Chapter 7
PRINTER CONTROL COMMANDS

The printer has two emulation modes: Standard mode and IBM mode. In standard mode, the printer emulates the functions of the Epson LQ-860/ LQ-1060, and the graphics commands for NEC 24-wire printers. In IBM mode, the printer emulates the IBM Proprinter X24E/XL24E. Additional command codes are included as a superset of these emulations.

The emulation is changed by means of EDS switch A-1. When "EMULATION STD", the printer will be in standard mode, and when "EMULATION IBM", the printer will be in IBM mode (see Chapter 6). It is not possible to change the emulation by means of software control.

This chapter describes the printer's control commands. Some commands are common to both the standard and IBM modes. In the descriptions of the commands, all commands will given by functions. The name of each command is followed by a table like the one below:

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "1"	27 120 49	1B 78 31
	<ESC> "x" <1>	27 120 1	1B 78 01

Mode: Indicates the mode in which the command is recognized.
- Std. Standard mode (EDS switch A-1 is "EMULATION STD".)
- IBM IBM mode (EDS switch A-1 is "EMULATION IBM".)
- Both Both standard and IBM modes

ASCII: Indicates the ASCII coding of the command. Control characters are enclosed in pointed brackets: For example, <1> means character code 1.

Decimal: Gives the command in decimal character codes.

Hexadecimal: Gives the command in hexadecimal character codes.

Parameters for which values must be supplied are indicated by italic letters such as *n*, *m* or *d*.

FONT CONTROL COMMANDS

Select draft quality characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "0"	27 120 48	1B 78 30
	<ESC> "x" <0>	27 120 0	1B 78 00

Changes from letter quality to draft quality. Ignored if the FONT LOCK mode was selected during power-up.

Select draft pica characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <0>	27 73 0	1B 49 00

Changes to draft quality characters with pica pitch (10 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select draft elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <8>	27 73 8	1B 49 08

Changes to draft quality characters with elite pitch (12 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select draft condensed characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <16>	27 73 16	1B 49 10

Changes to draft quality characters with condensed pitch (17 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "1"	27 120 49	1B 78 31
	<ESC> "x" <1>	27 120 1	1B 78 01

Changes from draft quality to letter quality. The initial LQ font is Roman unless a different font has been selected by a preceding command. Ignored if the FONT LOCK mode was selected during power-up.

Select LQ pica characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <2>	27 73 2	1B 49 02

Changes to letter quality characters with pica pitch (10 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <LF>	27 73 10	1B 49 0A

Changes to letter quality characters with elite pitch (12 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ condensed characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <DC2>	27 73 18	1B 49 12

Changes to letter quality characters with condensed pitch (17 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ proportional characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <3>	27 73 3	1B 49 03

Changes to letter quality characters with proportional pitch. Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ font

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "k" *n*	27 107 *n*	1B 6B *n*
Std.	<FS> "C" *n*	28 67 *n*	1C 43 *n*

Selects an LQ font according to the value of *n*. In draft mode, this command remains dormant and takes effect later when LQ is selected. Ignored if the FONT LOCK mode was selected during power-up or the corresponding Font Cartridge is not installed.

n	Font		*n*	Font	
0	Roman		11	Blippo	(FC-1Z)
1	Sanserif		12	H-Gothic	
2	Courier		13	Orane	(FC-3Z)
3	Prestige		14	Cinema	(FC-1Z)
4	Script		15	CODE 39	(FC-2Z)
5	OCR-B	(FC-2Z)	16	UPC/EAN	(FC-2Z)
6	OCR-A	(FC-2Z)	17	Old Style	(FC-5Z)
7	Orator		18	Firenze	(FC-5Z)
8	Orator 2	(FC-1Z)	32	SLQ Roman	
9	TW-Light	(FC-3Z)	33	SLQ TW-Light	
10	Letter Gothic	(FC-1Z)	34	SLQ Script	(FC-10Z)

Select font

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" *d*	40 40 70 41 41 *d*	28 28 46 29 29 *d*

Changes to the font according to the value of *d*. Ignored if the FONT LOCK mode was selected during power-up or the corresponding Font Cartridge is not installed.

d	Font	
0	Roman	
1	Sanserif	
2	Courier	
3	Prestige	
4	Script	
5	OCR-B	(FC-2Z)
6	OCR-A	(FC-2Z)
7	Orator	
8	Orator 2	(FC-1Z)
9	Draft	

Select italic characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "4"	27 52	1B 34

Causes subsequent characters to be printed in italics.

Select upright characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "5"	27 53	1B 35

Stops italic printing and causes subsequent characters to be printed upright.

Emphasized printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "E"	27 69	1B 45

Causes subsequent characters to be emphasized by adding extra thickness to vertical strokes.

Cancel emphasized printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "F"	27 70	1B 46

Cancels emphasized printing.

Double-strike printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "G"	27 71	1B 47

Causes subsequent characters to be printed in double-strike mode with a slight vertical paper motion in between, causing a thickening of horizontal strokes.
For bold print, use of double-strike is recommended in LQ mode, and combined use of emphasized and double-strike is recommended in draft mode.

Cancel double-strike printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "H"	27 72	1B 48

Cancels double-strike printing.

Start underlining

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "-" "1"	27 45 49	1B 2D 31
	<ESC> "-" <1>	27 45 1	1B 2D 01

Causes subsequent characters to be underlined. IBM block graphics characters and spaces skipped by horizontal tabulation are not underlined.

Stop underlining

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "-" "0"	27 45 48	1B 2D 30
	<ESC> "-" <0>	27 45 0	1B 2D 00

Stops underlining.

Start overlining

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "_" "1"	27 95 49	1B 5F 31
	<ESC> "_" <1>	27 95 1	1B 5F 01

Causes subsequent characters to be overlined. Spaces skipped by horizontal tabulation are not overlined.

Stop overlining

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "_" "0"	27 95 48	1B 5F 30
	<ESC> "_" <0>	27 95 0	1B 5F 00

Stops overlining.

Select score

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "(" "_" <3> <0> <1> *n1* *n2*	27 40 45 3 0 1 *n1* *n2*	1B 28 2D 03 00 01 *n1* *n2*

Start score according to the values of *n*1 and *n*2, as shown below.

n1	Function
1	Underlining
2	Strike-through
3	Overlining

*n*2	Function
0	Cancel score
1	Single continuous line
2	Double continuous line
5	Single broken line
6	Double broken line

Select ornament character

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "q" *n*	27 113 *n*	1B 71 *n*

Selects an ornament character according to the value of *n*, as shown below.

n	Character
0	Normal
1	Outline
2	Shadow
3	Shadow and outline

Superscript

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "S" "0"	27 83 48	1B 53 30
	<ESC> "S" <0>	27 83 0	1B 53 00

Causes subsequent characters to be printed as superscripts. Does not change the character pitch.

Subscript

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "S" "1"	27 83 49	1B 53 31
	<ESC> "S" <1>	27 83 1	1B 53 01

Causes subsequent characters to be printed as subscripts. Does not change the character pitch.

Cancel superscript or subscript

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "T"	27 84	1B 54

Stops printing superscripts or subscripts and returns to normal printing.

CHARACTER SET COMMANDS

Select standard character set

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "t" "0"	27 116 48	1B 74 30
	<ESC> "t" <0>	27 116 0	1B 74 00
Std.	<FS> "I" "0"	28 73 48	1C 49 30
	<FS> "I" <0>	28 73 0	1C 49 00

Selects the standard character set. This is the power-up default in Standard mode if EDS switch C-1 is set to "STD ITALIC".

Select IBM character set

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "t" "1"	27 116 49	1B 74 31
	<ESC> "t" <1>	27 116 1	1B 74 01
Std.	<FS> "I" "1"	28 73 49	1C 49 31
	<FS> "I" <1>	28 73 1	1C 49 01

Selects an IBM character set. This is the power-up default in IBM mode, or EDS switch C-1 is set to "STD GRAPH" in standard mode.

Select character set #1

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "7"	27 55	1B 37

Selects character set #1.

Select character set #2

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "6"	27 54	1B 36

Selects character set #2.

Select international character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "R" *n*	27 82 *n*	1B 52 *n*

Selects an international character set in the Standard character set according to the value of *n*.

n	Character set	*n*	Character set
0	U.S.A	8	Japan
1	France	9	Norway
2	Germany	10	Denmark II
3	England	11	Spain II
4	Denmark I	12	Latin America
5	Sweden	13	Korea
6	Italy	14	Irish
7	Spain I	64	Legal

One of these character sets can be selected as power-up default by EDS switch C-5.

Select IBM code page

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "[" "T" <4> <0> <0> <0> *n1* *n2*	27 91 84 4 0 0 0 *n1* *n2*	1B 5B 54 04 00 00 00 *n1* *n2*

Changes the code page of the current IBM character set according to the values of *n*1 and *n*2.

n1	*n2*	Code Page	
1	181	#437	U.S.A.
3	82	#850	Multi-lingual
3	92	#860	Portuguese
3	93	#861	Icelandic
3	95	#863	Canadian French
3	97	#865	Nordic

One of these code pages can be selected as power-up defaults by EDS switch C-4.

Enable printing of all character codes

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "\" *n1* *n2*	27 92 *n1* *n2*	1B 5C *n1* *n2*

Enables printing of all characters in the IBM character set, including those assigned to character codes which are normally considered control codes. This command remains in effect for the next *n1* + *n2* × 256 characters, where *n1* and *n2* are numbers between 0 and 255. During this interval no control functions are executed. If a code with no assigned character is received, the printer prints a space.

Enable printing of all character codes on next character

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "^" *n*	27 94 *n*	1B 5E *n*

This command operates like <ESC> "\" except that it remains in effect for only one character.

Select slash zero

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "~" "1"	27 126 49	1B 7E 31
	<ESC> "~" <1>	27 126 1	1B 7E 01

Causes subsequent zero characters to be overprinted with a slash (Ø).

Select normal zero

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "~" "0"	27 126 48	1B 7E 30
	<ESC> "~" <0>	27 126 0	1B 7E 00

Causes subsequent zero characters to be printed normally (0), without a slash.

CHARACTER SIZE AND PITCH COMMANDS

Pica pitch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "P"	27 80	1B 50
IBM	<DC2>	18	12

In Standard mode, changes from either elite or semi-condensed to pica pitch (10 cpi) or from condensed elite to condensed pica (17 cpi). In IBM mode, changes from either elite or condensed to pica (10 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

Elite pitch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "M"	27 77	1B 4D
IBM	<ESC> ":"	27 58	1B 3A

Changes from either pica or semi-condensed to elite pitch (12 cpi) or from condensed pica to condensed elite (20 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

Semi-condensed pitch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "g"	27 103	1B 67

Changes from either pica or elite to semi-condensed pitch (15 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

Condensed printing

Mode	ASCII	Decimal	Hexadecimal
Both	<SI>	15	0F
Std.	<ESC> <SI>	27 15	1B 0F

Changes from pica to condensed pica (17 cpi) or from elite to condensed elite (20 cpi).
Ignored if the PITCH LOCK mode was selected during power-up.

Cancel condensed printing

Mode	ASCII	Decimal	Hexadecimal
Both	<DC2>	18	12

In Standard mode, changes from condensed pica to normal pica or from condensed elite to normal elite. In IBM mode, always changes to normal pica. Ignored if the PITCH LOCK mode was selected during power-up.

Expanded printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "W" "1"	27 87 49	1B 57 31
	<ESC> "W" <1>	27 87 1	1B 57 01

Causes subsequent characters to be expanded to double width.

Cancel expanded printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "W" "0"	27 87 48	1B 57 30
	<ESC> "W" <0>	27 87 0	1B 57 00

Stops expanded printing and returns to normal width.

Expanded printing for one line

Mode	ASCII	Decimal	Hexadecimal
Both	<SO>	14	0E
Std.	<ESC> <SO>	27 14	1B 0E

Causes subsequent characters in the current line to be expanded to double width. Characters return to normal width after the next line feed (<LF>). The <DC4>, <VT>, <FF>, and <ESC> "W" 0 commands also cancel expanded printing.

Cancel one-line expanded printing

Mode	ASCII	Decimal	Hexadecimal
Both	<DC4>	20	14

Stops one-line expanded printing set with <SO> or <ESC> <SO>. Does not cancel <ESC> "W" 1.

Select character width

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "E" *n*	28 69 *n*	1C 45 *n*

Select a character width according to the value of *n* as shown below.

n	Character width
0	Normal-wide
1	Double-wide
2	Triple-wide

Select proportional spacing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "p" "1"	27 112 49	1B 70 31
	<ESC> "p" <1>	27 112 1	1B 70 01
IBM	<ESC> "P" <1>	27 80 1	1B 50 01

Causes subsequent characters to be proportionally spaced. Ignored if the PITCH LOCK mode was selected during power-up.

Select fixed spacing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "p" "0"	27 112 48	1B 70 30
	<ESC> "p" <0>	27 112 0	1B 70 00
IBM	<ESC> "P" <0>	27 80 0	1B 50 00

Causes subsequent characters to be printed with fixed character spacing. Ignored if the PITCH LOCK mode was selected during power-up.

Select master print mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "!" *n*	27 33 *n*	1B 21 *n*

Selects a combined print mode according to the value of *n*. The value of *n* is the sum of the values given below for the desired characteristics.

Function	*n* value
Underline	128
Italic	64
Expanded	32
Double strike	16
Emphasized	8
Condensed [*]	4
Proportional [*]	2
Elite [*]	1

[*] Ignored if the PITCH LOCK mode was selected during power-up.

Examples: $n = 1$ gives elite; $n = 9$ (1 + 8) gives emphasized elite; $n = 137$ (1 + 8 + 128) gives underlined emphasized elite.

Increase character spacing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <SP> *n*	27 32 *n*	1B 20 *n*

Increases the space between characters by *n* dots, where *n* is a number from 0 to 127. Used in microjustification.

Select double or quadruple size

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "h" *n*	27 104 *n*	1B 68 *n*

Selects the size of subsequent characters as shown below. Extra-high characters align along the cap-line of normal characters, with the base line temporarily moving down. Line spacing is temporarily doubled when $n = 1$ and quadrupled when $n = 2$.

n	Effect
0	Normal size
1	Double-high, double-wide
2	Quadruple-high, quadruple-wide

Select character size

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "S" ")" ")" *d*	40 40 83 41 41 *d*	28 28 53 29 29 *d*

Selects a combination of character height and width according to the value of *d*, as below.
Does not move the base line.

d	Line spacing	Character height
0	Single width	Single height
1	Double width	Single height
2	Single width	Double height
3	Double width	Double height

Print double-height characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "w" "1"	27 119 49	1B 77 31
	<ESC> "w" <1>	27 119 1	1B 77 01
	<FS> "V" "1"	28 86 49	1C 56 31
	<FS> "V" <1>	28 86 1	1C 56 01

Prints subsequent characters at double height without moving the base line, and without changing the line spacing.

Return to normal height

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "w" "0"	27 119 48	1B 77 30
	<ESC> "w" <0>	27 119 0	1B 77 00
	<FS> "V" "0"	28 86 48	1C 56 30
	<FS> "V" <0>	28 86 0	1C 56 00

Terminates double-height printing and prints subsequent characters at normal height.

Select character height, width, and line spacing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "[" "@" <4> <0> <0> <0> *n* *m*	27 91 64 4 0 0 0 *n* *m*	1B 5B 40 04 00 00 00 *n* *m*

Selects a combination of character height, width, and line spacing according to the value of *n* and *m*, as below. Does not move the base line.

n	Line spacing	Character height
0	Unchanged	Unchanged
1	Unchanged	Single height
2	Unchanged	Double height
16	Single	Unchanged
17	Single	Single height
18	Single	Double height
32	Double	Unchanged
33	Double	Single height
34	Double	Double height

m	Character width
1	Single width (same as <ESC> "W" 0)
2	Double width (same as <ESC> "W" 1)

VERTICAL POSITION COMMANDS

Set line spacing to 1/8 inch

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "0"	27 48	1B 30

Sets the distance the paper advances or reverses in subsequent line feeds to 1/8 inch.

Set line spacing to 7/60 or 7/72 inch

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "1"	27 49	1B 31

Sets the distance the paper advances or reverses in subsequent line feeds to 7/60 inch (standard mode) or 7/72 inch (IBM mode).

Set line spacing to 1/6 inch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "2"	27 50	1B 32

Sets the distance the paper advances or reverses in subsequent line feeds to 1/6 inch.

Set line spacing to n/360 inch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "+" *n*	27 43 *n*	1B 2B *n*
	<FS> "3" *n*	28 51 *n*	1C 33 *n*

Sets the distance the paper advances or reverses in subsequent line feeds to *n*/360 inch, where *n* is between 0 and 255.

Set base unit for line spacing

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "[" "\" <4> <0> <0> <0> <0> *n*	27 91 92 4 0 0 0 0 *n*	1B 5B 5C 04 00 00 00 00 *n*

Sets the base unit for the line spacing commands, <ESC> "3" and <ESC> "J". If the value of *n* is 180, the base unit is set to 1/180". If the value of *n* is 216, the base unit is set to 1/216". If otherwise specified, this command is ignored. This command becomes effective only after <ESC> "3" or <ESC> "J" is received, The default base unit is set to 1/216".

Set line spacing to n/180 inch or n/216 inch

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "3" *n*	27 51 *n*	1B 33 *n*

Sets the distance the paper advances or reverses in subsequent line feeds to *n*/180 inch or *n*/216 inch, where *n* is between 0 and 255. If *n* = 0, in Standard mode the line-feed distance is set to 0, but in IBM mode this command is ignored.

Set line spacing to n/60 inch or n/72 inch

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "A" *n*	27 65 *n*	1B 41 *n*

In Standard mode, sets the distance the paper advances or reverses in subsequent line feeds to *n*/60 inch, where *n* is between 0 and 255. If *n* = 0, the line spacing is set to 0.

In IBM mode this command defines the distance the paper advances or reverses in subsequent line feeds to *n*/72 inch, where *n* is between 1 and 85. The new line spacing does not take effect until next <ESC> "2" command.

Execute <ESC> "A"

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "2"	27 50	1B 32

Sets the line spacing to the value defined by the last preceding <ESC> "A" command. Sets the line spacing to 1/6 inch if there is no preceding <ESC> "A" command.

Line feed

Mode	ASCII	Decimal	Hexadecimal
Both	<LF>	10	0A

Prints the current line and feeds the paper to the next line. See the preceding commands for the line spacing.

Reverse line feed

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <LF>	27 10	1B 0A
IBM	<ESC> "]"	27 93	1B 5D

Prints the current line and feeds the paper in the reverse direction to the preceding line.
See the preceding commands for the line spacing. Ignored when the friction feed is used.

Select forward feed mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "F"	28 70	1C 46

Cancels the reverse feed mode and selects forward feed mode. This is the default setting at power-on.

Select reverse feed mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "R"	28 82	1C 52

Selects reverse feed mode. Reverses the direction of all vertical movements. Ignored when friction feed or bottom feed is used.

Perform one n/180-inch or n/216-inch line feed

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "J" *n*	27 74 *n*	1B 4A *n*

Feeds the paper once by *n*/180 inches or *n*/216 inches, where *n* is between 1 and 255. Does not move the print position right or left in the standard mode. Does not change the line-spacing setting.

Perform one n/180-inch reverse line feed

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "j" *n*	27 106 *n*	1B 6A *n*

Feeds the paper once by *n*/180 inches in the reverse direction, where *n* is between 1 and 255.
Does not move the print position right or left. Does not change the line-spacing setting.

Feed paper n lines

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "f" "1" *n*	27 102 49 *n*	1B 66 31 *n*
	<ESC> "f" <1> *n*	27 102 1 *n*	1B 66 01 *n*

Feeds the paper *n* lines from the current line, where *n* is between 0 and 127.

Set top of page at current position

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "4"	27 52	1B 34

Sets the current position as the top-of-page position. Note that this can also be done from the control panel.

Set page length to n lines

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "C" *n*	27 67 *n*	1B 43 *n*

Sets the page length to *n* lines in the current line spacing, where *n* is between 1 and 127 in Standard mode or between 1 and 64 in IBM mode. Changing the line spacing later does not alter the physical page length. The current line becomes the top of the page.

