

CHAPTER 4 PROGRAMMING

4.1 GENERAL

The printer operates in standard DEC mode (mode 0), and also emulates the IBM/Epson MX80 printer (mode 1), the IBM/Epson MX80 printer with Graftrax (mode 2), and the IBM Graphics printer (mode 3). This chapter provides a summary of the programming information for printer operation in these modes. For more complete interface and character processing information, see the LA210 Letterprinter Programmer Reference Manual (EK-LA210-RM).

4.2 PROGRAMMING INFORMATION FOR DEC MODE

This section lists programmer selectable features: standard character sets, graphic control characters, and escape and control sequences. Figure 4-1 shows the 7-bit character set. Figure 4-2 shows the 8-bit character set.

4.2.1 STANDARD CONTROL CHARACTERS

Table 4-1 lists the standard C0 control characters. Table 4-2 lists the standard C1 control characters.

Table 4-1 Standard C0 Control Characters

Name	Mnemonic	Octal Code	Function
Null	NUL	000	Used for fill characters. See Paragraph 2.3.3 in programmer reference manual.
End of transmission	EOT	004	Used for disconnect character if enabled.
Enquiry	ENQ	005	Requests answerback message.
Bell	BEL	007	Sounds bell tone.
Backspace	BS	010	Moves active column left one column (except in graphics mode).
Horizontal tab	HT	011	Advances to next horizontal tab stop (except in graphics mode).
Line feed	LF	012	Advances to next line. Performs carriage return if enabled (except in graphics mode).
Vertical tab	VT	013	Advances to next vertical tab stop (except in graphics mode).
Form feed	FF	014	Advances to next top margin (except in graphics mode).
Carriage return	CR	015	Returns to left margin. Performs line feed if enabled (except in graphics mode).
Shift out	SO	016	Maps G1 to GL printer character set.
Shift in	SI	017	Maps G0 to GL printer character set.
Cancel	CAN	030	Immediately ends any control or escape sequence.

Table 4-1 Standard C0 Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Substitute	SUB	032	Immediately ends any control or escape sequence. Replaces characters received with errors by SUB if enabled. SUB prints as _____ or _____. In graphics mode, SUB prints as a one-column space.
Escape	ESC	033	Introduces escape sequence.
Delete	DEL	177	No operation (not stored in input buffer and not used as filler).

Table 4-2 Standard C1 Control Characters

Name	Mnemonic	Octal Code	Function
Index	IND	204	Increments active line and advances paper. Line feed/new line mode does not affect this feature.
Next line	NEL	205	Sets active column to left margin and increments active line.
Horizontal tabulation set	HTS	210	Sets horizontal tab stop at active column.
Vertical tabulation set	VTS	212	Sets vertical tab stop at active line.
Partial line down	PLD*	213	Indexes paper up 1/12 inch. Line feed/new line mode does not affect this sequence.
Partial line up	PLU*	214	Indexes paper down 1/12 inch. Line feed/new line mode does not affect this sequence.

* PLD and PLU do not modify active line or the position counter. To maintain correct vertical forms handling, send the same number of PLDs and PLUs.

Table 4-2 Standard C1 Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Reverse index	RI	215	Decrements active line and moves paper down one line. Line feed/new line feed does not affect this sequence.
Single shift 2	SS2	216	Activates G2 character set for 1 character.
Single shift 3	SS3	217	Activates G3 character set for 1 character.
Device control string	DCS	220	Device control string introducer. (See Chapter 5 in the programmer reference manual.)
Control sequencer introducer	CSI	233	Used to select more functions through control sequencing.
String terminator	ST	234	Ends any pending ANSI string and reverts to text processing mode.
Operating system command	OSC	235	Starts OSC string. (See Chapter 5 in the programmer reference manual.)
Privacy message	PM	236	Starts privacy message. (See Chapter 5 in the programmer reference manual.)
Application program command	APC	237	Starts application program command. (See Chapter 5 in the programmer reference manual.)

BITS		0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B7 B6 B5		COLUMN		1		2		3		4		5		6		7	
B4 B3 B2 B1	ROW	0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4		24 20 14	\$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	,	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER	ESC	1/11	COLUMN/ROW
		33	OCTAL
		27	DECIMAL
		1B	HEX

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Figure 4-1 7-Bit Character Set

BITS				0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1		0 1 0 0		0 1 0 1		0 1 1 0		0 1 1 1			
BITS				COLUMN		1		2		3		4		5		6		7			
B4	B3	B2	B1	ROW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
0	0	0	0	0	NUL		SP	0	@	P	`	p	0	16	32	48	64	80	96	112	128
0	0	0	1	1		DC1 (XON)	!	1	A	Q	a	q	1	17	33	49	65	81	97	113	129
0	0	1	0	2			"	2	B	R	b	r	2	18	34	50	66	82	98	114	130
0	0	1	1	3		DC3 (XOFF)	#	3	C	S	c	s	3	19	35	51	67	83	99	115	131
0	1	0	0	4	EOT		\$	4	D	T	d	t	4	20	36	52	68	84	100	116	132
0	1	0	1	5	ENQ		%	5	E	U	e	u	5	21	37	53	69	85	101	117	133
0	1	1	0	6			&	6	F	V	f	v	6	22	38	54	70	86	102	118	134
0	1	1	1	7	BEL		,	7	G	W	g	w	7	23	39	55	71	87	103	119	135
1	0	0	0	8	BS	CAN	(	8	H	X	h	x	8	24	40	56	72	88	104	120	136
1	0	0	1	9	HT		)	9	I	Y	i	y	9	25	41	57	73	89	105	121	137
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z	10	26	42	58	74	90	106	122	138
1	0	1	1	11	VT	ESC	+	;	K	[	k	{	11	27	43	59	75	91	107	123	139
1	1	0	0	12	FF		,	<	L	\	l	|	12	28	44	60	76	92	108	124	140
1	1	0	1	13	CR		-	=	M	]	m	}	13	29	45	61	77	93	109	125	141
1	1	1	0	14	SO		.	>	N	^	n	~	14	30	46	62	78	94	110	126	142
1	1	1	1	15	SI		/	?	O	_	o	DEL	15	31	47	63	79	95	111	127	143

KEY

ASCII CHARACTER	ESC	1/11	COLUMN/ROW
		33	OCTAL
		27	DECIMAL
		1B	HEX

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Figure 4-2 8-Bit Character Set (Sheet 1 of 2)

1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
8		9		10		11		12		13		14		15	
	200 128 80	DCS	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
	201 129 81		221 145 91	i	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
IND	204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
NEL	205 133 85		225 149 95	¥	245 165 A5	μ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
	206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
	207 135 87		227 151 97	§	247 167 A7	•	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
HTS	210 136 88		230 152 98	⌘	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
	211 137 89		231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
VTS	212 138 8A		232 154 9A	à	252 170 AA	ó	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
PLD	213 139 8B	CSI	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
PLU	214 140 8C	ST	234 156 9C		254 172 AC	¼	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
RI	215 141 8D	OSC	235 157 9D		255 173 AD	½	275 189 BD	Í	315 205 CD	ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
SS2	216 142 8E	PM	236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
SS3	217 143 8F	APC	237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	ß	337 223 DF	ï	357 239 EF		377 255 FF
ADDITIONAL CONTROL SET				DEC SUPPLEMENTAL GRAPHIC SET											

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Figure 4-2 8-Bit Character Set (Sheet 2 of 2)

4.2.2 Graphics Mode Control Characters

Table 4-3 lists the graphics ANSI control characters. Table 4-4 lists the graphics private control characters.

4.2.3 Escape and Control Sequences

Table 4-5 lists the 8-bit character equivalents for 7-bit escape sequences. Table 4-6 lists the escape and control sequences, and the features that these sequences select.

