86
Single density image (8,60x72)	ESC K (n1)(n2)(data)	27 75 n1 n2 data	1B 4B n1 n2 data	-	-	X	X	X	X	3-86
Double density image (8,120x60)	ESC L (n1)(n2)(data)	27 76 n1 n2 data	1B 4C n1 n2 data	X	X	-	-	-	-	3-86
Double density image (8,120x72)	ESC L (n1)(n2)(data)	27 76 n1 n2 data	1B 4C n1 n2 data	-	-	X	X	X	X	3-86
Set Elite pitch	ESC M	27 77	1B 4D	X	X	-	X	X	X	3-16
Set skip perforations	ESC N (n)	27 78 n	1B 4E n	X	X	X	X	X	X	3-41
Reset skip perforations	ESC O	27 79	1B 4F	X	X	X	X	X	X	3-41
Set Pica pitch	ESC P	27 80	1B 50	X	X	-	X	X	X	3-16
Set right margin	ESC Q (n)	27 81 n	1B 51 n	X	X	-	X	X	X	3-39
Deselect the printer	ESC Q (3)	27 81 03	1B 51 03	-	-	-	-	-	-	-
International characters	ESC R (n)	27 82 n	1B 52 n	X	X	-	X	X	X	3-45
Set superscript mode	ESC S (0)	27 83 00	1B 53 00	X	X	X	X	X	X	3-9
Set subscript mode	ESC S (1)	27 83 01	1B 53 01	X	X	X	X	X	X	3-10
Reset superscript mode	ESC T	27 84	1B 54	X	X	X	X	X	X	3-9
Reset subscript mode	ESC T	27 84	1B 54	X	X	X	X	X	X	3-10
Bidirectional printing	ESC U (0)	27 85 00	1B 55 00	X	X	X	X	X	X	3-55
Unidirectional printing	ESC U (1)	27 85 01	1B 55 01	X	X	X	X	X	X	3-55
Reset double height mode	ESC V 0	27 86 48	1B 56 30	X	X	-	X	-	X	3-5
Set double height mode	ESC V 1	27 86 49	1B 56 31	X	X	-	X	-	X	3-5
Reset one-line double width mode	ESC W (0)	27 87 00	1B 57 00	X	X	X	X	X	X	3-3
Reset double width mode	ESC W (0)	27 87 00	1B 57 00	X	X	X	X	X	X	3-4
Set double width mode	ESC W (1)	27 87 01	1B 57 01	X	X	X	X	X	X	3-4
Double speed double density image (8,100x60)	ESC Y (n1)(n2)(data)	27 89 n1 n2 data	1B 59 n1 n2 data	X	X	-	-	-	-	3-86
Double speed double density image (8,120x72)	ESC Y (n1)(n2)(data)	27 89 n1 n2 data	1B 59 n1 n2 data	-	-	X	X	X	X	3-86
Quadruple density image (8,200x60)	ESC Z (n1)(n2)(data)	27 90 n1 n2 data	1B 5A n1 n2 data	X	X	-	-	-	-	3-86
Quadruple density image (8,240x72)	ESC Z (n1)(n2)(data)	27 90 n1 n2 data	1B 5A n1 n2 data	-	-	X	X	X	X	3-86
9-pin bit image printing	ESC ^ (m)(n1)(n2)(data)	27 94 m n1 n2 data	1B 5E m n1 n2 data	-	-	-	-	X	-	-
MPU position setting	ESC b (n)(data) MPU	27 98 n data 0	1B 62 n data 00	-	-	-	-	X	-	-
Horizontal spacing to n/120 inch	ESC h (n)	27 104 n	1B 68 n	X	X	-	X	-	X	3-18
Reset typewriter mode	ESC i (0)	27 105 00	1B 69 00	X	X	-	X	X	X	3-53

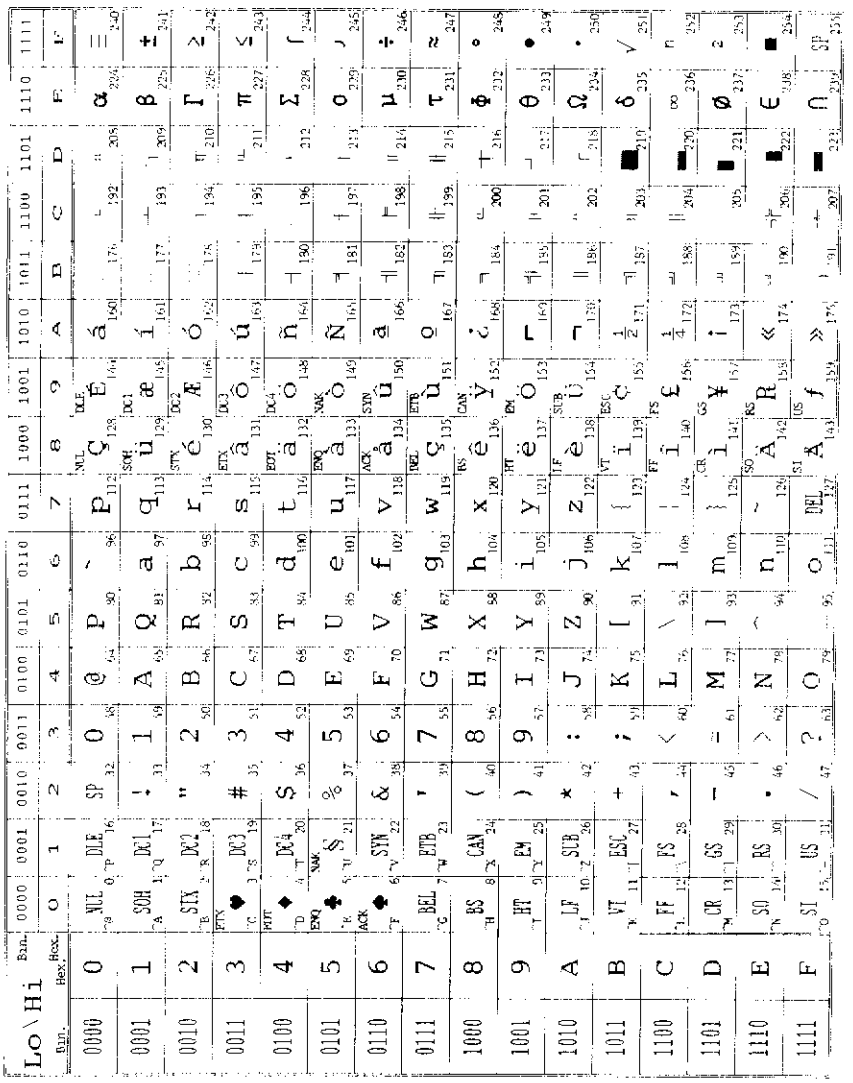
Function	ASCII	Decimal	Hex	DP24C/I		IBM-GPH		FX/JX80		Page
				Org.	Emu.	Org.	Emu.	Org.	Emu.	
Set typewriter mode	ESC i (1)	27 105 01	1B 69 01	X	X	-	X	X	X	3-53
Reset one-line double width mode	ESC j (n)	27 106 n	1B 6A n	X	X	-	X	X	X	3-3
Single linefeed backward (n/180 inch)	ESC j (n)	27 106 n	1B 6A n	X	X	-	-	-	-	3-24
Single linefeed backward (n/216 inch)	ESC j (n)	27 106 n	1B 6A n	-	-	-	X	X	X	3-24
Set left margin	ESC l (n)	27 108 n	1B 6C n	X	X	-	X	X	X	3-40
Enter auto justify mode	ESC m	27 109	1B 6D	X	X	-	X	-	X	3-57
Reset proportional spacing mode	ESC p (0)	27 112 00	1B 70 00	X	X	-	X	X	X	3-12
Set proportional spacing mode	ESC p (1)	27 112 01	1B 70 01	X	X	-	X	X	X	3-12
Select print color	ESC r (n)	27 114 n	1B 72 n	X(*1)	X(*1)	-	X	X(*1)	X(*1)	3-50
End half speed printing	ESC s (0)	27 115 00	1B 73 00	-	-	-	-	X	-	-
Start half speed printing	ESC s (1)	27 115 01	1B 73 01	-	-	-	-	X	-	-
Reset underline mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3-8
Reset shadow print mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3-6
Reset bold print mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3-7
Cancel offset selection	ESC x	27 120	1B 78	X	X	-	X	-	X	3-20
Exit auto justify mode	ESC x	27 120	1B 78	X	X	-	X	-	X	3-57
Space	SP	32	20	X	X	X	X	X	X	3-16
Select bin 1	ESC EM 1	27 25 49	1B 19 31	X	X	-	X	-	X	3-89
Select bin 2	ESC EM 2	27 25 50	1B 19 32	X	X	-	X	-	X	3-90
Select change bins	ESC EM C	27 25 67	1B 19 43	X	X	-	X	-	X	3-91
Select bin 3 (envelope)	ESC EM E	27 25 69	1B 19 45	X	X	-	X	-	X	3-90
Select remove	ESC EM R	27 25 82	1B 19 52	X	X	-	X	-	X	3-90
Delete last printable character	DEL	127	7F	-	-	-	-	X	-	-
IBM-GPH character set	-----	----	-----	X	X	X	X	-	X(*3)	B-3
FX-80 character set	-----	----	-----	-	-	-	-	X	X(*4)	B-1

Notes : *1 Color printers only
*2 M3.0 printer only
*3 M1.0 and M2.0 printers only
*4 M2.1 and M3.0 printers only

APPENDIX B
CHARACTER SET TABLE

B.1 IBM-GPH character set

This character set is used in the other than the FX-80 and JX-80 emulations of M2.1 and M3.0 printers.