Set page length to n inches

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "C" <0> *n*	27 67 0 *n*	1B 43 00 *n*

Sets the page length to *n* inches, where *n* is between 1 and 32 in Standard mode or between 1 and 64 in IBM mode. The current line becomes the top of the page.

Set bottom margin

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "N" *n*	27 78 *n*	1B 4E *n*

Sets the bottom margin to *n* lines, where *n* is between 1 and 127 in Standard mode or between 1 and 255 in IBM mode. The bottom margin is reset when you change the page length.

Cancel bottom margin

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "O"	27 79	1B 4F

Cancels the bottom margin.

Form feed

Mode	ASCII	Decimal	Hexadecimal
Both	<FF>	12	0C

Feeds the paper to the top of the next page according to the current page length, and moves the print position to the left margin. When the automatic sheet feeder (ASF) is selected with EDS switch E-3, this command ejects the current page.

Return to top of current page

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <FF>	27 12	1B 0C

Feeds the paper backward to the top of the current page. Ignored when the friction feed is used.

Disable paper-out detector

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "8"	27 56	1B 38

Causes the printer to disregard the signal sent by the paper-out detector, enabling printing to the bottom of the paper. Overrides the setting of EDS switch E-2.

Enable paper-out detector

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "9"	27 57	1B 39

Causes the printer to stop printing before the end of the paper. Overrides the setting of EDS switch E-2.

Set vertical tab stops

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "B" *n1* *n2* .... <0>	27 66 *n1* *n2* ... 0	1B 42 *n1* *n2* ... 00

Cancels all current vertical tab stops and sets new vertical tab stops at lines *n1*, *n2*, etc., where *n1*, *n2*, etc. are numbers between 1 and 255. A maximum of 16 vertical tab stops can be set. The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code. The vertical tab stops are set in terms of the current line spacing and do not move if the line spacing is changed later.

Set vertical tab stops every n lines

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "e" "1" *n*	27 101 49 *n*	1B 65 31 *n*
	<ESC> "e" <1> *n*	27 101 1 *n*	1B 65 01 *n*

Cancels all current vertical tab stops and sets new tab stops every *n* lines, where *n* is between 1 and 127.

Set vertical tab stops in channel

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "b" *n0 n1* *n2* .... <0>	27 98 *n0 n1* *n2* 0	1B 62 *n0 n1* *n2* ... 00

Cancels all current vertical tab stops in channel *n0*, (where *n0* is between 0 and 7) and sets new vertical tab stops in this channel. (A channel is a set of vertical tab stops selected by the <ESC> "/" command.) See <ESC> "B" for parameters *n1*, *n2*, ... <0>.

Select vertical tab channel

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "/" *n0*	27 47 *n0*	1B 2F *n0*

Selects a set of vertical tab stops designated by a channel number (*n0*) from 0 to 7. The tab stops in each channel are set by <ESC> "b".

Vertical tab

Mode	ASCII	Decimal	Hexadecimal
Both	<VT>	11	0B

Feeds the paper to the next vertical tab stop and moves the print position to the left margin. Performs a line feed if no vertical tabs are set, as at power-up. Feeds to the top of the next page if vertical tabs are set but the current line is at or below the last vertical tab stop.

HORIZONTAL POSITION COMMANDS

Set left margin

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "l" *n*	27 108 *n*	1B 6C *n*

Sets the left margin at column *n* (where *n* is between 0 and 255) in the current character pitch (pica pitch if proportional spacing is selected). The left margin does not move if the character pitch is changed later. The left margin must be at least two columns to the left of the right margin and within the limits below:

Printer Type	Normal Carriage	Wide Carriage
Pica	$0 \leqq n \leqq 76$	$0 \leqq n \leqq 132$
Elite	$0 \leqq n \leqq 91$	$0 \leqq n \leqq 158$
Semi-condensed	$0 \leqq n \leqq 114$	$0 \leqq n \leqq 198$
Condensed pica	$0 \leqq n \leqq 130$	$0 \leqq n \leqq 226$
Condensed elite	$0 \leqq n \leqq 152$	$0 \leqq n \leqq 255$
Expanded pica	$0 \leqq n \leqq 38$	$0 \leqq n \leqq 66$
Expanded elite	$0 \leqq n \leqq 45$	$0 \leqq n \leqq 79$
Expanded semi-condensed	$0 \leqq n \leqq 57$	$0 \leqq n \leqq 99$
Expanded condensed pica	$0 \leqq n \leqq 64$	$0 \leqq n \leqq 113$
Expanded condensed elite	$0 \leqq n \leqq 76$	$0 \leqq n \leqq 132$

Set right margin

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "Q" *n*	27 81 *n*	1B 51 *n*

Sets the right margin at column *n* in the current character pitch (pica pitch if proportional spacing is currently selected). Column *n* becomes the last character position in the line.
The right margin does not move if the character pitch is changed later. The right margin must be within the limits below:

Printer Type	Normal Carriage	Wide Carriage
Pica	$4 \leqq n \leqq 80$	$4 \leqq n \leqq 136$
Elite	$5 \leqq n \leqq 96$	$5 \leqq n \leqq 163$
Semi-condensed	$6 \leqq n \leqq 120$	$6 \leqq n \leqq 204$
Condensed pica	$7 \leqq n \leqq 137$	$7 \leqq n \leqq 233$
Condensed elite	$8 \leqq n \leqq 160$	$8 \leqq n \leqq 255$
Expanded pica	$2 \leqq n \leqq 40$	$2 \leqq n \leqq 68$
Expanded elite	$3 \leqq n \leqq 48$	$3 \leqq n \leqq 81$
Expanded semi-condensed	$3 \leqq n \leqq 60$	$3 \leqq n \leqq 102$
Expanded condensed pica	$4 \leqq n \leqq 68$	$4 \leqq n \leqq 116$
Expanded condensed elite	$4 \leqq n \leqq 80$	$4 \leqq n \leqq 136$

Set left and right margins

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "X" *n1* *n2*	27 88 *n1* *n2*	1B 58 *n1* *n2*

Sets the left margin at column *n1* and the right margin at column *n2*.
See the preceding commands for margin restrictions and other notes.

Carriage return

Mode	ASCII	Decimal	Hexadecimal
Both	<CR>	13	0D

Prints the current line and returns the next print position to the left margin. If EDS switch F-1 is set to "AUTO-LF ON", also performs a line feed.

Set automatic line feed

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "5" <1>	27 53 1	1B 35 01

Causes the printer to perform both a carriage return and line feed each time it receives a <CR> code. This command takes priority over EDS switch F-1.

Cancel automatic line feed

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "5" <0>	27 53 0	1B 35 00

Causes the printer to perform only a carriage return when it receives a <CR> code. This command takes priority over EDS switch F-1.

Backspace

Mode	ASCII	Decimal	Hexadecimal
Both	<BS>	8	08

Moves the print position one column to the left. Ignored if the print position is at the left margin. This command can be used to overstrike or combine characters.

Left justify

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "0"	27 97 48	1B 61 30
	<ESC> "a" <0>	27 97 0	1B 61 00

Aligns subsequent text with the left margin, leaving the right margin ragged.

Center text

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "1"	27 97 49	1B 61 31
	<ESC> "a" <1>	27 97 1	1B 61 01

Centers subsequent text between the left and right margins.

Right justify

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "2"	27 97 50	1B 61 32
	<ESC> "a" <2>	27 97 2	1B 61 02

Aligns subsequent text with the right margin, leaving the left margin ragged.

Full justify

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "3"	27 97 51	1B 61 33
	<ESC> "a" <3>	27 97 3	1B 61 03

Aligns subsequent text between the left and right margins.

Set horizontal tab stops

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "D" *n1* *n2* .... <0>	27 68 *n1* *n2* 0	1B 44 *n1* *n2* ... 00

Cancels all current horizontal tab stops and sets new tab stops at columns *n1*, *n2*, etc. in the current character pitch (pica pitch if proportional spacing is currently selected), where *n1*, *n2*, etc. are numbers between 1 and 255. The maximum number of horizontal tab stops allowed is 32 in Standard mode and 64 in IBM mode. The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code. To clear all tab stops, specify <ESC> "D" <0>.

Set horizontal tab stop every n columns

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "e" "0" *n*	27 101 48 *n*	1B 65 30 *n*
	<ESC> "e" <0> *n*	27 101 0 *n*	1B 65 00 *n*

Cancels all current horizontal tab stops and sets new tab stops every *n* columns, where *n* is between 1 and 127.

Reset all tab stops

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "R"	27 82	1B 52

Resets the horizontal tab stops to their power-up values in which a tab stop is set every 8 column starting at column 9. Also clears all vertical tab stops.

Horizontal tab

Mode	ASCII	Decimal	Hexadecimal
Both	<HT>	9	09

Moves the print position to the next horizontal tab stop. Ignored if there is no next horizontal tab stop in the current line. Note that when underlining is selected, spaces skipped by horizontal tabulation are not underlined.

Relative horizontal tab

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "\" *n1* *n2*	27 92 *n1* *n2*	1B 5C *n1* *n2*

Moves the print position right or left a specified distance. Ignored if the resulting position is beyond the right or left margin. The formulas for the distance and direction are as follows:
If *n2* is between 0 and 63, the print head moves right by ($n1 + n2 \times 256$) dots.
If you want to move the print head to the left, *n1* and *n2* are obtained by subtracting the value from 65536, and dividing the result into high and low bytes.

Relative horizontal tab in inches

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "d" *n1* *n2*	27 100 *n1* *n2*	1B 64 *n1* *n2*

Sets the next print position to ($n1 + n2 \times 256$)/120 inches from the current position.
Ignored if this position is beyond the right margin.

Absolute horizontal tab in inches

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "$" *n1* *n2*	27 36 *n1* *n2*	1B 24 *n1* *n2*

Sets the next print position to $(n1 + n2 \times 256)/60$ inches from the left margin on the current line. Ignored if this position is beyond the right margin.

Absolute horizontal tab in columns

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "f" "0" *n*	27 102 48 *n*	1B 66 30 *n*
	<ESC> "f" <0> *n*	27 102 0 *n*	1B 66 00 *n*

Moves the next print position to column *n* from the left margin, where *n* is between 0 and 127.

GRAPHICS COMMANDS

Print normal-density 8-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "K" *n1 n2 m1 m2 ...*	27 75 *n1 n2 m1 m2 ...*	1B 4B *n1 n2 m1 m2 ...*

Prints bit-image graphics at 60 dots per inch horizontally. The graphic image is 8 dots high and $n1 + n2 \times 256$ dots wide. Maximum width is 8 inches (480 dots) for normal carriage printer, and 13.6 inches (816 dots) for wide carriage printer. *m1*, *m2*, ... are the dot data, each a 1-byte value from 0 to 255 representing 8 vertical dots, with the most significant bit at the top and the least significant bit at the bottom. The number of data bytes must be $n1 + n2 \times 256$. Dots beyond the right margin are ignored. At the end of bit-image printing the printer returns automatically to character mode.

Print double-density 8-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "L" *n1 n2 m1 m2 ...*	27 76 *n1 n2 m1 m2 ...*	1B 4C *n1 n2 m1 m2 ...*

Prints bit-image graphics at 120 dots per inch horizontally (maximum 960 dots wide for normal carriage printer, 1632 dots for wide carriage printer). See <ESC> "K" for other information.

Print double-density, double-speed 8-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "Y" *n1 n2 m1 m2 ...*	27 89 *n1 n2 m1 m2 ...*	1B 59 *n1 n2 m1 m2 ...*

Prints bit-image graphics at 120 dots per inch horizontally (maximum 960 dots wide for normal carriage printer, 1632 dots for wide carriage printer), skipping every second dot in the horizontal direction. See <ESC> "K" for other information.

Print quadruple-density 8-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "Z" *n1* *n2* *m1* *m2* ...	27 90 *n1* *n2* *m1* *m2* ...	1B 5A *n1* *n2* *m1* *m2* ...

Prints bit-image graphics at 240 dots per inch horizontally (maximum 1920 dots wide for normal carriage printer, 3264 dots for wide carriage printer), skipping every second dot in the horizontal direction. See <ESC> "K" for other information.

Print hex-density 24-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "Z" *n1* *n2* *m1* *m2* *m3* ...	28 90 *n1* *n2* *m1* *m2* *m3* ...	1C 5A *n1* *n2* *m1* *m2* *m3* ...

Prints 24-bit dot graphics at 360 dots per inch horizontally. The graphics image is 24 dots high and $n1 + n2 \times 256$ dots wide. Maximum width is 8 inches (2880 dots) for normal carriage printer, and 13.6 inches (4896 dots) for wide carriage printer. In the data *m1*, *m2*, *m3* ... each three bytes represent 24 vertical dots. In the leftmost position, the most significant bit of *m1* is the top dot; the least significant bit of *m1* is the eighth dot from the top; the most significant bit of *m2* is the ninth dot; the least significant bit of *m2* is the sixteenth dot from the top; the most significant bit of *m3* is the seventeenth dot from the top; the least significant bit of *m3* is the bottom dot. The rest of data is similar. The number of data bytes must be $3 \times (n1 + n2 \times 256)$. Dots beyond the right margin are ignored. At the end of dot graphics printing, the printer returns automatically to character mode.

Select graphics mode

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "*" *n0* *n1* *n2* *m1* *m2* ...	27 42 *n0* *n1* *n2* *m1* *m2* ...	1B 2A *n0* *n1* *n2* *m1* *m2* ...

Selects one of eleven graphics modes depending on the value of *n0* and prints bit-image graphics in this mode. See <ESC> "K" (for 8-bit graphics) or <FS> "Z" (for 24-bit graphics) for information on *n1*, *n2*, *m1*, *m2*, ...

n0	Graphics mode	
0	8-bit Normal-density	(60 dots per inch)
1	8-bit Double-density	(120 dots per inch)
2	8-bit Double-density, double-speed	(120 dots per inch)
3	8-bit Quadruple-density	(240 dots per inch)
4	8-bit CRT graphics, mode I	(80 dots per inch)
6	8-bit CRT graphics, mode II	(90 dots per inch)
32	24-bit Normal-density	(60 dots per inch)
33	24-bit Double-density	(120 dots per inch)
38	24-bit CRT graphics	(90 dots per inch)
39	24-bit Triple-density	(180 dots per inch)
40	24-bit Hex-density	(360 dots per inch)

Select graphics mode

Mode	ASCII	Decimal	Hexadecimal
IBM.	<ESC> "[" "g" *n1* *n2* *m0* *m1* *m2* ...	28 91 103 *n1* *n2* *m0* *m1* *m2* ...	1B 5B 67 *n1* *n2* *m0* *m1* *m2* ...

Selects one of eight graphics modes depending on the value of *m*0 and prints dot graphics in this mode. The graphics image is (*n1* + *n2* × 256) – 1 dots wide. See <ESC> "K" (for 8-bit graphics) or <FS> "Z" (for 24-bit graphics) for information on *m1*, *m2*, ...

m0	Graphics mode	
0	8-bit Normal-density	(60 dots per inch)
1	8-bit Double-density	(120 dots per inch)
2	8-bit Double-density, double-speed	(120 dots per inch)
3	8-bit Quadruple-density	(240 dots per inch)
8	24-bit Normal-density	(60 dots per inch)
9	24-bit Double-density	(120 dots per inch)
11	24-bit Triple-density	(180 dots per inch)
12	24-bit Hex-density	(360 dots per inch)

Convert graphics density

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "?" *n* *m*	27 63 *n* *m*	1B 3F *n* *m*

Converts graphics defined by subsequent <ESC> "K", <ESC> "L", <ESC> "Y" or <ESC> "Z" commands to a density mode defined by <ESC> "*". *n* is "K", "L", "Y" or "Z", indicating the mode to be converted. *m* is a code from <0> to <4> or <6> indicating one of the modes of <ESC> "*".

DOWNLOAD CHARACTER COMMANDS

Define download characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "&" <0> *n1* *n2* *m0* *m1* *m2* *d1* *d2* ... *dx*	27 38 0 *n1* *n2* *m0* *m1* *m2* *d1* *d2* ... *dx*	1B 26 00 *n1* *n2* *m0* *m1* *m2* *d1* *d2* ... *dx*

Defines one or more new characters and stores them in RAM for later use. EDS switch A-2 must be set to "RAM DOWNLOAD"; otherwise RAM is used as an input buffer, not downloading characters, and this command is ignored.

n1 is the character code of the first character defined and *n2* is the character code of the last character defined. *n1* must be equal to or less than *n2*.

The data for each character start with three bytes specifying proportional spacing attributes: the first byte, *m0*, specifies the left of the character; the second byte, *m1*, specifies the character width; the third byte, *m2*, specifies the right of the character.
These values must not exceed the following maximum limits:

Character mode	*m1*	*m0* + *m1* + *m2*
Draft	9	12
LQ pica	31	36
LQ elite	27	30
LQ semi-condensed	21	24
LQ proportional	37	42
Draft super/subscript	7	12
LQ super/subscript	19	36
LQ prop. super/subscript	37	42

Next comes the dot data. Normal character height is 24 dots, so there must be 3 × *m1* bytes of dot data. If the printer is in super/subscript mode, however, the character height is 16 dots, so there must be 2 × *m1* bytes of dot data.
Each data byte indicates eight vertical dots, with the most significant bit being the top dot, and the least significant bit being the bottom dot.

For further details, please refer to chapter 8.

Define download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "=" *n1* *n2* "#" *n3* *n4* <0> *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*	27 61 *n1* *n2* 35 *n3* *n4* 0 *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*	1B 3D *n1* *n2* 23 *n3* *n4* 00 *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*

Defines new characters and stores them in RAM for later use. EDS switch A-2 must be set to "RAM DOWNLOAD"; otherwise RAM is used as an input buffer, not downloading characters, and this command is ignored.

Downloading characters in IBM mode requires Dot Pattern data and Character Index Table data.
Dot Pattern data controls which pins fire when printing a character. Index Table data is placed in a "lookup table" that provides information on where Dot Pattern data is stored in memory and defines certain attributes of the character.

($n1 + n2 \times 256$) give the number of bytes to be downloaded.
n3 and *n4* indicate the low order and high order addresses in which data is to be stored.
n3 should be 15 and *n4* should be 128 for this printer.
n5 determines the character mode to be downloaded, as shown below:

n5	Character mode	Character width
0	Draft	10
1	LQ pica	36
2	LQ proportional	18 ~ 42
3	LQ elite	30

m1 through *m9* indicate Index Table data.
m1 and *m2* indicate the address where Dot Pattern is stored. *m1* is the high-order byte. *m3* indicates the number of columns in the character memory, and *m4* indicates the number of columns in the character less 1.

m5 through *m9* are compression mask bits. Data compression allows the efficient use of memory in storing downloaded characters providing space for more characters than would be available without compression. The printer repeats the previous dot column in the current column when the current column compression mask bit is set to 1.
It is necessary to define all of Index Table data before the Dot Pattern data to download many characters.

d1, *d2*, ... *dx* is the Dot Pattern data being downloaded.
Each data byte indicates eight vertical dots, with the most significant bit being the top dot, and the least significant bit being the bottom dot.

Copy character set from ROM into RAM

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> ":" <0> *n* <0>	27 58 0 *n* 0	1B 3A 00 *n* 00

Copies the selected character set with *n*, as shown below, to the corresponding download character RAM area, overwriting any download data already present. Ignored when EDS switch A-2 is not set to "RAM DOWNLOAD".

n	Font		*n*	Font	
0	Roman		11	Blippo	(Option)
1	Sanserif		12	H-Gothic	
2	Courier		13	Orane	(Option)
3	Prestige		14	Cinema	(Option)
4	Script		15	CODE 39	(Option)
5	OCR-B	(Option)	16	UPC/EAN	(Option)
6	OCR-A	(Option)	17	Old Style	(Option)
7	Orator		18	Firenze	(Option)
8	Orator 2	(Option)	32	SLQ Roman	
9	TW-Light	(Option)	33	SLQ TW-Light	
10	Letter Gothic	(Option)	34	SLQ Script	(Option)

Select download character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "%" "1"	27 37 49	1B 25 31
	<ESC> "%" <1>	27 37 1	1B 25 01

Selects the download character set. Ignored when EDS switch A-2 is not set to "RAM DOWNLOAD".

Shift download character area

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "t" "2"	27 116 50	1B 74 32
	<ESC> "t" <2>	27 116 2	1B 74 02
	<FS> "I" "2"	28 73 50	1C 49 32
	<FS> "I" <2>	28 73 2	1C 49 02

Shifts the download character area defined between 0 to 127 to the area between 128 to 255.