Table 4-3 Graphics ANSI Control Characters

Name	Mnemonic	Octal Code	Function
Cancel	CAN	030	Immediately exits graphics mode.
Substitute	SUB	032	Replaces any character received with errors. When received in graphics mode, SUB is processed as 77 octal (column space).
Escape	ESC	033	Printer exits graphics mode and processes sequence.
All C1 control codes	(See C1 control codes table.)	200 through 237	Printer exits graphics mode and processes C1 codes.

NOTE

The printer processes NUL, EOT, ENQ, BEL, DEL, SI, and SO as it does in text mode. See C0 control codes table.

The printer ignores BS, LF, CR, FF, HT, and VT in graphics mode.

Table 4-4 Graphics Private Control Characters

Name	Mnemonic	Octal Code	ASCII Character	Function
Graphics repeat introducer	DECGRI	041	!	Begins repeat sequence.
Graphics carriage return	DECGCR	044	\$	Returns to graphics left margin.
Graphics new line	DECGNL	055	--	Returns to graphics left margin and advances to next graphics line.

Table 4-5 8-Bit Character Equivalents of 7-Bit Escape Sequences

8-Bit Character	7-Bit Sequence	Function
IND	ESC D	Index
NEL	ESC E	Vertical line
HTS	ESC H	Horizontal tabulation set
VTS	ESC Z	Vertical tabulation set
PLD	ESC K	Partial line down
PLU	ESC L	Partial line up
RI	ESC M	Reverse index
SS2	ESC N	Single shift 2
SS3	ESC O	Single shift 3
DCS	ESC P	Device control string
CSI	ESC [	Control sequence introducer
ST	ESC \	String terminator
OSC	ESC]	Operating system command
PM	ESC ^	Private message
APC	ESC _	Application program command

Table 4-6 DEC Mode Escape and Control Sequence Summary

C1 Control Character Processing

Sequence			Function
ESC	SP	Ps	Ps enables or disables C1 transmission and reception.
033	040	***	

Ps	Octal	Function
G	107	Enables C1 transmission.
F	106	Disables C1 transmission.
7	067	Enables C1 reception.
6	066	Disables C1 reception.

Printing Mode (Draft Mode Only)

Sequence					Function
CSI	?	4	l	h	Prints from left to right.
233	077	064	061	150	
CSI	?	4	l	l*	Prints bidirectionally.
233	077	064	061	154	

Active Column and Active Line

Sequence			Mnemonic	Function
IND			IND	Increments active line and advances paper.
204				
CSI	Pn	d	VPA	Sets active line to Pn.
233	***	144		
NEL			NEL	Sets active column to left margin. Increments active line.
205				
CSI	Pn	`	HPA	Sets active column to column Pn.
233	***	140		
CSI	Pn	a	HPR	Advances current active column by Pn columns.
233	***	141		
CSI	Pn	A	CUU	Decrements current active line by Pn lines without going past top margin.
233	***	101		

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Active Column and Active Line

Sequence	Mnemonic	Function
CSI Pn e 233 *** 145	VPR	Advances active line by Pn lines and stops at beginning of next page.
PLD 213	PLD	Moves paper up 1/12 inch (for subscripts or return from superscripts).
PLU 214	PLU	Moves paper down 1/12 inch (for superscripts or return from subscripts).
RI 215	RI	Decrements active line and moves paper down one line. (Prints on previous line.)

Line Feed/New Line Mode (LNM)

Sequence	Function
CSI 2 0 h 233 062 060 150	Sets line feed/new line mode on.
CSI 2 0 1* 233 062 060 154	Sets line feed/new line mode off.

Carriage Return/New Line Mode

Sequence	Function
CSI ? 4 0 h 233 077 064 060 150	Sets carriage return/new line mode on.
CSI ? 4 0 1* 233 077 064 060 154	Sets carriage return/new line mode off.

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Autowraparound Mode (DECAWM)

Sequence	Function
CSI ? 7 h 233 077 067 150	Sets autowraparound mode on.
CSI ? 7 l* 233 077 067 154	Sets autowraparound mode off.

Page Width Alignment (DECPWA)

Sequence	Function
CSI Pn1 ; Pn2 " s 233 *** 073 *** 042 163	Pn1 specifies the left edge of print area relative to the left edge of physical page. Pn2 specifies width of print area. Pn1 and Pn2 are measured in units of 1/12 inch.

Horizontal Margins (DECSLRM)

Sequence	Function
CSI Pn1 ; Pn2 s 233 *** 073 *** 163	Sets left and right margins to the given values.

Horizontal Pitch (DECSHORP)

CSI Ps w 233 *** 167		
Ps	Octal	Characters per Inch
0	060	Default (10)
1	061	10
2	062	12
3	063	13.2
4	064	16.5
5	065	5
6	066	6
7	067	6.6
8	070	8.25

* The last character of the sequence is lowercase L (154 octal).

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Pitch Select Mode (DECPSM)

Sequence	Function
CSI ? 2 9 h 233 077 062 071 150	Sets pitch select mode to font pitches.
CSI ? 2 9 1* 233 077 062 071 154	Sets pitch select mode to all pitches.

Horizontal Tabs

Sequence	Mnemonic	Function
HTS 210	HTS	Sets horizontal tab stop at active column.
ESC 1 033 061	DECHTS	Sets horizontal tab stop at active column. Not recommended; use HTS instead.
CSI 0 g 233 060 147	TBC	Clears horizontal tab stop at the active column.
CSI 2 g 233 062 147	TBC	Clears all horizontal tab stops.
CSI 3 g 233 063 147	TBC	Clears all horizontal tab stops.
ESC 2 033 062	DECAHT	Clears all horizontal tab stops. Not recommended; use TBC instead.
CSI Pn ; ... Pn u 233 *** 073 ... *** 165	DECSHTS	Sets horizontal tab stops at the given values for Pn. (You can specify 16 stops in one sequence, to a total of 217.)

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Set Vertical Pitch (DECVERP)

CSI	Ps	z	
233	***	172	
	Ps	Octal	Lines per Inch
	0	060	Default (6)
	1	061	6
	2	062	8
	3	063	12
	4	064	2
	5	065	3
	6	066	4

Form Length (DECSLPP)

Sequence

CSI Pn t
233 *** 164

Function

Sets form length to Pn lines.
 $Pn = F \times VP^*$.
 Sets top margin to 0 inches and active line to line 1. Sets top of form to current position. Sets bottom margin to form length.

Vertical Margins (DECSTBM)

Sequence

CSI Pn1 ; Pn2 r
233 *** 073 *** 162

Function

Sets top margin to line Pn1.
 Sets bottom margin to line Pn2.

* F = form length in inches
 VP = current vertical pitch

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Vertical Tabs

Sequence	Mnemonic	Function
VTS 212	VTS	Sets vertical tab stop at active line.
ESC 3 Ø33 Ø63	DECVTS	Sets vertical tab stop at active line. Not recommended; use VTS instead.
CSI Pn ; ... Pn v 233 *** Ø73 ... *** 166	DECSVTS	Sets vertical tab stop at line Pn. (You can specify 16 lines in one sequence, to a total of 168.)
CSI 1 g 233 Ø61 147	TBC	Clears vertical tab stop at active line.
CSI 4 g 233 Ø64 147	TBC	Clears all vertical tab stops.
ESC 4 Ø33 Ø64	DECCA VT	Clears all vertical tab stops. Not recommended; use TBC instead.

Quality Select Mode (DECDEN)

CSI Ps " z	Ps	Octal	Function
233 *** Ø42 172			
	Ø	Ø60	Sets density select mode to default (draft) density.
	1	Ø61	Sets density select mode to draft density.
	2	Ø62	Sets density select mode to letter density (medium or high density, depending on DPS).