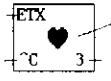
Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	# 35	$ 36	@ 64	[91	\ 92	] 93	^ 94	` 96	{ 123	| 124	} 125	~ 126
French	£ 35	$ 36	à 64	° 91	ç 92	§ 93	^ 94	` 96	é 123	ù 124	è 125	¨ 126
German	# 35	$ 36	§ 64	Ä 91	Ö 92	Ü 93	^ 94	` 96	ä 123	ö 124	ü 125	ß 126
UK	£ 35	$ 36	@ 64	[91	\ 92	] 93	^ 94	` 96	{ 123	| 124	} 125	~ 126
Danish/ Norwegn	# 35	$ 36	É 64	Æ 91	Ø 92	Å 93	Ü 94	é 96	æ 123	ø 124	å 125	ü 126
Swedish/ Finnish	# 35	¤ 36	É 64	Ä 91	Ö 92	Å 93	Ü 94	é 96	ä 123	ö 124	å 125	ü 126
Italian	£ 35	$ 36	§ 64	° 91	ç 92	é 93	^ 94	ù 96	à 123	ò 124	è 125	ì 126
Spanish	£ 35	$ 36	§ 64	¡ 91	Ñ 92	¿ 93	^ 94	` 96	° 123	ñ 124	ç 125	~ 126

LEGEND:

Control code for character set 1 (ETX) ——

CTRL-key(^) + letter key(C) ——————

generate this code



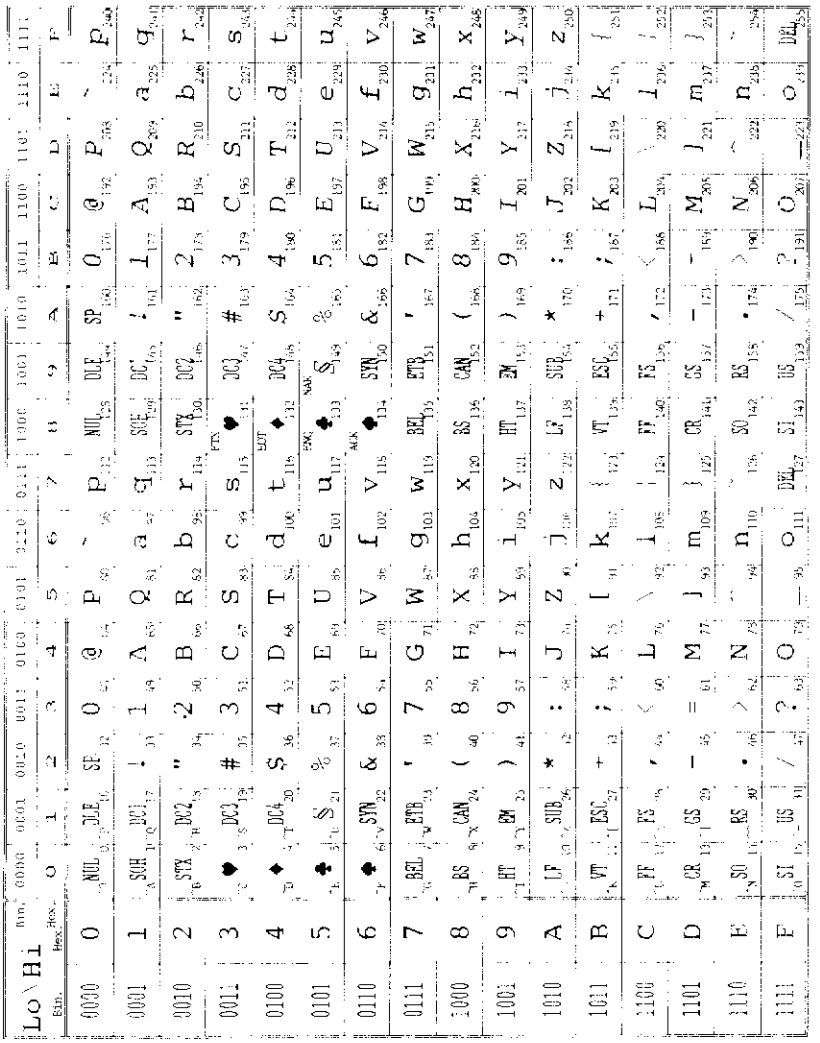
Character or control code for character set 2 (♥)

Decimal number (3)

(ALT-key + numeric key generate this code)

B.2 FX-80 character set

This character set is used in FX-80 and JX-80 emulations of M2.1 and M3.0 printers. The other cases, the IBM-GPH set is used.



Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	# 35	$ 36	@ 64	[91	\ 92	] 93	^ 94	` 96	{ 123	¦ 124	} 125	~ 126
French	£ 35	$ 36	à 64	° 91	ç 92	§ 93	^ 94	` 96	é 123	ù 124	è 125	¨ 126
German	# 35	$ 36	§ 64	Ä 91	Ö 92	Ü 93	^ 94	` 96	ä 123	ö 124	ü 125	ß 126
UK	£ 35	$ 36	@ 64	[91	\ 92	] 93	^ 94	` 96	{ 123	¦ 124	} 125	~ 126
Danish/ Norwegn	# 35	$ 36	É 64	Æ 91	Ø 92	Å 93	Ü 94	é 96	æ 123	ø 124	å 125	ü 126
Swedish/ Finnish	# 35	¤ 36	É 64	Ä 91	Ö 92	Å 93	Ü 94	é 96	ä 123	ö 124	å 125	ü 126
Italian	£ 35	$ 36	§ 64	° 91	ç 92	é 93	^ 94	ù 96	à 123	ò 124	è 125	ì 126
Spanish	£ 35	$ 36	§ 64	¡ 91	Ñ 92	¿ 93	^ 94	` 96	º 123	ñ 124	ç 125	~ 126

LEGEND:

Control code for character set 1 (ETX) — ETX ♥ — Character or control code for character set 2 (♥)

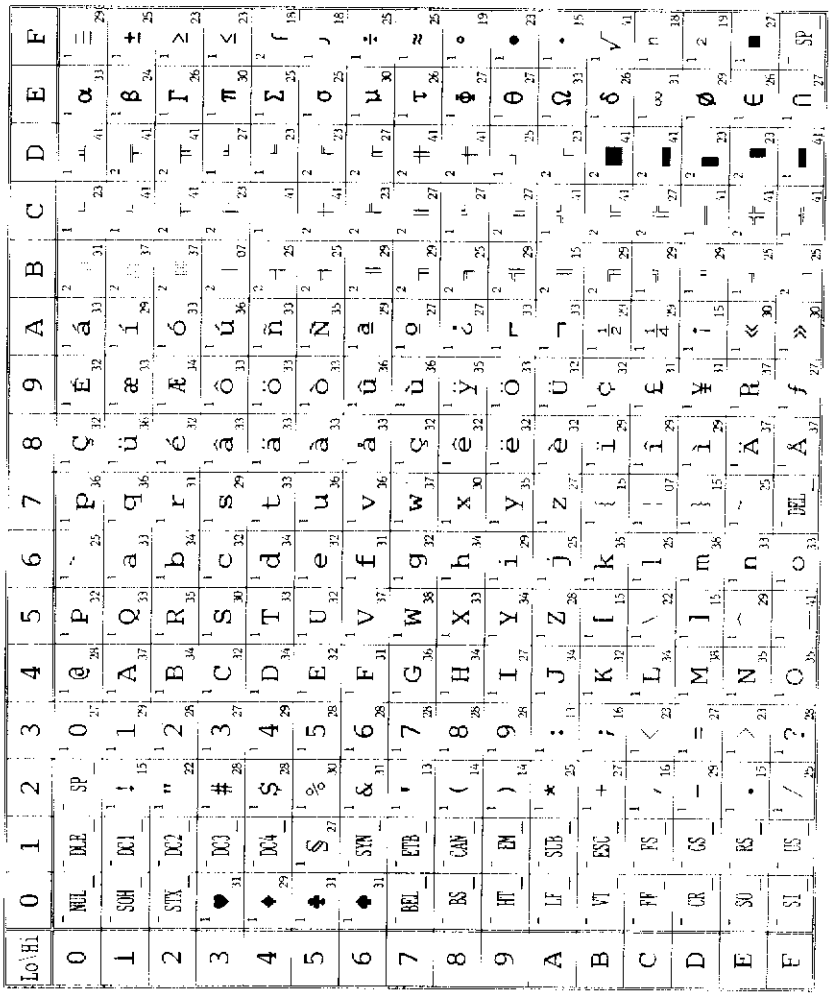
CTRL-key(^) + letter key(C) — ^C 3 — Decimal number (3)

generate this code — (ALT-key + numeric key generate this code)