Select draft pica download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <4>	27 73 4	1B 49 04

Selects the download character set, draft quality, and pica pitch (10 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select draft elite download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <FF>	27 73 12	1B 49 0C

Selects the download character set, draft quality, and elite pitch (12 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select draft condensed download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <DC4>	27 73 20	1B 49 14

Selects the download character set, draft quality, and condensed pitch (17 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select LQ pica download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <6>	27 73 6	1B 49 06

Selects the LQ download character set with pica pitch (10 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select LQ elite download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <SO>	27 73 14	1B 49 0E

Selects the LQ download character set with elite pitch (12 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select LQ condensed download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <SYN>	27 73 22	1B 49 16

Selects the LQ download character set with condensed pitch (17 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select LQ proportional download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <7>	27 73 7	1B 49 07

Selects the LQ download character set with proportional pitch. Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to "RAM DOWNLOAD".

Select ROM character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "%" "0"	27 37 48	1B 25 30
	<ESC> "%" <0>	27 37 0	1B 25 00

Stops using the download character set and returns to the built-in ROM character set. Ignored when EDS switch A-2 is not set to "RAM DOWNLOAD".

COLOR SELECTION COMMANDS

Select print color

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "r" *n*	27 114 *n*	1B 72 *n*

Selects the printing color according to the value of *n*, as shown below. Ignored if the color ribbon is not installed.

n	Color	*n*	Color
0	Black	4	Yellow
1	Magenta	5	Orange
2	Cyan	6	Green
3	Violet		

Select print color

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "C" ")" ")" *d*	40 40 67 41 41 *d*	28 28 43 29 29 *d*

Changes the printing color according to the value of *d*, as shown below. Ignored if the color ribbon is not installed.

d	Color	*d*	Color
0	Black	4	Yellow
1	Magenta	5	Orange
2	Cyan	6	Green
3	Violet		

OTHER PRINTER COMMANDS

Set MSB to 1

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> ">"	27 62	1B 3E

Sets the most significant bit of each subsequent byte received to 1, allowing users with a 7-bit interface to access characters with ASCII codes greater than 127.

Set MSB to 0

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "="	27 61	1B 3D

Sets the most significant bit of each subsequent byte received to 0.

Accept MSB as is

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "#"	27 35	1B 23

Cancels the preceding commands and accepts the most significant bit as it is sent to the printer.

Delete last character sent

Mode	ASCII	Decimal	Hexadecimal
Std.	<DEL>	127	7F

Deletes the last character received. Ignored if the last character received has already been printed, or if the last character received was all or part of a command.

Cancel last line

Mode	ASCII	Decimal	Hexadecimal
Both	<CAN>	24	18

Deletes the last line currently present in the print buffer.

Set printer off-line

Mode	ASCII	Decimal	Hexadecimal
Std.	<DC3>	19	13
IBM	<ESC> "Q" *n*	27 81 *n*	1B 51 *n*

Sets the printer off-line. The printer disregards all subsequent characters and commands except <DC1>, which returns it to the on-line. The printer's ON LINE indicator does not go off.
In the IBM mode, the value of *n* should be 36 for normal carriage printer, and 35 for wide carriage printer.

Set printer on-line

Mode	ASCII	Decimal	Hexadecimal
Both	<DC1>	17	11

Returns the printer on-line state, allowing it to receive and process all subsequent characters and commands. This command is ignored if the printer was set off-line by pressing the [ON LINE] button on the control panel.

Stop printing

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "j"	27 106	1B 6A

Prints the entire contents of the input buffer, then sets the printer off-line. The ON LINE indicator on the control panel goes off.

Bell

Mode	ASCII	Decimal	Hexadecimal
Both	<BEL>	7	07

Sounds a brief beep tone from the printer.

Bi-directional printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "U" "0"	27 85 48	1B 55 30
	<ESC> "U" <0>	27 85 0	1B 55 00

Causes subsequent printing to be done in the normal bi-directional mode, which is faster than uni-directional printing.

Uni-directional printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "U" "1"	27 85 49	1B 55 31
	<ESC> "U" <1>	27 85 1	1B 55 01

Causes subsequent printing to be done uni-directionally, ensuring maximum vertical alignment precision.

One-line uni-directional printing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "<"	27 60	1B 3C

Immediately returns the print head to the left margin, then prints the remainder of the line from left to right. Normal printing resumes on the next line.

Manual feed

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <0>	27 25 0	1B 19 00
	"(" "(" "0" ")" ")"	40 40 48 41 41	28 28 30 29 29

Selects manual sheet feeding even when the optional automatic sheet feeder is mounted. Ignored if EDS switch E-3 is set to "ASF OFF".

Auto feed

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <4>	27 25 4	1B 19 04
	"(" "(" "4" ")" ")"	40 40 52 41 41	28 28 34 29 29

Selects the automatic sheet feeder. Ignored if EDS switch E-3 is set to "ASF OFF".

Select ASF bin #1

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM><1>	27 25 1	1B 19 01
	"(" "(" "1" ")" ")"	40 40 49 41 41	28 28 31 29 29

Selects the ASF bin #1, and feeds paper from bin #1. Ignored if EDS switch E-3 is not set to "ASF-DUAL ON".

Select ASF bin #2

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM><2>	27 25 2	1B 19 02
	"(" "(" "2" ")" ")"	40 40 50 41 41	28 28 32 29 29

Selects the ASF bin #2, and feeds paper from bin #2. Ignored if EDS switch E-3 is not set to "ASF-DUAL ON".

Eject paper from ASF

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> "R"	27 25 82	1B 19 52
	"(" "(" "R" ")" ")"	40 40 82 41 41	28 28 52 29 29

Ejects the current page. Ignored if EDS switch E-3 is set to "ASF OFF".

Set print start position on ASF

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> "T" *n*	27 25 84 *n*	1B 19 54 *n*
	"(" "(" "T" ")" ")" *n*	40 40 84 41 41 *n*	28 28 54 29 29 *n*

Skips *n*/6 inches at the top of the page, where *n* is equal to or greater than 1. Ignored if EDS switch E-3 is set to "ASF OFF".

Reset printer

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "@"	27 64	1B 40
Std.	<FS> "@"	28 64	1C 40

Reinitializes the printer. Clears the print buffer and returns settings to their power-up values. Does not clear the input buffer or change ASF selections.

Chapter 8
DOWNLOAD CHARACTERS

With this printer you can create new characters and symbols, download their dot data, and have them printed in place of selected characters in the regular character set. Characters that can be generated in this way range from simple but useful symbols like the check mark through to complex Chinese or Japanese characters.

Regular characters are permanently stored in the printer's ROM, but characters you design are downloaded and stored in RAM for use.

Before you start to define your own characters, you must set the EDS switch A-2 to "RAM DOWNLOAD".
Otherwise, the RAM is used to store the input buffer, and the download commands are ignored.

DEFINING YOUR OWN CHARACTERS WITH STANDARD MODE

Designing and printing your own characters has two requirements: first, designing the shape of the character, calculating the data necessary to make the shape, and sending that data to the printer, and secondly, sending the command to print the downloaded characters instead of the regular characters. There are a number of design constraints for download characters:

- The matrix or grid on which you design the characters depends upon the print mode as shown below:

Character mode	Horizontal	Vertical
Draft characters	9	24
LQ pica characters	31	24
LQ elite characters	27	24
LQ semi-condensed	19	16
LQ proportional	37	24
Draft super/subscript	7	16
LQ super/subscript	19	16
LQ prop. super/subscript	37	16

- The minimum width of a character is five dots.
- Dots cannot overlap.
- You may define any position in the ASCII table.

Photocopy the grid in Figure 8-1 to help design your new characters. We will use a tiny representation of a telephone symbol for our example.

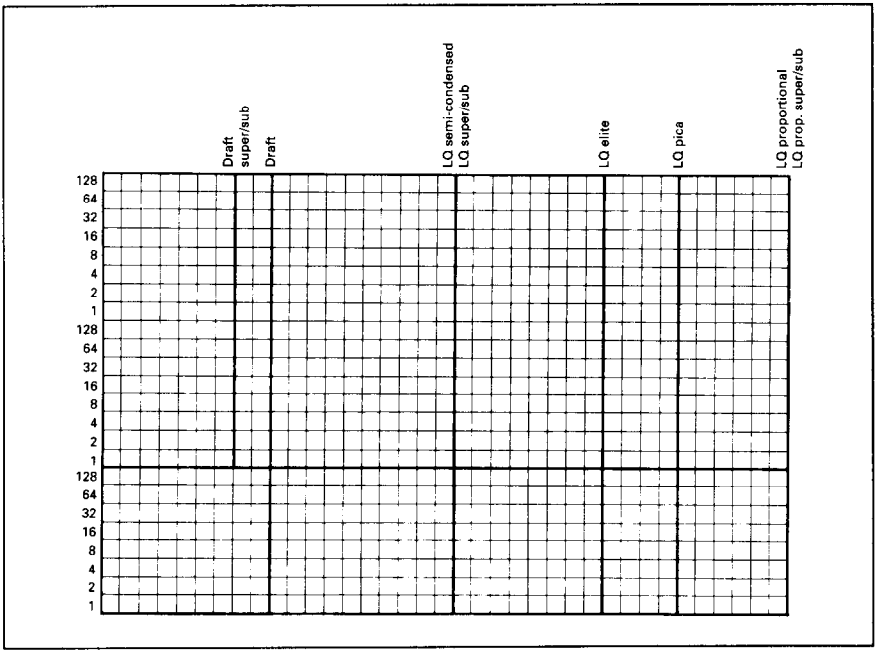


Figure 8-1. Use this grid (or one similar to it) to define your own characters.

Assigning the character data

Now, we calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. Each vertical column (which has a maximum of 24 dots) is first divided into three groups (or two groups for super/subscripts) of eight dots. Each group of eight dots is represented by one byte, which consists of eight bits.

This is where the numbers down the left side of the grid come in. Notice that there is a number for each row of dots and that each number is twice the number below it. By making these numbers powers of two we can take any combination of dots in a vertical column and assign them a unique value.

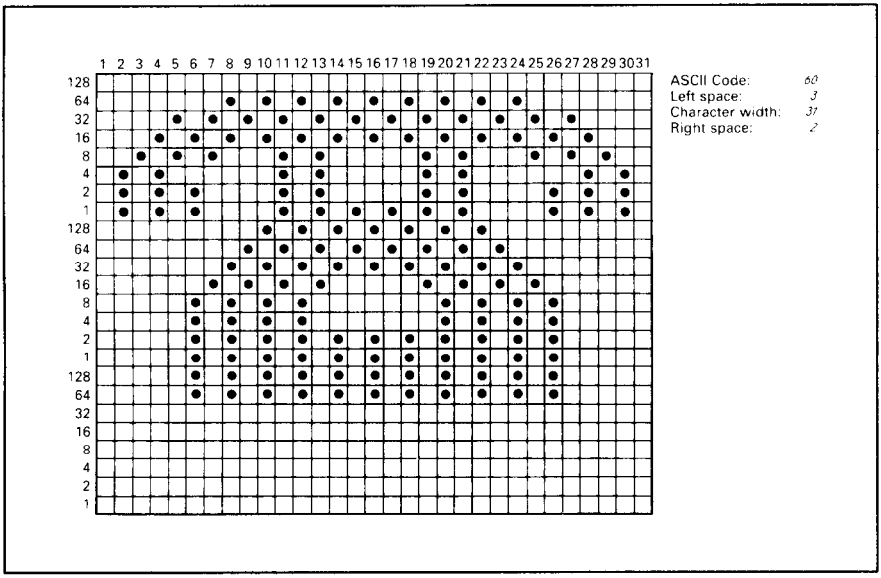


Figure 8-2. Telephone symbol with normal LQ pica.

Assigning a value of character space

Besides being able to specify the actual width of the character, this printer allows you to specify the position in the standard grid where the character will print. You must specify the dot column in which the printed character starts and the dot column in which the character ends. Why, you may ask, would you want to define a character this way instead of merely defining the overall width of the character? Because this printer's proportional character definitions can also be used to print normal width characters, and by centering even the narrow characters in the complete grid they will look good even you are not printing them proportionaly.

The three bytes are used to specify the width of the character and the space to be allowed on either side of it. The left space (in dot columns) is specified by *m0* and the right space is specified by *m2*. The second byte (*m1*) specifies the width of the character in dots. By varying the width of the character itself and the spaces around it, you can actually create proportional width characters.

When defining characters, the number of printed columns (*m1*), and the sum of side spaces and the character width (*m0* + *m1* + *m2*) cannot exceed the value shown below.

Character mode	*m1*	*m0* + *m1*+ *m2*
Draft characters	9	12
LQ pica characters	31	36
LQ elite characters	27	30
LQ semi-condensed	19	24
LQ proportional	37	42
Draft super/subscript	7	12
LQ super/subscript	19	36
LQ prop. super/subscript	37	42

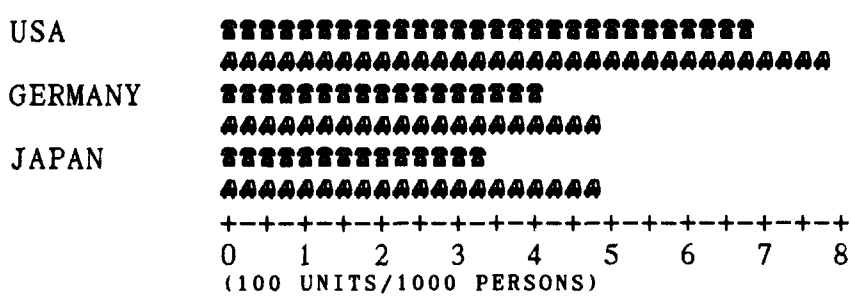
Sample program

To demonstrate how to use the download characters, let's use the "telephone" character and the other user-defined characters to print a small graph. This program will do just that:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"x1";
1020 LPRINT CHR$(27);"&";CHR$(0);
1030 LPRINT CHR$(60);CHR$(61);
1040 FOR N=60 TO 61
1050 READ LS :LPRINT CHR$(LS);
1060 READ CW :LPRINT CHR$(CW);
1070 READ RS :LPRINT CHR$(RS);
1080 FOR M=1 TO CW*3
1090 READ MM
1100 LPRINT CHR$(MM);
1110 NEXT M
1120 NEXT N
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0)
1140 LPRINT CHR$(27);"k";CHR$(4);
1150 LPRINT CHR$(27);"h";CHR$(1);
1160 LPRINT "    DIFFUSION RANGES OF"
1170 LPRINT "     CARS & TELEPHONES"
1180 LPRINT CHR$(27);"h";CHR$(0)
1190 LPRINT CHR$(27);"k";CHR$(0);
1200 LPRINT CHR$(27);"%";CHR$(1);
1210 LPRINT "USA";CHR$(9);
1220 FOR I=0 TO 681 STEP 25    :LPRINT CHR$(60);   :NEXT I
1230 LPRINT
1240 LPRINT CHR$(9);
1250 FOR I=0 TO 781 STEP 25    :LPRINT CHR$(61);   :NEXT I
1260 LPRINT
1270 LPRINT "GERMANY";CHR$(9);
1280 FOR I=0 TO 412 STEP 25    :LPRINT CHR$(60);   :NEXT I
1290 LPRINT
1300 LPRINT CHR$(9);
1310 FOR I=0 TO 488 STEP 25    :LPRINT CHR$(61);   :NEXT I
1320 LPRINT
```