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Select Graphic Rendition (SGR)

CSI	Ps1	;	Ps2	;	...	;	Psn	m
233	***	073	***	073	...	073	***	155
	Ps	Octal			Function			
	0	060			Reset.			
	4	064			Selects underline.			
	10	061, 060			Selects DPS 1.			
	11	061, 061			Selects DPS 2.			
	12	061, 062			Selects DPS 3.			
	13	061, 063			Selects DPS 4.			
	14	061, 064			Selects DPS 5.			
	24	062, 064			Clears underline.			

Select Character Set (SCS)

Sequence

ESC	I1	I2	I3	Final
033	***	***	***	***

Function

I1 designates a character set from the primary or alternate section of the repertory. The final character selects the character set.

I1 =	G0 (050	G1) 051	G2 * 052	G3 + 053
------	----------------	----------------	----------------	----------------

Designates a primary character set.

I1 =	G0 , 054	G1 / 055	G2 . 056	G3 / 057
------	----------------	----------------	----------------	----------------

Designates an alternate character set.

Final

Character Set

0 060	Digital VT100 line drawing
5 065	Digital Finnish
6 066	Digital Norwegian/Danish
7 067	Digital Swedish
8 070	Digital APL

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Final	Character Set
9 Ø71	Digital French Canadian
< Ø74	Digital multinational
A 1Ø1	ISO U.K.
B 1Ø2	ISO U.S.
K 113	ISO German
R 122	ISO French
Y 131	ISO Italian
Z 132	ISO Spanish
" Ø42	1 Ø61 Digital symbol

Shift Functions

Name	Mnemonic	Escape Sequence	Function
Locking shift Ø	LSØ	Same as shift in.	Maps GØ into GL.
Locking shift 1	LS1	Same as shift out.	Maps G1 into GL.
Locking shift 2	LS2	ESC n Ø33 156	Maps G2 into GL.
Locking shift 3	LS3	ESC o Ø33 157	Maps G3 into GL.
Locking shift 1 right	LS1R	ESC ~ Ø33 175	Maps G1 into GR.
Locking shift 2 right	LS2R	ESC } Ø33 175	Maps G2 into GR.

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Shift Functions (Cont)

Name	Mnemonic	Escape Sequence	Function
Locking shift 3 right	LS3R	ESC | Ø33 174	Maps G3 into GR.
Single shift 2	SS2	SS2 216	Invokes G2 for a single printable character.
Single shift 3	SS3	SS3 217	Invokes G3 for a single printable character.

NOTE

There is no locking shift Ø right. You cannot map GØ into GR.

Request Font Configuration (DECRQSC)

Sequence	Function
CSI ? 1 Ø c 233 Ø77 Ø61 Ø6Ø 143	Requests printer to send current font configuration.

Report Font Configuration Sequence

CSI Ps1 ; Ps2 ; Ps3 ; Ps4 ; Ps5 SP D
233 *** Ø73 *** Ø73 *** Ø73 *** Ø73 *** Ø4Ø 1Ø4

Ps1 represents the DPS location code. This code is the same as the select graphic rendition sequence.

Ps1 (Location Code)	DPS
1Ø	1
11	2
12	3
13	4
14	5

NOTE

DPS location code 1Ø is always present and is sent last to indicate the end of the report.

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Ps2 represents the ROM identification code. There are four possible ROM identification categories.

Ps2	Function
1-64	Indicates draft and letter standard DPS.
65-128	Indicates draft and memo standard DPS.
129-192	Indicates draft and letter custom DPS.
192-200	Indicates draft and memo special DPS.

For more detail about a specific number, see the appropriate ROM option documentation.

A standard DPS with an odd identification number contains the USASCII and ISO United Kingdom character sets. A standard DPS with an even identification number contains the following character sets.

- USASCII
- Digital Finnish
- Digital Norwegian/Danish
- Digital Swedish
- Digital French Canadian
- Digital multinational
- Digital VT100 line drawing set
- ISO United Kingdom
- ISO German
- ISO French
- ISO Italian
- ISO Spanish

Ps3 represents one of the following type style attributes.

Ps3	Function
0	No type style
1	Gothic
5	Courier
9	Orator

Ps4 represents one of the following pitch attributes.

Ps4	Function
8	10 characters per inch/5 characters per inch.
0	12 characters per inch/6 characters per inch.

Ps5 represents one of the following print quality attributes.

Ps5	Function
0	Letter (33 X 18 matrix)
1	Memo (33 X 9 matrix)

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Product Identification Request

Sequence	Mnemonic	Function
CSI c 233 143	DA	Requests product identification.
CSI Ø c 233 Ø6Ø 143	DA	Requests product identification.
ESC Z Ø33 132	DECID	Requests product identification. Not recommended; use DA instead.

Product Identification Report

Report	Device
ESC [? 1 Ø ; 3 c Ø33 133 Ø77 Ø61 Ø6Ø Ø73 Ø63 143	Base printer (V2, microcode-8-bit)

ANSI Strings

Name	8-Bit Character	7-Bit Sequence
String terminator	ST 234	ESC Ø33 \ 134
Application program command	APC 237	ESC Ø33 137
Operating system command	OSC 235	ESC Ø33] 135
Privacy message	PM 236	ESC Ø33 ^ 136
Device control string	DCS 22Ø	ESC Ø33 P 12Ø

Table 4-6 DEC Mode Escape and Control Sequence Summary (Cont)

Graphics String

DCS	Ps	q	Data	...	Data	ST
220	***	161	***	...	***	234

Ps	Octal	Dot Spacing (mils)
0, 1, or 5	060, 061, or 065	7.57
2	062	3.03
3	063	4.54
4	064	6.06
6	066	9.09
7	067	10.60
8	078	12.12
9	071	13.63

Repeat Sequence

Sequence	Function
! Pn dot column 041 060 077 to to 071 176	Lets printer print a specified dot column consecutively for Pn times.

Answerback Message

Sequence	Function
DCS l v Data ... Data ST 220 061 166 *** ... *** 234	Enters an answerback message. Data consists of up to 30 characters in hexadecimal code.

4.3 PROGRAMMING INFORMATION FOR EMULATION MODE 1 -- IBM/EPSON MX80

This section lists the programmer selectable features in the IBM/EPSON MX80 printer emulation mode. Figure 4-3 shows the printable characters for mode 1.

BITS		0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1		0 1 0 0		0 1 0 1		0 1 1 0		0 1 1 1	
B8 B7 B6 B5		COLUMN		1		2		3		4		5		6		7	
B4 B3 B2 B1	ROW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	'	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	\$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8		10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A		32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	:	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F
				ASCII CONTROL SET				ASCII GRAPHIC CHARACTER SET									

KEY

ASCII CHARACTER	ESC	33 27 1B	OCTAL DECIMAL HEX
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Figure 4-3 Mode 1 Character Set (Sheet 1 of 2)