APPENDIX C
FONTS

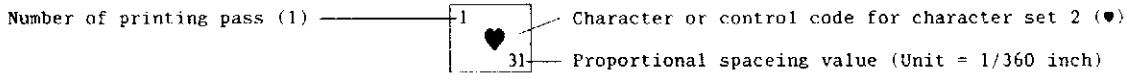
C.1 Resident ROM Fonts

(1) Courier 10

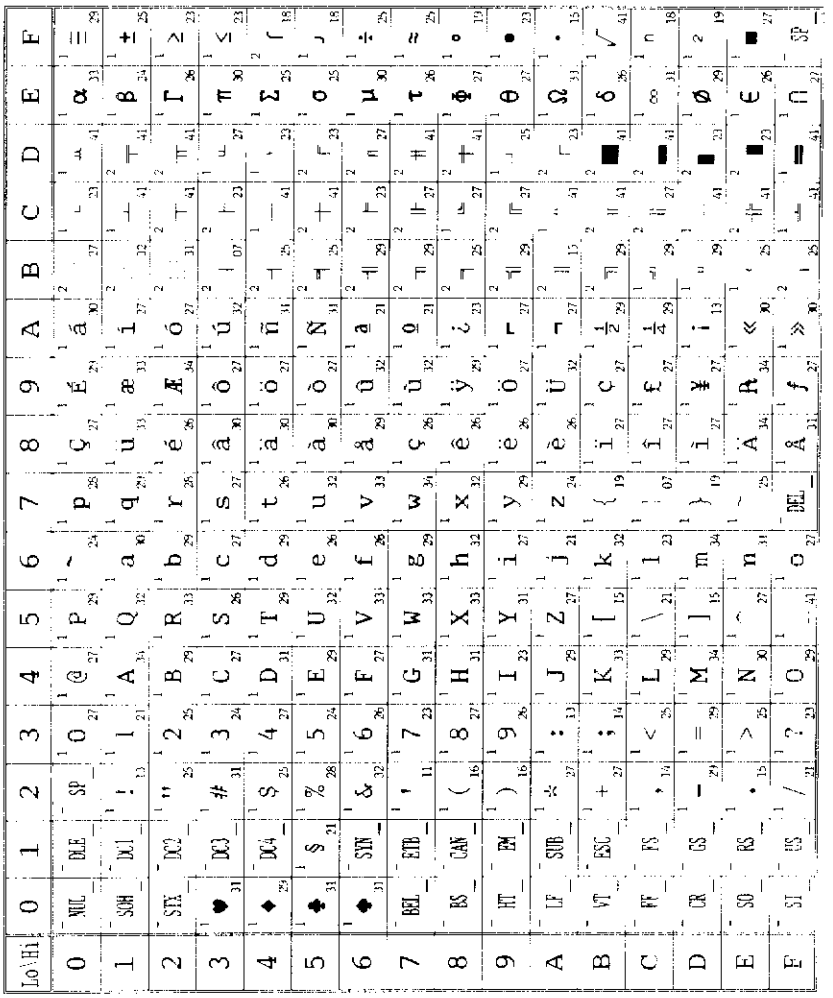


Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 28	1 $ 28	1 @ 28	1 [15	1 \ 22	1] 15	1 ^ 29	1 ` 25	1 { 15	1 ¦ 07	1 } 15	1 ~ 25
French	1 £ 31	1 $ 28	1 à 33	1 ° 19	1 ç 32	1 § 27	1 ^ 29	1 ` 25	1 é 32	1 ù 36	1 è 32	1 .. 26
German	1 # 28	1 $ 28	1 § 27	1 Ä 37	1 Ö 33	1 Ü 32	1 ^ 29	1 ` 25	1 ä 33	1 ö 33	1 ü 36	1 ß 34
UK	1 £ 31	1 $ 28	1 @ 28	1 [15	1 \ 22	1] 15	1 ^ 29	1 ` 25	1 { 15	1 ¦ 07	1 } 15	1 ~ 25
Danish/ Norwegn	1 # 28	1 $ 28	1 É 32	1 Æ 34	1 Ø 35	1 Å 37	1 Ü 32	1 é 32	1 æ 33	1 ø 33	1 å 33	1 ü 36
Swedish/ Finnish	1 # 28	1 ¤ 31	1 É 32	1 Ä 37	1 Ö 33	1 Å 37	1 Ü 32	1 é 32	1 ä 33	1 ö 33	1 å 33	1 ü 36
Italian	1 £ 31	1 $ 28	1 § 27	1 ° 19	1 ç 32	1 é 32	1 ^ 29	1 ù 36	1 à 33	1 ò 33	1 è 32	1 ì 29
Spanish	1 £ 31	1 $ 28	1 § 27	1 ¡ 15	1 Ñ 33	1 ¿ 32	1 ^ 29	1 ` 25	1 ° 19	1 ñ 33	1 ç 32	1 ~ 25

LEGEND:

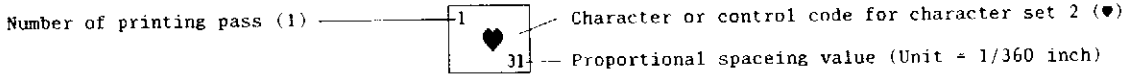


(2) Prestige Elite 12 (Font 1 for 12 CPI)