```
1330 LPRINT "JAPAN";CHR$(9);
1340 FOR I=0 TO 347 STEP 25   :LPRINT CHR$(60);  :NEXT I
1350 LPRINT
1360 LPRINT CHR$(9);
1370 FOR I=0 TO 493 STEP 25   :LPRINT CHR$(61):  :NEXT I
1380 LPRINT
1390 LPRINT CHR$(9);"+-";
1400 SCALE$="+-+-"
1410 FOR I=2 TO 8             :LPRINT SCALE$;    :NEXT I
1420 LPRINT "+-+"
1430 LPRINT CHR$(9);"0 ";
1440 FOR I=1 TO 8
1450 LPRINT " ";I;
1460 NEXT I
1470 LPRINT CHR$(27);"%";CHR$(0)
1480 LPRINT CHR$(27);"M";
1490 LPRINT CHR$(27);"S";CHR$(0);
1500 LPRINT CHR$(9);"(100 UNITS/1000 PERSONS)"
1510 LPRINT CHR$(27);"T";
1520 LPRINT CHR$(27);"@"
1530 END
2000 ' DATA
2010 ' Telephone Symbol
2020 DATA   3, 31,  2
2030 DATA   0,  0,  0,  7,  0,  0,  8,  0,  0, 23,  0,  0, 40,  0,  0
2040 DATA  19, 15,192, 40, 16,  0, 80, 47,192, 32, 80,  0, 80,175,192
2050 DATA  47, 80,  0, 80,175,192, 47, 80,  0, 80,163,192, 33, 64,  0
2060 DATA  80,163,192, 33, 64,  0, 80,163,192, 47, 80,  0, 80,175,192
2070 DATA  47, 80,  0, 80,175,192, 32, 80,  0, 80, 47,192, 40, 16,  0
2080 DATA  19, 15,192, 40,  0,  0, 23,  0,  0,  8,  0,  0,  7,  0,  0
2090 DATA   0,  0,  0
2100 ' Car Symbol
2110 DATA   3, 31,  2
2120 DATA   0,  0,  0,  0, 30,  0,  0,  0,  0,  0, 60,  0,  0,  3,  0
2130 DATA   0,252,128,  0,  3, 64,  1,252,128,  2,  3, 64,  5,124,128
2140 DATA  10,  3,  0, 20,124,  0, 40,  0,  0, 80,126,  0, 32,  0,  0
2150 DATA  64,126,  0, 63,128,  0, 64,126,  0, 63,128,  0, 64,124,  0
2160 DATA  32,  3,  0, 64,124,128, 32,  3, 64, 64,124,128, 48,  3, 64
2170 DATA  76,124,128, 51,  3,  0, 12,252,  0,  3,  0,  0,  0,254,  0
2180 DATA   0,  0,  0
```

DIFFUSION RANGES OF CARS & TELEPHONES



DEFINING YOUR OWN CHARACTERS WITH IBM MODE

Downloading fonts in IBM mode requires downloading character Dot Pattern data and character Index Table data. Dot pattern data controls which pins fire when printing a character. Index Table data is placed in a "lookup table" that provides information on where Dot Pattern data is stored in memory and defines certain attributes of the character.

Assigning the download character set

You can define one of more download character sets for later use in IBM mode.
Before you start to design your characters, you must define what character set(s) you want to download.
The character width on which you design the characters depends upon the character set as shown below:

Character set	Character width	Character ID
Draft characters	9	0
LQ pica characters	35	1
LQ elite characters	29	2
LQ proportional	17 ~ 41	3

After you have decided your download character set, you must tell the printer where the download character data to be stored, and how many download character sets you will define.

The first download font area starts from <800F>h, and you must enter 0 for the Format byte.
This Format byte indicates the printer that the RAM is stored the download character set.

Following the format byte, you must enter the Character ID data. If you want to define more character set, add 128 to the Character ID data.

The second area starts from <8911>h, the third area starts from <9212>h, and the last area starts from <9B13>h. But you need not enter Format byte for these area.

Assigning the character dot pattern

We will use a tiny representation of a telephone symbol for our example.

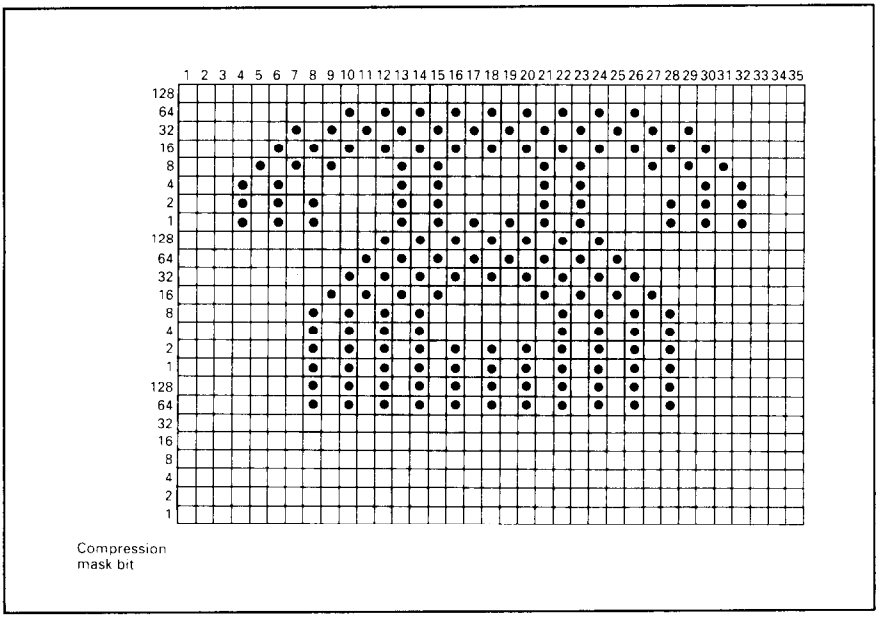


Figure 8-3. **Telephone symbol with LQ pica.**

After you have designed the character pattern, you need to compress the Dot Pattern.

Data compression allows you to store more download characters than without compression. It is a more efficient use of memory. The printer will repeat the previous dot column when the current column compression mask bit is set to "1".

Fill up the adjacent dot even they do not print, then compare the each vertical line to the left line. If the line is the same as the left one, write "1" in the column of the "compression mask bit". If it is not, write "0".

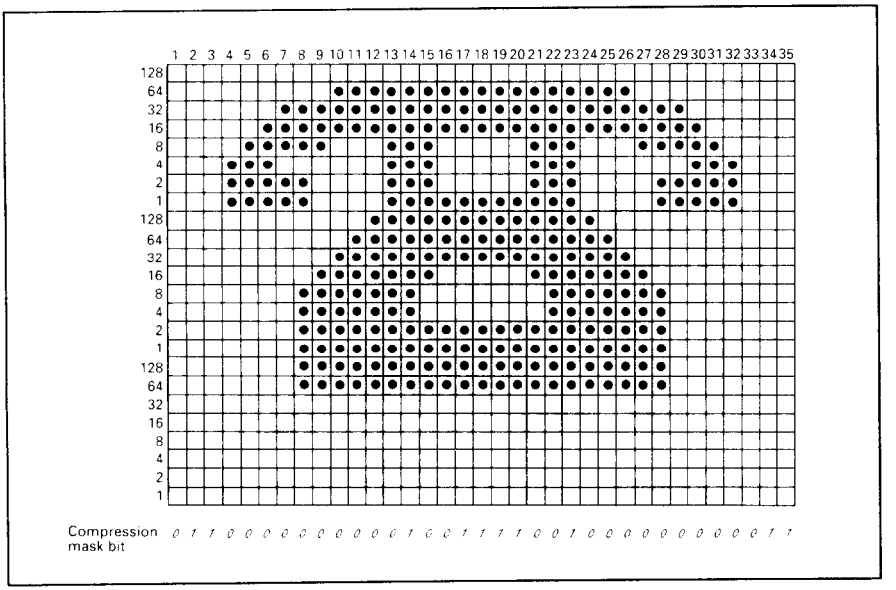


Figure 8-4. Fill up the adjacent dot, then write the "compression data".

After you have written the "compression mask bit" data, line up all the character data for the "compression mask bit" that requires "0". The telephone symbol looks like in Figure 8-5.

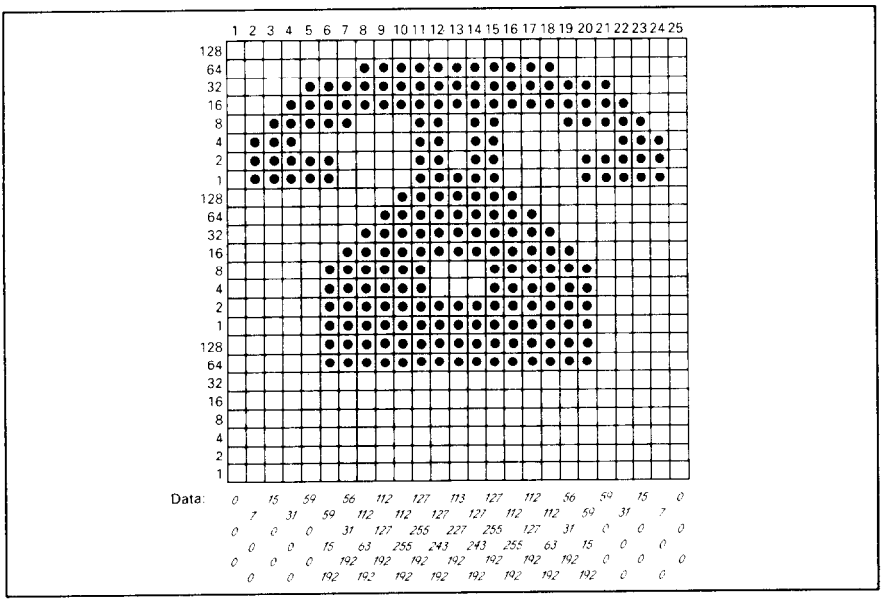


Figure 8-5. Compressed character pattern of telephone symbol.

Now we calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. Each vertical column is first divided into three groups of eight dots. Each group of eight dots is represented by one byte, which consists of eight bits.

That's where the numbers down the left side of the grid come in. Notice that there is a number for each row of dots and that each number is twice the number below it. By making these numbers powers of two we can take any combination of dots in a vertical column and assign them a unique value.

Assigning the Index Table data

Unlike defining in the Standard mode, you must assign the Index Table with the IBM mode.

This Index Table is prepared for the information of each character attribute data, such as character type (Normal 24-dot high, or 30-dot high block graphics), the dot pattern data in the memory, and the compression mask bit data.

Each character requires 9 index table data.

The first and the second bytes (*m1* and *m2*) indicates the position of the first dot pattern in the memory. *m1* is the high order byte, and *m2* is the low order byte.

The third byte, *m3*, indicates the character type and the dot pattern data width in the memory.
If the character is normal, simply, enter the width of dot pattern in the memory. If your character is block graphics, add 128 to the width of dot pattern in the memory.
Our telephone symbol is normal character and the width of dot pattern in the memory should be 25, so this value is 25.

The fourth byte, *m4*, indicates the printing attribute.
This byte indicates the character width to be printed, and information of the repetition dots for block graphics characters.
If your character is a normal character, add 192 to the character width.
If your character is a block character, and it should be printed as line draw character, add 64 to the character width. If the block character is not a line draw character, this byte should be the same as the character width.
Our telephone symbol is normal pica character, so the character width is 35, and this byte should be 227.

The remaining five bytes (*m5* through *m9*) indicate the compression mask bits. Each bits of this byte shows the data that will translate the compressed dot pattern data back to the original character pattern.
For example, the compression mask bits of our telephone symbol are 01100000 00000100 11110010 00000000 01100000. So these bytes are 96, 4, 242, 0, and 96.

You must define the index table data for all characters from 0 to 255. If you do not want to define a particular character, enter 0 into that index table data.

Sample program

To demonstrate how to define and to use the download characters in IBM mode, let's use the "telephone" character and the other user-defined characters to print a small graph. This program will do just that:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"=";CHR$(164);CHR$(9);"#";
1020 LPRINT CHR$(&H0F);CHR$(&H80);CHR$(0);
1030 ' INDEX TABLE
1040 LPRINT CHR$(1);
1050 FOR I=0 TO 59
1060 LPRINT STRING$(9,0);
1070 NEXT I
1080 FOR IT=1 TO 9 :READ MM :LPRINT CHR$(MM); :NEXT IT
1090 FOR IT=1 TO 9 :READ MM :LPRINT CHR$(MM); :NEXT IT
1100 FOR I=62 TO 255
1110 LPRINT STRING$(9,0);
1120 NEXT I
1130 ' DOT PATTERN
1140 FOR DP=1 TO 159
1150 READ MM
1160 LPRINT CHR$(MM);
1170 NEXT DP
1180 ' PRINTOUT PROGRAM
1190 LPRINT CHR$(27);"D";CHR$(11);CHR$(0)
1200 LPRINT CHR$(27);"k";CHR$(4);
1210 LPRINT CHR$(27);"h";CHR$(1);
1220 LPRINT "    DIFFUSION RANGES OF"
1230 LPRINT "     CARS & TELEPHONES
1240 LPRINT CHR$(27);"h";CHR$(0);
1250 LPRINT CHR$(27);"k";CHR$(0)
1260 LPRINT "USA";CHR$(9);
1270 LPRINT CHR$(27);"I";CHR$(6);
1280 FOR I=0 TO 681 STEP 25 :LPRINT CHR$(60); :NEXT I
1290 LPRINT
1300 LPRINT CHR$(9);
1310 FOR I=0 TO 781 STEP 25 :LPRINT CHR$(61); :NEXT I
1320 LPRINT CHR$(27);"I";CHR$(2)
1330 LPRINT "GERMANY";CHR$(9);
1340 LPRINT CHR$(27);"I";CHR$(6);
1350 FOR I=0 TO 412 STEP 25 :LPRINT CHR$(60); :NEXT I
1360 LPRINT
1370 LPRINT CHR$(9);
1380 FOR I=0 TO 488 STEP 25 :LPRINT CHR$(61); :NEXT I
1390 LPRINT CHR$(27);"I";CHR$(2)
1400 LPRINT "JAPAN";CHR$(9);
1410 LPRINT CHR$(27);"I";CHR$(6);
1420 FOR I=0 TO 347 STEP 25 :LPRINT CHR$(60); :NEXT I
```

```
1430 LPRINT
1440 LPRINT CHR$(9);
1450 FOR I=0 TO 493 STEP 25 :LPRINT CHR$(61); :NEXT I
1460 LPRINT CHR$(27);"I";CHR$(2)
1470 LPRINT CHR$(9);"+-";
1480 SCALE$="+-+-"
1490 FOR I=1 TO 7            :LPRINT SCALE$;    :NEXT I
1500 LPRINT "+-+"
1510 LPRINT CHR$(9);"0 ";
1520 FOR I=1 TO 8
1530 LPRINT " ";I;
1540 NEXT I
1550 LPRINT CHR$(27);":"
1560 LPRINT CHR$(27);"S";CHR$(0);
1570 LPRINT CHR$(9);"(100 UNITS/1000 PERSONS)"
1580 LPRINT CHR$(27);"T";
1590 LPRINT CHR$(27);"@"
1600 END
2000 ' DATA
2010 ' Index Table Data
2020 DATA 137, 17, 25,227, 96,  4,242,  0, 96
2030 DATA 137, 92, 28,227, 96,  0, 80, 64, 96
2040 ' Dot Pattern Data
2050 '  Telephone symbol
2060 DATA   0,  0,  0,  7,  0,  0, 15,  0,  0, 31,  0,  0, 59,  0,  0
2070 DATA  59, 15,192, 56, 31,192,112, 63,192,112,127,192,112,255,192
2080 DATA 127,255,192,127,243,192,113,227,192,127,243,192,127,255,192
2090 DATA 112,255,192,112,127,192,112, 63,192, 56, 31,192, 59, 15,192
2100 DATA  59,  0,  0, 31,  0,  0, 15,  0,  0,  7,  0,  0,  0,  0,  0
2110 '  Car symbol
2120 DATA   0,  0,  0,  0, 30,  0,  0, 28,  0,  0, 60,  0,  0, 63,  0
2130 DATA   0,255,128,  0,255,192,  1,255,192,  3,255,192,  7,127,128
2140 DATA  14,127,  0, 28,124,  0, 56,124,  0,112,126,  0, 96,124,  0
2150 DATA 127,254,  0,127,252,  0, 96,124,  0, 96,127,  0, 96,127,128
2160 DATA  96,127,192,112,127,192,124,127,128, 63,127,  0, 15,124,  0
2170 DATA   3,124,  0,  0,254,  0,  0,  0,  0
```

MEMO

Chapter 9
MS-DOS AND YOUR PRINTER

When using your printer with an IBM PS/2, PC-AT or compatible, you will probably be using PC-DOS or MS-DOS as an operating system. A number of software tricks may be useful here. This chapter is not, however, a substitute for the operating system manuals supplied with your computer.

To learn how to print files, etc. it is best to read the relevant parts of these manuals.

INSTALLING APPLICATION SOFTWARE WITH YOUR PRINTER

When installing application software, you may find that your printer is not specifically mentioned in the lists of printers given for installation. However, this should pose no problem. Read this section, and guidelines provided with your software on printer installation.

Choose one of the following (in order of preference) according to your selected Emulation mode.

#	Standard mode	IBM mode
1	Star XB24-200/250	* Proprinter X24E/XL24E
2	Star XB24-10/15	* Proprinter X24/XL24
3	Star LC24-200 Color	
4	* Star LC24-200	
5	Epson LQ-860/1060	
6	* Epson LQ-850/1050	

NOTE: * does not support color printing.

You can also select one of NEC 24-wire printers to print graphics in the Standard emulation mode.

If your software package does not mention printers by name, but asks instead what features your printer is capable of, the most common questions are: "Can your printer perform a backspace?" and "Can it do a hardware form feed?". You should answer "Yes" to both these questions.

Other software packages may allow you to install specific features. Spreadsheet programs will often ask for the maximum number of columns to be printed. This is given below.

	CPI	Number of columns	
		Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Semi-condensed	15	120	204
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	

Sometimes the software installation will ask you for an initialization sequence to return to the default settings. The command for your printer is <ESC> @.

Make sure that the EDS switches are set for the correct printer emulation, and that you have selected the appropriate character set using the EDS switches.

If you are in doubt about the configuration of your application software, seek expert advice. Your software supplier will probably be your most qualified reference.

EMBEDDING PRINTER COMMANDS

Many word-processors and other software lack commands for changing font, printing double-size characters, or printing in color. Your printer therefore has commands that can be embedded in documents to control these functions without software help. The commands consist of a capital letter enclosed in double parentheses, followed by a digit:

Font:	((F))0	Roman
	((F))1	Sanserif
	((F))2	Courier
	((F))3	Prestige
	((F))4	Script
	((F))5	OCR-B
	((F))6	OCR-A

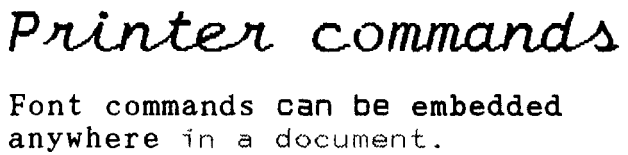
	((F))7	Orator
	((F))8	Orator 2
	((F))9	Draft
Size:	((S))0	Standard size
	((S))1	Double width
	((S))2	Double height
	((S))3	Double width and height
Color:	((C))0	Black
	((C))1	Magenta
	((C))2	Cyan
	((C))3	Violet
	((C))4	Yellow
	((C))5	Orange
	((C))6	Green

If you want to print a title in double-size Script, then change to regular-size fonts for other text, you can use these commands as follows:

File as seen on computer screen:

```
((F))4 ((S))3
Printer commands
((F))0 ((S))0
Font commands ((F))1can be ((F))2embedded
((F))3anywhere ((F))9in a document.
```

Printout:



When you use these commands there are several points to note:

- The font ((F)) command is ignored if the FONT LOCK mode was selected when power was switched on.
- The color ((C)) command is valid only when the color ribbon is installed.
- A line consisting of commands alone prints as a blank line.

- The software will not know that these are commands, so you cannot trust your software to give you the correct line width. The printed line may be considerably shorter than the line on the screen; the extra space being the space that was occupied by the commands.

One way to handle the last problem is to prepare your document without the commands, then insert them as a final step, with the margins released. The find, replace, and copy functions of word-processing software can be helpful here.

If you do not use these commands or the panel controls, the printer will print standard-size, Roman characters.

The printer supports various commands in addition to the above, such as quadruple-size printing. Most of these other commands consist of the escape code followed by one or more letters or numbers.

If your software enables you to place the escape code in your files, or if you are able to define this as a user option during installation, you can also embed these escape sequences.

PROGRAMMING THE PRINTER WITH DOS COMMANDS

If your system includes the file PRINT.COM you can use the main DOS printing command. Simply type the word PRINT followed by the name of the file you want to print. To print a file named README.DOC, for example, type:

```
A>PRINT README.DOC
```

The computer may respond with the following message, asking which printer to use:

```
Name of list device [PRN]:
```

If your computer is connected to only one printer, press RETURN to select the default choice (PRN). Printing will begin and the A> prompt will reappear. You can execute other commands or programs while the file is being printed.

A single PRINT command can print two or more files. List the file names consecutively on the same line, or use wild-card characters (* and ?). Each file will be printed starting on a new page. The PRINT command also has

control options. For example, you can terminate a printing job in progress with the /T option. (The printer may not stop printing immediately as there may be considerable data stored ahead in its buffer.) For the /T option, type:

```
A>PRINT/T
```

See your DOS manual for further information about the PRINT command. If your system does not include PRINT.COM, you can print files by using the PRN device name in COPY or TYPE commands such as the following:

```
A>COPY README.DOC PRN
A>TYPE README.DOC >PRN
```

COPY and TYPE do not permit you to execute other commands while the file is printing.

If you want a particular font, or print pitch, you can make these settings from the control panel before you start printing. See Chapter 5.

If you print from the DOS command level very often, it will be advantageous to create a printer setup file. Then instead of setting font style etc. manually each time, you can complete the setup with a single command from your computer. For example, you can create a file containing printer commands to select letter quality, and select elite pitch with the Standard mode. You can find the commands in Chapter 7. We suggest the following:

- Letter quality <ESC> "x" "1"
- Elite pitch <ESC> "!" <1>

<ESC> "!" <1> is a powerful command that, in addition to selecting elite pitch, cancels unwanted features such as underlining which might be left from previous commands. The angle brackets around the <1> indicate character code 1, which is a control code, not the printable digit "1".

You may want to place additional commands in this file, such as left and right margins, line spacing and bottom margin commands. Or you may want to create a variety of setup files with a different set of commands in each.

To avoid excess line feeds, you should place the commands on one line in the setup file. You may or may not be able to generate a setup file with word-processing software; it depends on whether your software lets you enter control codes. If your system includes the file EDLIN.COM, however, you can easily create a setup file with the DOS line editor.

An appropriate name for this setup file would be LQELITE.DAT. To use the DOS line editor, type the command EDLIN LQELITE.DAT, then type the underlined parts of the following display. Press RETURN at the end of each line. Do not type the symbol "^". This symbol means to hold the CTRL key down while pressing the next key: for example, ^V means to type CTRL-V. ^C means to type CTRL-C, which indicates the end of the input.

```
A>EDLIN LQELITE.DAT
New file
*1
       1:*^V[x1^V[!^VA
       2:*^C
*E
```

^V indicates that the following character is a control code. ^V[enters the <ESC> code. <ESC> has character code 27, and "[" is the 27th character from A in the ASCII sequence. Similarly, ^VA enters the control code <1>. See your DOS manual if you need further information about EDLIN.

You can now set up the printer by sending it the file LQELITE.DAT. To avoid unnecessary logging of commands, switch hard-copy output off (by pressing CTRL-PRTSC if hard copy is on). To print the file README.DOC in LQ elite type, give the following two commands:

```
A>COPY LQELITE.DAT PRN
A>PRINT README.DOC
```

For greater convenience you can make a batch file that will set up the printer and print any specified file with a single command. To create such a batch file with the name LQPRINT.BAT, type in the first four lines shown next. ^Z means to press the CTRL and Z keys simultaneously. To use this file to print README.DOC, type the fifth line.

```
A>COPY CON LQPRINT.BAT
COPY LQELITE.DAT PRN
PRINT %1
^Z
A>LQPRINT README.DOC
```

The first line above is a copy command from the CONsole screen to a file named LQPRINT.BAT. The next two lines are the contents of this file. The %1 is a dummy parameter: whatever file name you type after LQPRINT will be substituted for %1 and printed.