1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
8		9		10		11		12		13		14		15	
NUL	200		220			240			260			300			320
	128		144			160			176			192			208
	80		90			A0			80			C0			D0
	201	DC1	221			241			261			301			321
129		145			161			177			193			209	
81		91			A1			81			C1			D1	
202	DC2	222			242			262			302			322	
130		146			162			178			194			210	
82		92			A2			82			C2			D2	
203	DC3	223			243			263			303			323	
131		147			163			179			195			211	
83		93			A3			83			C3			D3	
204	DC4	224			244			264			304			324	
132		148			164			180			196			212	
84		94			A4			84			C4			D4	
205		225			245			265			305			325	
133		149			165			181			197			213	
85		95			A5			85			C5			D5	
206		226			246			266			306			326	
134		150			166			182			198			214	
86		96			A6			86			C6			D6	
BEL	207		227			247			267			307			327
135		151			167			183			199			215	
87		97			A7			87			C7			D7	
210	CAN	230			250			270			310			330	
136		152			168			184			200			216	
88		98			A8			88			C8			D8	
211		231			251			271			311			331	
137		153			169			185			201			217	
89		99			A9			89			C9			D9	
212	LF	232			252			272			312			332	
138		154			170			186			202			218	
8A		9A			AA			8A			CA			DA	
213	VT	233			253			273			313			333	
139		155			171			187			203			219	
8B		9B			AB			8B			CB			DB	
214	FF	234			254			274			314			334	
140		156			172			188			204			220	
8C		9C			AC			8C			CC			DC	
215	CR	235			255			275			315			335	
141		157			173			189			205			221	
8D		9D			AD			8D			CD			DD	
216	SO	236			256			276			316			336	
142		158			174			190			206			222	
8E		9E			AE			8E			CE			DE	
217	SI	237			257			277			317			337	
143		159			175			191			207			223	
8F		9F			AF			8F			CF			DF	
ADDITIONAL CONTROL SET			MODE 1 SUPPLEMENTAL CHARACTER SET												

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Figure 4-3 Mode 1 Character Set (Sheet 2 of 2)

4.3.1 Mode 1 C0 and C1 Control Characters

The following table lists the mode 1 C0 and C1 control characters.

Table 4-7 Mode 1 C0 and C1 Control Characters

Name	Mnemonic	Octal Code		Function
		C0	C1	
Null	NUL	00	200	Used in escape sequences.
Bell	BEL	07	207	Sounds bell if enabled by switch A7.
Horizontal tab	HT	11	211	Advances to next horizontal tab, if any. Otherwise, takes no action.
Line feed	LF	12	212	Prints buffer's contents, then advances paper by current line spacing.
Vertical tab	VT	13	213	Prints buffer's contents, then moves to next vertical tab, if any. Otherwise, performs line feed.
Form feed	FF	14	214	Advances to next top of form.
Carriage return	CR	15	215	Prints buffer's contents, then performs a carriage return. Also performs a line feed if line feed/new line is enabled by switch A6.

Table 4-7 Mode 1 C0 and C1 Control Characters (Cont)

Name	Mnemonic	Octal Code		Function
		C0	C1	
Shift out	SO	16	216	Sets double width for all following characters, until the next line terminator or DC4 is received.
Shift in	SI	17	217	Sets compressed pitch for current line and following lines, until DC2 is received.
Device control 1	DC1	21	221	Enables the printer and clears print buffer.
Device control 2	DC2	22	222	Sets standard pitch for current line and following lines, until SI is received.
Device control 3	DC3	23	223	Disables the printer until DC1 is received.
Device control 4	DC4	24	224	Sets single width for all following characters, until SO is received.
Cancel	CAN	30	230	Clears the print buffer if enabled by switch A4.
Escape	ESC	33	233	Starts escape sequences.

4.3.2 Mode 1 Escape and Control Sequences

The following table lists the escape and control sequences for mode 1 and the features that these sequences select.

Table 4-8 Mode 1 Escape and Control Sequence Summary

Vertical Form Handling

Name (Mnemonic)	Sequence	Function
Set vertical pitch (ER8LI)	ESC 0 033 060	Sets vertical pitch to 8 lines per inch.
(ER10LI)	ESC 1 033 061	Sets vertical pitch to 10.3 lines per inch (72/7).
(ERNLI2)	ESC 2 033 062	Sets vertical pitch to the setting specified in a previous ESC A sequence.
(ERNLI1)	ESC A Pn 033 101 ***	Sets vertical pitch to 72/Pn lines per inch. Does not take effect until ESC2 is sent.
Set form length (ERSFL)	ESC C Pn 033 103 ***	Sets the form length to the number of inches that equal Pn X current pitch.

Vertical Tabs

Set vertical tabs (ERSVT)	ESC B Pn1 Pn2 Pn NUL 033 102 *** *** *** 000	Clears vertical tabs, then sets tabs at Pn1, Pn2, and other designated stops. Pn is a character representing the line numbers in ascending order. For example, the character DC2 sets a tab at line 18. You can specify up to 16 tabs in one sequence.
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Table 4-8 Mode 1 Escape and Control Sequence Summary (Cont)

Horizontal Tabs

Name (Mnemonic)	Sequence						Function
Set horizontal tabs (ERSHT)	ESC Ø33	D 1Ø4	Pn1 ***	Pn2 ***	Pn ***	NUL ØØØ	Clears horizontal tabs, then tabs at Pn1, Pn2, and other designated stops. Pn is a character representing the column number of the desired tab. For example, the character DC2 sets a tab at column 18. You can specify up to 16 tabs.

Paper Fault Handling

Disable paper out (ERDPO)	ESC Ø33	8 Ø56					Disables paper out handling.
Enable paper out (EREPO)	ESC Ø33	9 Ø57					Enables paper out handling.

Printing Modes

Enable bold (EREBD)	ESC Ø33	E 1Ø5					Sets bold printing for all following characters.
Disable bold (ERDBD)	ESC Ø33	F 1Ø6					Turns off bold printing for all following characters.
Set high resolution (EREHR)	ESC Ø33	G 1Ø7					Enters high resolution mode.
Set low resolution (ERDHR)	ESC Ø33	H 1Ø8					Enters low resolution mode.

4.4 PROGRAMMING INFORMATION FOR EMULATION MODE 2 -- IBM MX80 PLUS GRAFTRAX

This section lists the programmer selectable features in the IBM MX80 plus Graftrax emulation mode. Figure 4-4 shows the printable characters for mode 2.

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

KEY

ASCII CHARACTER	ESC	33 27 1B	OCTAL DECIMAL HEX
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Figure 4-4 Mode 2 Character Set (Sheet 1 of 2)

1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
8		9		10		11		12		13		14		15	
NUL	200 128 80		220 144 90	SP	240 160 A0	0	260 176 B0	@	300 192 C0	P	320 208 D0	τ	340 224 E0	p	360 240 F0
£	201 129 81		221 145 91	!	241 161 A1	1	261 177 B1	A	301 193 C1	Q	321 209 D1	a	341 225 E1	q	361 241 F1
..	202 130 82	DC2	222 146 92	"	242 162 A2	2	262 178 B2	B	302 194 C2	R	322 210 D2	b	342 226 E2	r	362 242 F2
,	203 131 83		223 147 93	#	243 163 A3	3	263 179 B3	C	303 195 C3	S	323 211 D3	c	343 227 E3	s	363 243 F3
'	204 132 84	DC4	224 148 94	\$	244 164 A4	4	264 180 B4	D	304 196 C4	T	324 212 D4	d	344 228 E4	t	364 244 F4
§	205 133 85	⌋	225 149 95	%	245 165 A5	5	265 181 B5	E	305 197 C5	U	325 213 D5	e	345 229 E5	u	365 245 F5
ı	206 134 86	┌	226 150 96	&	246 166 A6	6	266 182 B6	F	306 198 C6	V	326 214 D6	f	346 230 E6	v	366 246 F6
BEL	207 135 87	└	227 151 97	'	247 167 A7	7	267 183 B7	G	307 199 C7	W	327 215 D7	g	347 231 E7	w	367 247 F7
BS	210 136 88	┘	230 152 98	(	250 168 A8	8	270 184 B8	H	310 200 C8	X	330 216 D8	h	350 232 E8	x	370 248 F8
HT	211 137 89	┐	231 153 99	)	251 169 A9	9	271 185 B9	I	311 201 C9	Y	331 217 D9	i	351 233 E9	y	371 249 F9
LF	212 138 8A	┌	232 154 9A	*	252 170 AA	:	272 186 BA	J	312 202 CA	Z	332 218 DA	j	352 234 EA	z	372 250 FA
VT	213 139 8B	ESC	233 155 9B	+	253 171 AB	;	273 187 BB	K	313 203 CB	[	333 219 DB	k	353 235 EB	{	373 251 FB
FF	214 140 8C	|	234 156 9C	,	254 172 AC	<	274 188 BC	L	314 204 CC	\	334 220 DC	l	354 236 EC	/	374 252 FC
CR	215 141 8D	-	235 157 9D	-	255 173 AD	=	275 189 BD	M	315 205 CD	]	335 221 DD	m	355 237 ED	}	375 253 FD
SO	216 142 8E	└	236 158 9E	,	256 174 AE	>	276 190 BE	N	316 206 CE	^	336 222 DE	n	356 238 EE	~	376 254 FE
SI	217 143 8F	+	237 159 9F	/	257 175 AF	?	277 191 BF	O	317 207 CF	-	337 223 DF	o	357 239 EF	DEL	377 255 FF
ADDITIONAL CONTROL SET				MODE 2 SUPPLEMENTAL CHARACTER SET											