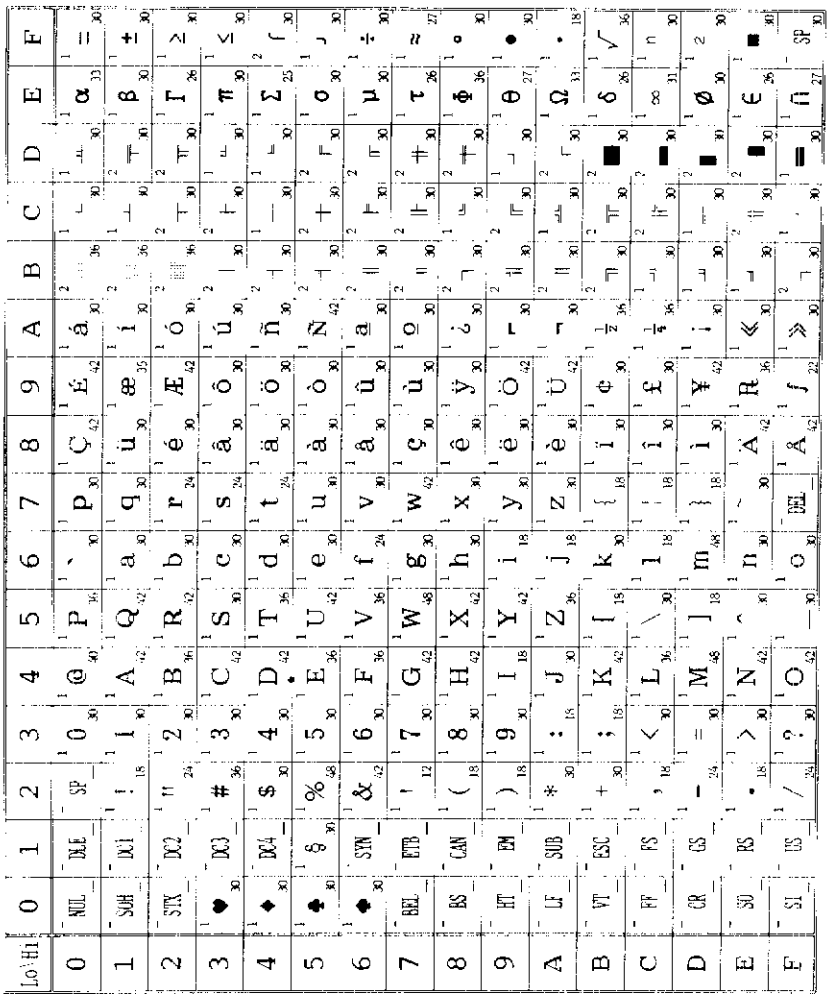


Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 31	1 $ 25	1 @ 27	1 [15	1 \ 21	1] 15	1 ^ 27	1 ` 24	1 { 19	1 | 07	1 } 19	1 ~ 25
French	1 £ 27	1 $ 25	1 à 30	1 ° 19	1 ç 26	1 § 21	1 ^ 27	1 ` 24	1 é 26	1 ù 32	1 è 26	1 .. 27
German	1 # 31	1 $ 25	1 § 21	1 Ä 34	1 Ö 27	1 Ü 32	1 ^ 27	1 ` 24	1 ä 30	1 ö 27	1 ü 33	1 ß 32
UK	1 £ 27	1 $ 25	1 @ 27	1 [15	1 \ 21	1] 15	1 ^ 27	1 ` 24	1 { 19	1 | 07	1 } 19	1 ~ 25
Danish/ Norwegn	1 # 31	1 $ 25	1 É 29	1 Æ 34	1 Ø 27	1 Å 31	1 Ü 32	1 é 26	1 æ 33	1 ø 27	1 å 29	1 ü 33
Swedish/ Finnish	1 # 31	1 ¤ 30	1 É 29	1 Ä 34	1 Ö 27	1 Å 31	1 Ü 32	1 é 26	1 ä 30	1 ö 27	1 å 29	1 ü 33
Italian	1 £ 27	1 $ 25	1 § 21	1 ° 19	1 ç 26	1 é 26	1 ^ 27	1 ù 32	1 à 30	1 ò 27	1 è 26	1 ì 27
Spanish	1 £ 27	1 $ 25	1 § 21	1 ¡ 13	1 Ñ 31	1 ¿ 23	1 ^ 27	1 ` 24	1 ° 19	1 ñ 31	1 ç 26	1 ~ 25

LEGEND:



(3) Boldface PS (Font 2 for proportional spacing) *



Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 36	1 $ 30	1 @ 40	1 [18	1 \ 30	1] 18	1 ^ 30	1 ` 30	1 { 18	1 ¦ 18	1 } 18	1 ~ 30
French	1 £ 30	1 $ 30	1 à 30	1 ° 30	1 ç 30	1 § 30	1 ^ 30	1 ` 30	1 é 30	1 ù 30	1 è 30	1 ¨ 30
German	1 # 36	1 $ 30	1 § 30	1 Ä 42	1 Ö 42	1 Ü 42	1 ^ 30	1 ` 30	1 ä 30	1 ö 30	1 ü 30	1 ß 30
UK	1 £ 30	1 $ 30	1 @ 40	1 [18	1 \ 30	1] 18	1 ^ 30	1 ` 30	1 { 18	1 ¦ 18	1 } 18	1 ~ 30
Danish/ Norwegn	1 # 36	1 $ 30	1 É 42	1 Æ 42	1 Ø 42	1 Å 42	1 Ü 42	1 é 30	1 æ 35	1 ø 36	1 å 30	1 ü 30
Swedish/ Finnish	1 # 36	1 ¤ 30	1 É 42	1 Ä 42	1 Ö 42	1 Å 42	1 Ü 42	1 é 30	1 ä 30	1 ö 30	1 å 30	1 ü 30
Italian	1 £ 30	1 $ 30	1 § 30	1 ° 30	1 ç 30	1 é 30	1 ^ 30	1 ù 30	1 à 30	1 ò 30	1 è 30	1 ì 30
Spanish	1 £ 30	1 $ 30	1 § 30	1 ¡ 30	1 Ñ 42	1 ¿ 30	1 ^ 30	1 ` 30	1 ° 30	1 ñ 30	1 ç 30	1 ~ 30

LEGEND:

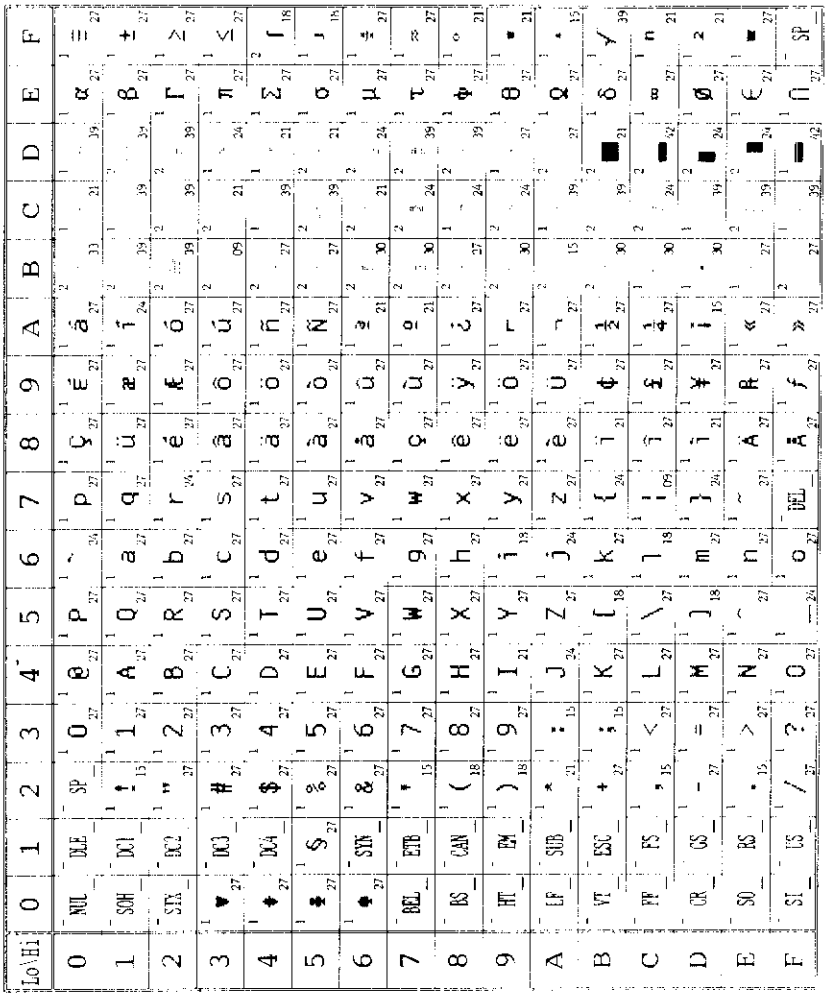
Number of printing pass (1)

Character or control code for character set 2 (♥)

Proportional spaceing value (Unit = 1/360 inch)

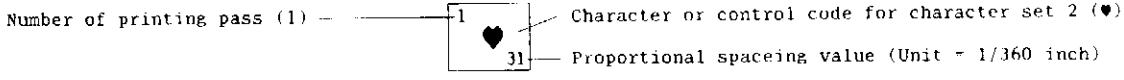
***Note:** Some models do not have this font.

(4) Draft (Font 4 for 10, 12 CPI)