PROGRAMMING WITH BASIC

As an example of programming the printer on Microsoft BASIC, we have listed the program for the IBM-PC. This program runs in the printer's Standard mode, and the downloadable condition.

```
1000 ' Set control codes
1010 E$=CHR$(27)                          'Escape code
1020 D$=E$+"x0"                           'Draft quality
1030 L$=E$+"x1"+E$+"k"                    'Letter quality
1040 RM$=L$+CHR$(0)                       'Roman character
1050 H$=CHR$(9)                           'Horizontal tab
1060 PI$=E$+"P"                           'Pica pitch
1070 ' Start printing
1080 WIDTH "LPT1:",255
1090 LPRINT E$;"D";CHR$(3);CHR$(24);CHR$(0)       'Set HT
1100 LPRINT L$;CHR$(0);"Resident fonts are:"
1110 LPRINT H$;D$;"Draft characters,";
1120 LPRINT H$;L$;CHR$(0);"Roman characters,"
1130 LPRINT H$;L$;CHR$(1);"Sanserif characters,";
1140 LPRINT H$;L$;CHR$(2);"Courier characters,"
1150 LPRINT H$;L$;CHR$(3);"Prestige characters,";
1160 LPRINT H$;L$;CHR$(4);"Script characters,"
1170 LPRINT H$;L$;CHR$(7);"Orator characters,";
1180 LPRINT H$;L$;CHR$(12);"H-Gothic characters,"
1190 LPRINT H$;L$;CHR$(32);"SLQ Roman,";
1200 LPRINT H$;L$;CHR$(33);"SLQ TW-Light."
1210 LPRINT
1220 LPRINT RM$;"Print pitches are:"
1230 LPRINT H$;PI$;"Pica pitch (10 CPI),";
1240 LPRINT H$;E$;"M";"Elite pitch (12 CPI),"
1250 LPRINT H$;E$;"g";"Semi-condensed pitch (15 CPI),";
1260 LPRINT H$;PI$;
1270 LPRINT CHR$(15);                     'Select condensed print
1280 LPRINT "Condensed pica pitch (17 CPI),"
1290 LPRINT H$;E$;"M";"Condensed elite pitch (20 CPI),";
1300 LPRINT CHR$(18)                      'Cancel condensed print
1310 LPRINT H$;E$;"p1";                   'Select proportional spacing
1320 LPRINT PI$;"Normal proportional,";
1330 LPRINT H$;CHR$(15);"Condensed proportional.";
1340 LPRINT CHR$(18);
1350 LPRINT E$;"p0"                       'Cancel proportional spacing
1360 LPRINT
1370 LPRINT H$;E$;"w1";"Double-height,";E$;"w0"
1380 LPRINT H$;E$;"W1";"Double width, ";E$;"W0"
1390 LPRINT H$;CHR$(28);"E";CHR$(2);"Triple width,";
1400 LPRINT CHR$(28);"E";CHR$(0)
1410 LPRINT H$;E$;"h";CHR$(1);"Double-sized,"
1420 LPRINT H$;E$;"h";CHR$(2);"Quad-sized.";
1430 LPRINT E$;"h";CHR$(0)
1440 LPRINT :LPRINT
1450 LPRINT E$;"Q";CHR$(47)               'Set right margin
1460 LPRINT RM$;"Various line and character spacings:"
1470 LPRINT E$;"a1"                       'Center text
1480 FOR I=1 TO 7
1490 LPRINT E$;"A";CHR$(I);               'Line spacing set
1500 LPRINT E$;" ";CHR$(I);               'Increase character space
1510 LPRINT "THE SPACINGS ARE CHANGED"
1520 NEXT I
1530 FOR I=7 TO 1 STEP -1
1540 LPRINT E$;"A";CHR$(I);               'Line spacing set
1550 LPRINT E$;" ";CHR$(I);               'Increase character space
1560 LPRINT "THE SPACINGS ARE CHANGED"
1570 NEXT I
```

```
1580 LPRINT E$;"a0"                          'Left justify
1590 LPRINT E$;"3";CHR$(30);                 'Set 1/6" line spacing
1600 LPRINT E$;" ";CHR$(0);                  'Normal character space
1610 LPRINT :LPRINT
1620 LPRINT RM$;"Other features:"
1630 LPRINT H$;E$;"q";CHR$(1);"OUTLINED";E$;"q";CHR$(0);", ";
1640 LPRINT E$;"q";CHR$(2);"SHADOWED";E$;"q";CHR$(0);", ";
1650 LPRINT E$;"q";CHR$(3);"OUTLINED WITH SHADOWED";
1660 LPRINT E$;"q";CHR$(0);", "
1670 LPRINT H$;E$;"E";"Emphasized";E$;"F";", ";
1680 LPRINT E$;"G";"Double-strike";E$;"H";", ";
1690 LPRINT E$;"4";"Italics";E$;"5";", "
1700 LPRINT H$;E$;"-1";"Underlining";E$;"-0";", ";
1710 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(2);
1720 LPRINT "Strike-through";
1730 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(0);", ";
1740 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(1);
1750 LPRINT "Overlining";
1760 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(0);", "
1770 LPRINT H$;E$;"S0";"SUPERSCRIPT";E$;"T";" and ";
1780 LPRINT E$;"S1";"SUBSCRIPT";E$;"T";", "
1790 LPRINT H$;RM$;"Download characters: ";
1800 SS$=E$+"S0"                             'Superscript
1810 GOSUB 2520
1820 LPRINT E$;"%1";                         'Select download character
1830 FOR I=1 TO 5
1840 LPRINT CHR$(60);                        'Print download character
1850 NEXT I
1860 LPRINT E$;"%0";                         'Select normal character
1870 LPRINT E$;"T";                          'Cancel superscript
1880 GOSUB 2650
1890 LPRINT E$;"%1";                         'Select download character
1900 FOR I=1 TO 5
1910 LPRINT CHR$(60);                        'Print download character
1920 NEXT I
1930 LPRINT E$;"%0";                         'Select normal character
1940 SS$=E$+"S1"                             'Subscript
1950 GOSUB 2520
1960 LPRINT E$;"%1";                         'Select download character
1970 FOR I=1 TO 5
1980 LPRINT CHR$(60);                        'Print download character
1990 NEXT I
2000 LPRINT E$;"%0";                         'Select normal character
2010 LPRINT E$;"T"                           'Cancel superscript
2020 LPRINT H$;RM$;"Dot graphics:"
2030 RESTORE 3170
2040 LPRINT E$;"A";CHR$(8);                  'Set 8/60" line spacing
2050 FOR I=1 TO 3
2060 LPRINT E$;"f0";CHR$(8);
2070 LPRINT E$;"*";CHR$(33);CHR$(240);CHR$(0);
2080 FOR J=1 TO 240*3
2090 READ DAT
2100 LPRINT CHR$(DAT);
2110 NEXT J
2120 LPRINT
2130 NEXT I
2140 LPRINT E$;"@"                           'Initialize printer
2150 END
2500 '
2510 ' SUBROUTINES
2520 ' Define super/subscript download character
2530 LPRINT SS$;                             'Select super/subscript
2540 LPRINT E$;"&";CHR$(0);CHR$(60);CHR$(60);
2550 RESTORE 3010
2560 READ LS :LPRINT CHR$(LS);
2570 READ CW :LPRINT CHR$(CW);
2580 READ RS :LPRINT CHR$(RS);
```

```
2590 FOR M=1 TO CW*2
2600 READ MM
2610 LPRINT CHR$(MM);
2620 NEXT M
2630 RETURN
2640 '
2650 ' Define LQ pica download character
2660 LPRINT C$;
2670 LPRINT E$;"&";CHR$(0);CHR$(60);CHR$(60);
2680 RESTORE 3070
2690 READ LS :LPRINT CHR$(LS);
2700 READ CW :LPRINT CHR$(CW);
2710 READ RS :LPRINT CHR$(RS);
2720 FOR M=1 TO CW*3
2730 READ MM
2740 LPRINT CHR$(MM);
2750 NEXT M
2760 RETURN
3000 ' DATA
3010 ' Super/subscript download character data
3020 DATA   9, 19,  8
3030 DATA  12,  0, 16,  0, 44,  0, 80,120, 32,128, 95,120, 32,128
3040 DATA  95,120, 32,128, 65,120, 32,128, 95,120, 32,128, 95,120
3050 DATA  32,128, 80,120, 44,  0, 16,  0, 12,  0
3060 '
3070 ' LQ pica download character data
3080 DATA   3, 31,  2
3090 DATA   0,  0,  0,  7,  0,  0,  8,  0,  0, 23,  0,  0, 40,  0,  0
3100 DATA  19, 15,192, 40, 16,  0, 80, 47,192, 32, 80,  0, 80,175,192
3110 DATA  47, 80,  0, 80,175,192, 47, 80,  0, 80,163,192, 33, 64,  0
3120 DATA  80,163,192, 33, 64,  0, 80,163,192, 47, 80,  0, 80,175,192
3130 DATA  47, 80,  0, 80,175,192, 32, 80,  0, 80, 47,192, 40, 16,  0
3140 DATA  19, 15,192, 40,  0,  0, 23,  0,  0,  8,  0,  0,  7,  0,  0
3150 DATA   0,  0,  0
3160 '
3170 ' Dot graphics data
3180 ' 1ST LINE
3190 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3200 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3210 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3220 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3230 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,127,255,  0,255,255
3240 DATA   1,255,255,  3,  0,  0,  7,  0,  0,  7,  0,  0, 15,  0,  0
3250 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3260 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3270 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3280 DATA  31,  0,  0, 31,128,  0, 31,224,  0, 31,248,  0, 31,255,  0
3290 DATA  31,255,224, 15,255,248,  7,255,255,  1,255,255,  0,127,255
3300 DATA   0,  7,255,  0,  0,255,  0,  0, 63,  0,  0, 63,  0,  0,248
3310 DATA   0,  3,192,  0, 63,  0,  0,248,  0,  1,128,  0,  3,  0,  0
3320 DATA   7,  0,  0, 15,  0,  0, 15,  0,  0, 31,  0,  0, 31,  0,  0
3330 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3340 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3350 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3360 DATA  31,255,255, 31,255,255, 31,255,255, 31,255,255, 31,255,255
3370 DATA  31,255,255, 15,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0
3380 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3390 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3400 DATA   0,  0,  0,  0,  0, 60,  0,  3,255,  0, 11,195,  0, 28,  0
3410 DATA   0, 12,  0,  0, 96,  0,  0,192,  0,  0,192,  0,  1,128,  0
3420 DATA   3,  0,  0,  3,  0,  0,  7,  0,  0,  7,  0,  0, 15,  0,  0
3430 DATA  15,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0, 15
3440 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3450 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3460 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3470 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 63
3480 DATA  31,255,255, 31,255,255, 31,255,247, 31,255,231, 31,255,199
```

```
3490 DATA  15,255,135,  7,255,  7,  0,  0,  3,  0,  0,  1,  0,  0,  0
3500 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3510 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,254,  0
3520 DATA   1,255,240,  3,135,255,  7,  0, 63, 15,  0,  0, 15,  0,  0
3530 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3540 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,128,  0, 31,128,  0
3550 DATA  31,192,  0, 31,255,  0, 31,255,255, 31,255,255, 31,255,255
3560 DATA  31,255,255, 15,255,255,  7,255,255,  0,255,240,  1,254,  0
3570 DATA   1,240,  0,  3,128,  0,  7,  0,  0, 15,  0,  0, 31,  0,  0
3580 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3590 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,128,  0, 31,128,  0
3600 DATA  31,192,  0, 31,240,  0, 31,255,  0, 31,255,240, 31,255,255
3610 DATA  31,255,255,  7,255,255,  0,255,255,  0,255,255,  1,255,240
3620 DATA   3,192,  0,  7,128,  0, 15,  0,  0, 31,  0,  0, 31,  0,  0
3630 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3640 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0, 15, 31,135,255
3650 DATA  31,255,255, 31,255,255, 31,255,255, 31,255,255, 31,255,240
3660 DATA  15,252,  0, 47,128,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3670 ' 2ND LINE
3680 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3690 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3700 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3710 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3720 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,255,255,255,255,255,255
3730 DATA 255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3740 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3750 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3760 DATA 255,255,255, 31,255,255,  7,255,255,  0,255,255,  0, 31,255
3770 DATA   0,  3,255,  0,  0,255,  0,  0, 31,  0,  0,  7,  0,  0,  0
3780 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,224,  0,  0,252,  0,  0
3790 DATA 254,  0,  0,248,  0,  0,192,  0,  0,  0,  0,  0,  0,  0,  0
3800 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  7,  0,  0, 63
3810 DATA   0,  1,255,  0, 15,255,  0,127,255,  1,255,255, 15,255,255
3820 DATA 255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3830 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3840 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3850 DATA 255,255,255,255,255,255,255,255,255,255,255,255,255,255,255
3860 DATA 255,255,255,255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0
3870 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3880 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3890 DATA   0,  7,224,  0, 63,252,128,120, 31,192,224,  3, 97,128,  0
3900 DATA  59,  0,  0, 30,  0,  0, 14,  0,  0, 12,  0,  0, 12,  0,  0
3910 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3920 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 63,  0
3930 DATA 128,127,128,128,127,128,128,127,128,128,127,128,128,255,128
3940 DATA 223,255,128,255,255,128,255,255,  0,224,  0,  0,224,  0,  0
3950 DATA 224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0
3960 DATA 224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0
3970 DATA 224,  0,  1,224,  0,  3,240,  0, 15,255,255,255,255,255,254
3980 DATA 255,255,254,255,255,252,255,255,248,255,255,224,255,255,128
3990 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4000 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4010 DATA   0,  0,  0,  0,  0,  0,240,  0,  0,255,  0,  0, 15,248,  0
4020 DATA   0, 63,  0,  0,  3,248,  0,  0, 31,  0,  0,  3,  0,  0,  0
4030 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4040 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,255,  0,  0,255,224,  0
4050 DATA 255,128,  0,240,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4060 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  7,  0,  0,127
4070 DATA   0,  7,255,  0, 63,255,  1,255,255, 31,255,255,  3,255,255
4080 DATA   0,127,254,  0,  7,252,  0,  0,127,  0,  0,  7,  0,  0,  0
4090 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,128,  0,  0
4100 DATA 248,  0,  0,255,  0,  0,255,192,  0,128,  0,  0,  0,  0,  0
4110 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4120 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  1,  0,  0, 63
4130 DATA   0, 31,255,  7,255,255,255,255,255,255,255,255,255,255,254
4140 DATA 255,255,192,255,248,  0,255,  0,  0,  0,  0,  0,  0,  0,  0
4150 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
```

```
4160 ' 3RD LINE
4170 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 24,  0,  0, 56
4180 DATA   0,  0, 56,  0,  0,120,  0,  0,248,  0,  1,248,  0,  1,248
4190 DATA   0,  3,248,  0,  7,248,  0,  7,248,  0, 15,248,  0, 15,248
4200 DATA   0, 31,248,  0, 63,248,  0,127,248,  0,127,248,  0,255,248
4210 DATA   0,255,248,  1,255,248,  3,255,248,199,255,248,247,255,248
4220 DATA 255,255,248, 31,255,240, 15,255,240, 15,255,224, 15,255,224
4230 DATA  15,255,192, 15,255,192, 15,255,192, 15,255,128, 15,255,128
4240 DATA  15,255,  0, 15,255,  0, 15,255,  0, 15,254,  0, 15,254,  0
4250 DATA 252,252, 24,252,252, 56,249,252,248,249,252,248,243,255,248
4260 DATA 227,255,248,231,255,248,199,255,248,231,255,248,255,255,248
4270 DATA  31,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,248
4280 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,207,248
4290 DATA  31, 15,248, 30, 31,248,252, 63,248,248,127,248,240,127,240
4300 DATA 224,255,240,225,255,240,195,255,224,199,255,192,247,255,128
4310 DATA 255,255,128, 63,255,  0, 31,254,  0, 15,254,  0, 15,252,  0
4320 DATA  15,248,  0, 15,240,  0, 15,240,  0, 15,224,  0, 15,192,  0
4330 DATA  15,192,  0, 15,128,  0, 15,  0,  0, 31,  0,  0, 62,  0,  0
4340 DATA 252,  0,  0,252,  0,  0,248,  0,  0,240,  0,224,240,  0,240
4350 DATA 224,  1,240,192,  1,248,  0,  3,248,  0,  3,248,  0,  3,248
4360 DATA   0,  7,248,  0,  7,248,  0, 63,248,  0,127,248,  0,127,248
4370 DATA   0,255,248,  0,255,248,  1,255,248,  1,255,248,  1,255,248
4380 DATA   3,255,248,  3,255,248,  3,255,248,131,255,248,199,255,248
4390 DATA 103,255,248,119,255,248, 55,255,248, 63,255,248, 31,255,248
4400 DATA  31,255,248, 31,255,248, 15,255,248, 15,255,248, 15,255,248
4410 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,240
4420 DATA  15,255,240, 15,255,224, 15,255,192, 15,255,192, 15,254,  0
4430 DATA  15,254,  0, 15,254,  0, 15,254,  0, 15,254,  0, 15,254,  0
4440 DATA  15,252,  0, 15,252,  0, 15,248,  0, 15,240,  0, 31,240,  0
4450 DATA  31,224,  0, 31,192,  0, 55,128,  0, 48,  0,  8, 96,  0, 24
4460 DATA 192,  0, 24,128,  0, 56,  0,  0, 56,  0,  0,120,  0,  0,120
4470 DATA   0,  0,248,  0,  0,248,  0,  1,248,  0,  1,248,  0,  3,248
4480 DATA   0,  3,248,  0,  7,248,  0,  7,248,  0, 15,248,  0, 15,248
4490 DATA   0, 31,248,  0, 31,240,  0, 63,240,  0, 63,224,  0,127,224
4500 DATA   0,127,192,  0,255,192,  0,255,128,  1,255,128,  1,255, 24
4510 DATA   3,255, 56,  3,255,248,231,255,248,255,255,248, 31,255,248
4520 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,248
4530 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,240
4540 DATA  15,255,240, 15,255,240, 15,255,224, 15,255,224, 15,255,192
4550 DATA  15,255,192, 31,255,128,254,127,128,252,127, 24,248,255, 56
4560 DATA 248,255,248,240,255,248,225,255,248,193,255,248,131,255,248
4570 DATA   3,255,248,  7,255,248,135,255,248,231,255,248,255,255,248
4580 DATA  63,255,248, 31,255,248, 15,255,248, 15,255,248, 15,255,240
4590 DATA  15,255,240, 15,255,224, 15,255,192, 15,255,128, 15,255,  0
4600 DATA  15,254,  0, 15,252,  0, 15,248,  0, 15,240,  0, 15,224,  0
4610 DATA  15,192,  0, 15,  0,  0,  0, 62,  0,  0,252,  0,  0,248,  0,  0
4620 DATA 240,  0,  0,224,  0,  0,192,  0,  0,128,  0,  0,  0,  0,  0,  0
4630 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4640 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
```

How the program works

This program begins by assigning a number of printer commands to BASIC string variables (lines 1000 to 1060). You can find most of these commands near the beginning of chapter 7.

The WIDTH "LPT1:" 255 statement in line 1080 means infinite line width. It prevents the IBM-PC from inserting unwanted carriage returns and line feeds in graphics data.

Actual printing begins in line 1090. Using the preassigned commands, the program prints samples of its different fonts, followed by samples of the print pitches, then some double and quadruple-sized printing.

Next comes the central attraction of the program: a line of text printed fourteen times in expanding and contracting loops to give a barrel effect. The work is done by four printer commands: a command setting the right margin (line 1450); a centering command (line 1470); a command to vary the line spacing (lines 1490 and 1540); and a command to micro-adjust the space between characters (lines 1500 and 1550).

Next the program returns to normal spacing and gives a demonstration of the printer's word-processing abilities: italic printing, bold printing, underlining, subscripts, etc.

The row of telephone symbols in the next printed line is created by downloading two new character patterns, which are printed in place of the character "<" (character 60). Details can be found in Chapter 8.

The final part of the program uses dot graphics to print an "M & W" logo. The dot pattern of the logo was originally laid out on graph paper, then converted to the data in lines 3180 to 4640 with the help of a calculator. Each number represents eight vertical dots. (See "Graphics commands" in Chapter 7 for details.)

The pattern is printed in three rows, each row is twenty-four dots high and 240 dots wide. Line 2040 sets the line spacing to 8/60 inch so that the rows will connect vertically. The loop in lines 2050 to 2130 does the printing in three passes of the print head.