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Figure 4-4 Mode 2 Character Set (Sheet 2 of 2)

4.4.1 Mode 2 C0 and C1 Control Characters

The following tables lists the mode 2 C0 and C1 control characters.

Table 4-9 Mode 2 C0 Control Characters

Name	Mnemonic	Octal Code	Function
Null	NUL	00	Used in escape sequences.
Bell	BEL	07	Sounds bell if enabled by switch A7.
Backspace	BS	10	Prints buffer's contents, then moves back one character cell. (Moves back two cells if this is first time in double width.)
Horizontal tab	HT	11	Moves to next horizontal tab, if any. Otherwise, takes no action.
Line feed	LF	12	Prints buffer's contents, then advances paper by current line spacing.

Table 4-9 Mode 2 CØ Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Vertical tab	VT	13	Prints buffer's contents, then performs a line feed.
Form feed	FF	14	Advance to next top of form.
Carriage return	CR	15	Prints buffer's contents, then returns to left margin. Performs line feed if enabled by switch A6.
Shift out	SO	16	Sets double width for all following characters until the next line terminator or DC4 is received.
Shift in	SI	17	Sets compressed pitch for current line and following lines, until DC2 received.
Device control 2	DC2	22	Sets standard horizontal pitch for current line and following lines, until SI is received.
Device control 4	DC4	24	Sets single width for all following characters, until SO is received.
Escape	ESC	33	Starts escape sequences.

Table 4-10 Mode 2 C1 Control Characters

Name	Mnemonic	Octal Code	Function
Null	NUL	200	Used in escape sequences.
Pound sign	--	201	*
Umlaut	--	202	*
Opening single quote	--	203	*
Closing single quote	--	204	*
Paragraph	--	205	*
Top level corner	--	206	*
Bell	BEL	207	Sounds bell tone if enabled by switch A7.
Backspace	BS	210	Prints buffer's contents, then moves back one character cell.
Horizontal tab	HT	211	Advances to next horizontal tab stop, if any. Otherwise, takes no action.
Line feed	LF	212	Prints buffer's contents, then advances paper by current line spacing.
Vertical tab	VT	213	Prints buffer's contents, then performs a line feed.
Form feed	FF	214	Advances to next top of form.

Table 4-10 Mode 2 C1 Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Carriage return	CR	215	Prints buffer's contents, then returns to left margin. Performs line feed if enabled by switch A6.
Shift out	SO	216	Sets double width for all following characters, until next line terminator or DC4 is received.
Shift in	SI	217	Sets compressed horizontal pitch for current line and following lines, until DC2 is received.
Device control 2	DC2	222	Sets standard horizontal pitch for current line and following lines, until SI is received.
Device control 4	DC4	224	Sets single width for all following characters, until SO is received.
Top right corner		225	*
Right T		226	*
Left T		227	*
Top T		230	*

* Indicates a printable character. See the Mode 2 Character Set for examples of these characters.

Table 4-10 Mode 2 C1 Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Bottom left corner		231	*
Bottom right corner		232	*
Escape	ESC	233	Starts escape sequences.
Vertical line		234	*
Horizontal line		235	*
Bottom T		236	*
Center cross		237	*

* Indicates a printable character. See the Mode 2 Character Set for examples of these characters.

4.4.2 Mode 2 Escape and Control Sequences

The following table lists the escape and control sequences for mode 2 and the features these sequences select.

NOTE

Pn is a variable numeric parameter in escape sequences. In emulation mode escape sequences, Pn is the ASCII character equivalent of a decimal value. Calculate this value according to the instructions with the escape sequence. Locate the value in the character chart. Use the ASCII character in the sequence.

The *** character below each Pn parameter represents the octal code of the Pn character.

Table 4-11 Mode 2 Escape and Control Sequence Summary

Vertical Form Handling

Name (Mnemonic)	Sequence	Function
Set vertical pitch (ER8LI)	ESC 0 033 060	Sets vertical pitch to 8 lines per inch.
(ER10LI)	ESC 1 033 061	Sets vertical pitch to 10.3 (72/7) lines per inch.
(ER6LI2)	ESC 2 033 062	Sets vertical pitch to 6 lines per inch.
(ERNLI3)	ESC 3 Pn 033 063 ***	Sets vertical pitch to 216/Pn lines per inch.
(ERNLI5)	ESC A Pn 033 101 ***	Sets vertical pitch to 72/Pn lines per inch.
(ERNLI4)	ESC J Pn 033 112 ***	Prints buffer's contents, then sets vertical pitch to 216/Pn lines per inch for next line feed only.
Set form length (ERSFL)	ESC C Pn 033 103 ***	Sets the form length to the number of inches that equal Pn X current pitch.
(ERSFLI)	ESC C NUL Pn 033 103 000 *	Sets the form length to Pn inches.
Set bottom margin (ERSBM)	ESC N Pn 033 116 ***	Sets the bottom margin to Pn lines from the bottom of the page.
Clear bottom margin (ERCBM)	ESC 0 033 117	Clears the bottom margin. Overrides any margin set by switch A2.

Table 4-11 Mode 2 Escape and Control Sequence Summary (Cont)

Horizontal Form Handling

Name (Mnemonic)	Sequence	Function
Set right margin (ERSRM)	ESC Q Pn 033 121 ***	Sets right margin to Pn (column number in octal).
Set double-width characters (EREDW)	ESC W >0 033 127 ***	Sets double width characters for current line and following lines. Any non zero character as the third character completes this sequence.
Set single-width characters (ERDDW)	ESC W NUL 033 127 000	Sets single width characters for current line and following lines.

Horizontal Tabs

Name (Mnemonic)	Sequence	Function
Set horizontal tabs (ERSHT)	ESC D Pn1 Pn2 Pn NUL 033 104 *** *** *** 000 or ESC D Pn1 Pn2 Pn 80H 033 104 *** *** *** 200	Sets horizontal tab stops at Pn1, Pn2, and other designated stops. Pn is a character representing the column number of the desired stop. For example, the character DC2 sets a tab at column 18. You can specify up to 16 tabs.

Paper Fault Handling

Name (Mnemonic)	Sequence	Function
Disable paper out (ERDPO)	ESC 8 033 056	Disables paper out handling.
Enable paper out (EREPO)	ESC 9 033 057	Enables paper out handling.