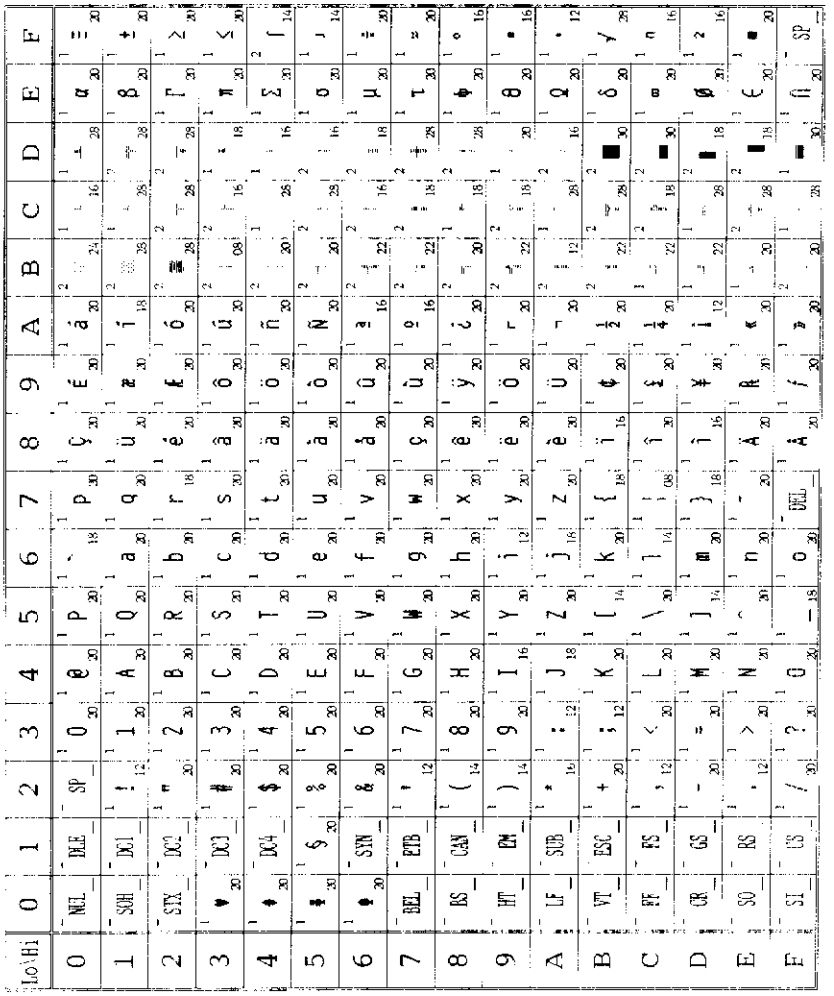
Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 27	1 $ 27	1 @ 27	1 [18	1 \ 27	1] 18	1 ^ 27	1 ` 24	1 { 24	1 ¦ 09	1 } 24	1 ~ 27
French	1 £ 27	1 $ 27	1 à 27	1 ° 21	1 ç 27	1 § 27	1 ^ 27	1 ` 24	1 é 27	1 ù 27	1 è 27	1 .. 21
German	1 # 27	1 $ 27	1 § 27	1 Ä 27	1 Ö 27	1 Ü 27	1 ^ 27	1 ` 24	1 ä 27	1 ö 27	1 ü 27	1 ß 27
UK	1 £ 27	1 $ 27	1 @ 27	1 [18	1 \ 27	1] 18	1 ^ 27	1 ` 24	1 { 24	1 ¦ 09	1 } 24	1 ~ 27
Danish/ Norwegn	1 # 27	1 $ 27	1 É 27	1 Æ 27	1 ø 27	1 Å 27	1 Ü 27	1 é 27	1 æ 27	1 ø 27	1 å 27	1 ü 27
Swedish/ Finnish	1 # 27	1 ¤ 27	1 É 27	1 Ä 27	1 Ö 27	1 Å 27	1 Ü 27	1 é 27	1 ä 27	1 ö 27	1 å 27	1 ü 27
Italian	1 £ 27	1 $ 27	1 § 27	1 ° 21	1 ç 27	1 é 27	1 ^ 27	1 ù 27	1 à 27	1 ò 27	1 è 27	1 ì 21
Spanish	1 £ 27	1 $ 27	1 § 27	1 ¡ 15	1 Ñ 27	1 ¿ 27	1 ^ 27	1 ` 24	1 ° 21	1 ñ 27	1 ç 27	1 ~ 27

LEGEND:



Note: Resident font 3 is reserved for these printers

(5) Compression (Font 5 for 15, 17, 18, 20 CPI)



Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 20	1 $ 20	1 @ 20	1 [14	1 \ 20	1] 14	1 ^ 20	1 ` 18	1 { 18	1 ¦ 08	1 } 18	1 ~ 20
French	1 £ 20	1 $ 20	1 à 20	1 ° 16	1 ç 20	1 § 20	1 ^ 20	1 ` 18	1 é 20	1 ù 20	1 è 20	1 ¨ 16
German	1 # 20	1 $ 20	1 § 20	1 Ä 20	1 Ö 20	1 Ü 20	1 ^ 20	1 ` 18	1 ä 20	1 ö 20	1 ü 20	1 ß 20
UK	1 £ 20	1 $ 20	1 @ 20	1 [14	1 \ 20	1] 14	1 ^ 20	1 ` 18	1 { 18	1 ¦ 08	1 } 18	1 ~ 20
Danish/ Norwegn	1 # 20	1 $ 20	1 É 20	1 Æ 20	1 Ø 20	1 Å 20	1 Ü 20	1 é 20	1 æ 20	1 ø 20	1 å 20	1 ü 20
Swedish/ Finnish	1 # 20	1 ¤ 20	1 É 20	1 Ä 20	1 Ö 20	1 Å 20	1 Ü 20	1 é 20	1 ä 20	1 ö 20	1 å 20	1 ü 20
Italian	1 £ 20	1 $ 20	1 § 20	1 ° 16	1 ç 20	1 é 20	1 ^ 20	1 ù 20	1 à 20	1 ò 20	1 è 20	1 ì 16
Spanish	1 £ 20	1 $ 20	1 § 20	1 ¡ 12	1 Ñ 20	1 ¿ 20	1 ^ 20	1 ` 18	1 ° 16	1 ñ 20	1 ç 20	1 _ 20

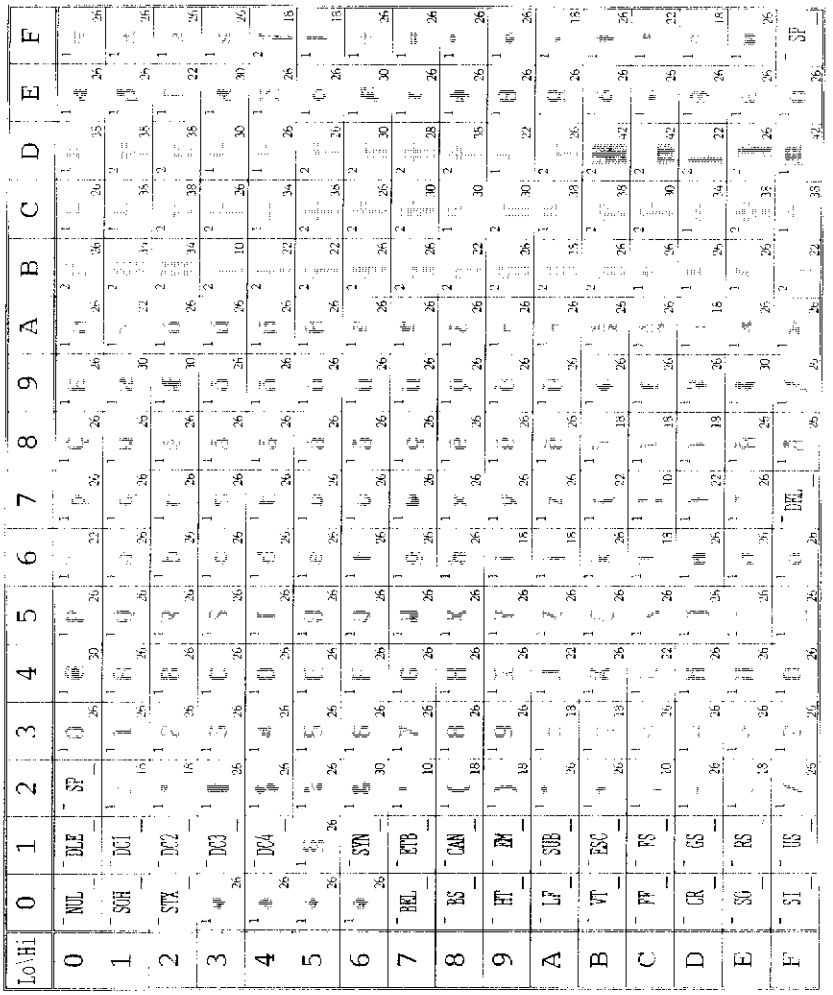
LEGEND:

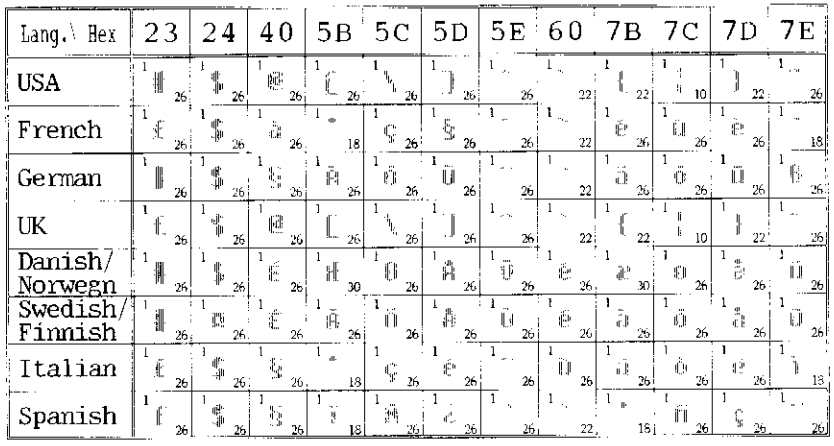
Number of printing pass (1) ——— 1 ♥ 31 — Character or control code for character set 2 (♥)

– Proportional spaceing value (Unit = 1/360 inch)

Note: Fonts 6 and 7 are not defined for these printers.