Resident fonts are:

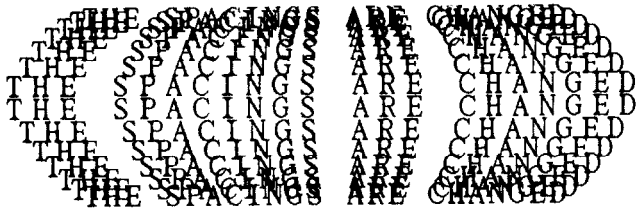
Draft characters, Roman characters,
Sanserif characters, Courier characters,
Prestige characters, *Script characters,*
ORATOR CHARACTERS, H-Gothic characters,
SLQ Roman, SLQ TW-Light.

Print pitches are:

Pica pitch (10 CPI), Elite pitch (12 CPI),
Semi-condensed pitch (15 CPI), Condensed pica pitch (17 CPI),
Condensed elite pitch (20 CPI),
Normal proportional, Condensed proportional.

Double-height,
Double width,
Triple width,
Double-sized,
Quad-sized.

Various line and character spacings:



Other features:

OUTLINED, **SHADOWED**, **OUTLINED WITH SHADOWED**,
Emphasized, Double-strike, *Italics*,
Underlining, ~~Strike-through~~, Overlining,
SUPERSCRIPT and SUBSCRIPT,
Download characters:
Dot graphics:

MEMO

Chapter 10 TROUBLESHOOTING AND MAINTENANCE

The following section on troubleshooting and maintenance is intended only as a brief guide to these functions. Remember that your printer is a highly sophisticated electronic device, which also contains high voltage inside. For that reason, only carry out those operations described in this chapter.

CAUTION: Any attempt to carry out operations other than those described here may result in electric shock and/or damage to the printer. When carrying out any repairs or maintenance, always follow the instructions carefully.

TROUBLESHOOTING

Your printer is a reliable piece of precision machinery, which should not cause you any trouble, provided it is used and treated sensibly. However, the few elementary tips below should help you avoid having to make unnecessary service calls. The following table gives you ideas on where to look in this section if you experience faults:

Region of fault	Description
Power supply	Power is not being supplied to the printer
Printing	The printer does not print, or stops printing
	The print is faint or uneven
	Dots are missing in characters or graphics
	While using application software, fonts or characters cannot be printed
	The printout is not what is expected when running a program
Paper feeding	Single sheets do not feed properly (without ASF)
	Continuous paper does not feed properly with the tractor feed
	The ASF is not operating or is not feeding paper properly
	Paper park (switching between continuous paper and cut sheets) is not working properly
	Text is being printed all on one line, or with extra blank lines
	Page length and margin settings are not what is expected

Power supply

If the POWER indicator does not illuminate, check the following:

Check	Possible remedy
Is the power cable properly plugged into the electrical outlet?	Turn off the printer, ensure the power cable is securely connected, and then turn the printer back on.
Is power being supplied to the outlet?	Turn off the printer, unplug it, and try the outlet with another appliance to determine if electricity is being supplied from that outlet.
Is the printer voltage correct?	Check the bottom panel of your printer to ensure that the outlet voltage corresponds to the voltage required by the printer. If they do not match, DO NOT try to operate the printer. Contact your supplier.

Printing

If your printer does not print, or suddenly stops printing, check the following:

Check	Possible remedy
Is the interface cable connected securely?	Check both ends of the cable - printer and computer to make sure that the connector is firmly in position.
Is the ON LINE indicator illuminated?	If it is not, press the [ON LINE] button to set the printer on-line.
Is the "PAPER OUT" message flashing?	If it is, the paper has run out. Load more paper.
Is the printer beeping intermittently?	The release lever is moved while the paper is in printing position. Move the release lever to the original position.
Is the paper caught up internally?	Turn off the power, remove the jammed paper, replace, turn on the printer, and continue printing. Make sure that the loading edge of the paper is smooth and uncreased.
Is the ribbon caught up around the print head?	Turn off the power, remove the ribbon, retension it, and replace it. This problem occurs most frequently with a worn ribbon, so you may need to replace the ribbon.
Is the software you are using properly installed for your printer?	Check the installation settings in your software, and reinstall if necessary.
Can the printer perform self-test operations?	Turn the printer off, and turn it on again, holding down one of the buttons to perform a self-test. If these do not work, contact your dealer.

If the print is faint, or uneven, check the following:

Check	Possible remedy
Is the ribbon properly installed?	Check and reinstall if necessary.
Is the ribbon worn out?	The ribbon has a long life, but will eventually need replacing. Fit a new ribbon cartridge if necessary.

If dots are missing in the printing, check the following:

Check	Possible remedy
Are dots missing at random in the printing?	The ribbon has become slack, causing it to get caught up. Stop printing, remove the ribbon cartridge, retension and replace it.
Is a line of dots missing consistently throughout the printing?	The print head may be damaged. Stop printing, and contact your supplier.

If your application software cannot print the fonts or characters selected, check the following:

Check	Possible remedy
Is your application software properly installed?	Check the software installation, and re-install the software if necessary.
Are fonts not being selected properly?	Check the software installation, and insert the commands necessary for font changes into the software. If you have selected the optional font, you need to install the related Font cartridge to the printer.
Are characters other than those expected being printed?	Either you are using the wrong International Character Set (reset with EDS switches or software commands), or you have the wrong character set selected (for example if characters other than IBM block graphic characters are being printed). Correct this with EDS switches or the appropriate software sequences.

If the printout is not what is expected:

Check	Possible remedy
Is the printer installed correctly?	Your software may think that it is driving a different emulation to the one actually set. Check the EDS settings to make sure you have the right emulation.
Is the printer not printing anything that you are expecting?	Use the Hex Dump mode to analyze the output from the computer to the printer. This will enable you determine that the right escape sequence, etc are being transmitted.

Paper feeding

If cut sheet paper (without ASF) is not feeding smoothly, check the following:

Check	Possible remedy
Is the paper release lever pushed front (to the position)?	Set the release lever to the position.
Is the paper guide in place and vertical?	The paper guide should be in place and vertically for cut sheets to feed smoothly.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper feed freely.
Is the ASF selected with the EDS setting?	If it is, then deselect it.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.
Are forms jamming between printing surface and the platen?	Clean the surface of the platen roller with a cloth barely dampended with a little alcohol.

If fanfold (continuous) paper is not being fed correctly using the tractor feed, check the following:

Check	Possible remedy
Is the paper release lever pushed to the position?	Make sure the release lever is pushed to the position.
Is the paper guide in the vertical position?	When using the tractor feed, the paper guide should be horizontal.
Are the holes on each side of the paper aligned with regard to each other in the tractor units?	If the two sides of the paper are out of alignment, realign them so that the tractor holes match up.
Are the tractor units too close or too far apart?	Misalignment of the tractor units, making the paper too close or too tight, will prevent a smooth paper feed.
Are the tractor units locked in position and the covers closed?	Correct this if necessary.

Check	Possible remedy
Is the paper feeding freely into the printer?	The paper should not be too far from the printer (less than 1 meter/3 feet), and there should be no cables or other obstacles obstructing its path. The paper should also be feeding straight into the printer, and an angled feed may cause jams and blockages.
Is the paper caught up around the perforation?	It is recommended to skip around the perforation. If you cannot, set on the Multi-part mode with the EDS switch.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.

If the ASF is not operating or is not feeding paper correctly, check the following:

Check	Possible remedy
Has the correct ASF option been selected with the EDS switch?	Select correct option.
Is the release lever set to the position?	The release lever should be set to the single-sheet position.
Is the ASF correctly mounted?	Make sure that the ASF is properly seated on the printer.
Is paper caught up near the print head?	Stop printing, remove the jammed sheet (you may have to remove the ASF for this), and continue.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper to feed freely.
Is there too much paper in the paper feed hopper or stacker?	The ASF's paper feed hopper and stacker can hold between 100 to 150 sheets each. Make sure that there is no more paper than this in either the hopper or stacker.
Was the paper fanned before being fed into the ASF?	If this is not done, paper jams may occur. Remove the stack of paper from the ASF and fan it before reinserting.
Has the paper been used already or is it creased?	Only new, uncreased paper should be used with the ASF.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick or too thin?	There are limits to the thickness of paper that can be fed in this way. Try with different paper.

If the paper park facility does not appear to be working correctly, check the following:

Check	Possible remedy
Is the paper release lever in the position?	The paper release lever must be set to the position after the fanfold paper has been parked.
Has the fanfold paper been properly parked?	Make sure that the "PAPER OUT" message comes on flashing after the fanfold paper has been parked.

If text is being printed all on one line, or with extra blank lines, check the following:

Check	Possible remedy
Is the text all on the same line?	Carriage returns are not being expanded to <CR> + <LF> pairs. Check the EDS setting and correct.
Is text being printed with extra blank lines?	Two line feeds are being printed. Either make sure your software print just a carriage return or (if this is not possible), set the AUTO LF to OFF with the EDS setting.

If the page length and margins are not what is expected, check the following:

Check	Possible remedy
Is the printing starting too high or too low on the page?	Use the Micro Feed facility to adjust the print position relative to the page.
Does the printer's page length not match the physical page length?	Use the EDS switches to set up the correct page length, or use software commands to do it.

MAINTENANCE

Essentially, your printer is a robust piece of equipment, but should be treated with a modicum of care in order to avoid malfunctions. For example:

- Keep your printer in a "comfortable" environment. Roughly speaking, if you are comfortable, then the environment is suitable for your printer (see Chapter 2).
- Do not subject the printer to physical shocks or excessive vibration.
- Avoid over-dusty environments. Dust is the enemy of all precision mechanical devices.
- To clean the exterior of the printer, use a cloth barely dampened with either water with a little detergent or a little alcohol, but do not allow any liquid to fall inside the printer.
- The interior of the printer may be cleaned with a small vacuum cleaner or a compressed-air aerosol (sold for this purpose). When performing this operation, be sure not to bend or damage any cable connections or electronic components.

REPLACING THE PRINT HEAD

This is not a job which you will need to do very often. The print head has been designed to last for about 200 million dots. In normal everyday use, this will translate to years of life. However, if the print quality is faint, even after you have changed the ribbon or you have adjusted the gap between the print head and the platen (see Chapter 4), the print head may need replacement.

Only use a replacement print head as recommended by your supplier.

1. Turn OFF the printer, and unplug the power cord.
2. Open the front cover, and remove the ribbon cartridge.
3. If the printer has been in operation immediately before this operation, the print head will be hot. Allow time for the print head to cool before attempting to work on it.
4. Unscrew the two screws that hold the print head in place and set them aside.
5. Disengage the connector, then remove the print head.
6. Place the new print head on its support, seating it on the two pins.

7. Fasten the print head down with the two screws.
8. Replace the ribbon cartridge and close the front cover, then plug the power cord back in.

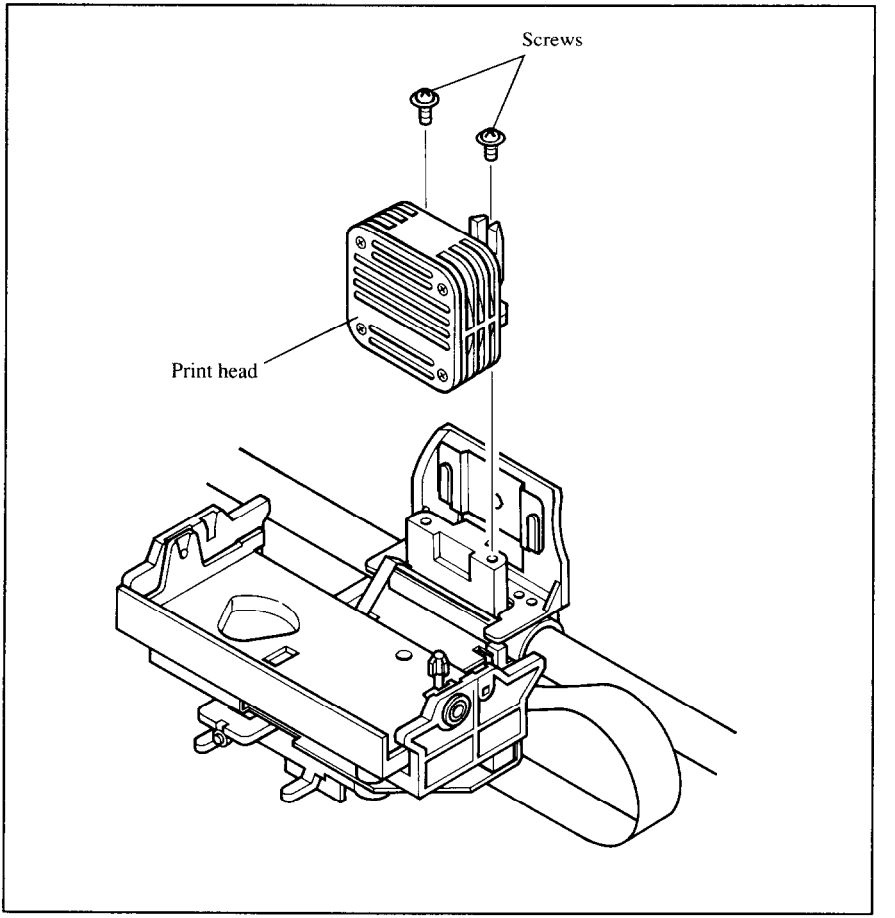


Figure 10-1. Replacing the print head.

Chapter 11

REFERENCE

SPECIFICATIONS

Printing system ..... Serial Impact Dot-matrix

Printing speed	Pica	Elite	Semi-condensed
High-Speed Draft	332 cps	—	—
Draft	250 cps	300 cps	375 cps
Letter Quality	83.3 cps	100 cps	125 cps

Print direction ..... Bi-directional, logic-seeking
Uni-directional, logic-seeking (selectable)

Print head ..... 24 pins
Life: 200 million dots

Line spacing ..... 1/6, 1/8, *n*/60, *n*/72, *n*/180, *n*/216, *n*/360 inches

Font styles

Standard ..... Draft, High-Speed Draft, Roman, Sanserif, Courier, Prestige, Script, Orator, H-Gothic, SLQ Roman, SLQ TW-Light

Option [FC-1Z Cartridge] ..... Orator 2, Letter Gothic, Blippo, Cinema
[FC-2Z Cartridge] ..... OCR-B, OCR-A, CODE 39, UPC/EAN
[FC-3Z Cartridge] ..... TW-Light, Orane
[FC-4Z Cartridge] ..... Russian
[FC-5Z Cartridge] ..... Old Style, Firenze
[FC-10Z Cartridge] ..... SLQ Script

Characters	ASCII	96	
	International	16	sets (*)
	IBM special	111	
	IBM block graphic	50	
	IBM code page	6	sets (**)
	Download	255	

* USA, France, Germany, England, Denmark I, Sweden, Italy, Spain I, Japan, Norway, Denmark II, Spain II, Latin America, Korea, Irish, Legal

** #437 (USA), #850 (Multi-Lingual), #860 (Portuguese), #861 (Icelandic), #863 (Canadian French), #865 (Nordic)

Number of columns	CPI	Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Semi-condensed	15	120	204
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	Variable

Character matrix	Draft	LQ	SLQ
Pica	24 × 9	24 × 31	48 × 31
Elite	24 × 9	24 × 27	48 × 27
Semi-condensed	16 × 7	16 × 19	32 × 19
Condensed pica	24 × 9	24 × 16	48 × 16
Condensed elite	24 × 9	24 × 16	48 × 16
Super/subscript	16 × 7	16 × 19	32 × 19
Proportional	—	24 × *n*	48 × *n*
Super/subscript proportional	—	24 × *n*	48 × *n*

Bit image dot-matrix	DPI	Normal type	Wide type
8-pin normal	60	8 × 480	8 × 816
8-pin double	120	8 × 960	8 × 1632
8-pin high-speed double *	120	8 × 960	8 × 1632
8-pin quadruple *	240	8 × 1920	8 × 3264
8-pin CRT I	80	8 × 640	8 × 1088
8-pin CRT II	90	8 × 720	8 × 1224
24-pin normal	60	24 × 480	24 × 816
24-pin double	120	24 × 960	24 × 1632

24-pin CRT III	90	24 × 720	24 × 1224
24-pin Triple	180	24 × 1440	24 × 2448
24-pin Hex *	360	24 × 2880	24 × 4896

* It is impossible to print adjacent dots in the mode marked with an asterisk (*).

Paper feed ..... Friction or push tractor (standard)
Bottom feed or Push/Pull feed (option)

Paper feed speed ..... 3.7 inches/second max

Paper specifications	Normal type	Wide type
Cut sheet		
Width	4" - 11.7"	4" - 16.5"
	(101 - 297 mm)	(101 - 419 mm)
Length	7.17" - 14.3"	7.17" - 14.3"
	(182 - 364 mm)	(182 - 364 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
Weight	52 - 90 g/m²	52 - 90 g/m²
	45 - 77 kg	45 - 77 kg
	14 - 24 lb	14 - 24 lb
Fanfold (continuous)		
Width	4" - 10"	4" - 16"
	(101 - 254 mm)	(101 - 406 mm)
Length	5.5" (Minimum)	5.5" (Minimum)
	(140 mm)	(140 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
	0.35 mm (Total for multi-part forms)	
Weight	52 - 82 g/m²	52 - 82 g/m²
	45 - 70 kg	45 - 70 kg
	14 - 22 lb	14 - 22 lb

Copies ..... Original + 2 copies (Multi-part mode off)
Original + 4 copies (Multi-part mode on)

Maximum buffer size ..... Without Download
29 kB (Normal type)
76 kB (Wide type)
With Download
200 Bytes (Normal type)
46 kB (Wide type)

Emulations
Standard mode ..... Epson LQ-860/LQ-1060, NEC 24-wire Graphics commands
IBM mode ..... IBM Proprinter X24E/XL24E

Interface ..... Centronics parallel (standard)
RS-232C/422 serial (option)

Ribbon type ..... On-carriage, dedicated
Film ribbon (Black only)
Monochrome (Black only)
Color (Black, magenta, cyan, violet, yellow, orange, green)

Ribbon life
Film ribbon (FZ24) ..... 0.2 million characters (LQ pica)
Monochrome (LZ24) ..... 4 million characters (draft pica)
Color (X24CL) ..... 1 million characters (draft pica)

Dimensions and Weight	Normal type	Wide type
Width	466 mm (18.3")	608 mm (23.9")
Depth	400 mm (15.7")	400 mm (15.7")
Height	157 mm (6.2")	157 mm (6.2")
Weight	9.9 kg (21.8 lb)	12.3 kg (27.1 lb)

Power supply ..... 120VAC, 220VAC, 240VAC, 50/60 Hz (varies according to the country of purchase)

Options	Film ribbon cartridge (FZ24) Color ribbon cartridge (X24CL) Single-bin Automatic Sheet Feeder (SF-10DMII/15DMII) Dual-bin Automatic Sheet Feeder (SF-10RMII/15RMII) Pull Tractor Unit (PT-10XM/15XM) Font cartridge (FC-1Z, FC-2Z, FC-3Z, FC-4Z, FC-5Z, FC-10Z) RAM cartridge (RC-32Z, DC-32Z) Serial Interface Cartridge (IS-8XL) Buffered Parallel Interface cartridge (IP-128XL)

PINOUT OF INTERFACE CONNECTOR

The following describes the pinout of the interface connector (signals which are low when active are overlined).