Table 4-11 Mode 2 Escape and Control Sequence Summary (Cont)

Unidirectional/Bidirectional Control

Name (Mnemonic)	Sequence	Function
Set one-line unidirectional printing (EREUDI)	ESC < Ø33 Ø74	Prints current line from left to right.
Set bidirectional printing (ERDUD)	ESC U NUL Ø33 Ø74 ØØØ	Prints lines in bidirectional mode.
Set unidirectional printing (EREUD)	ESC U >Ø Ø33 Ø74 ***	Prints lines from left to right only. Any nonzero character as the third character completes this sequence.

Character Set Mapping

When you install a primary cartridge other than the italic cartridge in slot 2, all references to the italic set in the following table apply to the character set of the installed primary cartridge.

Switch A4 Setting	Escape Sequence	CØ	GL	C1	GR
Down (normal)	None	CØ	ASCII	C1	Italic ASCII
Up (italic)	None	CØ	Italic ASCII	C1	Italic ASCII
Down (normal)	ER8BS	C1	Italic ASCII	C1	Italic ASCII
Down (normal)	ER8BC	CØ	ASCII	CØ	ASCII
Up (italic)	ER8BS	C1	Italic ASCII	C1	Italic ASCII
Up(italic)	ER8BC	CØ	Italic ASCII	CØ	Italic ASCII

Name (Mnemonic)	Sequence	Function
Retain eighth bit (ER8BU)	ESC # Ø33 Ø43	Keeps 8th bit unchanged. Use current character set.
Clear eighth bit (ER8BC)	ESC = Ø33 Ø75	Clears 8th bit (sets to Ø). Maps the default GL and CØ character set to the C1 and GR range.
Set eighth bit (ER8BS)	ESC > Ø33 Ø76	Sets 8th bit. Maps the default C1 and GR character set to the CØ and GL range.

Table 4-11 Mode 2 Escape and Control Sequence Summary (Cont)

Printing Modes

Name (Mnemonic)	Sequence	Function
Enable bold (EREBD)	ESC E 033 105	Sets bold printing for all following characters.
Disable bold (ERDBD)	ESC F 033 106	Turns off bold printing for all following characters.
Set high resolution (EREHR)	ESC G 033 107	Enters high resolution mode.
Set low resolution (ERDHR)	ESC H 033 108	Enters low resolution mode, and resets the script setting.
Set underline (EREUL)	ESC - >0 033 045 ***	Underlines all following characters. Any nonzero character as the third character completes this sequence.
Reset underline (ERDUL)	ESC - NUL 033 045 000	Turns off underlining for all following characters.
Select italic (EREIL)	ESC 4 033 064	Selects italic ASCII set as GL.
Select nonitalic (ERDIL)	ESC 5 033 065	Selects nonitalic ASCII set as GL.
Enable superscript (ERESCR)	ESC S NUL 033 123 000	Prints all following characters in superscript mode.
Enable subscript (ERESCR)	ESC S >0 033 123 ***	Prints all following characters in subscript mode. Any nonzero character as the third character completes this sequence.
Reset script and directional printing (ERDSCR)	ESC T 033 124	Resets script setting to no script and resets printing mode to bidirectional.

Table 4-11 Mode 2 Escape and Control Sequence Summary (Cont)

Graphics Mode

Name (Mnemonic)	Sequence				Function
60 DPI graphics (ERGR6)	ESC 033	K 113	Pn1 ***	Pn2 ***	<p>Enter 60 dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula</p> $n = 256 \times Pn2 + Pn1$ <p>The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 480 (8 inch paper selected) or less than 780 (13 inch paper selected).</p>
132 DPI graphics (ERGR12)	ESC 033	L 114	Pn1 ***	Pn2 ***	<p>Enter 132 dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula</p> $n = (256 \times Pn2) + Pn1$ <p>The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 960 (8 inch paper selected) or less than 1740 (13 inch paper selected).</p>

4.4.3 Restoring Mode 2 Default Settings

The following sequence resets all features set by escape sequences to the default conditions.

Name (Mnemonic)	Sequence	Function
Reset (ERRIS)	ESC @ 033 100	Resets all features (previously set by escape sequences) to their initial default settings.

4.5 PROGRAMMING INFORMATION FOR EMULATION MODE 3 -- IBM GRAPHICS PRINTER

This section lists the programmer selectable features in the IBM graphics printer emulation mode. The printer has two character sets for Mode 3. They are shown in Figures 4-5 and 4-6.

Table 4-12 Mode 2 Default Settings (Restored by Reset)

Feature	Setting
GL character set	Set to current setting of switch A4 (GL is not italic if A4 is set to down position.)
8-bit operations	Leave 8th bit unchanged.
Print direction	Set to bidirectional.
Script	Set to no superscript or subscript.
Character width	Set to single width.
Underline	Set to no underlining.
Paper fault	Enabled.
Vertical tab	Set to every line.
Horizontal tab	Set every eight columns (1, 9, 17, ...).
Form length	Set to 11 inches.
Bottom margin	Set to current setting of switch A2 (either no bottom margin or 1 inch margin).
Vertical pitch	Set to 6 lines per inch.
Paper width	Set to current setting of switch A8 (either 8 inches or 13 inches).
Right margin	Set to the current paper width selected by switch A8 .
Resolution	Set to low resolution.
Bold	Set to current setting of switch A3 .
Horizontal pitch	Set to current setting of switch A1 (either standard or compressed).

BITS		0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1		0 1 0 0		0 1 0 1		0 1 1 0		0 1 1 1				
B8	B7	B6	B5	COLUMN		1		2		3		4		5		6		7		
B4	B3	B2	B1	ROW	0	1		2		3		4		5		6		7		
0	0	0	0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	'	140 96 60	p	160 112 70
0	0	0	1	1		1 1 1	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71	
0	0	1	0	2		2 2 2	22 18 12	DC2	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72	
0	0	1	1	3		3 3 3	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73	
0	1	0	0	4		4 4 4	24 20 14	DC4	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74	
0	1	0	1	5		5 5 5	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75	
0	1	1	0	6		6 6 6	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76	
0	1	1	1	7	BEL	7 7 7	27 23 17	,	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77	
1	0	0	0	8		10 8 8	30 24 18	CAN	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78	
1	0	0	1	9	HT	11 9 9	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1	0	1	0	10	LF	12 10 A	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A	
1	0	1	1	11	VT	13 11 B	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1	1	0	0	12	FF	14 12 C	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	;	174 124 7C	
1	1	0	1	13	CR	15 13 D	35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1	1	1	0	14	SO	16 14 E	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E	
1	1	1	1	15	SI	17 15 F	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F	
					ASCII CONTROL SET					ASCII GRAPHIC CHARACTER SET										

KEY

ASCII CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

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Figure 4-5 Mode 3 Character Set 1 (Sheet 1 of 2)