(6) High-Speed Draft (Font 7 for 10, 12 CPI) *





LEGEND:

Number of printing pass (1) ——— 1 ♥ 31

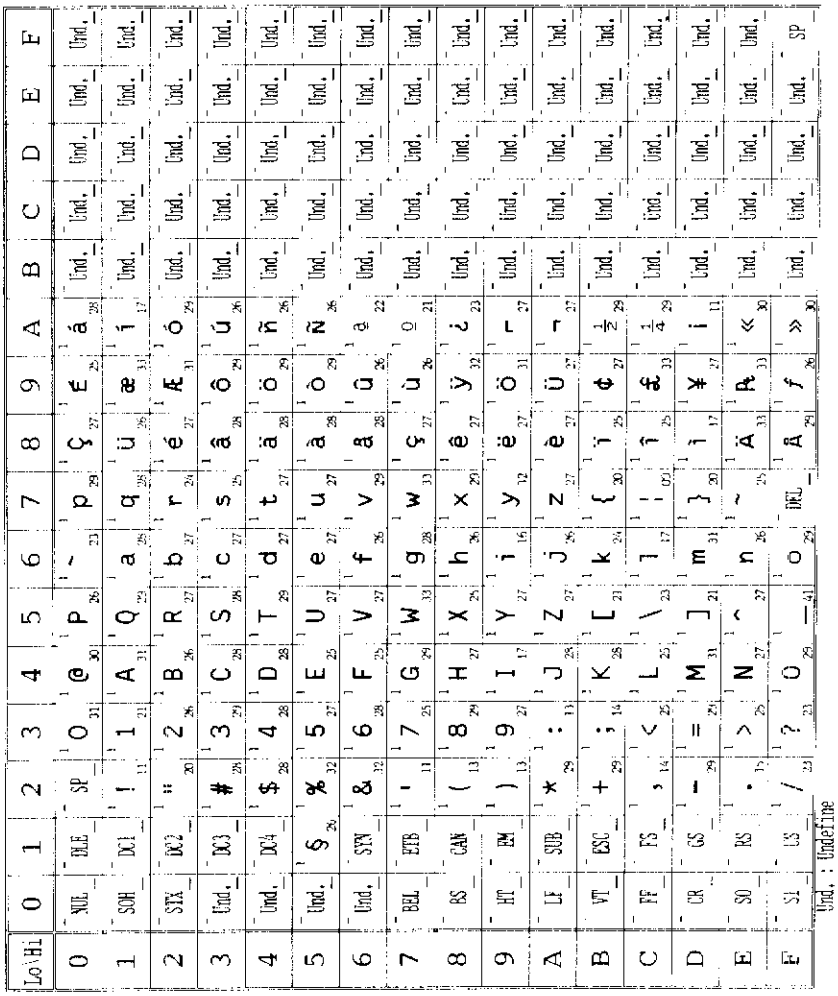
Character or control code for character set 2 (♥)

Proportional spacing value (Unit = 1/360 inch)

* M2.0 and M2.1 printers only

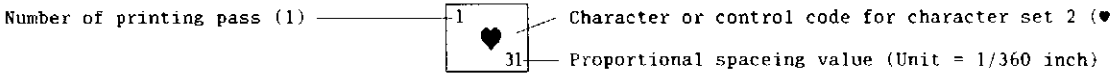
C.2 Font Cards and Font Cartridges

(1) Letter Gothic 12 (For 12 CPI)



Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 28	1 $ 28	1 @ 30	1 [21	1 \ 23	1] 21	1 ^ 27	1 ` 23	1 { 20	1 ¦ 09	1 } 20	1 ~ 25
French	1 £ 33	1 $ 28	1 à 28	1 ° 19	1 ç 27	1 § 26	1 ^ 27	1 ` 23	1 é 27	1 ù 26	1 è 27	1 .. 25
German	1 # 28	1 $ 28	1 § 26	1 Ä 33	1 Ö 31	1 Ü 27	1 ^ 27	1 ` 23	1 ä 28	1 ö 29	1 ü 26	1 ß 28
UK	1 £ 33	1 $ 28	1 @ 30	1 [21	1 \ 23	1] 21	1 ^ 27	1 ` 23	1 { 20	1 ¦ 09	1 } 20	1 ~ 25
Danish/ Norwegn	1 # 28	1 $ 28	1 É 25	1 Æ 31	1 Ø 29	1 Å 29	1 Ü 27	1 é 27	1 æ 33	1 ø 27	1 å 28	1 ü 26
Swedish/ Finnish	1 # 28	1 ¤ 27	1 É 25	1 Ä 33	1 Ö 31	1 Å 29	1 Ü 27	1 é 27	1 ä 28	1 ö 29	1 å 28	1 ü 26
Italian	1 £ 33	1 $ 28	1 § 26	1 ° 19	1 ç 27	1 é 27	1 ^ 27	1 ù 26	1 à 28	1 ò 29	1 è 27	1 ì 17
Spanish	1 £ 33	1 $ 28	1 § 26	1 ¡ 11	1 Ñ 26	1 ¿ 23	1 ^ 27	1 ` 23	1 ° 19	1 ñ 26	1 ç 27	1 ~ 25

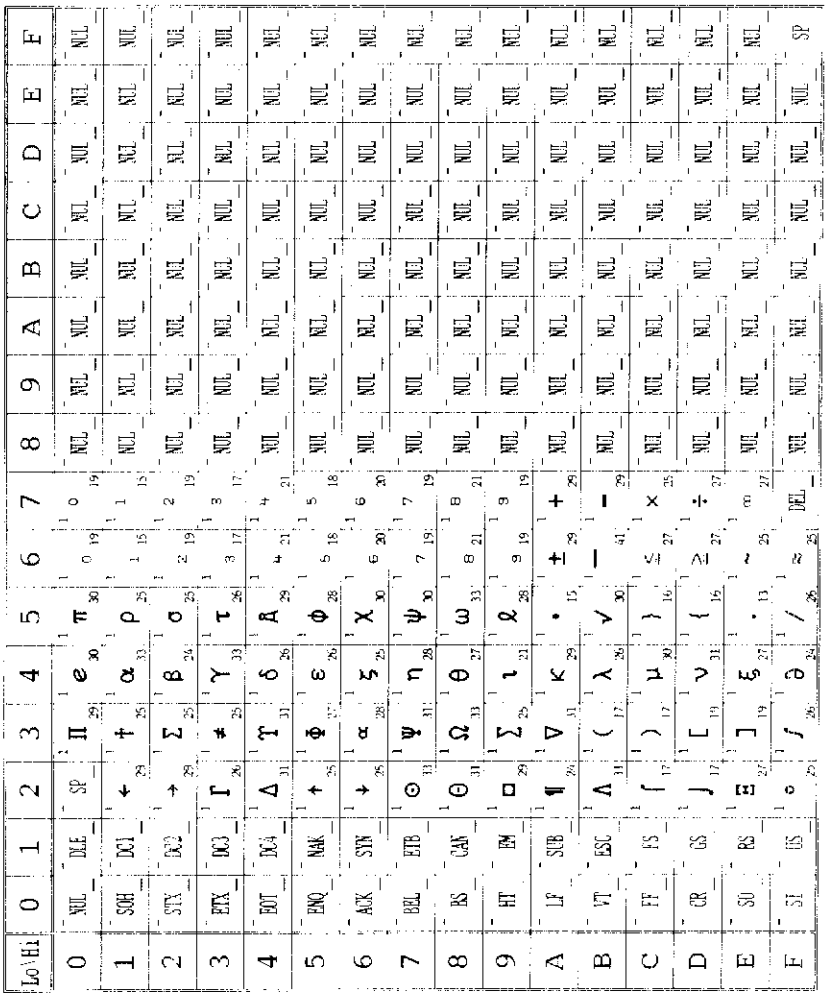
LEGEND:



Notes: 1. Und: Underfine (When these codes are accessed, characters of resident font 0 are printed.)

