CHAPTER 8
CARING FOR YOUR PRINTER

Subjects covered in Chapter 8 include–
- **Cleaning the printer**
- **Changing the ribbon**
- **Replacing the print head**

Dust and heat will make any mechanism wear more quickly. The best maintenance is *preventive*, so the first step in any maintenance program is correct location of the printer. This is covered in greater detail in Chapter 1, but in general a normal office environment is best for both the computer and the printer.

CLEANING THE PRINTER

Cleaning the printer regularly will prolong its service life. Use a damp cloth on the exterior every week or so. For stubborn dirt, you may moisten the cloth with alcohol or water containing a mild detergent, but be careful not to spill any liquid into the interior of the printer or onto the print mechanism.

Use a soft brush to remove paper dust and lint from the interior. A small vacuum cleaner can also make this task easier – but be very careful not to bend or injure any electronic parts or wiring. The printer contains delicate electronic parts, so only clean those places where you have easy access.

REPLACING THE RIBBON

This printer uses an endless-type ribbon cartridge, meaning

that the ribbon is recycled automatically. In time, however, when the print becomes to faint to read clearly, you will need to change either the whole cartridge or the ribbon inside it.

Changing the whole cartridge is the simplest method, and because you don't need to touch the ribbon itself, it is the cleanest way too. To remove the old cartridge, remove the printer cover, grasp the ribbon cartridge with both hands, and pull straight up gently until the holder springs release. To fit the new cartridge, refer to Chapter 1, Installing the ribbon cartridge.

A more economical method is to only replace the ribbon itself. First, obtain the correct type of replacement sub-cassette from your dealer. Use the following procedure to change the ribbon.

1. Place the cartridge on a flat surface, and use a flatbladed screwdriver to unhook the tabs holding the two sections of the cartridge together. See Figure 8-1.
2. After opening the cartridge, take a moment to notice how the ribbon is threaded. Then press a finger against the idler gear holder (it is held in position by spring pressure), and make enough space to remove the ribbon from between the two gears. See Figure 8-2.

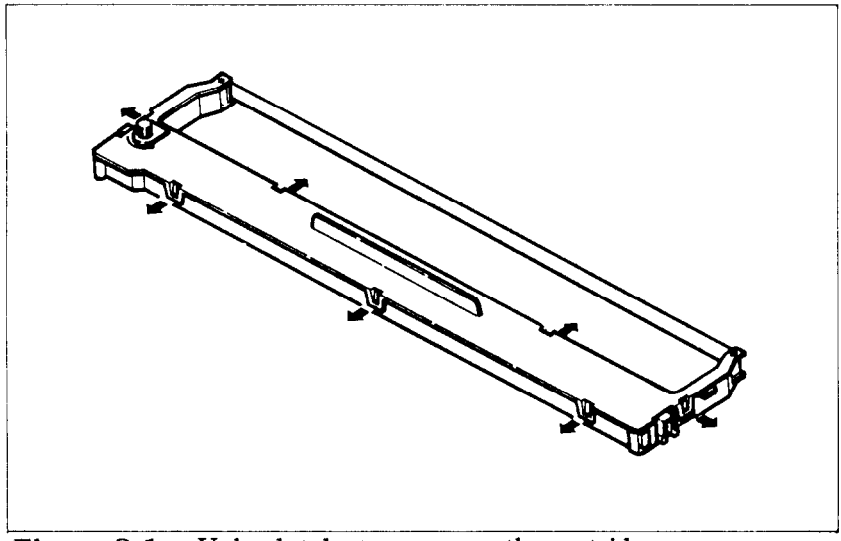


Figure 8-1. Unhook tabs to pry open the cartridge.

3. Clean the inside of the cartridge, especially around the vicinity of the two gears.

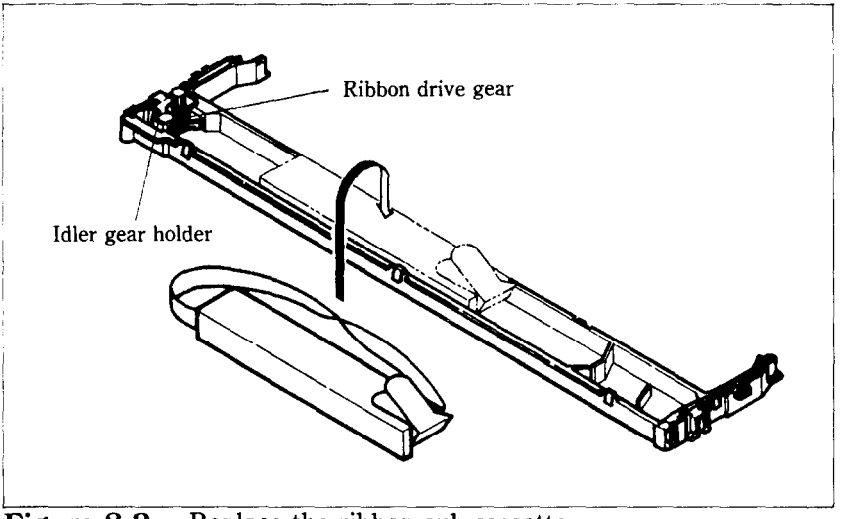


Figure 8-2. Replace the ribbon sub-cassette.

4. Take the new ribbon and holder out of the wrapper, remove the adhesive tape on the joint on the holder, and place it into the cassette as shown in Figure 8-2.
5. Pull sufficient ribbon out of the holder, and thread it as shown in Figure 8-3. Be careful that the half-twist in the ribbon is positioned in the right-hand section of the ribbon cartridge, between the two guide posts. Make sure that no twists occur anywhere else.
6. Again press on the idler gear holder and thread the ribbon between both gears.
7. Remove the top and bottom of the ribbon holder, and replace the cartridge top cover. Snap all tabs back into place.
8. When you've completed the installation, remount the cartridge to the printer.
   Note: You should replace the whole cartridge after replacing the ribbon five times.

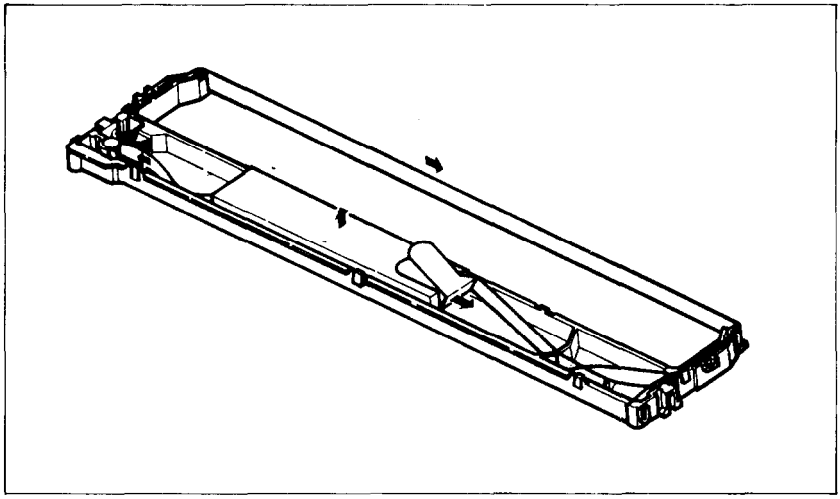


Figure 8-3. Make sure that the ribbon is not twisted when you thread it through its path.

REPLACING THE PRINT HEAD

The dot matrix print head has an extremely long life, around 200 million dots per wire, or years of normal use. However, when printing is too light even after replacing the ribbon, you'll know that the print head has reached the end of its service life.

Turn off the power, unplug the power cord, and use the following procedure to replace the print head.

Warning: The print head becomes hot during operation. If you have been using the printer, let it stand for a while so that the print head can cool off.

1. Remove the printer cover and the ribbon cartridge.
2. Remove the two screws fastening the print head.
3. Holding the print head and the head cable board securely, unplug the head cable.
4. Making sure that the new print head is facing the correct direction, carefully plug the cable into the connector on the head cable board. Make sure that this connection is secure, and that the cable is inserted far enough into the connector.

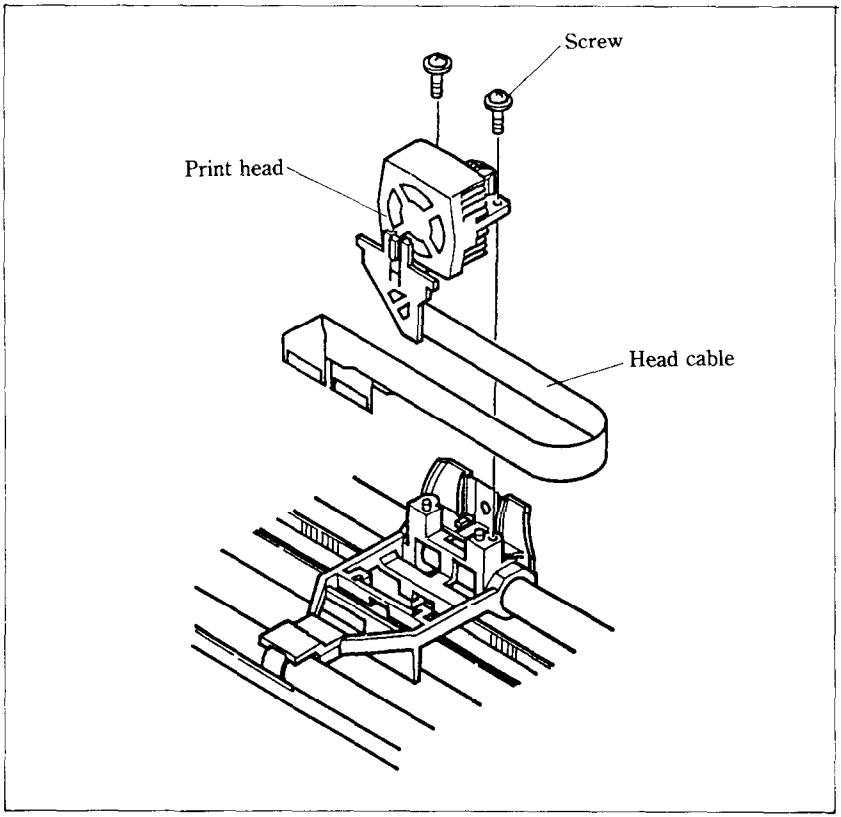


Figure 8-4. Replacement of the print head.

5. Fit the new print head into its support, and fasten it with screws. Make sure that the print head is inserted correctly.

MEMO

APPENDIX A

DIP SWITCH SETTINGS

The DIP (Dual In-line Package) switches control many of the functions of the printer. A DIP switch contains a number of small switches, and in this printer, one DIP switch has 10 individual switches and the another has 8 individual switches.

Both DIP switches are easily accessible from the top of the printer. Remove the ribbon cartridge, and you will see the two DIP switches underneath a sheet of protective plastic film, which you fold back for access. DIP switch 1 is the one on the left as you look at the printer from the front. The individual switches of DIP switch 1 are named from 1-1 to 1-10; similarly, the switches of DIP switch 2 go from 2-1 to 2-8.

To change a setting, turn the power OFF, and use a ball-point pen or similar to move any of the small white switches to the front or back of the printer. The "on" position for all switches is towards the back of the printer, and "off" is to the front. Figure A-1 shows the location of the printer's DIP switches.