Parallel interface

Pin	Name	Function
1	$\overline{\text{STROBE}}$	Goes from high to low (for $\geqq$ 0.5 µs) when active
2	DATA0	High when active
3	DATA1	High when active
4	DATA2	High when active
5	DATA3	High when active
6	DATA4	High when active
7	DATA5	High when active
8	DATA6	High when active
9	DATA7	High when active
10	$\overline{\text{ACK}}$	5µs low pulse acknowledges receipt of data
11	BUSY	Low when printer ready to receive data
12	PAPER	High when paper out. Can be disabled with EDS setting
13	SELECT	High when printer is on-line
14, 15	N/C	
16	SIGNAL GND	Signal ground
17	CHASSIS	Chassis ground (isolated from signal ground)
18	+5V	+5V DC output from printer
19 ~ 30	GND	Twisted pair ground return
31	$\overline{\text{RESET}}$	When this input signal is low, printer is reset
32	$\overline{\text{ERROR}}$	Outputs low when printer cannot continue, due to an error
33	EXT GND	External ground
34, 35	N/C	
36	$\overline{\text{SELECT IN}}$	Always high

Serial Interface

Pin	Name	Function
1	GND	Printer's chassis ground.
2	TXD	This pin carries data from the printer.
3	RXD	This pin carries data to the printer.
4	RTS	This pin is always set space.
5	CTS	This pin is Space when the computer is ready to send data. This printer does not check this pin.
6	N/C	
7	GND	Signal ground.
8 ~ 10	N/C	
11	RCH	This printer turn this pin Space when it is ready to receive data. This line carries the same signal as pin 20.
12	N/C	
13	GND	Signal ground.
14 ~ 19	N/C	
20	DTR	This printer turns this pin Space when it is ready to receive data.
21 ~ 25	N/C	

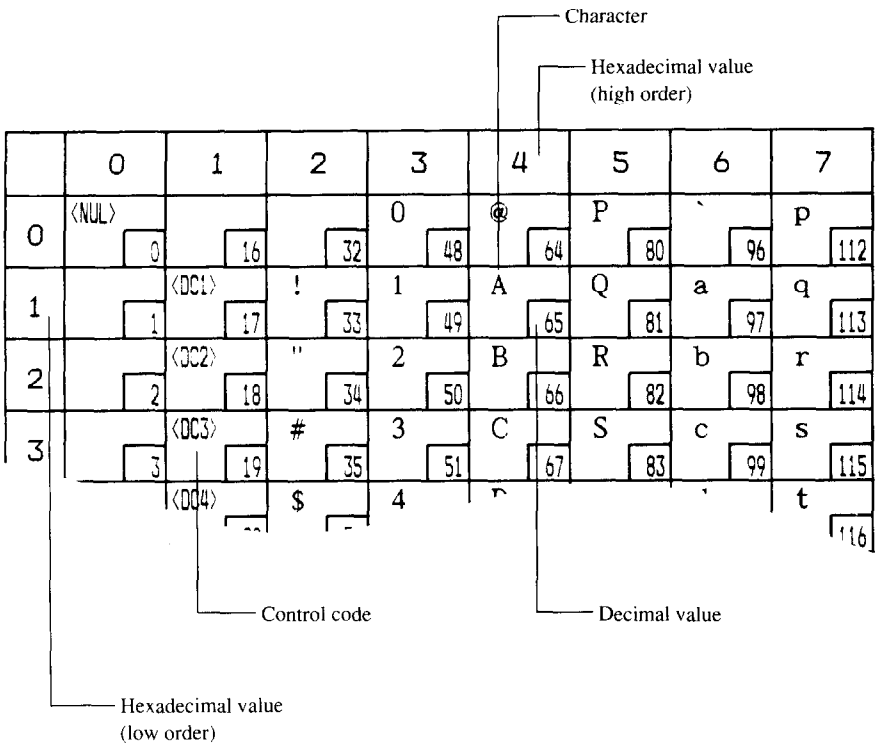
CHARACTER SETS

The following tables show the standard and IBM character sets.

The decimal character code of each character is shown in an inset to the lower right of the character.

The hexadecimal code can be found by reading the entires at the top and left edges of the table. For example, the character "A" is in column 4 and row 1, so its hexadecimal character code is 41. This is equivalent ($4 \times 16 + 1 = 65$) to decimal 65, the number in the inset.

Control codes recognized by this printer are indicated by abbreviations inside pointed brackets < >.



	0	1	2	3	4	5	6	7
0	<NUL> 0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	<DC1> 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	<DC2> 18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	<DC3> 19	# 35	3 51	C 67	S 83	c 99	s 115
		<DC4>	$	4				t 116

Standard character set #2

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

	8	9	A	B	C	D	E	F
0	à 128	§ 144	160	0 176	@ 192	P 208	` 224	p 240
1	è 129	ß 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	ù 130	Æ 146	" 162	2 178	B 194	R 210	b 226	r 242
3	ò 131	æ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	ì 132	Ø 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	° 133	ø 149	% 165	5 181	E 197	U 213	e 229	u 245
6	£ 134	¨ 150	& 166	6 182	F 198	V 214	f 230	v 246
7	ì 135	Ä 151	' 167	7 183	G 199	W 215	g 231	w 247
8	¿ 136	Ö 152	(168	8 184	H 200	X 216	h 232	x 248
9	Ñ 137	Ü 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	ñ 138	ä 154	* 170	: 186	J 202	Z 218	j 234	z 250
B	¤ 139	ö 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	Pt 140	ü 156	, 172	< 188	L 204	\ 220	l 236	| 252
D	Å 141	É 157	- 173	= 189	M 205	] 221	m 237	} 253
E	å 142	é 158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	ç 143	¥ 159	/ 175	? 191	O 207	_ 223	o 239	255

International character sets

When an international character set is selected by a command from software, the following changes are made in the Standard Italic character set:

Country	35	36	64	88	90	91	92	93	94	96	123	124	125	126
U.S.A.	#	$	@	X	Z	[	\	]	^	`	{	¦	}	~
FRANCE	#	$	à	X	Z	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	X	Z	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	$	@	X	Z	[	\	]	^	`	{	¦	}	~
DENMARK 1	#	$	@	X	Z	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	X	Z	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	X	Z	°	\	é	^	ù	à	ò	è	ì
SPAIN 1	₧	$	@	X	Z	¡	Ñ	¿	^	´	¨	ñ	}	~
JAPAN	#	$	@	X	Z	[	¥	]	^	`	{	¦	}	~
NORWAY	#	¤	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK 2	#	$	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN 2	#	$	á	X	Z	¡	Ñ	¿	é	´	í	ñ	ó	ú
LATIN AMERICA	#	$	á	X	Z	¡	Ñ	¿	é	ü	í	ñ	ó	ú
KOREA	#	$	@	X	Z	[	₩	]	^	`	{	¦	}	~
IRISH	#	$	@	Ú	´	[	\	]	^	`	Á	É	Ó	~
LEGAL	#	$	§	X	Z	°	'	"	¶	`	©	®	†	™

The command for selecting the international character set is:

<ESC> "R" *n*

Where *n* means character code *n*, i.e. CHR$ (*n*) in BASIC. The values of *n* are:

0	U.S.A.	6	Italy	12	Latin America
1	France	7	Spain I	13	Korea
2	Germany	8	Japan	14	Irish
3	England	9	Norway	64	Legal
4	Denmark I	10	Denmark II		
5	Sweden	11	Spain II		

IBM character set #2

Code Page #437 (U.S.A.)

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

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #850 (Multi-lingual)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	= 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▌ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▊ 223	´ 239	255

Code Page #860 (Portuguese)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	À 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	È 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	Ê 137	Õ 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Í 139	¢ 155	½ 171	╗ 187	╦ 203	▒ 219	δ 235	√ 251
C	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▒ 220	∞ 236	n 252
D	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▒ 221	ø 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▒ 222	∈ 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	╧ 207	▒ 223	∩ 239	255

Code Page #861 (Icelandic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	Á 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Þ 149	í 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	Ó 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	Ý 151	Ú 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ý 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Ð 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	ð 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	Þ 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #863 (Canadian French)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	¦ 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Ê 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	¶ 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ù 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
D	= 141	Û 157	¾ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	À 142	Ü 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #865 (Nordic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▀ 220	∞ 236	n 252
D	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▄ 223	∩ 239	255

Character set #1

Other characters are identical to character set #2.

The duplication of control codes enables systems with a 7-bit interface to obtain control functions when the most significant bit is set to 1 by the <ESC> ">" command in the standard mode.

	0	1
0	⟨NUL⟩ 0	16
1	1	⟨DC1⟩ 17
2	2	⟨DC2⟩ 18
3	3	⟨DC3⟩ 19
4	4	⟨DC4⟩ 20
5	5	21
6	6	⟨SYN⟩ 22
7	⟨BEL⟩ 7	23
8	⟨BS⟩ 8	⟨CAN⟩ 24
9	⟨HT⟩ 9	⟨EM⟩ 25
A	⟨LF⟩ 10	26
B	⟨VT⟩ 11	⟨ESC⟩ 27
C	⟨FF⟩ 12	⟨FS⟩ 28
D	⟨CR⟩ 13	29
E	⟨SO⟩ 14	30
F	⟨SI⟩ 15	31

	8	9
0	⟨NUL⟩ 128	144
1	129	⟨DC1⟩ 145
2	130	⟨DC2⟩ 146
3	131	⟨DC3⟩ 147
4	132	⟨DC4⟩ 148
5	133	149
6	134	⟨SYN⟩ 150
7	⟨BEL⟩ 135	151
8	⟨BS⟩ 136	⟨CAN⟩ 152
9	⟨HT⟩ 137	⟨EM⟩ 153
A	⟨LF⟩ 138	154
B	⟨VT⟩ 139	⟨ESC⟩ 155
C	⟨FF⟩ 140	⟨FS⟩ 156
D	⟨CR⟩ 141	157
E	⟨SO⟩ 142	158
F	⟨SI⟩ 143	159

IBM special character set

Additional characters can be printed by special commands.

	0	1
0	Ø 0	► 16
1	☺ 1	◄ 17
2	☻ 2	↕ 18
3	♥ 3	!! 19
4	♦ 4	¶ 20
5	♣ 5	§ 21
6	♠ 6	▬ 22
7	• 7	↨ 23
8	◘ 8	↑ 24
9	○ 9	↓ 25
A	◙ 10	→ 26
B	♂ 11	← 27
C	♀ 12	∟ 28
D	♪ 13	↔ 29
E	♫ 14	▲ 30
F	☼ 15	▼ 31

PROPORTIONAL SPACING TABLE

This table lists the widths of your printer's proportional characters, for Standard mode and IBM mode.

The values given are in 360ths of an inch. For example, a value of 36 is 36/360ths of an inch. You may need to enter these widths into a special table for your processing program so it can calculate the number of proportional characters that will fit on a line.

The following width table shows each character, its ASCII code (decimal) for each character set, and its width for Standard normal mode, Standard super/subscript mode, and IBM mode.

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
-	0	0	0	0	0	0	Ø	30	20	30
-	1	1	1	1	1	1	☺	30	20	30
-	2	2	2	2	2	2	☻	30	20	30
-	3	3	3	3	3	3	♥	30	20	30
-	4	4	4	4	4	4	♦	30	20	30
-	5	5	5	5	5	5	♣	30	20	30
-	6	6	6	6	6	6	♠	30	20	30
-	7	7	7	7	7	7	•	30	20	30
-	8	8	8	8	8	8	◘	30	20	30
-	9	9	9	9	9	9	○	30	20	30
-	10	10	10	10	10	10	◙	30	20	30
-	11	11	11	11	11	11	♂	30	20	30
-	12	12	12	12	12	12	♀	30	20	30
-	13	13	13	13	13	13	♪	30	20	30
-	14	14	14	14	14	14	♫	30	20	30
-	15	15	15	15	15	15	☼	30	20	30
-	16	16	16	16	16	16	►	30	20	30
-	17	17	17	17	17	17	◄	30	20	30
-	18	18	18	18	18	18	↕	30	20	30
-	19	19	19	19	19	19	‼	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
INT	20	20	20	20	20	20	¶	30	20	30
INT	21	21	21	21	21	21	§	30	20	30
-	22	22	22	22	22	22	▬	30	20	30
-	23	23	23	23	23	23	↨	30	20	30
-	24	24	24	24	24	24	↑	30	20	30
-	25	25	25	25	25	25	↓	30	20	30
-	26	26	26	26	26	26	→	30	20	30
-	27	27	27	27	27	27	←	30	20	30
-	28	28	28	28	28	28	∟	30	20	30
-	29	29	29	29	29	29	↔	30	20	30
-	30	30	30	30	30	30	▲	30	20	30
-	31	31	31	31	31	31	▼	30	20	30
32	32	32	32	32	32	32		30	20	30
33	33	33	33	33	33	33	!	18	12	30
34	34	34	34	34	34	34	"	30	20	30
35	35	35	35	35	35	35	#	30	20	30
36	36	36	36	36	36	36	$	30	20	30
37	37	37	37	37	37	37	%	36	24	30
38	38	38	38	38	38	38	&	36	24	36
39	39	39	39	39	39	39	'	18	12	18
40	40	40	40	40	40	40	(	24	16	30
41	41	41	41	41	41	41	)	24	16	30
42	42	42	42	42	42	42	*	30	20	30
43	43	43	43	43	43	43	+	30	20	30
44	44	44	44	44	44	44	,	18	12	30
45	45	45	45	45	45	45	-	30	20	30
46	46	46	46	46	46	46	.	18	12	30
47	47	47	47	47	47	47	/	30	20	30
48	48	48	48	48	48	48	0	30	20	30
49	49	49	49	49	49	49	1	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
50	50	50	50	50	50	50	2	30	20	30
51	51	51	51	51	51	51	3	30	20	30
52	52	52	52	52	52	52	4	30	20	30
53	53	53	53	53	53	53	5	30	20	30
54	54	54	54	54	54	54	6	30	20	30
55	55	55	55	55	55	55	7	30	20	30
56	56	56	56	56	56	56	8	30	20	30
57	57	57	57	57	57	57	9	30	20	30
58	58	58	58	58	58	58	:	18	12	30
59	59	59	59	59	59	59	;	18	12	30
60	60	60	60	60	60	60	<	30	20	30
61	61	61	61	61	61	61	=	30	20	30
62	62	62	62	62	62	62	>	30	20	30
63	63	63	63	63	63	63	?	30	20	30
64	64	64	64	64	64	64	@	36	24	30
65	65	65	65	65	65	65	A	36	24	42
66	66	66	66	66	66	66	B	36	24	42
67	67	67	67	67	67	67	C	36	24	42
68	68	68	68	68	68	68	D	36	24	42
69	69	69	69	69	69	69	E	36	24	36
70	70	70	70	70	70	70	F	36	24	36
71	71	71	71	71	71	71	G	36	24	42
72	72	72	72	72	72	72	H	36	24	42
73	73	73	73	73	73	73	I	24	16	24
74	74	74	74	74	74	74	J	30	20	30
75	75	75	75	75	75	75	K	36	24	42
76	76	76	76	76	76	76	L	36	24	36
77	77	77	77	77	77	77	M	42	28	42
78	78	78	78	78	78	78	N	36	24	42
79	79	79	79	79	79	79	O	36	24	42

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
80	80	80	80	80	80	80	P	36	24	36
81	81	81	81	81	81	81	Q	36	24	42
82	82	82	82	82	82	82	R	36	24	42
83	83	83	83	83	83	83	S	36	24	36
84	84	84	84	84	84	84	T	36	24	42
85	85	85	85	85	85	85	U	42	28	42
86	86	86	86	86	86	86	V	36	24	42
87	87	87	87	87	87	87	W	42	28	42
88	88	88	88	88	88	88	X	36	24	42
89	89	89	89	89	89	89	Y	36	24	42
90	90	90	90	90	90	90	Z	30	20	36
91	91	91	91	91	91	91	[	24	16	30
92	92	92	92	92	92	92	\	30	20	30
93	93	93	93	93	93	93	]	24	16	30
94	94	94	94	94	94	94	^	30	20	30
95	95	95	95	95	95	95	_	30	20	30
96	96	96	96	96	96	96	`	18	12	30
97	97	97	97	97	97	97	a	30	20	30
98	98	98	98	98	98	98	b	36	24	36
99	99	99	99	99	99	99	c	30	20	30
100	100	100	100	100	100	100	d	36	24	36
101	101	101	101	101	101	101	e	30	20	30
102	102	102	102	102	102	102	f	24	16	24
103	103	103	103	103	103	103	g	36	24	36
104	104	104	104	104	104	104	h	36	24	36
105	105	105	105	105	105	105	i	18	12	18
106	106	106	106	106	106	106	j	24	16	18
107	107	107	107	107	107	107	k	36	24	36
108	108	108	108	108	108	108	l	18	12	18
109	109	109	109	109	109	109	m	42	28	42

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
110	110	110	110	110	110	110	n	36	24	36
111	111	111	111	111	111	111	o	30	20	30
112	112	112	112	112	112	112	p	36	24	36
113	113	113	113	113	113	113	q	36	24	36
114	114	114	114	114	114	114	r	30	20	30
115	115	115	115	115	115	115	s	30	20	30
116	116	116	116	116	116	116	t	24	16	24
117	117	117	117	117	117	117	u	36	24	36
118	118	118	118	118	118	118	v	36	24	36
119	119	119	119	119	119	119	w	42	28	42
120	120	120	120	120	120	120	x	30	20	36
121	121	121	121	121	121	121	y	36	24	36
122	122	122	122	122	122	122	z	30	20	30
123	123	123	123	123	123	123	{	24	16	30
124	124	124	124	124	124	124	¦	18	12	30
125	125	125	125	125	125	125	}	24	16	30
126	126	126	126	126	126	126	~	30	20	30
-	127	127	127	127	127	127	⌂	30	20	30
128	128	128	128	128	128	128	Ç	36	24	42
129	129	129	129	129	129	129	ü	36	24	36
130	130	130	130	130	130	130	é	30	20	30
131	131	131	131	131	131	131	â	30	20	30
132	132	132	-	132	-	132	ä	30	20	30
133	133	133	133	133	133	133	à	30	20	30
134	134	134	-	134	-	134	å	30	20	30
135	135	135	135	135	135	135	ç	30	20	30
136	136	136	136	136	136	136	ê	30	20	30
137	137	137	-	137	137	137	ë	30	20	30
138	138	138	138	138	138	138	è	30	20	30
139	139	139	-	-	139	139	ï	18	12	18

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
140	140	140	-	-	140	140	î	18	12	18
141	141	141	141	-	-	141	ì	18	12	18
142	142	142	-	142	-	142	Ä	36	24	42
143	143	143	-	143	-	143	Å	36	24	42
144	144	144	144	144	144	144	É	36	24	36
145	145	145	-	145	-	145	æ	42	28	42
146	146	146	-	146	-	146	Æ	42	28	42
147	147	147	147	147	147	147	ô	30	20	30
148	148	148	-	148	-	148	ö	30	20	30
149	149	149	149	-	-	149	ò	30	20	30
150	150	150	-	150	150	150	û	36	24	36
151	151	151	151	-	151	151	ù	36	24	36
152	152	152	-	-	-	152	ÿ	36	24	36
153	153	153	-	153	-	153	Ö	36	24	42
154	154	154	154	154	154	154	Ü	42	28	42
155	155	189	155	-	155	-	¢	30	20	30
156	156	156	156	156	156	156	£	30	20	30
157	157	190	-	-	-	-	¥	36	24	30
158	158	-	158	158	-	158	₧	42	28	42
159	159	159	-	159	159	159	ƒ	30	20	30
160	160	160	160	160	-	160	á	30	20	30
161	161	161	161	161	-	161	í	18	12	18
162	162	162	162	162	162	162	ó	30	20	30
163	163	163	163	163	163	163	ú	36	24	36
164	164	164	164	-	-	164	ñ	36	24	36
165	165	165	165	-	-	165	Ñ	36	24	42
166	166	166	166	-	-	166	ª	30	20	30
167	167	167	167	-	-	167	º	30	20	30
168	168	168	168	168	-	168	¿	30	20	30
169	169	-	-	169	169	169	⌐	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
170	170	170	170	170	170	170	¬	30	20	30
171	171	171	171	171	171	171	½	30	20	30
172	172	172	172	172	172	172	¼	30	20	30
173	173	173	173	173	-	173	¡	30	20	30
174	174	174	174	174	174	174	«	30	20	42
175	175	175	175	175	175	-	»	30	20	42
176	176	176	176	176	176	176	▒	30	30	30
177	177	177	177	177	177	177	▒	30	30	30
178	178	178	178	178	178	178	▒	30	30	30
179	179	179	179	179	179	179	│	30	30	30
180	180	180	180	180	180	180	┤	30	30	30
181	181	-	181	181	181	181	╡	30	30	30
182	182	-	182	182	182	182	╢	30	30	30
183	183	-	183	183	183	183	╖	30	30	30
184	184	-	184	184	184	184	╕	30	30	30
185	185	185	185	185	185	185	╣	30	30	30
186	186	186	186	186	186	186	║	30	30	30
187	187	187	187	187	187	187	╗	30	30	30
188	188	188	188	188	188	188	╝	30	30	30
189	189	-	189	189	189	189	╜	30	30	30
190	190	-	190	190	190	190	╛	30	30	30
191	191	191	191	191	191	191	┐	30	30	30
192	192	192	192	192	192	192	└	30	30	30
193	193	193	193	193	193	193	┴	30	30	30
194	194	194	194	194	194	194	┬	30	30	30
195	195	195	195	195	195	195	├	30	30	30
196	196	196	196	196	196	196	─	30	30	30
197	197	197	197	197	197	197	┼	30	30	30
198	198	-	198	198	198	198	╞	30	30	30
199	199	-	199	199	199	199	╟	30	30	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
200	200	200	200	200	200	200	╚	30	30	30
201	201	201	201	201	201	201	╔	30	30	30
202	202	202	202	202	202	202	╩	30	30	30
203	203	203	203	203	203	203	╦	30	30	30
204	204	204	204	204	204	204	╠	30	30	30
205	205	205	205	205	205	205	═	30	30	30
206	206	206	206	206	206	206	╬	30	30	30
207	207	-	207	207	207	207	╧	30	30	30
208	208	-	208	208	208	208	╨	30	30	30
209	209	-	209	209	209	209	╤	30	30	30
210	210	-	210	210	210	210	╥	30	30	30
211	211	-	211	211	211	211	╙	30	30	30
212	212	-	212	212	212	212	╘	30	30	30
213	213	-	213	213	213	213	╒	30	30	30
214	214	-	214	214	214	214	╓	30	30	30
215	215	-	215	215	215	215	╫	30	30	30
216	216	-	216	216	216	216	╪	30	30	30
217	217	217	217	217	217	217	┘	30	30	30
218	218	218	218	218	218	218	┌	30	30	30
219	219	219	219	219	219	219	▉	30	30	30
220	220	220	220	220	220	220	▄	30	30	30
221	221	-	221	221	221	221	▌	30	30	30
222	222	-	222	222	222	222	▐	30	30	30
223	223	223	223	223	223	223	▀	30	30	30
224	224	-	224	224	224	224	α	30	30	30
225	225	225	225	225	225	225	β	30	30	36
226	226	-	226	226	226	226	Γ	30	30	36
227	227	-	227	227	227	227	π	30	30	36
228	228	-	228	228	228	228	Σ	30	30	42
229	229	-	229	229	229	229	σ	30	30	36