1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
8		9		10		11		12		13		14		15	
NUL	200 128 80		220 144 90	á	240 160 A0		260 176 80		300 192 C0		320 208 D0	α	340 224 E0	≡	360 240 F0
	201 129 81		221 145 91	í	241 161 A1		261 177 81		301 193 C1		321 209 D1	β	341 225 E1	±	361 241 F1
	202 130 82	DC2	222 146 92	ó	242 162 A2		262 178 82		302 194 C2		322 210 D2	Γ	342 226 E2	≥	362 242 F2
	203 131 83		223 147 93	ú	243 163 A3		263 179 83		303 195 C3		323 211 D3	Π	343 227 E3	≤	363 243 F3
	204 132 84	DC4	224 148 94	ñ	244 164 A4		264 180 84		304 196 C4		324 212 D4	Σ	344 228 E4		364 244 F4
	205 133 85		225 149 95	ñ	245 165 A5		265 181 85		305 197 C5		325 213 D5	σ	345 229 E5		365 245 F5
	206 134 86		226 150 96	la	246 166 A6		266 182 86		306 198 C6		326 214 D6	μ	346 230 E6	÷	366 246 F6
BEL	207 135 87		227 151 97	o	247 167 A7		267 183 87		307 199 C7		327 215 D7	τ	347 231 E7	≈	367 247 F7
	210 136 88	CAN	230 152 98	¿	250 168 A8		270 184 88		310 200 C8		330 216 D8	ø	350 232 E8	o	370 248 F8
HT	211 137 89		231 153 99	¡	251 169 A9		271 185 89		311 201 C9		331 217 D9	θ	351 233 E9	■	371 249 F9
LF	212 138 8A		232 154 9A	¡	252 170 AA		272 186 8A		312 202 CA		332 218 DA	Ω	352 234 EA	—	372 250 FA
VT	213 139 8B	ESC	233 155 9B	½	253 171 AB		273 187 8B		313 203 CB		333 219 DB	δ	353 235 EB		373 251 FB
FF	214 140 8C		234 156 9C	¼	254 172 AC		274 188 8C		314 204 CC		334 220 DC	∞	354 236 EC	n	374 252 FC
CR	215 141 8D		235 157 9D	i	255 173 AD		275 189 8D		315 205 CD		335 221 DD	∅	355 237 ED	2	375 253 FD
SO	216 142 8E		236 158 9E	«	256 174 AE		276 190 8E		316 206 CE		336 222 DE	ε	356 238 EE	■	376 254 FE
SI	217 143 8F		237 159 9F	»	257 175 AF		277 191 8F		317 207 CF		337 223 DF	∩	357 239 EF	SP	377 255 FF
ADDITIONAL CONTROL SET				MODE 3 SUPPLEMENTAL CHARACTER SET 1											

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Figure 4-5 Mode 3 Character Set 1 (Sheet 2 of 2)

BITS		0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1		0 1 0 0		0 1 0 1		0 1 1 0		0 1 1 1	
B8 B7 B6 B5		COLUMN		1		2		3		4		5		6		7	
B4 B3 B2 B1	ROW	0															
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	,	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1		21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	♥	3 3 3		23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	♦	4 4 4	DC4	24 20 14	\$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	♣	5 5 5	§	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	♠	6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8		10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A		32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

ASCII CONTROL SET

ASCII GRAPHIC CHARACTER SET

KEY

ASCII CHARACTER	ESC	33 27 1B	OCTAL DECIMAL HEX
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Figure 4-6 Mode 3 Character Set 2 (Sheet 1 of 2)

1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
8		9		10		11		12		13		14		15	
Ç	200 128 80	É	220 144 90	á	240 160 A0		260 176 B0	L	300 192 C0	ll	320 208 D0	α	340 224 E0	≡	360 240 F0
Ü	201 129 81	æ	221 145 91	í	241 161 A1		261 177 B1	l	301 193 C1	ll	321 209 D1	β	341 225 E1	±	361 241 F1
é	202 130 82	Æ	222 146 92	ó	242 162 A2		262 178 B2	l	302 194 C2	ll	322 210 D2	Γ	342 226 E2	≥	362 242 F2
â	203 131 83	ô	223 147 93	ú	243 163 A3		263 179 B3	l	303 195 C3	ll	323 211 D3	Π	343 227 E3	≤	363 243 F3
ä	204 132 84	ö	224 148 94	ñ	244 164 A4		264 180 B4	l	304 196 C4	ll	324 212 D4	Σ	344 228 E4	ƒ	364 244 F4
à	205 133 85	ò	225 149 95	ñ	245 165 A5		265 181 B5	l	305 197 C5	ll	325 213 D5	σ	345 229 E5	♪	365 245 F5
â	206 134 86	û	226 150 96	la	246 166 A6		266 182 B6	l	306 198 C6	ll	326 214 D6	μ	346 230 E6	÷	366 246 F6
ç	207 135 87	ù	227 151 97	o	247 167 A7		267 183 B7	l	307 199 C7	ll	327 215 D7	τ	347 231 E7	≈	367 247 F7
ê	210 136 88	ÿ	230 152 98	ç	250 168 A8		270 184 B8	l	310 200 C8	ll	330 216 D8	ϕ	350 232 E8	o	370 248 F8
ë	211 137 89	ö	231 153 99	l	251 169 A9		271 185 B9	l	311 201 C9	ll	331 217 D9	θ	351 233 E9	■	371 249 F9
è	212 138 8A	ü	232 154 9A	l	252 170 AA		272 186 BA	l	312 202 CA	ll	332 218 DA	Ω	352 234 EA	—	372 250 FA
ï	213 139 8B	€	233 155 9B	½	253 171 AB		273 187 BB	l	313 203 CB	ll	333 219 DB	δ	353 235 EB	√	373 251 FB
î	214 140 8C	£	234 156 9C	¼	254 172 AC		274 188 BC	l	314 204 CC	ll	334 220 DC	∞	354 236 EC	n	374 252 FC
ì	215 141 8D	¥	235 157 9D	i	255 173 AD		275 189 BD	l	315 205 CD	ll	335 221 DD	∅	355 237 ED	2	375 253 FD
ä	216 142 8E	₣	236 158 9E	«	256 174 AE		276 190 BE	l	316 206 CE	ll	336 222 DE	€	356 238 EE	■	376 254 FE
â	217 143 8F	f	237 159 9F	»	257 175 AF		277 191 BF	l	317 207 CF	ll	337 223 DF	∩	357 239 EF	SP	377 255 FF

MODE 3 SUPPLEMENTAL CHARACTER SET 2

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Figure 4-6 Mode 3 Character Set 2 (Sheet 2 of 2)

4.5.1 Mode 3 C0 and C1 Control Characters

The following tables list the mode 3 C0 and C1 control characters.

Table 4-13 Mode 3 C0 and C1 Control Characters (Set 1)

Name	Mnemonic	Octal Code		Function
		C0	C1	
Null	NUL	00	200	Used in escape sequences.
Bell	BEL	07	207	Sounds bell tone if enabled by switch A7.
Horizontal tab	HT	11	211	Advances to next horizontal tab, if any. Otherwise, takes no action.
Line feed	LF	12	212	Prints buffer's contents, then advances paper by current line spacing.
Vertical tab	VT	13	213	Prints buffer's contents, then performs line feed.
Form feed	FF	14	214	Advances to next top of form.
Carriage return	CR	15	215	Prints buffer's contents, returns to left margin, and performs line feed if enabled by switch A6.
Shift out	SO	16	216	Sets double width for all following characters, until next line terminator or DC4 is received.
Shift in	SI	17	217	Sets compressed horizontal pitch for current line and following lines, until DC2 is received.

Table 4-13 Mode 3 C0 and C1 Control Characters (Set 1) (Cont)

Name	Mnemonic	Octal Code		Function
		C0	C1	
Device control 2	DC2	22	222	Sets standard horizontal pitch for current line and following lines, until SI is received.
Device control 4	DC4	24	224	Sets single width for all following characters, until SO is received.
Cancel	CAN	30	230	Clears print buffer if enabled by switch A4.
Escape	ESC	33	233	Starts escape sequences.

Table 4-14 Mode 3 C0 Control Characters (Set 2)

Name	Mnemonic	Octal Code	Function
Null	NUL	00	Used in escape sequences.
Heart	-	03	Prints a heart symbol.
Diamond	-	04	Prints a diamond symbol.
Clubs	-	05	Prints a club symbol.
Spade	-	06	Prints a spade symbol.
Bell	BEL	07	Sounds bell tone if enabled by switch A7.
Horizontal tab	HT	11	Advances to next horizontal tab, if any. Otherwise, takes no action.
Line feed	LF	12	Prints buffer's contents, then advances paper by current line spacing.