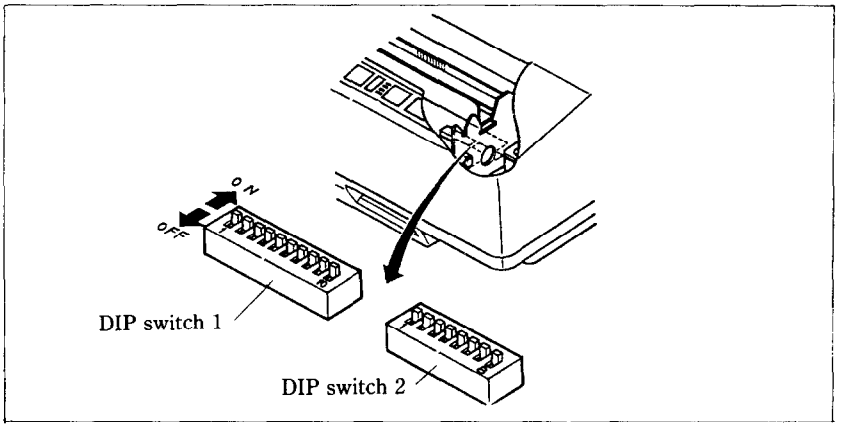


Figure A-1. The DIP switches are located under the printer cover.

Caution: Never change the setting of any of the DIP switches when the power is on. The printer only reads the DIP switch settings at the moment the power is turned on. Turn off power to both the computer and the printer when changing settings, and turn on again to use the new settings.

Table A-1 shows a summary of DIP switch functions.

Table A-1
DIP switch settings

Switch	ON	OFF
Switch 1		
1-1	10 CPI (Normal pica)	17 CPI (Condensed pica)
1-2	Set SELECT IN signal to LOW	Not fixed
1-3	Select internal characters	Select optional characters
1-4	No bottom margin	Set bottom margin to 1 inch
1-5	Character set #1	Character set #2
1-6	International character set selection — see Table A-2.	
1-7		
1-8		
1-9	(Not used)	
1-10	(Not used)	
Switch 2		
2-1	Print mode selection — see Table A-3.	
2-2		
2-3	Ignore download characters	Enable download characters
2-4	Paper-out detected	Paper-out not detected
2-5	Auto CR with line feed	CR from host
2-6	LF from host	Auto LF with CR
2-7	Print "normal zero"	Print "slash zero"
2-8	1/6 inch line feed	1/8 inch line feed

SWITCH FUNCTIONS

Switch **Function**

1-1 This switch selects the default character pitch. If this switch is on, the default pitch is normal pica pitch (10 CPI). If this switch is off, the default pitch

is condensed pica pitch (17 CPI). This switch is set on at the factory.

1-2 This switch controls the status of the SELECT IN signal of the parallel interface. If this switch is on, this signal is held to LOW. If this switch is off, the signal goes HIGH when the printer cannot get data. This switch is set on at the factory.

1-3 This switch selects the default character set. If this switch is on, the internal character set is selected as the default. If this switch is off, the optional character set mounted on the Font slot is selected. (If the cartridge is not mounted, the internal character set is selected.) This switch is set on at the factory.

1-4 This switch determines the default bottom margin. When this switch is on, the bottom margin is not set at power-on. When this switch is off, the bottom margin is automatically set to 1 inch. This switch is set on at the factory.

1-5 This switch selects the default character set with the IBM modes. If this switch is on, the default character set is character set #1. If this switch is off, the default character set is character set #2. If the print mode is not set to IBM modes, this switch have no effect. This switch is set on at the factory.

1-6～1-8 These switches determine the default international character set, as shown in Table A-2. These switches are all set on at the factory.

Table A-2
International character sets

Switch	U.S.A.	France	Germany	England	Denmark	Sweden	Italy	Spain
1-6	ON	OFF	ON	OFF	ON	OFF	ON	OFF
1-7	ON	ON	OFF	OFF	ON	ON	OFF	OFF
1-8	ON	ON	ON	ON	OFF	OFF	OFF	OFF

2-1～2-2 These switches select the active control codes, as shown in Table A-3. The "Standard" mode

emulates the Epson LQ-1000 printer. The "IBM-P" mode emulates the IBM Proprinter, and the "IBM-G" mode emulates the IBM Graphics printer. These switches are set on at the factory.

Table A-3
Print mode selection

Switch	Standard mode	IBM-P mode	IBM-G mode	Not used
2-1	ON	ON	OFF	OFF
2-2	ON	OFF	ON	OFF

2-3 This switch controls the RAM. When this switch is on, the download character definitions are ignored and the RAM is used as a print buffer. When this switch is off, the download character definitions are enable and the print buffer is set to a one line buffer. This switch is set on at the factory.

2-4 This switch disables the paper-out detector. If this switch is on, the printer will signal the computer when it runs out of paper and printing will stop. If this switch is off, the printer will ignore the paper-out detector and will continue printing. This switch is set on at the factory.

2-5 This switch sets the status of the print head after the paper is advanced. When this switch is on, the print head returns to the left margin after the paper is advanced. When this switch is off, the print head does not return to the left margin after the paper is advanced. This switch is set on at the factory.

2-6 When this switch is on, the computer must send a line feed command every time the paper is to advance. When this switch is off, the printer will automatically advance the paper one line every time it receives a carriage return. (Most BASICs send a line feed with every carriage return, therefore, this switch should usually be on.) This switch is set on at the factory.

2-7 This switch selects the print style of zeroes. If this switch is on, normal zeroes are printed. If this switch is off, slashed zeroes are printed. This switch is set on at the factory.

2-8 This switch sets the default line spacing. When this switch is on, the default line spacing is set to 1/6 inch. This means that the printer will advance the paper 1/6 inch each time it receives a line feed. When this switch is off, the default line spacing is 1/8 inch. This switch is set on at the factory.

MEMO

APPENDIX B

ASCII CODE CONVERSION CHART

Decimal	Binary	Hexadecimal	Decimal	Binary	Hexadecimal	Decimal	Binary	Hexadecimal
0	00000000	00	46	00101110	2E	92	01011100	5C
1	00000001	01	47	00101111	2F	93	01011101	5D
2	00000010	02	48	00110000	30	94	01011110	5E
3	00000011	03	49	00110001	31	95	01011111	5F
4	00000100	04	50	00110010	32	96	01100000	60
5	00000101	05	51	00110011	33	97	01100001	61
6	00000110	06	52	00110100	34	98	01100010	62
7	00000111	07	53	00110101	35	99	01100011	63
8	00001000	08	54	00110110	36	100	01100100	64
9	00001001	09	55	00110111	37	101	01100101	65
10	00001010	0A	56	00111000	38	102	01100110	66
11	00001011	0B	57	00111001	39	103	01100111	67
12	00001100	0C	58	00111010	3A	104	01101000	68
13	00001101	0D	59	00111011	3B	105	01101001	69
14	00001110	0E	60	00111100	3C	106	01101010	6A
15	00001111	0F	61	00111101	3D	107	01101011	6B
16	00010000	10	62	00111110	3E	108	01101100	6C
17	00010001	11	63	00111111	3F	109	01101101	6D
18	00010010	12	64	01000000	40	110	01101110	6E
19	00010011	13	65	01000001	41	111	01101111	6F
20	00010100	14	66	01000010	42	112	01110000	70
21	00010101	15	67	01000011	43	113	01110001	71
22	00010110	16	68	01000100	44	114	01110010	72
23	00010111	17	69	01000101	45	115	01110011	73
24	00011000	18	70	01000110	46	116	01110100	74
25	00011001	19	71	01000111	47	117	01110101	75
26	00011010	1A	72	01001000	48	118	01110110	76
27	00011011	1B	73	01001001	49	119	01110111	77
28	00011100	1C	74	01001010	4A	120	01111000	78
29	00011101	1D	75	01001011	4B	121	01111001	79
30	00011110	1E	76	01001100	4C	122	01111010	7A
31	00011111	1F	77	01001101	4D	123	01111011	7B
32	00100000	20	78	01001110	4E	124	01111100	7C
33	00100001	21	79	01001111	4F	125	01111101	7D
34	00100010	22	80	01010000	50	126	01111110	7E
35	00100011	23	81	01010001	51	127	01111111	7F
36	00100100	24	82	01010010	52	128	10000000	80
37	00100101	25	83	01010011	53	129	10000001	81
38	00100110	26	84	01010100	54	130	10000010	82
39	00100111	27	85	01010101	55	131	10000011	83
40	00101000	28	86	01010110	56	132	10000100	84
41	00101001	29	87	01010111	57	133	10000101	85
42	00101010	2A	88	01011000	58	134	10000110	86
43	00101011	2B	89	01011001	59	135	10000111	87
44	00101100	2C	90	01011010	5A	136	10001000	88
45	00101101	2D	91	01011011	5B	137	10001001	89

Decimal	Binary	Hexadecimal	Decimal	Binary	Hexadecimal	Decimal	Binary	Hexadecimal
138	10001010	8A	178	10110010	B2	218	11011010	DA
139	10001011	8B	179	10110011	B3	219	11011011	DB
140	10001100	8C	180	10110100	B4	220	11011100	DC
141	10001101	8D	181	10110101	B5	221	11011101	DD
142	10001110	8E	182	10110110	B6	222	11011110	DE
143	10001111	8F	183	10110111	B7	223	11011111	DF
144	10010000	90	184	10111000	B8	224	11100000	E0
145	10010001	91	185	10111001	B9	225	11100001	E1
146	10010010	92	186	10111010	BA	226	11100010	E2
147	10010011	93	187	10111011	BB	227	11100011	E3
148	10010100	94	188	10111100	BC	228	11100100	E4
149	10010101	95	189	10111101	BD	229	11100101	E5
150	10010110	96	190	10111110	BE	230	11100110	E6
151	10010111	97	191	10111111	BF	231	11100111	E7
152	10011000	98	192	11000000	C0	232	11101000	E8
153	10011001	99	193	11000001	C1	233	11101001	E9
154	10011010	9A	194	11000010	C2	234	11101010	EA
155	10011011	9B	195	11000011	C3	235	11101011	EB
156	10011100	9C	196	11000100	C4	236	11101100	EC
157	10011101	9D	197	11000101	C5	237	11101101	ED
158	10011110	9E	198	11000110	C6	238	11101110	EE
159	10011111	9F	199	11000111	C7	239	11101111	EF
160	10100000	A0	200	11001000	C8	240	11110000	F0
161	10100001	A1	201	11001001	C9	241	11110001	F1
162	10100010	A2	202	11001010	CA	242	11110010	F2
163	10100011	A3	203	11001011	CB	243	11110011	F3
164	10100100	A4	204	11001100	CC	244	11110100	F4
165	10100101	A5	205	11001101	CD	245	11110101	F5
166	10100110	A6	206	11001110	CE	246	11110110	F6
167	10100111	A7	207	11001111	CF	247	11110111	F7
168	10101000	A8	208	11010000	D0	248	11111000	F8
169	10101001	A9	209	11010001	D1	249	11111001	F9
170	10101010	AA	210	11010010	D2	250	11111010	FA
171	10101011	AB	211	11010011	D3	251	11111011	FB
172	10101100	AC	212	11010100	D4	252	11111100	FC
173	10101101	AD	213	11010101	D5	253	11111101	FD
174	10101110	AE	214	11010110	D6	254	11111110	FE
175	10101111	AF	215	11010111	D7	255	11111111	FF
176	10110000	B0	216	11011000	D8			
177	10110001	B1	217	11011001	D9			

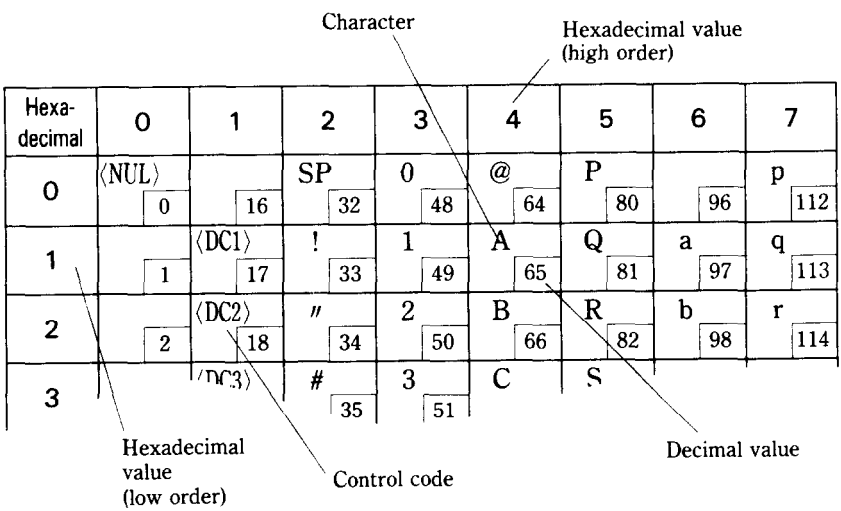
APPENDIX C
CHARACTER CODE TABLE

The purpose of this Appendix is to provide a quick reference for the relationship between the characters available on this printer and the decimal or hexadecimal values.