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
230	230	230	230	230	230	230	μ	30	30	36
231	231	-	231	231	231	231	τ	30	30	30
232	232	-	232	232	232	232	Φ	30	30	42
233	233	-	233	233	233	233	Θ	30	30	42
234	234	-	234	234	234	234	Ω	30	30	42
235	235	-	235	235	235	235	δ	30	30	30
236	236	-	236	236	236	236	∞	30	30	30
237	237	-	237	237	237	237	ø	30	30	42
238	238	-	238	238	238	238	∈	30	30	30
239	239	-	239	239	239	239	∩	30	30	30
240	240	-	240	240	240	240	≡	30	30	30
241	241	241	241	241	241	241	±	30	30	30
242	242	-	242	242	242	242	≥	30	30	30
243	243	-	243	243	243	243	≤	30	30	30
244	244	-	244	244	244	244	⌠	30	30	30
245	245	-	245	245	245	245	⌡	30	30	30
246	246	246	246	246	246	246	÷	30	30	30
247	247	-	247	247	247	247	≈	30	30	30
248	248	248	248	248	248	248	°	30	30	30
249	249	-	249	249	249	249	∙	30	30	30
250	250	250	250	250	250	250	·	30	30	30
251	251	-	251	251	251	251	√	30	30	30
252	252	-	252	252	252	252	n	30	30	30
253	253	253	253	253	253	253	²	30	30	30
254	254	254	254	254	254	254	■	30	30	30
255	255	255	255	255	255	255		30	20	30
INT	-	155	-	155	-	155	ø	30	30	42
INT	-	157	-	157	-	157	Ø	36	28	42
-	-	158	-	-	-	-	×	42	20	30
INT	-	169	-	-	-	-	®	36	21	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
INT	-	181	134	164	-	-	Á	36	28	42
-	-	182	143	-	132	-	Â	42	20	42
-	-	183	145	-	142	-	À	42	28	42
INT	-	184	-	-	-	-	©	36	21	30
-	-	198	132	-	-	-	ã	30	20	30
-	-	199	142	-	-	-	Ã	42	28	42
INT	-	207	-	-	152	175	¤	30	20	30
-	-	208	-	140	-	-	ð	36	24	36
-	-	209	-	139	-	-	Ð	42	28	42
-	-	210	137	-	146	-	Ê	36	24	36
-	-	211	-	-	148	-	Ë	36	24	36
-	-	212	146	-	145	-	È	36	24	36
-	-	213	-	-	-	-	ı	18	12	18
-	-	214	139	165	-	-	Í	24	16	24
-	-	215	-	-	168	-	Î	24	16	24
-	-	216	-	-	149	-	Ï	24	16	24
-	-	221	-	-	160	-	¦	18	12	30
-	-	222	152	-	-	-	Ì	24	16	24
INT	-	224	159	166	-	-	Ó	30	28	42
-	-	226	140	-	153	-	Ô	30	28	42
-	-	227	169	-	-	-	Ò	30	28	42
-	-	228	148	-	-	-	õ	30	20	30
-	-	229	153	-	-	-	Õ	30	28	42
-	-	231	-	149	-	-	þ	30	24	36
-	-	232	-	141	-	-	Þ	30	28	42
INT	-	233	150	167	-	-	Ú	30	28	42
-	-	234	-	-	158	-	Û	30	28	42
-	-	235	157	-	157	-	Ù	30	28	42
-	-	236	-	152	-	-	ý	30	24	36
-	-	237	-	151	-	-	Ý	30	28	42

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
-	-	238	-	-	167	-	¯	30	20	30
INT	-	239	-	-	161	-	´	18	20	30
-	-	240	-	-	-	-	-	30	20	30
-	-	242	-	-	-	-	‗	30	20	30
-	-	243	-	-	173	-	¾	30	21	30
-	-	244	-	-	134	-	¶	30	20	30
-	-	245	-	-	143	-	§	30	20	30
-	-	247	-	-	165	-	¸	30	20	30
INT	-	249	-	-	164	-	¨	30	20	30
-	-	251	-	-	-	-	¹	30	20	30
-	-	252	-	-	166	-	³	30	20	30
-	-	-	-	-	141	-	‗	30	20	30
INT	-	-	-	-	-	-	¸	30	20	30
INT	-	-	-	-	-	-	°	24	16	24
INT	-	-	-	-	-	-	₩	42	28	42
INT	-	-	-	-	-	-	†	30	20	30
INT	-	-	-	-	-	-	ß	36	24	36
INT	-	-	-	-	-	-	™	36	24	36

MEMO

INDEX

COMMAND SUMMARY

Standard Mode

The following commands take effect with the Standard mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	114
<BS>	Backspace	99
<HT>	Horizontal tab	101
<LF>	Line feed	92
<VT>	Vertical tab	96
<FF>	Form feed	94
<CR>	Carriage return	98
<SO>	Expanded printing for one line	85
<SI>	Condensed printing	84
<DC1>	Set printer on-line	114
<DC2>	Cancel condensed printing	85
<DC3>	Set printer off-line	114
<DC4>	Cancel one-line expanded printing	85
<CAN>	Cancel last line	113
<ESC> <LF>	Reverse line feed	92
<ESC> <FF>	Return to top of current page	95
<ESC> <SO>	Expanded printing for one line	85
<ESC> <SI>	Condensed printing	84
<ESC> <EM> <0>	Manual feed	115
<ESC> <EM> <1>	Select ASF bin #1	116
<ESC> <EM> <2>	Select ASF bin #2	116
<ESC> <EM> <4>	Auto feed	115
<ESC> <EM> "R"	Eject paper from ASF	116
<ESC> <EM> "T" *n*	Set print start position on ASF	116
<ESC> <SP> *n*	Increase character spacing	87
<ESC> "!" *n*	Select master print mode	86
<ESC> "#"	Accept MSB as is	113
<ESC> "$" *n1 n2*	Absolute horizontal tab in inches	102
<ESC> "%" 0	Select ROM character set	112
<ESC> "%" 1	Select download character set	110
<ESC> "&" <0> *n1 n2 m0 m1 m2 d1 d2 ... dx*	Define download characters	107
<ESC> "(" "-" <3> <0> <1> *n1 n2*	Select score	79
<ESC> "*" *n0 n1 n2 m1 m2 ...*	Select graphics mode	104
<ESC> "+" *n*	Set line spacing to *n*/360 inch	90
<ESC> "-" 0	Stop underlining	78
<ESC> "-" 1	Start underlining	78
<ESC> "/" *n0*	Select vertical tab channel	96
<ESC> "0"	Set line spacing to 1/8 inch	90
<ESC> "1"	Set line spacing to 7/60 or 7/72 inch	90
<ESC> "2"	Set line spacing to 1/6 inch	90
<ESC> "3" *n*	Set line spacing to *n*/180 inch or *n*/216 inch	91
<ESC> "4"	Select italic characters	77
<ESC> "5"	Select upright characters	77
<ESC> "6"	Select character set #2	81
<ESC> "7"	Select character set #1	81
<ESC> "8"	Disable paper-out detector	95
<ESC> "9"	Enable paper-out detector	95

CONTROL CODE	FUNCTION	PAGE
<ESC> ":" <0> *n* <0>	Copy character set from ROM into RAM	109
<ESC> "<"	One-line uni-directional printing	115
<ESC> "="	Set MSB to 0	113
<ESC> ">"	Set MSB to 1	113
<ESC> "?" *n m*	Convert graphics density	106
<ESC> "@"	Reset printer	116
<ESC> "A" *n*	Set line spacing to *n*/60 inch or *n*/72 inch	91
<ESC> "B" *n1 n2* .... <0>	Set vertical tab stops	95
<ESC> "C" <0> *n*	Set page length to *n* inches	94
<ESC> "C" *n*	Set page length to *n* lines	94
<ESC> "D" *n1 n2* .... <0>	Set horizontal tab stops	100
<ESC> "E"	Emphasized printing	77
<ESC> "F"	Cancel emphasized printing	77
<ESC> "G"	Double-strike printing	78
<ESC> "H"	Cancel double-strike printing	78
<ESC> "J" *n*	Perform one *n*/180-inch or *n*/216-inch line feed	93
<ESC> "K" *n1 n2 m1 m2* ...	Print normal-density 8-bit graphics	103
<ESC> "L" *n1 n2 m1 m2* ...	Print double-density 8-bit graphics	103
<ESC> "M"	Elite pitch	84
<ESC> "N" *n*	Set bottom margin	94
<ESC> "O"	Cancel bottom margin	94
<ESC> "P"	Pica pitch	84
<ESC> "Q" *n*	Set right margin	98
<ESC> "R" *n*	Select international character set	82
<ESC> "S" 0	Superscript	80
<ESC> "S" 1	Subscript	80
<ESC> "T"	Cancel superscript or subscript	80
<ESC> "U" 0	Bi-directional printing	115
<ESC> "U" 1	Uni-directional printing	115
<ESC> "W" 0	Cancel expanded printing	85
<ESC> "W" 1	Expanded printing	85
<ESC> "Y" *n1 n2 m1 m2* ...	Print double-density, double-speed 8-bit graphics	103
<ESC> "Z" *n1 n2 m1 m2* ...	Print quadruple-density 8-bit graphics	104
<ESC> "[" "T" <4> <0> <0> <0> *n1 n2*	Select IBM code page	82
<ESC> "\" *n1 n2*	Relative horizontal tab	101
<ESC> "a" 0	Left justify	99
<ESC> "a" 1	Center text	99
<ESC> "a" 2	Right justify	100
<ESC> "a" 3	Full justify	100
<ESC> "b" *n0 n1 n2* .... <0>	Set vertical tab stops in channel	96
<ESC> "e" 0 *n*	Set horizontal tab stop every *n* columns	100
<ESC> "e" 1 *n*	Set vertical tab stops every *n* lines	96
<ESC> "f" 0 *n*	Absolute horizontal tab in columns	102
<ESC> "f" 1 *n*	Feed paper *n* lines	93
<ESC> "g"	Semi-condensed pitch	84
<ESC> "h" *n*	Select double or quadruple size	87
<ESC> "j" *n*	Perform one *n*/180-inch reverse line feed	93
<ESC> "k" *n*	Select LQ font	76
<ESC> "l" *n*	Set left margin	97
<ESC> "p" 0	Select fixed spacing	86
<ESC> "p" 1	Select proportional spacing	86
<ESC> "q" *n*	Select ornament character	80
<ESC> "r" *n*	Select print color	112
<ESC> "t" 0	Select standard character set	81
<ESC> "t" 1	Select IBM character set	81
<ESC> "t" 2	Shift download character area	110
<ESC> "w" 0	Return to normal height	88
<ESC> "w" 1	Print double-height characters	88
<ESC> "x" 0	Select draft quality characters	74

CONTROL CODE	FUNCTION	PAGE
<ESC> "x" 1	Select LQ characters	75
<ESC> "~" 0	Select normal zero	83
<ESC> "~" 1	Select slash zero	83
<FS> "3" *n*	Set line spacing to *n*/360 inch	90
<FS> "@"	Reset printer	116
<FS> "C" *n*	Select LQ font	76
<FS> "E" *n*	Select character width	86
<FS> "F"	Select forward feed mode	92
<FS> "I" 0	Select standard character set	81
<FS> "I" 1	Select IBM character set	81
<FS> "I" 2	Shift download character area	110
<FS> "R"	Select reverse feed mode	92
<FS> "V" 0	Return to normal height	88
<FS> "V" 1	Print double-height characters	88
<FS> "Z" *n1 n2 m1 m2 m3* ...	Print hex-density 24-bit graphics	104
"(" "(" "0" ")" ")"	Manual feed	115
"(" "(" "1" ")" ")"	Select ASF bin #1	116
"(" "(" "2" ")" ")"	Select ASF bin #2	116
"(" "(" "4" ")" ")"	Auto feed	115
"(" "(" "C" ")" ")" *d*	Select print color	112
"(" "(" "F" ")" ")" *d*	Select font	76
"(" "(" "R" ")" ")"	Eject paper from ASF	116
"(" "(" "S" ")" ")" *d*	Select character size	88
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	116
<DEL>	Delete last character sent	113

IBM Mode

The following commands take effect with the IBM mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	114
<BS>	Backspace	99
<HT>	Horizontal tab	101
<LF>	Line feed	92
<VT>	Vertical tab	96
<FF>	Form feed	94
<CR>	Carriage return	98
<SO>	Expanded printing for one line	85
<SI>	Condensed printing	84
<DC1>	Set printer on-line	114
<DC2>	Pica pitch	84
<DC4>	Cancel one-line expanded printing	85
<CAN>	Cancel last line	113
<ESC> <EM> <0>	Manual feed	115
<ESC> <EM> <1>	Select ASF bin #1	116
<ESC> <EM> <2>	Select ASF bin #2	116
<ESC> <EM> <4>	Auto feed	115
<ESC> <EM> "R"	Eject paper from ASF	116
<ESC> <EM> "T" *n*	Set print start position on ASF	116
<ESC> "-" 0	Stop underlining	78
<ESC> "-" 1	Start underlining	78
<ESC> "0"	Set line spacing to 1/8 inch	90
<ESC> "1"	Set line spacing to 7/60 or 7/72 inch	90
<ESC> "2"	Execute <ESC> "A"	92
<ESC> "3" *n*	Set line spacing to *n*/180 inch or *n*/216 inch	91
<ESC> "4"	Set top of page at current position	93
<ESC> "5" <0>	Cancel automatic line feed	99
<ESC> "5" <1>	Set automatic line feed	99
<ESC> "6"	Select character set #2	81
<ESC> "7"	Select character set #1	81
<ESC> "8"	Disable paper-out detector	95
<ESC> "9"	Enable paper-out detector	95
<ESC> ":"	Elite pitch	84
<ESC> "=" *n1 n2* "#" *n3 n4* <0> *n5 m1 m2 ... m9 d1 d2 ... dx*	Define download characters	108
<ESC> "@"	Reset printer	116
<ESC> "A" *n*	Set line spacing to *n*/60 inch or *n*/72 inch	91
<ESC> "B" *n1 n2* .... <0>	Set vertical tab stops	95
<ESC> "C" <0> *n*	Set page length to *n* inches	94
<ESC> "C" *n*	Set page length to *n* lines	94
<ESC> "D" *n1 n2* .... <0>	Set horizontal tab stops	100
<ESC> "E"	Emphasized printing	77
<ESC> "F"	Cancel emphasized printing	77
<ESC> "G"	Double-strike printing	78
<ESC> "H"	Cancel double-strike printing	78
<ESC> "I" <0>	Select draft pica characters	74
<ESC> "I" <2>	Select LQ pica characters	75
<ESC> "I" <3>	Select LQ proportional characters	76
<ESC> "I" <4>	Select draft pica download character set	110
<ESC> "I" <6>	Select LQ pica download characters	111
<ESC> "I" <7>	Select LQ proportional download characters	111
<ESC> "I" <8>	Select draft elite characters	74
<ESC> "I" <LF>	Select LQ elite characters	75
<ESC> "I" <FF>	Select draft elite download character set	110
<ESC> "I" <SO>	Select LQ elite download characters	111

CONTROL CODE	FUNCTION	PAGE
<ESC> "I" <16>	Select draft condensed characters	74
<ESC> "I" <DC2>	Select LQ condensed characters	75
<ESC> "I" <DC4>	Select draft condensed download characters	111
<ESC> "I" <SYN>	Select LQ condensed download characters	111
<ESC> "J" *n*	Perform one *n*/180-inch or *n*/216-inch line feed	93
<ESC> "K" *n1 n2 m1 m2 ...*	Print normal-density 8-bit graphics	103
<ESC> "L" *n1 n2 m1 m2 ...*	Print double-density 8-bit graphics	103
<ESC> "N" *n*	Set bottom margin	94
<ESC> "O"	Cancel bottom margin	94
<ESC> "P" <0>	Select fixed spacing	86
<ESC> "P" <1>	Select proportional spacing	86
<ESC> "Q" *n*	Set printer off-line	114
<ESC> "R"	Reset all tab stops	101
<ESC> "S" 0	Superscript	80
<ESC> "S" 1	Subscript	80
<ESC> "T"	Cancel superscript or subscript	80
<ESC> "U" 0	Bi-directional printing	115
<ESC> "U" 1	Uni-directional printing	115
<ESC> "W" 0	Cancel expanded printing	85
<ESC> "W" 1	Expanded printing	85
<ESC> "X" *n1 n2*	Set left and right margins	98
<ESC> "Y" *n1 n2 m1 m2 ...*	Print double-density, double-speed 8-bit graphics	103
<ESC> "Z" *n1 n2 m1 m2 ...*	Print quadruple-density 8-bit graphics	104
<ESC> "[" "@" <4> <0> <0> <0> *n m*	Select character height, width, and line spacing	89
<ESC> "[" "T" <4> <0> <0> <0> *n1 n2*	Select IBM code page	82
<ESC> "[" "\" <4> <0> <0> <0> <0> *n*	Set base unit for line spacing	91
<ESC> "[" "g" *n1 n2 m0 m1 m2 ...*	Select graphics mode	105
<ESC> "\" *n1 n2*	Enable printing of all character codes	83
<ESC> "]"	Reverse line feed	92
<ESC> "^" *n*	Enable printing of all character codes on next character	83
<ESC> "_" 0	Stop overlining	79
<ESC> "_" 1	Start overlining	79
<ESC> "d" *n1 n2*	Relative horizontal tab in inches	101
<ESC> "j"	Stop printing	114
<ESC> "k" *n*	Select LQ font	76
<ESC> "r" *n*	Select print color	112
<ESC> "t" 0	Select standard character set	81
<ESC> "t" 1	Select IBM character set	81
"(" "(" "0" ")" ")"	Manual feed	115
"(" "(" "1" ")" ")"	Select ASF bin #1	116
"(" "(" "2" ")" ")"	Select ASF bin #2	116
"(" "(" "4" ")" ")"	Auto feed	115
"(" "(" "C" ")" ")" *d*	Select print color	112
"(" "(" "F" ")" ")" *d*	Select font	76
"(" "(" "R" ")" ")"	Eject paper from ASF	116
"(" "(" "S" ")" ")" *d*	Select character size	88
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	116