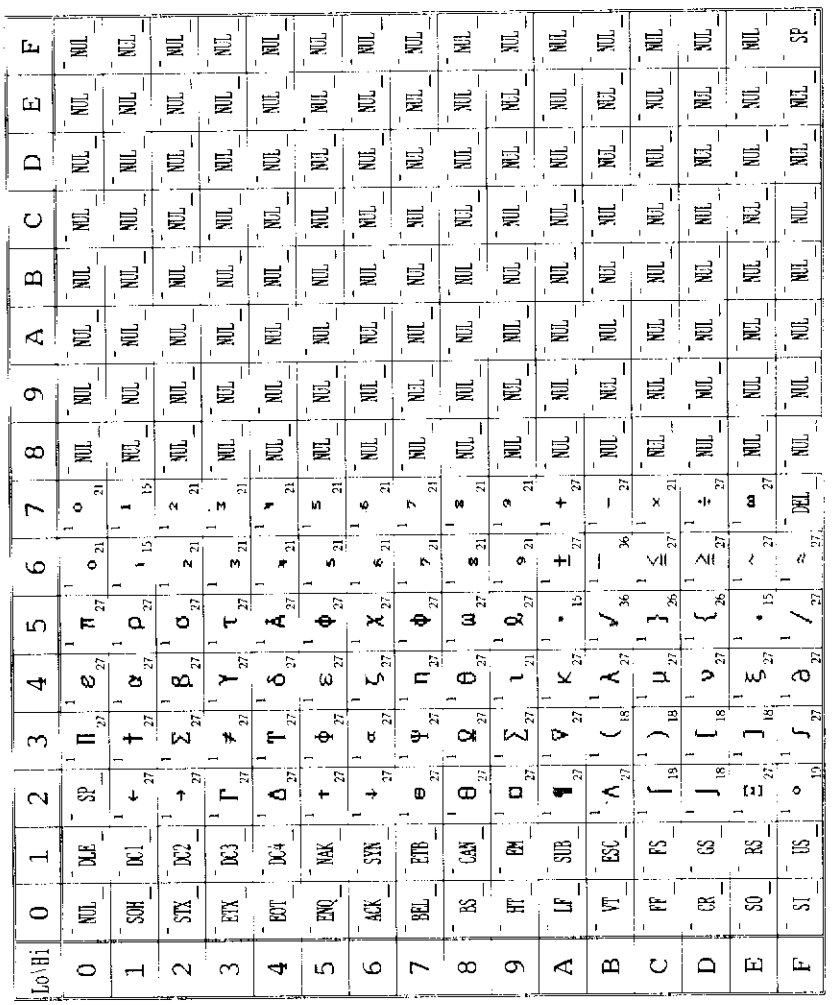
(2) Scientific 12

A. Font 0 for 12 CPI-Letter



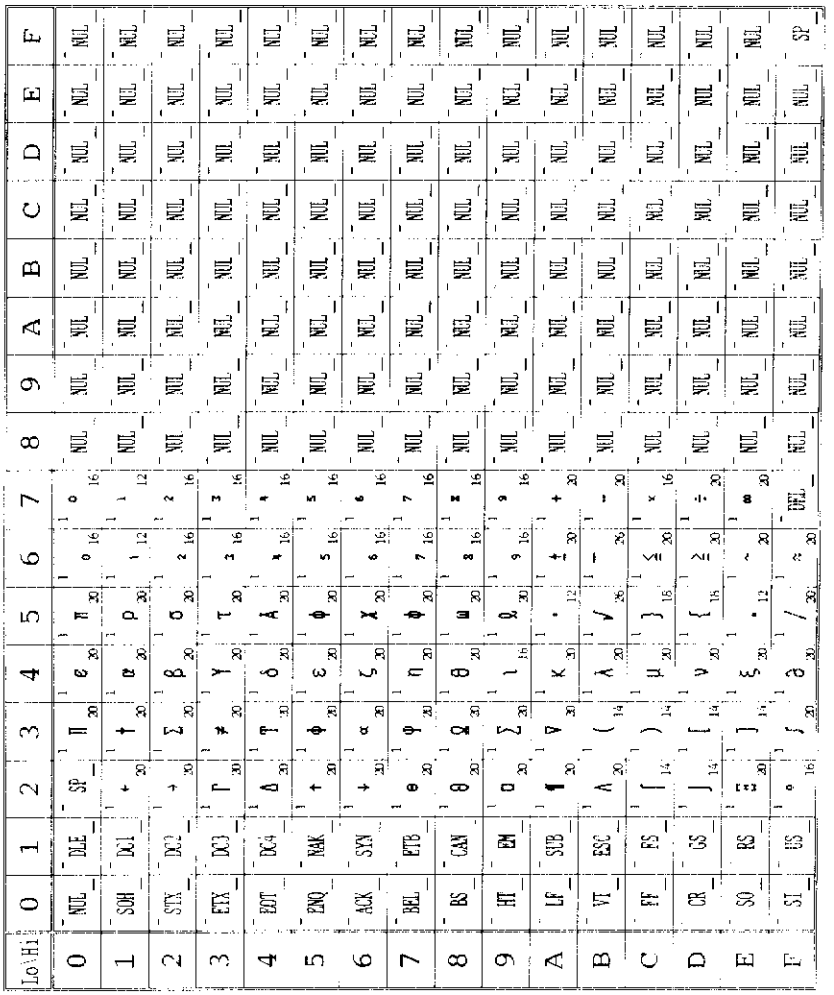
Notes: 1. These are no code conversions against the lauguage for this Font. Please set language setting to "USA".

B. Font 1 for 12 CPI-Draft



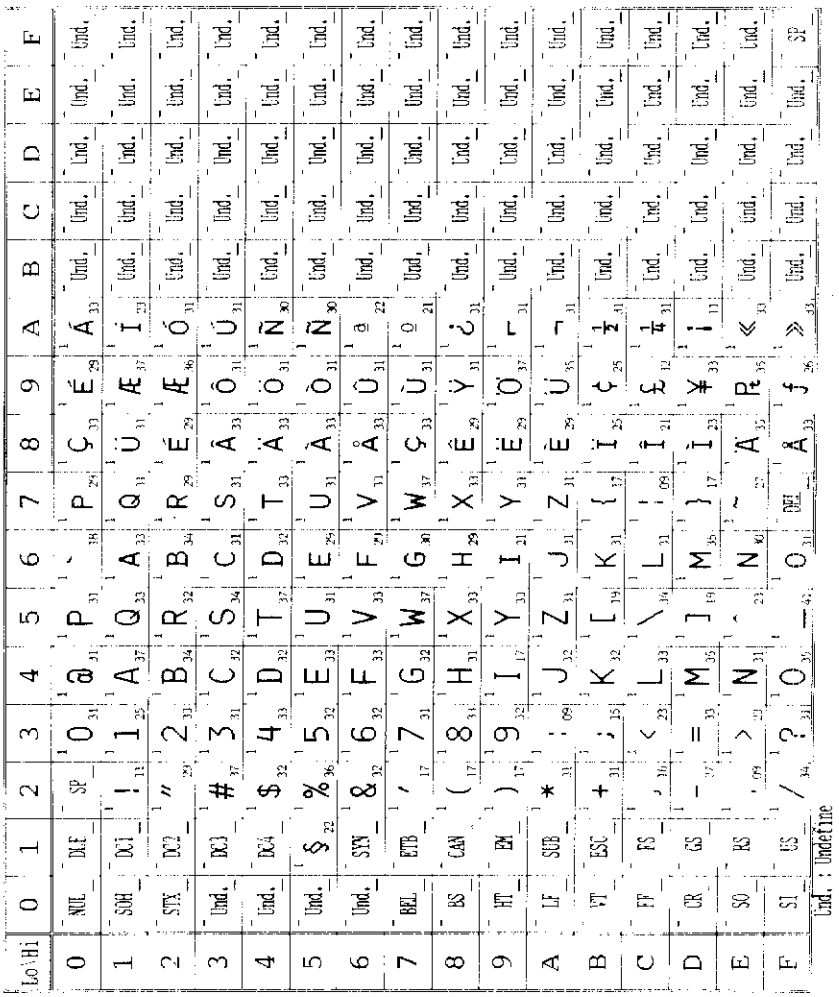
Notes: 1. These are no code conversions against the language for this Font. Please set language setting to "USA".

C. Font 2 for 15, 17, 18, 20 CPI



Notes: 1. These are no code conversions against the language for this Font. Please set language setting to "USA".

(3) Orator (For 10 CPI)



Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 37	1 $ 32	1 @ 31	1 [19	1 \ 34	1] 19	1 ^ 23	1 ` 18	1 { 17	1 ¦ 09	1 } 17	1 ~ 27
French	1 £ 32	1 $ 32	1 À 33	1 ° 25	1 Ç 33	1 § 28	1 ^ 23	1 ` 18	1 É 29	1 Ù 31	1 È 29	1 ¨ 26
German	1 # 37	1 $ 32	1 § 28	1 Ä 35	1 Ö 37	1 Ü 35	1 ^ 23	1 ` 18	1 ä 33	1 ö 31	1 ü 31	1 ß 35
UK	1 £ 32	1 $ 32	1 @ 31	1 [19	1 \ 34	1] 19	1 ^ 23	1 ` 18	1 { 17	1 ¦ 09	1 } 17	1 ~ 27
Danish/ Norwegn	1 # 37	1 $ 32	1 É 29	1 Æ 36	1 Ø 35	1 Å 33	1 Ü 35	1 É 29	1 æ 37	1 ø 31	1 å 33	1 ü 31
Swedish/ Finnish	1 # 37	1 ¤ 37	1 É 29	1 Ä 35	1 Ö 37	1 Å 33	1 Ü 35	1 é 29	1 ä 33	1 ö 31	1 å 33	1 ü 31
Italian	1 £ 32	1 $ 32	1 § 28	1 ° 25	1 Ç 33	1 é 29	1 ^ 23	1 ù 31	1 à 33	1 ò 31	1 è 29	1 ì 23
Spanish	1 £ 32	1 $ 32	1 § 28	1 ¡ 11	1 Ñ 30	1 ¿ 31	1 ^ 23	1 ` 18	1 ° 25	1 Ñ 30	1 ç 33	1 ~ 27