For example, when you refer the character "A", it sits in the "4" column and the "1" row. So its hexadecimal value is "41". Similarly, it is written "65" close to the character, which shows the decimal value.

When you refer the table, there are many control codes, which are written inside broken brackets.

[Sample]



Hexa-decimal	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	16	SP 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		⟨DC3⟩	# 35	3 51	C	S		

STANDARD MODE CHARACTERS

Hexa-decimal	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	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	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	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

Hexa-decimal	8	9	A	B	C	D	E	F
0	⟨NUL⟩ 128	144	160	0 176	@ 192	P 208	' 224	p 240
1	129	⟨DC1⟩ 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	130	⟨DC2⟩ 146	" 162	2 178	B 194	R 210	b 226	r 242
3	131	⟨DC3⟩ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	132	⟨DC4⟩ 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	133	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	⟨BEL⟩ 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	⟨BS⟩ 136	⟨CAN⟩ 152	(168	8 184	H 200	X 216	h 232	x 248
9	⟨HT⟩ 137	153	) 169	9 185	I 201	Y 217	i 233	y 249
A	⟨LF⟩ 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	⟨VT⟩ 139	⟨ESC⟩ 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	⟨FF⟩ 140	156	, 172	< 188	L 204	\ 220	l 236	¦ 252
D	⟨CR⟩ 141	157	- 173	= 189	M 205	] 221	m 237	} 253
E	⟨SO⟩ 142	158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	⟨SI⟩ 143	159	/ 175	? 191	O 207	_ 223	o 239	⟨DEL⟩ 255

IBM MODE CHARACTERS

■ Character set #1

Hexa-decimal	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	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	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

Hexa-decimal	8	9	A	B	C	D	E	F
0	⟨NUL⟩ 128	144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	129	⟨DC1⟩ 145	í 161	▓ 177	┴ 193	╤ 209	β 225	± 241
2	130	⟨DC2⟩ 146	ó 162	▉ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	131	⟨DC3⟩ 147	ú 163	▏ 179	├ 195	╙ 211	π 227	≤ 243
4	132	⟨DC4⟩ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	133	149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	134	150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	⟨BEL⟩ 135	151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	⟨BS⟩ 136	⟨CAN⟩ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	⟨HT⟩ 137	153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	⟨LF⟩ 138	154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	⟨VT⟩ 139	⟨ESC⟩ 155	½ 171	╗ 187	╦ 203	▊ 219	δ 235	√ 251
C	⟨FF⟩ 140	⟨FS⟩ 156	¼ 172	╝ 188	╠ 204	▌ 220	∞ 236	n 252
D	⟨CR⟩ 141	157	¡ 173	╜ 189	═ 205	▐ 221	Ø 237	² 253
E	⟨SO⟩ 142	158	« 174	╛ 190	╬ 206	▋ 222	∈ 238	■ 254
F	⟨SI⟩ 143	159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

■ Character set #2

Hexa-decimal	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	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	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

Hexa-decimal	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

■ All character set (IBM-P mode only)

Hexa-decimal	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	♥ 3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	♦ 4	¶ 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	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	8	24	(40	8 56	H 72	X 88	h 104	x 120
9	9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	10	→ 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	← 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124
D	13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	15	Ø 31	/ 47	? 63	O 79	_ 95	o 111	127

Hexa-decimal	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

MEMO

APPENDIX D

FUNCTION CODES

The purpose of this Appendix is to provide a quick reference for the various functions available on this printer. Codes are described in the following format.

PURPOSE	**Tells what the function code does.**
MODE	Indicates the valid print emulation mode.
CODE	Control code mnemonic
(decimal ASCII)	ASCII decimal equivalent
(hex ASCII)	Hexadecimal equivalent
REMARKS	Briefly describes how the command is used.
SEE	Tells where any additional details of the command may be found.

Several commands require you to specify a value or values. In these cases, we have used an "*n*" or "*m*" to indicate a variable. You should insert the ASCII code for the proper value here.

COMMANDS TO CONTROL PRINT STYLE

These commands are used to control the font style, the print pitch, and special effects.

■ Font style controls

PURPOSE	**Selects italic characters.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "4"
(decimal ASCII)	27 52
(hex ASCII)	1B 34
MODE	IBM-P
CODE	〈FS〉 "4"
(decimal ASCII)	28 52
(hex ASCII)	1C 34
REMARKS	This command causes all subsequent characters to be printed in italics until italic printing is cancelled. This command is ignored when the Type Style Panel mode is selected at power-on. **NOTE:** In some cases, a character is chipped at the right end of a line with 10-inch type.
SEE	Chapter 4

PURPOSE	**Cancels italic characters.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "5"
(decimal ASCII)	27 53
(hex ASCII)	1B 35
MODE	IBM-P
CODE	〈FS〉 "5"
(decimal ASCII)	28 53
(hex ASCII)	1C 35
REMARKS	This command causes the printer to cancel italic printing and selects the standard roman characters. This command is ignored when the Type Style Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Selects a character set.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"k"	*n*
(decimal ASCII)	27	107	*n*
(hex ASCII)	1B	6B	*n*

REMARKS

This command selects one of the character sets mounted on the printer depending the value of the *n*. When the value of *n* is 0 then the character set is selected the internal character set. When *n* is 1 it is selected the character set mounted on the Font 1 slot. When *n* is 2 it is selected the character set mounted on the Font 2 slot for the 15-inch type printer. This command is ignored when the Type Style Panel mode is selected at power-on.

SEE Chapter 4

PURPOSE **Selects an international character set.**

MODE	Standard, IBM-G		
CODE	〈ESC〉	"R"	*n*
(decimal ASCII)	27	82	*n*
(hex ASCII)	1B	52	*n*
MODE	IBM-P		
CODE	〈FS〉	"R"	*n*
(decimal ASCII)	28	82	*n*
(hex ASCII)	1C	52	*n*

REMARKS This command selects the international character set according to the value of *n* as shown in the table below:

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

You can select a specific international character set (except Japan, Norway, Denmark type II, Spain type II, and Latin America), as a power-on default by adjusting the settings of DIP switches 1-6, 1-7, and 1-8.

SEE Chapter 6

PURPOSE	**Selects character set #2.**
MODE	IBM-G, IBM-P
CODE	〈ESC〉 "6"
(decimal ASCII)	27 54
(hex ASCII)	1B 36
REMARKS	This command selects character set #2 when the IBM mode is selected. You can select character set #2 as the power-on default by turning DIP switch 1-5 off while the IBM mode is selected.
SEE	Chapter 6

PURPOSE	**Selects character set #1.**
MODE	IBM-G, IBM-P
CODE	〈ESC〉 "7"
(decimal ASCII)	27 55
(hex ASCII)	1B 37
REMARKS	This command cancels character set #2 and selects character set #1 when the IBM mode is selected. You can select character set #1 as the power-on default by turning DIP switch 1-5 on while the IBM mode is selected.
SEE	Chapter 6

PURPOSE	**Selects LQ characters.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"x"	1
(decimal ASCII)	27	120	1
(hex ASCII)	1B	78	01

REMARKS

This command causes the printer to print letter quality (LQ) characters until the LQ mode is cancelled. This command is ignored when the Quality Panel mode is selected at power-on.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 4

PURPOSE	**Cancels LQ characters.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"x"	0
(decimal ASCII)	27	120	0
(hex ASCII)	1B	78	00

REMARKS

This command cancels LQ printing and returns the printer to the draft mode. This command is ignored when the Quality Panel mode is selected at power-on.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 4

PURPOSE	**Selects LQ characters.**		
MODE	IBM-P		
CODE	⟨ESC⟩	"I"	2
(decimal ASCII)	27	73	2
(hex ASCII)	1B	49	02

REMARKS

This command causes the printer to print letter quality (LQ) characters until the LQ mode is cancelled. This command is ignored when the Quality Panel mode is selected at power-on.
NOTE: The character "2" (decimal code 50, hexadecimal code 32) can be used instead of ASCII 2.

SEE Chapter 4

PURPOSE	**Selects draft characters.**		
MODE	IBM-P		
CODE	⟨ESC⟩	"I"	0
(decimal ASCII)	27	73	0
(hex ASCII)	1B	49	00

REMARKS

This command cancels LQ printing and returns the printer to draft mode. This command is ignored when the Quality Panel mode is selected at power-on.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 4

■ Font pitch controls

PURPOSE	**Sets the print pitch to pica.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "P"
(decimal ASCII)	27 80
(hex ASCII)	1B 50
REMARKS	This command causes printing to be done in pica pitch, with 80 characters per line on the 10-inch type and 136 characters per line on the 15-inch type. You can select the pica pitch as the power-on default by turning DIP switch 1-1 on. This command is ignored when the Print Pitch Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Sets the print pitch to elite.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "M"
(decimal ASCII)	27 77
(hex ASCII)	1B 4D
REMARKS	This command causes printing to be done in elite pitch, with 96 characters per line on the 10-inch type and 163 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Sets the print pitch to elite.**
MODE	IBM-P
CODE	〈ESC〉 ":"
(decimal ASCII)	27 58
(hex ASCII)	1B 3A
REMARKS	This command causes printing to be done in elite pitch, with 96 characters per line on the 10-inch type and 163 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Sets the print pitch to semi-condensed.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "g"
(decimal ASCII)	27 103
(hex ASCII)	1B 67
REMARKS	This command causes printing to be done in semi-condensed pitch, with 120 characters per line on the 10-inch type and 204 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Sets the printer to condensed print.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨SI⟩
(decimal ASCII)	15
(hex ASCII)	0F
REMARKS	This command causes printing to be done in condensed pitch, with 137 characters per line or 233 characters per line for pica condensed, and 160 characters per line or 272 characters per line for elite condensed. You can select the pica condensed pitch as the power-on default by turning DIP switch 1-1 off. This command is ignored when the Print Pitch Panel mode is selected at power-on. **NOTE:** This command sets the printer to pica condensed print only with the IBM-P mode.
SEE	Chapter 4

PURPOSE	**Sets the printer to condensed print.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨ESC⟩ ⟨SI⟩
(decimal ASCII)	27 15
(hex ASCII)	1B 0F
REMARKS	Same as ⟨SI⟩, above.
SEE	Chapter 4