Table 4-14 Mode 3 CØ Control Characters (Set 2) (Cont)

Name	Mnemonic	Octal Code	Function
Vertical tab	VT	13	Prints buffer's contents, then performs line feed.
Form feed	FF	14	Advance to next top of form.
Carriage return	CR	15	Prints buffer's contents, then returns to left margin. Performs line feed if enabled by switch A6.
Shift out	SO	16	Sets double width for all following characters, until the next line terminator or DC4 is received.
Shift in	SI	17	Sets compressed horizontal pitch for current line and following lines, until DC2 is received.
Device control 2	DC2	22	Sets standard horizontal pitch for current line and following lines, until SI is received.
Device control 4	DC4	24	Sets single width for all following characters, until SO is received.
Paragraph	-	25	Prints paragraph symbol.
Cancel	CAN	30	Clears print buffer if enabled by switch A4.
Escape	ESC	33	Starts escape sequences.

4.5.2 Mode 3 Escape and Control Sequences

The following table lists the escape and control sequences for mode 3 and the features that these sequences select.

NOTE

Pn is a variable numeric parameter in escape sequences. In emulation mode escape sequences, Pn is the ASCII character equivalent of a decimal value. Calculate this value according to the instructions with the escape sequence. Locate the value in the character chart. Use the ASCII character in the sequence.

The *** character below each Pn parameter represents the octal code of the Pn character.

Table 4-15 Mode 3 Escape and Control Sequence Summary

Vertical Form Handling

Name (Mnemonic)	Sequence	Function
Set vertical pitch (ER8LI)	ESC 0 033 060	Sets vertical pitch to 8 lines per inch.
(ER10LI)	ESC 1 033 061	Sets vertical pitch to 10.3 lines per inch (72/7).
(ERNL12)	ESC 2 033 062	Sets vertical pitch to the setting specified in a previously issued ESC A sequence. If none was set, sets pitch to 6 lines per inch.
(ERNLI1)	ESC A Pn 033 101 ***	Sets vertical pitch to 72/Pn lines per inch. Does not take effect until ESC2 is sent.
(ERNLI3)	ESC 3 Pn 033 063 ***	Sets vertical pitch to 216/Pn lines per inch.

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Vertical Form Handling (Cont)

Name (Mnemonic)	Sequence			Function
(ERNLI4)	ESC Ø33	J 112	Pn ***	Prints buffer's contents and sets vertical pitch to 216/Pn lines per inch for next line feed only.
Set form length (ERSFL)	ESC Ø33	C 1Ø3	Pn ***	Sets the form length to the number of inches that equal Pn X current pitch.
(ERSFLI)	ESC Ø33	C 1Ø3	NUL ØØØ Pn ***	Sets the form length to Pn inches.
Set bottom margin (ERSBM)	ESC Ø33	N 116	Pn ***	Sets the bottom margin to Pn lines from the bottom of the page.
Clear bottom margin (ERCBM)	ESC Ø33	O 117		Clears the bottom margin.

Horizontal Form Handling

Name (Mnemonic)	Sequence			Function
Set double-width characters (EREDW)	ESC Ø33	W 127	>Ø ***	Sets double width characters for current line and following lines. Any nonzero character as the third character completes this sequence.
Set single-width characters (ERDDW)	ESC Ø33	W 127	NUL ØØØ	Sets single width characters for current line and following lines.
Carriage return (PCR1)	ESC Ø33	< Ø74		Performs carriage return without performing line feed, regardless of current switch setting.

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Horizontal Tabs

Name (Mnemonic)	Sequence	Function
Set horizontal tabs (ERSHT)	ESC D Pn1 Pn2 Pn NUL Ø33 1Ø4 *** **	Sets horizontal tab stops at Pn1, Pn2, and other designated stops. Pn is a character representing the column number of the desired stop. For example, the character DC2 sets a tab at column 18. You can specify up to 16 tabs.

Paper Fault Handling

Name (Mnemonic)	Sequence	Function
Disable paper out (ERDPO)	ESC 8 Ø33 Ø56	Disables paper out handling.
Enable paper out (EREPO)	ESC 9 Ø33 Ø57	Enables paper out handling.

Unidirectional/Bidirectional Control

Name (Mnemonic)	Sequence	Function
Set bidirectional (ERDUD)	ESC U NUL Ø33 Ø74 ØØØ	Prints lines in bidirectional mode.
Set unidirectional printing (EREUD)	ESC U >Ø Ø33 Ø74 ***	Prints lines from left to right only. Any nonzero character as the third character completes this sequence.

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Alternate Character Set Mapping

Name (Mnemonic)	Sequence	Function
Select set 2 (ERC02)	ESC 6 033 066	Selects the alternate character set (set 2).
Select set 1 (ERC01)	ESC 7 033 067	Selects character set 1. (This character set is the default set when you power on the printer.)

Printing Modes

Name (Mnemonic)	Sequence	Function
Enable bold (EREBD)	ESC E 033 105	Sets bold printing for all following characters.
Disable bold (ERDBD)	ESC F 033 106	Turns off bold printing for all following characters.
Set high resolution (EREHR)	ESC G 033 107	Enters high resolution mode.
Set low resolution (ERDHR)	ESC H 033 108	Enters low resolution mode.
Set underline (EREUL)	ESC - >0 033 045 ***	Underlines all following characters. Any nonzero character as the third character completes this sequence.
Reset underline (ERDUL)	ESC - NUL 033 045 000	Turns off underlining for all following characters.
Enable superscript (ERESCR)	ESC S NUL 033 123 000	Prints all following characters in superscript mode.

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Name (Mnemonic)	Sequence			Function
Enable subscript (ERESCR)	ESC Ø33	S 123	>Ø ***	Prints all following characters in subscript mode. Any nonzero character as the third character completes this sequence.
Reset script and directional printing (ERDSCR)	ESC Ø33	T 124		Resets script setting to no script and resets printing mode to bidirectional.

Graphics Mode

Name (Mnemonic)	Sequence				Function
6Ø DPI graphics (ERGR6)	ESC Ø33	K 113	Pn1 ***	Pn2 ***	<p>Enter 6Ø dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula</p> $n = (256 \times Pn2) + Pn1$ <p>The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 48Ø (8 inch paper selected) or less than 78Ø (13 inch paper selected).</p>

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Graphics Modes (Cont)

Name (Mnemonic)	Sequence				Function
132 DPI graphics (ERGR12)	ESC 033	L 114	Pn1 ***	Pn2 ***	<p>Enter 132 dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula</p> $n = (256 \times Pn2) + Pn1$ <p>The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 960 (8 inch paper selected) or less than 1740 (13 inch paper selected).</p>
132 DPI graphics (ERGS12)	ESC 033	Y 131	Pn1 ***	Pn2 ***	<p>Enter 132 dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula</p> $n = (256 \times Pn2) + Pn1$ <p>The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 960 (8 inch paper selected) or less than 1740 (13 inch paper selected). ESC Y prints every other dot.</p>

Table 4-15 Mode 3 Escape and Control Sequence Summary (Cont)

Name (Mnemonic)	Sequence				Function
220 DPI graphics (ERGD24)	ESC	Z	Pn1	Pn2	Enter 220 dots per inch for the next n bytes. Pn1 and Pn2 together specify the number of bytes according to the formula $n = (256 \times Pn2) + Pn1$ The total must be less than the remainder of bytes in the line buffer. If the buffer is empty, the total must be less than 1920 (8 inch paper selected) or less than 2895 (13 inch paper selected). ESC Z prints one dot in any three consecutive positions.
	033	132	***	***	