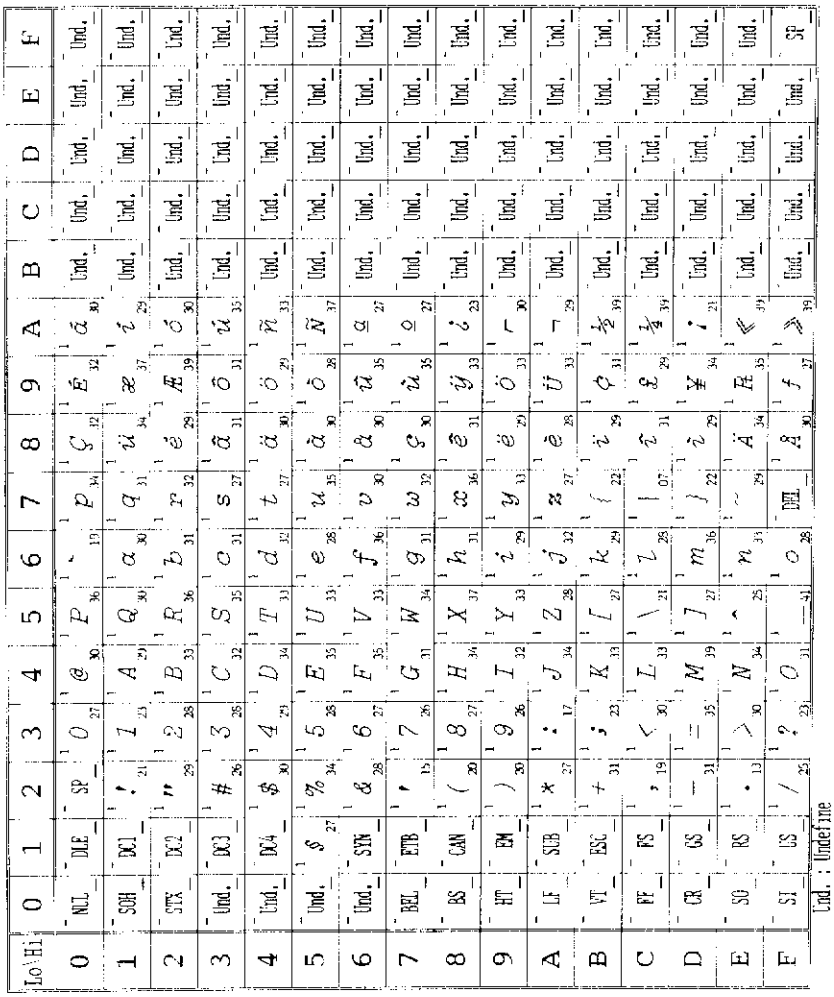
LEGEND:

Number of printing pass (1) ——— 1 ♥ 31 — Character or control code for character set 2 (♥)

Proportional spaceing value (Unit = 1/360 inch)

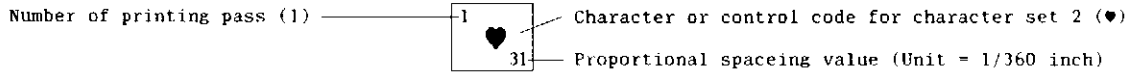
Notes: 1. Und: Undefine (When these codes are accessed, characters of Resident Font 0 may be printed.)

(4) Light Italic (For 10 CPI)



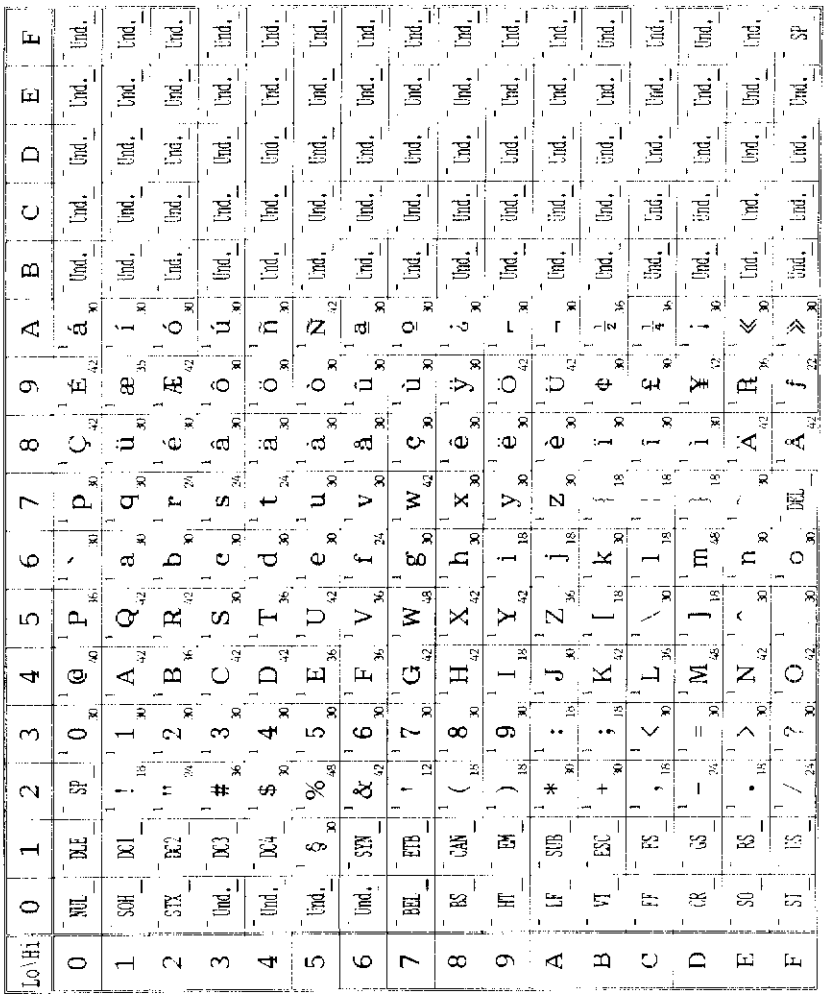
Lang.\ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	1 # 26	1 $ 30	1 @ 30	1 [27	1 \ 21	1] 27	1 ^ 25	1 ` 19	1 { 22	1 | 07	1 } 22	1 ~ 29
French	1 £ 29	1 $ 30	1 à 30	1 ° 17	1 ç 30	1 § 27	1 ^ 25	1 ` 19	1 é 29	1 ù 35	1 è 28	1 ¨ 24
German	1 # 26	1 $ 30	1 § 27	1 Ä 34	1 Ö 33	1 Ü 33	1 ^ 25	1 ` 19	1 ä 30	1 ö 29	1 ü 34	1 ß 31
UK	1 £ 29	1 $ 30	1 @ 30	1 [27	1 \ 21	1] 27	1 ^ 25	1 ` 19	1 { 22	1 | 07	1 } 22	1 ~ 29
Danish/ Norwegn	1 # 26	1 $ 30	1 É 32	1 Æ 39	1 Ø 35	1 Å 30	1 Ü 33	1 é 29	1 æ 37	1 ø 28	1 å 30	1 ü 34
Swedish/ Finnish	1 # 26	1 ¤ 38	1 É 32	1 Ä 34	1 Ö 33	1 Å 30	1 Ü 33	1 é 29	1 ä 30	1 ö 29	1 å 30	1 ü 34
Italian	1 £ 29	1 $ 30	1 § 27	1 ° 17	1 ç 30	1 é 29	1 ^ 33	1 ù 35	1 à 30	1 ò 28	1 è 28	1 ì 29
Spanish	1 £ 29	1 $ 30	1 § 27	1 ¡ 21	1 Ñ 37	1 ¿ 23	1 ^ 25	1 ` 19	1 ° 17	1 ñ 33	1 ç 30	1 ~ 29

LEGEND:



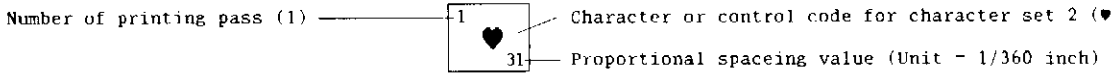
Note: 1. Und: Undefine (When these codes are accessed, characters of resident font 0 may be printed.)

(5) Boldface PS (For proportional spacing)



Lang. \ Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	@	[	\	]	^	`	{	¦	}	~
French	£	$	à	°	ç	§	^	`	é	ù	è	¨
German	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
UK	£	$	@	[	\	]	^	`	{	¦	}	~
Danish/ Norwegn	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Swedish/ Finnish	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italian	£	$	§	°	ç	é	^	ù	à	ò	è	ì
Spanish	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	~

LEGEND:



Note: 1. Und: Undefine (When these code are accessed, characters of resident font 0 may be printed.)