PURPOSE	**Cancels condensed print.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨DC2⟩
(decimal ASCII)	18
(hex ASCII)	12
REMARKS	This command cancels condensed printing and returns the printer to the normal print pitch. This command is ignored when the Print Pitch Panel mode is selected at power-on.
SEE	Chapter 4

PURPOSE	**Sets the printer to proportional print.**		
MODE	Standard, IBM-G, IBM-P		
CODE	⟨ESC⟩	"p"	1
(decimal ASCII)	27	112	1
(hex ASCII)	1B	70	01
REMARKS	This command causes all subsequent characters except draft characters to be printed with proportional spacing until proportional printing is cancelled. This command is ignored when the Print Pitch Panel mode is selected at power-on. **NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.		
SEE	Chapter 4		

PURPOSE	**Cancels proportional print.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "p" 0
(decimal ASCII)	27 112 0
(hex ASCII)	1B 70 00
REMARKS	This command cancels proportional printing and returns to "fixed pitch" printing. This command is ignored when the Print Pitch Panel mode is selected at power-on. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.
SEE	Chapter 4

PURPOSE	**Sets the printer to expanded print.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "W" 1
(decimal ASCII)	27 87 1
(hex ASCII)	1B 57 01
REMARKS	This command causes characters to be printed twice as wide as normal (half the current pitch) until expanded printing is cancelled. **NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.
SEE	Chapter 4

PURPOSE	**Cancels expanded print.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "W" 0
(decimal ASCII)	27 87 0
(hex ASCII)	1B 57 00
REMARKS	This command resets the character pitch to what it was before expanded printing was set. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.
SEE	Chapter 4

PURPOSE	**Sets the printer to expanded print for the remainder of the current line.**
MODE	Standard, IBM-G, IBM-P
CODE	〈SO〉
(decimal ASCII)	14
(hex ASCII)	0E
REMARKS	This command causes characters to be printed twice as wide as normally until a carriage return is sent. It can also be cancelled with 〈DC4〉.
SEE	Chapter 4

PURPOSE	**Sets the printer to expanded print for the remainder of the current line.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 〈SO〉
(decimal ASCII)	27 14
(hex ASCII)	1B 0E
REMARKS	Same as 〈SO〉, above.
SEE	Chapter 4

PURPOSE	**Cancels one line expanded print.**
MODE	Standard, IBM-G, IBM-P
CODE	〈DC4〉
(decimal ASCII)	20
(hex ASCII)	14
REMARKS	This command cancels one line expanded print set with 〈SO〉 or 〈ESC〉 〈SO〉.
SEE	Chapter 4

■ Special print modes

PURPOSE	**Sets the master print mode.**		
MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"!"	*n*
(decimal ASCII)	27	33	*n*
(hex ASCII)	1B	21	*n*
REMARKS	This is a powerful command that allows the user to set several printing characteristics at one time: print pitch, condensed print, expanded print, boldface, italics, underlining, or any combination of these, as determined by *n*, a number from 0 to 255. (See Table 4-11 for details.)		
SEE	Chapter 4		

PURPOSE	**Selects emphasized printing.**	
MODE	Standard, IBM-G, IBM-P	
CODE	〈ESC〉	"E"
(decimal ASCII)	27	69
(hex ASCII)	1B	45
REMARKS	This command causes characters to be printed in emphasized until cancelled.	
SEE	Chapter 4	

PURPOSE	**Cancels emphasized printing.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "F"
(decimal ASCII)	27 70
(hex ASCII)	1B 46
REMARKS	This command cancels emphasized printing and returns the printer to normal printing.
SEE	Chapter 4

PURPOSE	**Selects boldface printing.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "G"
(decimal ASCII)	27 71
(hex ASCII)	1B 47
REMARKS	This command causes characters to be printed in boldface until cancelled.
SEE	Chapter 4

PURPOSE	**Cancels boldface printing.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "H"
(decimal ASCII)	27 72
(hex ASCII)	1B 48
REMARKS	This command turns off boldface printing and returns the printer to normal printing.
SEE	Chapter 4

PURPOSE	**Selects underlining.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"–"	1
(decimal ASCII)	27	45	1
(hex ASCII)	1B	2D	01

REMARKS — This command underlines the following characters until cancelled.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE — Chapter 4

PURPOSE	**Cancels underlining.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"–"	0
(decimal ASCII)	27	45	0
(hex ASCII)	1B	2D	00

REMARKS — This command stops underlining.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE — Chapter 4

PURPOSE	**Selects overlining.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"_"	1
(decimal ASCII)	27	95	1
(hex ASCII)	1B	5F	01

REMARKS — This command prints a line above the following characters until cancelled.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE — Chapter 4

PURPOSE	**Cancels overlining.**		
MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"_"	0
(decimal ASCII)	27	95	0
(hex ASCII)	1B	5F	00
REMARKS	This command stops overlining. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 4		

PURPOSE	**Selects superscripts.**		
MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"S"	0
(decimal ASCII)	27	83	0
(hex ASCII)	1B	53	00
REMARKS	This command raises the following characters and prints them as superscripts until cancelled. Superscripts are not printed as condensed pitch. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 4		

PURPOSE	**Selects subscripts.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "S" 1
(decimal ASCII)	27 83 1
(hex ASCII)	1B 53 01
REMARKS	This command lowers the following characters and prints them as subscripts until cancelled. All conditions appliable to superscripts also apply to subscripts. **NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.
SEE	Chapter 4

PURPOSE	**Cancels a superscript or subscript.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "T"
(decimal ASCII)	27 84
(hex ASCII)	1B 54
REMARKS	This command stops printing of superscripts or subscripts and returns to the normal printing previously set.
SEE	Chapter 4

CONTROLLING THE VERTICAL PRINT POSITION

These commands are used to move the paper relative to the print head. By moving the paper up or down, the print head, in effect, moves the opposite direction (down or up) on the page.

■ Line feed and reverse line feed controls

PURPOSE	**Advances the paper one line (line feed).**
MODE	Standard, IBM-G, IBM-P
CODE	〈LF〉
(decimal ASCII)	10
(hex ASCII)	0A
REMARKS	The actual distance advanced by the line feed is set either through DIP switch 2-8 or through various codes which can be sent (see below). When the DIP switch 2-6 is off, a line feed is automatically generated whenever the printer receives a carriage return.
SEE	Chapter 5

PURPOSE	**Reverses the paper one line.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 〈LF〉
(decimal ASCII)	27 10
(hex ASCII)	1B 0A
REMARKS	This command causes the printer to reverse the paper (in effect moving the print head up on the sheet) one line. The actual distance travelled is set through various codes (see below). You cannot reverse the paper more than one inch when the optional automatic sheet feeder in installed.
SEE	Chapter 5

PURPOSE	**Sets line spacing to 1/8 inch.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "0"
(decimal ASCII)	27 48
(hex ASCII)	1B 30
REMARKS	This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 1/8 inch. You can select 1/8 inch line spacing as the power-on default by turning DIP switch 2-8 off.
SEE	Chapter 5

PURPOSE	**Sets line spacing to 1/6 inch.**
MODE	Standard
CODE	〈ESC〉 "2"
(decimal ASCII)	27 50
(hex ASCII)	1B 32
MODE	IBM-G, IBM-P
CODE	〈FS〉 "2"
(decimal ASCII)	28 50
(hex ASCII)	1C 32
REMARKS	This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 1/6 inch. You can select 1/6 inch line spacing as the power-on default by turning DIP switch 2-8 on.
SEE	Chapter 5

PURPOSE	**Sets line spacing to 7/60 inch or 7/72 inch.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "1"
(decimal ASCII)	27 49
(hex ASCII)	1B 31
REMARKS	This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 7/60 inch with the Standard mode, or 7/72 inch with the IBM modes.
SEE	Chapter 5

PURPOSE	**Sets line spacing to *n*/180 inch or *n*/216 inch.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "3" *n*
(decimal ASCII)	27 51 *n*
(hex ASCII)	1B 33 *n*
REMARKS	This command sets the actual distance the paper advances or reverses during all subsequent line feeds to *n*/180 inch with the Standard mode or *n*/216 inch with the IBM modes. The value of *n* must be between 1 and 255.
SEE	Chapter 5

PURPOSE	**Sets line spacing to *n*/60 inch or *n*/72 inch.**		
MODE	Standard		
CODE	⟨ESC⟩	"A"	*n*
(decimal ASCII)	27	65	*n*
(hex ASCII)	1B	41	*n*
MODE	IBM-G, IBM-P		
CODE	⟨FS⟩	"A"	*n*
(decimal ASCII)	28	65	*n*
(hex ASCII)	1C	41	*n*

REMARKS

This command sets the actual distance the paper advances or reverses during all subsequent line feeds to *n*/60 inch with the Standard mode or *n*/72 inch with the IBM modes immediately. The value of *n* must be between 0 and 255.

SEE

Chapter 5

PURPOSE	**Defines line spacing to *n*/72 inch.**		
MODE	IBM-G, IBM-P		
CODE	⟨ESC⟩	"A"	*n*
(decimal ASCII)	27	65	*n*
(hex ASCII)	1B	41	*n*

REMARKS

This command defines the actual distance the paper advances or reverses during all subsequent line feeds to *n*/72 inch. This command must be used in conjunction with ⟨ESC⟩ "2" which activates the ⟨ESC⟩ "A" definition. The value of *n* must be between 1 and 85.

SEE

Chapter 5

PURPOSE	**Uses ⟨ESC⟩ "A" definition.**
MODE	IBM-G, IBM-P
CODE	⟨ESC⟩ "2"
(decimal ASCII)	27 50
(hex ASCII)	1B 32
REMARKS	This command activates the line spacing defined in the ⟨ESC⟩ "A" command. If the ⟨ESC⟩ "A" command has not been defined, the line spacing is changed to 1/6 inch.
SEE	Chapter 5

PURPOSE	**Sends a one-time paper feed of *n*/180 inch or *n*/216 inch.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨ESC⟩ "J" *n*
(decimal ASCII)	27 74 *n*
(hex ASCII)	1B 4A *n*
REMARKS	This command causes the printer to advance the paper *n*/180 inch with the Standard mode or *n*/216 inch with the IBM modes. It does not change the current value of line spacing and it does not cause a carriage return. The value of *n* must be between 0 and 255.
SEE	Chapter 5

PURPOSE	**Sends a one-time reverse feed of *n*/180 inch or *n*/216 inch.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"j"	*n*
(decimal ASCII)	27	106	*n*
(hex ASCII)	1B	6A	*n*

REMARKS

This command causes the printer to reverse the paper *n*/180 inch with the Standard mode or *n*/216 inch with the IBM modes. It does not change the current value of line spacing and it does not cause a carriage return. The value of *n* must be between 0 and 255.

SEE

Chapter 5

PURPOSE

Sets print position to *n* lines.

MODE

Standard, IBM-G, IBM-P

CODE	〈ESC〉	"f"	1	*n*
(decimal ASCII)	27	102	1	*n*
(hex ASCII)	1B	66	01	*n*

REMARKS

This command sets the next print position to the *n*th line from the top of the current page.

NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE

Chapter 5

■ Form feed and related commands

PURPOSE	**Advances the paper to the top of the next page (form feed).**
MODE	Standard, IBM-G, IBM-P
CODE	〈FF〉
(decimal ASCII)	12
(hex ASCII)	0C
REMARKS	The actual length of a page ejected by a form feed is set either by setting of the control panel key or through various codes (see below). This command works as the paper eject command when the optional automatic sheet feeder is installed.
SEE	Chapter 5

PURPOSE	**Reverses the paper to the top of the current page.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 〈FF〉
(decimal ASCII)	27 12
(hex ASCII)	1B 0C
REMARKS	This command causes the printer to reverse the paper to the top of the current printing page (or form). This command is ignored when the optional automatic sheet feeder is installed.
SEE	Chapter 5

PURPOSE **Sets page length to *n* inches.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"C"	0	*n*
(decimal ASCII)	27	67	0	*n*
(hex ASCII)	1B	43	00	*n*

REMARKS This command sets the length of all subsequent pages to *n* inches. The value of *n* must be between 1 and 22. You can select a power-on default form length by setting the Form Length dial on the control panel. This command is ignored when the optional automatic sheet feeder is installed.

SEE Chapter 5

PURPOSE **Sets page length to *n* lines.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"C"	*n*
(decimal ASCII)	27	67	*n*
(hex ASCII)	1B	43	*n*

REMARKS This command sets the length of all subsequent pages to *n* lines. The value of *n* must be between 1 and 127. This command is ignored when the optional automatic sheet feeder is installed.

SEE Chapter 5

PURPOSE **Sets the top of form to the current position.**

MODE IBM-P

CODE	⟨ESC⟩	"4"
(decimal ASCII)	27	52
(hex ASCII)	1B	34

REMARKS This command sets the top of form to the current position.

SEE Chapter 4

■ Top/Bottom margins and vertical tabs

PURPOSE **Sets the top margin.**

MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"r"	*n*
(decimal ASCII)	27	114	*n*
(hex ASCII)	1B	72	*n*

REMARKS This command sets the top margin to *n* lines. Printing begins on the (*n* + 1)th line on the page. This command is ignored when the optional automatic sheet feeder is installed. The value of *n* must be between 1 and 255.

SEE Chapter 5

PURPOSE **Sets the bottom margin.**

MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"N"	*n*
(decimal ASCII)	27	78	*n*
(hex ASCII)	1B	4E	*n*

REMARKS This command sets the bottom margin to *n* lines. The printer will generate a form feed whenever there are *n* lines left on the page. This command is ignored when the optional automatic sheet feeder is installed. The value of *n* must be between 1 and 127.

SEE Chapter 5

PURPOSE	**Cancels top and bottom margins.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "O"
(decimal ASCII)	27 79
(hex ASCII)	1B 4F
REMARKS	This command cancels both the top margin and the bottom margin.
SEE	Chapter 5

PURPOSE	**Advances paper to the next vertical tab position.**
MODE	Standard, IBM-G, IBM-P
CODE	〈VT〉
(decimal ASCII)	11
(hex ASCII)	0B
REMARKS	This command causes the paper to be advanced to the next vertical tab position, or the top of the next page, whichever is first. If the vertical tab positions are not set, this command works as a line feed command.
SEE	Chapter 5

PURPOSE **Sets vertical tab positions.**

MODE	Standard, IBM-G, IBM-P			
CODE	⟨ESC⟩	"B"	*n1 n2 n3 ...*	0
(decimal ASCII)	27	66	*n1 n2 n3 ...*	0
(hex ASCII)	1B	42	*n1 n2 n3 ...*	00

REMARKS This command cancels all current vertical tab positions and sets those defined at lines *n1*, *n2*, *n3*, etc. The maximum number of vertical tab positions allowed is 16. The ASCII 0 character is used as a command terminator. Each vertical tab position must be specified in ascending order.

SEE Chapter 5

PURPOSE **Selects vertical channels.**

MODE	Standard, IBM-G, IBM-P		
CODE	⟨ESC⟩	"/"	*n0*
(decimal ASCII)	27	47	*n0*
(hex ASCII)	1B	2F	*n0*

REMARKS This command selects one of the multiple vertical channels determined by the value of *n0*. The value of *n0* must be between 0 and 7.

SEE Chapter 5

PURPOSE **Sets vertical tab positions in a channel.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"b"	*n0 n1 n2 n3 ...*	0
(decimal ASCII)	27	98	*n0 n1 n2 n3 ...*	0
(hex ASCII)	1B	62	*n0 n1 n2 n3 ...*	00

REMARKS This command cancels all current vertical tab positions in channel *n0* and sets those defined at lines *n1*, *n2*, *n3*, etc. The maximum number of vertical tab positions for each channel allowed is 16. The ASCII 0 character is used as a command terminator. Each vertical tab position must be specified in ascending order. The vertical channel *n0* must be between 0 and 7.

SEE Chapter 5

PURPOSE **Sets vertical tab positions every *n* lines.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"e"	1	*n*
(decimal ASCII)	27	101	1	*n*
(hex ASCII)	1B	65	01	*n*

REMARKS This command cancels all current vertical tab positions and sets those every *n* lines.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 5

PURPOSE	**Cancels vertical tab positions.**
MODE	IBM-P
CODE	〈ESC〉 "R"
(decimal ASCII)	27 82
(hex ASCII)	1B 52
REMARKS	This command cancels the vertical tab positions. This command also sets the horizontal tab positions every 8 characters.
SEE	Chapter 5

CONTROLLING THE HORIZONTAL PRINT POSITION

This section described commands that move the print head and restrict its printing range (such as setting margins and tabs).

PURPOSE	**Returns print head to the left margin (carriage return).**
MODE	Standard, IBM-G, IBM-P
CODE	〈CR〉
(decimal ASCII)	13
(hex ASCII)	0D
REMARKS	This command returns the print head to the left margin. If DIP switch 2-6 has been set off, then this command will also cause a line feed character to be generated after the carriage retuen, thereby advancing to the beginning of the next print line automatically.
SEE	Chapter 5

PURPOSE **Sets carriage return function with a line feed.**

MODE	IBM-P		
CODE	⟨ESC⟩	"5"	1
(decimal ASCII)	27	53	1
(hex ASCII)	1B	35	01

REMARKS This command sets the carriage return function with a line feed. When the ⟨CR⟩ command is sent to the printer after this command has been sent, the printer automatically advances the paper one line.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 5

PURPOSE **Sets carriage return function without a line feed.**

MODE	IBM-P		
CODE	⟨ESC⟩	"5"	0
(decimal ASCII)	27	53	0
(hex ASCII)	1B	35	00

REMARKS This command sets the carriage return function without a line feed. After this command has been sent to the printer, the print head returns to the left margin of the current line every time it receives a carriage return.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 5

PURPOSE **Sets the left and right margins.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"X"	*n1*	*n2*
(decimal ASCII)	27	88	*n1*	*n2*
(hex ASCII)	1B	58	*n1*	*n2*

REMARKS This command sets the left margin to *n1* characters and the right margin to *n2*. The values of *n1* and *n2* must be between 0 and 255, and *n2* should be greater than *n1*. You can set the left and right margins manually on the control panel.

NOTE: Changing the print pitch after the margins have been set does not change the margins — they stay in exactly the same place on the page.

SEE Chapter 5

PURPOSE **Sets the left margin.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"l"	*n*
(decimal ASCII)	27	108	*n*
(hex ASCII)	1B	6C	*n*

REMARKS This command sets the left margin to *n* characters. Each line will begin in the (*n* + 1)th character position from the left edge. The value of *n* must be between 0 and 255. You can set the left margin manually on the control panel.

NOTE: Changing the print pitch after the left margin has been set does not change the margin — it stays in exactly the same place on the page.

SEE Chapter 5

PURPOSE	**Sets the right margin.**		
MODE	Standard, IBM-G		
CODE	⟨ESC⟩	"Q"	*n*
(decimal ASCII)	27	81	*n*
(hex ASCII)	1B	51	*n*
MODE	IBM-P		
CODE	⟨FS⟩	"Q"	*n*
(decimal ASCII)	28	81	*n*
(hex ASCII)	1C	51	*n*

REMARKS

This command sets the right margin to *n*, which is the last character position that will be printed in a line. After execution of this command, any attempt to print beyond print position *n* will cause the printer to automatically generate a carriage return and a line feed before printing the remainder of the line. The value of *n* must be between 2 and 255. You can set the right margin manually on the control panel.

NOTE: Changing the print pitch after the right margin has been set does not change the margin — it stays in exactly the same position on the page.

SEE

Chapter 5

PURPOSE	**Moves the print head to the next horizontal tab position.**
MODE	Standard, IBM-G, IBM-P
CODE	〈HT〉
(decimal ASCII)	9
(hex ASCII)	09
REMARKS	This command causes the print head to advance to the next horizontal tab position. The horizontal tab positions are set at power-on to print positions 8, 16, 24, etc. (to the maximum print position).
SEE	Chapter 5

PURPOSE	**Sets horizontal tab positions.**			
MODE	Standard, IBM-G, IBM-P			
CODE	〈ESC〉	"D"	*n1 n2 n3 ...*	0
(decimal ASCII)	27	68	*n1 n2 n3 ...*	0
(hex ASCII)	1B	44	*n1 n2 n3 ...*	00
REMARKS	This command cancels all current horizontal tab positions and sets those defined at print positions *n1*, *n2*, *n3*, etc. The maximum number of horizontal tab positions allowed is 28. The ASCII 0 character is used as a command terminator. Each horizontal tab position must be specified in ascending order.			
SEE	Chapter 5			

PURPOSE	**Sets horizontal tab positions every *n* characters.**			
MODE	Standard, IBM-G, IBM-P			
CODE	〈ESC〉	"e"	0	*n*
(decimal ASCII)	27	101	0	*n*
(hex ASCII)	1B	65	00	*n*

REMARKS

This command cancels all current horizontal tab positions and sets those every *n* characters

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE

Chapter 5

PURPOSE	**Sets the horizontal tab positions to every 8 characters.**		
MODE	IBM-P		
CODE	〈ESC〉	"R"	
(decimal ASCII)	27	82	
(hex ASCII)	1B	52	

REMARKS

This command cancels all current horizontal tab positions and sets those every 8 characters. This command also cancels the vertical tab positions.

SEE

Chapter 5

PURPOSE **Moves the print head to an absolute horizontal position.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"$"	*n1*	*n2*
(decimal ASCII)	27	36	*n1*	*n2*
(hex ASCII)	1B	24	*n1*	*n2*

REMARKS This command causes the printer to move the print head to an absolute horizontal position. The position, in inches, is determined by the formula $(n1 + n2 \times 256)/60$.

SEE Chapter 5

PURPOSE **Moves the print head to a specified horizontal position.**

MODE Standard, IBM-G

CODE	⟨ESC⟩	"\"	*n1*	*n2*
(decimal ASCII)	27	92	*n1*	*n2*
(hex ASCII)	1B	5C	*n1*	*n2*

MODE IBM-P

CODE	⟨FS⟩	"\"	*n1*	*n2*
(decimal ASCII)	28	92	*n1*	*n2*
(hex ASCII)	1C	5C	*n1*	*n2*

REMARKS This command causes the printer to move the print head to a specified horizontal position. It can move the print head either left or right. The distance is determined by the formula $(n1 + n2 \times 256)$ dots.

To move to the left, add 64 to the calculated value of *n2*. The command will be ignored if you try to move to a position outside the current margins.

SEE Chapter 5

PURPOSE	**Adds *n* dot spaces between characters.**
MODE	Standard

CODE	⟨ESC⟩	*"space"*	*n*
(decimal ASCII)	27	32	*n*
(hex ASCII)	1B	20	*n*

REMARKS — This command increases the space between characters by *n* dots. The value of *n* must be between 0 and 127.

SEE — Chapter 6

PURPOSE	**Sets the print position to *n* characters.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"f"	0	*n*
(decimal ASCII)	27	102	0	*n*
(hex ASCII)	1B	66	00	*n*

REMARKS — This command sets the next print position to *n* columns from the left margin. The value of *n* must be between 0 and 127.

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE — Chapter 5

PURPOSE **Sets alignment, or centering.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"a"	*n*
(decimal ASCII)	27	97	*n*
(hex ASCII)	1B	61	*n*

REMARKS This command causes the printer to format text as follows:

n	Text formatting
0	Left justified (ragged right margin)
1	Centered
2	Right justified
3	Right and left justified

SEE Chapter 5

DOWNLOAD CHARACTER COMMANDS

PURPOSE	**Defines download characters into RAM.**			
MODE	Standard, IBM-G			
CODE	⟨ESC⟩	"&"	0	*n1 n2 m0 m1 m2 d1 d2 ... dx*
(decimal ASCII)	27	38	0	*n1 n2 m0 m1 m2 d1 d2 ... dx*
(hex ASCII)	1B	26	00	*n1 n2 m0 m1 m2 d1 d2 ... dx*
MODE	IBM-P			
CODE	⟨ESC⟩	"="	0	*n1 n2 m0 m1 m2 d1 d2 ... dx*
(decimal ASCII)	27	61	0	*n1 n2 m0 m1 m2 d1 d2 ... dx*
(hex ASCII)	1B	3D	00	*n1 n2 m0 m1 m2 d1 d2 ... dx*

REMARKS

This command is used to define one or more user-defined characters and to store them into RAM for later use. RAM is cleared when the power is turned off. The values of *n1* and *n2* specify the range of positions in RAM that the characters are to occupy. Valid character positions are any number between 32 and 126 or between 160 and 255. Following *n2* the printer expects character data bytes for each character to be defined. The first byte, *m0*, specifies the left hand space of the download character. The second byte, *m1*, specifies the character width. And the third byte, *m2*, specifies the right hand space of the character. *d1* through *dx* determine which dots form the character.

NOTE: This command is ignored when the DIP switch 2-3 is set on.

SEE

Chapter 7

PURPOSE	**Copies standard character ROM font into RAM.**				
MODE	Standard, IBM-G				
CODE	〈ESC〉	":"	0	0	0
(decimal ASCII)	27	58	0	0	0
(hex ASCII)	1B	3A	00	00	00
MODE	IBM-P				
CODE	〈FS〉	":"	0	0	0
(decimal ASCII)	28	58	0	0	0
(hex ASCII)	1C	3A	00	00	00

REMARKS

This command copies all the standard characters to the corresponding download character RAM area. This destroys any existing user-defined characters in that range.
NOTE: This command is ignored when the DIP switch 2-3 is set on.

SEE

Chapter 7

PURPOSE	**Selects download character set.**		
MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"%"	1
(decimal ASCII)	27	37	1
(hex ASCII)	1B	25	01

REMARKS

This command causes the printer to select the download character set.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE

Chapter 7

PURPOSE	**Cancels download character set.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "%" 0
(decimal ASCII)	27 37 0
(hex ASCII)	1B 25 00
REMARKS	This command cancels the download character set and selects the previous character set. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.
SEE	Chapter 7

PURPOSE	**Selects draft download character set.**
MODE	IBM-P
CODE	〈ESC〉 "I" 4
(decimal ASCII)	27 73 4
(hex ASCII)	1B 49 04
REMARKS	This command causes the printer to select the draft download character set. **NOTE:** The character "4" (decimal code 52, hexadecimal code 34) can be used instead of ASCII 4.
SEE	Chapter 7

PURPOSE	**Selects LQ download character set.**		
MODE	IBM-P		
CODE	⟨ESC⟩	"I"	6
(decimal ASCII)	27	73	6
(hex ASCII)	1B	49	06
REMARKS	This command causes the printer to select the LQ download character set. **NOTE:** The character "6" (decimal code 54, hexadecimal code 36) can be used instead of ASCII 6.		
SEE	Chapter 7		

DOT GRAPHICS COMMANDS

PURPOSE	**Prints 8-dot normal-density graphics.**		
MODE	Standard, IBM-G, IBM-P		
CODE	⟨ESC⟩	"K"	*n1 n2 m1 m2* .....
(decimal ASCII)	27	75	*n1 n2 m1 m2* .....
(hex ASCII)	1B	4B	*n1 n2 m1 m2* .....
REMARKS	This command selects 60 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* represent the number of graphics characters to be printed, where the total number of characters = *n2* times 256 + *n1*. The correct number of graphics data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII values of these bytes determine which pins are fired for each character.		
SEE	Chapter 7		

PURPOSE	**Prints 8-dot double-density graphics.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "L" *n1 n2 m1 m2 .....*
(decimal ASCII)	27 76 *n1 n2 m1 m2 .....*
(hex ASCII)	1B 4C *n1 n2 m1 m2 .....*
REMARKS	This command selects 120 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* are the same as in normal-density graphics. The correct number of graphics data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII values of these bytes determine which pins are fired for each character.
SEE	Chapter 7

PURPOSE	**Prints 8-dot double-density graphics at double-speed.**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "Y" *n1 n2 m1 m2 .....*
(decimal ASCII)	27 89 *n1 n2 m1 m2 .....*
(hex ASCII)	1B 59 *n1 n2 m1 m2 .....*
REMARKS	This command selects 120 dots-per-inch, column-scan, bit-image graphics mode at double-speed. The values of *n1* and *n2* are the same as in normal-density graphics. The correct number of graphics data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII values of these bytes determine which pins are fired for each character.
SEE	Chapter 7

PURPOSE **Prints 8-dot quadruple-density graphics.**

MODE Standard, IBM-G, IBM-P

CODE	〈ESC〉	"Z"	*n1 n2 m1 m2* .....
(decimal ASCII)	27	90	*n1 n2 m1 m2* .....
(hex ASCII)	1B	5A	*n1 n2 m1 m2* .....

REMARKS This command selects 240 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* are the same as in normal-density graphics. The correct number of graphics data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII values of these bytes determine which pins are fired for each character.

SEE Chapter 7

PURPOSE **Selects graphics modes.**

MODE Standard, IBM-G, IBM-P

CODE	〈ESC〉	"*"	*n0 n1 n2 m1 m2* .....
(decimal ASCII)	27	42	*n0 n1 n2 m1 m2* .....
(hex ASCII)	1B	2A	*n0 n1 n2 m1 m2* .....

REMARKS This command selects one eleven possible graphics modes, depending on the value of *n0*. The values of *n1* and *n2* are the same as normal-density graphics mode. The correct number of graphics data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII values of these bytes determine which pins are fired for each character. The value of *n0* and its related graphics modes are shown below.

n	Graphics mode
0	8-dot normal-density (60 dots per inch)
1	8-dot double-density (120 dots per inch)

2 8-dot double-density at double-speed (120 dots per inch)
3 8-dot quadruple-density (240 dots per inch)
4 8-dot semi-double density (80 dots per inch)
6 8-dot CRT graphics (90 dots per inch)
32 24-dot normal-density (60 dots per inch)
33 24-dot double-density (120 dots per inch)
38 24-dot CRT graphics (90 dots per inch)
39 24-dot triple-density (180 dots per inch)
40 24-dot hexa-density (360 dots per inch)

SEE Chapter 7

PURPOSE **Redefines the graphics mode.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"?"	*n0*	*n1*
(decimal ASCII)	27	63	*n0*	*n1*
(hex ASCII)	1B	3F	*n0*	*n1*

REMARKS This command redefines one of the 4 alternate graphics commands — ⟨ESC⟩ "K", ⟨ESC⟩ "L", ⟨ESC⟩ "Y", or ⟨ESC⟩ "Z" — as one of the eleven graphics density numbers with the ⟨ESC⟩ "*" command, where *n0* is "K", "L", "Y", or "Z" and *n1* is 0, 1, 2, 3, 4, 6, 32, 33, 38, 39 or 40.

SEE Chapter 7

OTHER COMMANDS

PURPOSE	**Sets the value of the eighth data bit to logical 1.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "〉"
(decimal ASCII)	27 62
(hex ASCII)	1B 3E
REMARKS	This command forces the eighth data bit of each subsequent character sent to the printer to logical 1. This code allows users with a 7-bit interface to access those characters whose ASCII code is greater than 127. This code should not be used to transmit printer control codes.
SEE	Chapter 6

PURPOSE	**Sets the value of the eighth data bit to logical 0.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "="
(decimal ASCII)	27 61
(hex ASCII)	1B 3D
REMARKS	This command forces the eighth data bit of each subsequent character sent to the printer to logical 0. This code should not be used to transmit printer control code.
SEE	Chapter 6

PURPOSE	**Accepts the value of the eighth data bit as is.**
MODE	Standard, IBM-G
CODE	〈ESC〉 "#"
(decimal ASCII)	27 35
(hex ASCII)	1B 23
REMARKS	This command cancels either setting of the eighth data bit. The printer will use the value of the eighth data bit that is sent from the computer. This code allows users with a 7-bit interface to resume normal functions after accessing those characters whose ASCII code is greater than 127.
SEE	Chapter 6

PURPOSE	**Prints "slash zero".**
MODE	Standard, IBM-G, IBM-P
CODE	〈ESC〉 "~" 1
(decimal ASCII)	27 126 1
(hex ASCII)	1B 7E 01
REMARKS	This command causes to print the zero character with a slash. **NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.
SEE	Chapter 6

PURPOSE	**Prints "normal zero".**		
MODE	Standard, IBM-G, IBM-P		
CODE	〈ESC〉	"~"	0
(decimal ASCII)	27	126	0
(hex ASCII)	1B	7E	00
REMARKS	This command cancels printing the slash zero and returns printing to the normal zero character. **NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 6		

PURPOSE	**Moves the print head back one print position (backspace).**
MODE	Standard, IBM-G, IBM-P
CODE	〈BS〉
(decimal ASCII)	8
(hex ASCII)	08
REMARKS	This command shifts the print head one column to the left. If the print head is at the left margin, the command is ignored. This command can be used to overstrike or combine characters.
SEE	Chapter 6

PURPOSE	**Deletes the last character sent.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨DEL⟩
(decimal ASCII)	127
(hex ASCII)	7F
REMARKS	This command deletes the last character received. This command is ignored if the last character received has already been printed, or if the last character received was all or part of a function code.
SEE	Chapter 6

PURPOSE	**Cancels a line.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨CAN⟩
(decimal ASCII)	24
(hex ASCII)	18
REMARKS	This command deletes the last line in the print buffer at the time the command is used.
SEE	Chapter 6

PURPOSE	**Sets printer off line.**
MODE	Standard, IBM-G
CODE	⟨DC3⟩
(decimal ASCII)	19
(hex ASCII)	13

MODE	IBM-P		
CODE	⟨ESC⟩	"Q"	3
(decimal ASCII)	27	81	3
(hex ASCII)	1B	51	03

REMARKS — This command causes the printer to go off line, disregarding all subsequent characters and function codes, with the exception of ⟨DC1⟩, which will return the printer to the on line state. This is not the same as pushing the On Line key. When the On Line indicator is not lit the printer will not respond to ⟨DC1⟩.

SEE — Chapter 6

PURPOSE	**Sets printer on line.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨DC1⟩
(decimal ASCII)	17
(hex ASCII)	11

REMARKS — This command resets the printer to the on line state, allowing it to receive and process all subsequent characters and function codes. This is not the same as pushing the On Line key. When the On Line indicator is not lit, the printer will not respond to ⟨DC1⟩.

SEE — Chapter 6

PURPOSE	**Sounds the printer bell.**
MODE	Standard, IBM-G, IBM-P
CODE	〈BEL〉
(decimal ASCII)	7
(hex ASCII)	07
REMARKS	This command causes the buzzer to sound for about a quarter of a second.
SEE	Chapter 6

PURPOSE	**Disables paper-out detector.**	
MODE	Standard, IBM-G, IBM-P	
CODE	〈ESC〉	"8"
(decimal ASCII)	27	56
(hex ASCII)	1B	38
REMARKS	This command causes the printer to disregard the signal sent by the paper-out detector. The paper-out signal normally sounds the printer bell and stops printing until paper is inserted and the printer is reset. DIP switch 2-4 can also set to disable the paper-out detector.	
SEE	Chapter 6	

PURPOSE	**Enables paper-out detector.**	
MODE	Standard, IBM-G, IBM-P	
CODE	〈ESC〉	"9"
(decimal ASCII)	27	57
(hex ASCII)	1B	39
REMARKS	This command restores the function of the paper-out detector.	
SEE	Chapter 6	

PURPOSE **Selects uni-directional printing.**

MODE	Standard, IBM-G, IBM-P		
CODE	⟨ESC⟩	"U"	1
(decimal ASCII)	27	85	1
(hex ASCII)	1B	55	01

REMARKS This command causes all subsequent printing to be done in uni-directional printing. Uni-directional printing is useful in printing tables or charts, since it ensures that vertical columns of characters will be aligned.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 6

PURPOSE **Cancels uni-directional printing.**

MODE	Standard, IBM-G, IBM-P		
CODE	⟨ESC⟩	"U"	0
(decimal ASCII)	27	85	0
(hex ASCII)	1B	55	00

REMARKS This command cancels uni-directional printing and returns to the standard bi-directional printing, which is considerably faster.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 6

PURPOSE **Selects one-line uni-directional printing.**

MODE Standard, IBM-G, IBM-P

CODE	〈ESC〉	"〈"
(decimal ASCII)	27	60
(hex ASCII)	1B	3C

REMARKS This command immediately returns the print head to the left margin. The remainder of the line is printed from left to right. Normal (bi-directional) printing resumes following a carriage return.

SEE Chapter 6

PURPOSE **Enlarges characters in whole or cancels same.**

MODE Standard, IBM-G, IBM-P

CODE	〈ESC〉	"h"	*n*
(decimal ASCII)	27	104	*n*
(hex ASCII)	1B	68	*n*

REMARKS This special command enlarges characters following the command until the enlargement is cancelled. The values of *n* have the following effects.

n	Effect
0	Cancels enlargement
1	Double-high, double-wide
2	Quadruple-high, quadruple-wide

SEE Chapter 6

PURPOSE **Prints characters from all character sets.**

MODE	IBM-P			
CODE	⟨ESC⟩	"\"	*n1*	*n2*
(decimal ASCII)	27	92	*n1*	*n2*
(hex ASCII)	1B	5C	*n1*	*n2*

REMARKS This command allows the printing of all characters, including characters with an ASCII value below decimal 32. The printer normally recognizes the ASCII values less than decimal value 32 as control codes. This command allows the printer to print the special characters assigned to the ASCII control codes. If the printer receives a code value for an unassigned character, a space character prints.
The total number of characters is equal to $n1 + (n2 \times 256)$.

SEE Chapter 6

PURPOSE **Prints a character from all character sets.**

MODE	IBM-P		
CODE	⟨ESC⟩	"^"	*n*
(decimal ASCII)	27	94	*n*
(hex ASCII)	1B	5E	*n*

REMARKS This command prints one character defined with the value of *n* from the whole character sets. You can use this command to print codes the printer normally recognizes as control codes.

SEE Chapter 6

PURPOSE	**Sets immediate print mode.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"i"	1
(decimal ASCII)	27	105	1
(hex ASCII)	1B	69	01

REMARKS

This command selects the immediate print mode. In the immediate print mode the print head prints one character at a time, as you send it. The printer also moves the paper up so that you can see the current line and then down to continue printing. This kind of instant feedback can be especially helpful in telecommunications.

NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 6

PURPOSE	**Cancels immediate print mode.**
MODE	Standard, IBM-G, IBM-P

CODE	〈ESC〉	"i"	0
(decimal ASCII)	27	105	0
(hex ASCII)	1B	69	00

REMARKS

This command cancels the immediate print mode and returns the normal print mode.

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 6

PURPOSE	**Sets half-speed printing.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"s"	1
(decimal ASCII)	27	115	1
(hex ASCII)	1B	73	01

REMARKS — This command causes the printer to select half-speed printing. Half-speed printing reduces the noise of printing.
NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE — Chapter 6

PURPOSE	**Cancels half-speed printing.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	"s"	0
(decimal ASCII)	27	115	0
(hex ASCII)	1B	73	00

REMARKS — This command cancels half-speed printing mode, and restores normal printing.
NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE — Chapter 6

PURPOSE	**Resets the printer.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨ESC⟩ "@"
(decimal ASCII)	27 64
(hex ASCII)	1B 40
REMARKS	This command reinitializes the printer. The print buffer is cleared, and the character pitch, character set, line feed pitch, bottom margin, and international character set are all reset to the values defined by their respective DIP switches. The main difference between the ⟨ESC⟩ "@" command and turning the printer off and back on again is that download characters are preserved with this command.
SEE	Chapter 6

PURPOSE	**Selects auto feed mode.**
MODE	Standard, IBM-G, IBM-P
CODE	⟨ESC⟩ ⟨EM⟩ 4
(decimal ASCII)	27 25 4
(hex ASCII)	1B 19 04
REMARKS	This command causes the printer to select the auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.
SEE	Chapter 6

PURPOSE **Selects auto feed mode.**

MODE Standard, IBM-G, IBM-P

CODE	"("	"("	"4"	")"	")"
(decimal ASCII)	40	40	52	41	41
(hex ASCII)	28	28	34	29	29

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ 4, above.

SEE Chapter 6

PURPOSE **Cancels auto feed mode.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	⟨EM⟩	0
(decimal ASCII)	27	25	0
(hex ASCII)	1B	19	00

REMARKS This command causes the printer to cancel the auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE Chapter 6

PURPOSE **Cancels auto feed mode.**

MODE Standard, IBM-G, IBM-P

CODE	"("	"("	"0"	")"	")"
(decimal ASCII)	40	40	48	41	41
(hex ASCII)	28	28	30	29	29

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ 0, above.

SEE Chapter 6

PURPOSE	**Supplies paper from first bin.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	⟨EM⟩	1
(decimal ASCII)	27	25	1
(hex ASCII)	1B	19	01

REMARKS This command causes the 15-inch type printer to supply paper from the first bin. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE Chapter 6

PURPOSE	**Supplies paper from first bin.**
MODE	Standard, IBM-G, IBM-P

CODE	"("	"("	"1"	")"	")"
(decimal ASCII)	40	40	49	41	41
(hex ASCII)	28	28	31	29	29

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ 1, above.

SEE Chapter 6

PURPOSE	**Supplies paper from second bin.**
MODE	Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	⟨EM⟩	2
(decimal ASCII)	27	25	2
(hex ASCII)	1B	19	02

REMARKS This command causes the 15-inch type printer to supply paper from the second bin. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE Chapter 6

PURPOSE **Supplies paper from second bin.**

MODE Standard, IBM-G, IBM-P

CODE	"("	"("	"2"	")"	")"
(decimal ASCII)	40	40	50	41	41
(hex ASCII)	28	28	32	29	29

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ 2, above.

SEE Chapter 6

PURPOSE **Ejects paper.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	⟨EM⟩	"R"
(decimal ASCII)	27	25	82
(hex ASCII)	1B	19	52

REMARKS This command causes the printer to eject paper. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE Chapter 6

PURPOSE **Ejects paper.**

MODE Standard, IBM-G, IBM-P

CODE	"("	"("	"R"	")"	")"
(decimal ASCII)	40	40	82	41	41
(hex ASCII)	28	28	52	29	29

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ "R", above.

SEE Chapter 6

PURPOSE **Sets print start position.**

MODE Standard, IBM-G, IBM-P

CODE	⟨ESC⟩	⟨EM⟩	"T"	*n*
(decimal ASCII)	27	25	84	*n*
(hex ASCII)	1B	19	54	*n*

REMARKS This command sets the print start position to the *n*/6 inches at the top of the page. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE Chapter 6

PURPOSE **Sets print start position.**

MODE Standard, IBM-G, IBM-P

CODE	"("	"("	"T"	")"	")"	*n*
(decimal ASCII)	40	40	84	41	41	*n*
(hex ASCII)	28	28	54	29	29	*n*

REMARKS Same as ⟨ESC⟩ ⟨EM⟩ "T" *n*, above.

SEE Chapter 6

APPENDIX E
COMMAND SUMMARY IN NUMERIC ORDER

The purpose of this Appendix is to provide a quick reference of each mode for the various function codes in numeric order.

■ Standard mode

The following functions take effect under the Standard mode, which emulates the Epson LQ-1000 printer.

Control code	Function
CHR$(7)	Sounds the printer bell
CHR$(8)	Moves the print head back one print position (backspace)
CHR$(9)	Moves the print head to the next horizontal tab position
CHR$(10)	Advances the paper one line (line feed)
CHR$(11)	Advances paper to the next vertical tab position
CHR$(12)	Advances the paper to the top of the next page (form feed)
CHR$(13)	Returns print head to the left margin (carriage return)
CHR$(14)	Sets the printer to expanded print for the remainder of the current line
CHR$(15)	Sets the printer to condensed print
CHR$(17)	Sets printer on line
CHR$(18)	Cancels condensed print
CHR$(19)	Sets printer off line
CHR$(20)	Cancels one line expanded print

CHR$(24)	Cancels a line
CHR$(27)	Escape (indicated as 〈ESC〉 below)
CHR$(127)	Deletes the last character sent
〈ESC〉 CHR$(10)	Reverses the paper one line
〈ESC〉 CHR$(12)	Reverses the paper to the top of the current page
〈ESC〉 CHR$(14)	Sets the printer to expanded print for the remainder of the current line
〈ESC〉 CHR$(15)	Sets the printer to condensed print
〈ESC〉 CHR$(25) CHR$(0)	Cancels auto feed mode
〈ESC〉 CHR$(25) CHR$(1)	Supplies paper from first bin
〈ESC〉 CHR$(25) CHR$(2)	Supplies paper from second bin
〈ESC〉 CHR$(25) CHR$(4)	Selects auto feed mode
〈ESC〉 CHR$(25) "R"	Ejects paper
〈ESC〉 CHR$(32) *n*	Adds *n* dot spaces between characters
〈ESC〉 "!" *n*	Sets the master print mode
〈ESC〉 "#"	Accepts the value of the eighth data bit as is
〈ESC〉 "$" *n1 n2*	Moves the print head to an absolute horizontal position
〈ESC〉 "%" 0	Cancels download character set
〈ESC〉 "%" 1	Selects download character set
〈ESC〉 "&" CHR$(0) *n1 n2 m0 m1 m2 d1 d2 ... dx*	Defines download characters into RAM
〈ESC〉 "*" *n0 n1 n2 m1 m2 ...*	Selects graphics modes
〈ESC〉 "−" 0	Cancels underlining
〈ESC〉 "−" 1	Selects underlining
〈ESC〉 "/" *n0*	Selects vertical channels
〈ESC〉 "0"	Sets line spacing to 1/8 inch
〈ESC〉 "1"	Sets line spacing to 7/60 inch
〈ESC〉 "2"	Sets line spacing to 1/6 inch
〈ESC〉 "3" *n*	Sets line spacing to *n*/180 inch

⟨ESC⟩ "4"	Selects italic characters
⟨ESC⟩ "5"	Cancels italic characters
⟨ESC⟩ "8"	Disables paper-out detector
⟨ESC⟩ "9"	Enables paper-out detector
⟨ESC⟩ ":" CHR$(0) CHR$(0) CHR$(0)	Copies standard ROM font into RAM
⟨ESC⟩ "⟨"	Selects one-line uni-directional printing
⟨ESC⟩ "="	Sets the value of the eighth data bit to logical 0
⟨ESC⟩ "⟩"	Sets the value of the eighth data bit to logical 1
⟨ESC⟩ "?" *n0 n1*	Redefines the graphics mode
⟨ESC⟩ "@"	Resets the printer
⟨ESC⟩ "A" *n*	Sets line spacing to *n*/60 inch
⟨ESC⟩ "B" *n1 n2 n3* ... CHR$(0)	Sets vertical tab positions
⟨ESC⟩ "C" CHR$(0) *n*	Sets page length to *n* inches
⟨ESC⟩ "C" *n*	Sets page length to *n* lines
⟨ESC⟩ "D" *n1 n2 n3* ... CHR$(0)	Sets horizontal tab positions
⟨ESC⟩ "E"	Selects emphasized printing
⟨ESC⟩ "F"	Cancels emphasized printing
⟨ESC⟩ "G"	Selects boldface printing
⟨ESC⟩ "H"	Cancels boldface printing
⟨ESC⟩ "J" *n*	Sends a one-time paper feed of *n*/180 inch
⟨ESC⟩ "K" *n1 n2 m1 m2* ...	Prints 8-dot normal-density graphics
⟨ESC⟩ "L" *n1 n2 m1 m2* ...	Prints 8-dot double-density graphics
⟨ESC⟩ "M"	Sets the print pitch to elite
⟨ESC⟩ "N" *n*	Sets the bottom margin
⟨ESC⟩ "O"	Cancels top and bottom margins
⟨ESC⟩ "P"	Sets the print pitch to pica
⟨ESC⟩ "Q" *n*	Sets the right margin
⟨ESC⟩ "R" *n*	Selects an international character set
⟨ESC⟩ "S" 0	Selects superscripts
⟨ESC⟩ "S" 1	Selects subscripts

〈ESC〉 "T"	Cancels a superscript or subscript
〈ESC〉 "U" 0	Cancels uni-directional printing
〈ESC〉 "U" 1	Selects uni-directional printing
〈ESC〉 "W" 0	Cancels expanded print
〈ESC〉 "W" 1	Sets the printer to expanded print
〈ESC〉 "X" *n1 n2*	Sets the left and right margins
〈ESC〉 "Y" *n1 n2 m1 m2* ...	Prints 8-dot double-density graphics at double-speed
〈ESC〉 "Z" *n1 n2 m1 m2* ...	Prints 8-dot quadruple-density graphics
〈ESC〉 "\" *n1 n2*	Moves the print head to a specified horizontal position
〈ESC〉 "_" 0	Cancels overlining
〈ESC〉 "_" 1	Selects overlining
〈ESC〉 "a" *n*	Sets alignment or centering
〈ESC〉 "b" *n0 n1 n2 n3* ... CHR$(0)	Sets vertical tab positions in a channel
〈ESC〉 "e" 0 *n*	Sets horizontal tab positions every *n* characters
〈ESC〉 "e" 1 *n*	Sets vertical tab positions every *n* lines
〈ESC〉 "f" 0 *n*	Sets the print position to *n* characters
〈ESC〉 "f" 1 *n*	Sets print position to *n* lines
〈ESC〉 "g"	Sets the print pitch to semi-condensed
〈ESC〉 "h" *n*	Enlarges characters in whole or cancels same
〈ESC〉 "i" 0	Cancels immediate print mode
〈ESC〉 "i" 1	Sets immediate print mode
〈ESC〉 "j" *n*	Sends a one-time reverse feed of *n*/180 inch
〈ESC〉 "k" *n*	Selects a character set
〈ESC〉 "l" *n*	Sets the left margin
〈ESC〉 "p" 0	Cancels proportional print
〈ESC〉 "p" 1	Sets the printer to proportional print
〈ESC〉 "r" *n*	Sets the top margin

〈ESC〉 "s" 0	Cancels half-speed printing
〈ESC〉 "s" 1	Sets half-speed printing
〈ESC〉 "x" 0	Cancels LQ characters
〈ESC〉 "x" 1	Selects LQ characters
〈ESC〉 "~" 0	Prints "normal zero"
〈ESC〉 "~" 1	Prints "slash zero"
"((0))"	Cancels auto feed mode
"((1))"	Supplies paper from first bin
"((2))"	Supplies paper from second bin
"((4))"	Selects auto feed mode
"((R))"	Ejects paper

■ IBM-G mode

The following functions take effect under the IBM-G mode, which emulates the IBM Graphics printer.

Control code	**Function**
CHR$(7)	Sounds the printer bell
CHR$(8)	Moves the print head back one print position (backspace)
CHR$(9)	Moves the print head to the next horizontal tab position
CHR$(10)	Advances the paper one line (line feed)
CHR$(11)	Advances paper to the next vertical tab position
CHR$(12)	Advances the paper to the top of the next page (form feed)
CHR$(13)	Returns print head to the left margin (carriage return)
CHR$(14)	Sets the printer to expanded print for the remainder of the current line
CHR$(15)	Sets the printer to condensed print
CHR$(17)	Sets printer on line
CHR$(18)	Cancels condensed print
CHR$(19)	Sets printer off line
CHR$(20)	Cancels one line expanded print
CHR$(24)	Cancels a line
CHR$(27)	Escape (indicated as 〈ESC〉 below)

CHR$(127)	Deletes the last character sent
〈ESC〉 CHR$(10)	Reverses the paper one line
〈ESC〉 CHR$(12)	Reverses the paper to the top of the current page
〈ESC〉 CHR$(14)	Sets the printer to expanded print for the remainder of the current line
〈ESC〉 CHR$(15)	Sets the printer to condensed print
〈ESC〉 CHR$(25) CHR$(0)	Cancels auto feed mode
〈ESC〉 CHR$(25) CHR$(1)	Supplies paper from first bin
〈ESC〉 CHR$(25) CHR$(2)	Supplies paper from second bin
〈ESC〉 CHR$(25) CHR$(4)	Selects auto feed mode
〈ESC〉 CHR$(25) "R"	Ejects paper
〈ESC〉 "!" *n*	Sets the master print mode
〈ESC〉 "#"	Accepts the value of the eighth data bit as is
〈ESC〉 "$" *n1 n2*	Moves the print head to an absolute horizontal position
〈ESC〉 "%" 0	Cancels download character set
〈ESC〉 "%" 1	Selects download character set
〈ESC〉 "&" CHR$(0) *n1 n2 m0 m1 m2 d1 d2 ... dx*	Defines download characters into RAM
〈ESC〉 "*" *n0 n1 n2 m1 m2* ···	Select graphics modes
〈ESC〉 "−" 0	Cancels underlining
〈ESC〉 "−" 1	Selects underlining
〈ESC〉 "/" *n0*	Selects vertical channels
〈ESC〉 "0"	Sets line spacing to 1/8 inch
〈ESC〉 "1"	Sets line spacing to 7/72 inch
〈ESC〉 "2"	Uses 〈ESC〉 "A" definition
〈ESC〉 "3" *n*	Sets line spacing to *n*/216 inch
〈ESC〉 "4"	Selects italic characters
〈ESC〉 "5"	Cancels italic characters
〈ESC〉 "6"	Selects character set #2
〈ESC〉 "7"	Selects character set #1

⟨ESC⟩ "8"	Disables paper-out detector
⟨ESC⟩ "9"	Enables paper-out detector
⟨ESC⟩ ":" CHR$(0) CHR$(0) CHR$(0)	Copies standard ROM font into RAM
⟨ESC⟩ "⟨"	Selects one-line uni-directional printing
⟨ESC⟩ "="	Sets the value of the eighth data bit to logical 0
⟨ESC⟩ "⟩"	Sets the value of the eighth data bit to logical 1
⟨ESC⟩ "?" *n0 n1*	Redefines the graphics mode
⟨ESC⟩ "@"	Resets the printer
⟨ESC⟩ "A" *n*	Defines line spacing to *n*/72 inch
⟨ESC⟩ "B" *n1 n2 n3* ... CHR$(0)	Sets vertical tab positions
⟨ESC⟩ "C" CHR$(0) *n*	Sets page length to *n* inches
⟨ESC⟩ "C" *n*	Sets page length to *n* lines
⟨ESC⟩ "D" *n1 n2 n3* ... CHR$(0)	Sets horizontal tab positions
⟨ESC⟩ "E"	Selects emphasized printing
⟨ESC⟩ "F"	Cancels emphasized printing
⟨ESC⟩ "G"	Selects boldface printing
⟨ESC⟩ "H"	Cancels boldface printing
⟨ESC⟩ "J" *n*	Sends a one-time paper feed of *n*/216 inch
⟨ESC⟩ "K" *n1 n2 m1 m2* ...	Prints 8-dot normal-density graphics
⟨ESC⟩ "L" *n1 n2 m1 m2* ...	Prints 8-dot double-density graphics
⟨ESC⟩ "M"	Sets the print pitch to elite
⟨ESC⟩ "N" *n*	Sets the bottom margin
⟨ESC⟩ "O"	Cancels top and bottom margins
⟨ESC⟩ "P"	Sets the print pitch to pica
⟨ESC⟩ "Q" *n*	Sets the right margin
⟨ESC⟩ "R" *n*	Selects an international character set
⟨ESC⟩ "S" 0	Selects superscripts
⟨ESC⟩ "S" 1	Selects subscripts
⟨ESC⟩ "T"	Cancels a superscript or subscript
⟨ESC⟩ "U" 0	Cancels uni-directional printing

〈ESC〉 "U" 1	Selects uni-directional printing
〈ESC〉 "W" 0	Cancels expanded print
〈ESC〉 "W" 1	Sets the printer to expanded print
〈ESC〉 "X" *n1 n2*	Sets the left and right margins
〈ESC〉 "Y" *n1 n2 m1 m2* ...	Prints 8-dot double-density graphics at double-speed
〈ESC〉 "Z" *n1 n2 m1 m2* ...	Prints 8-dot quadruple-density graphics
〈ESC〉 "\" *n1 n2*	Moves the print head to a specified horizontal position
〈ESC〉 "_" 0	Cancels overlining
〈ESC〉 "_" 1	Selects overlining
〈ESC〉 "a" *n*	Sets alignment or centering
〈ESC〉 "b" *n0 n1 n2 n3* ... CHR$(0)	Sets vertical tab positions in a channel
〈ESC〉 "e" 0 *n*	Sets horizontal tab positions every *n* characters
〈ESC〉 "e" 1 *n*	Sets vertical tab positions every *n* lines
〈ESC〉 "f" 0 *n*	Sets the print position to *n* characters
〈ESC〉 "f" 1 *n*	Sets print position to *n* lines
〈ESC〉 "g"	Sets the print pitch to semi-condensed
〈ESC〉 "h" *n*	Enlarges characters in whole or cancels same
〈ESC〉 "i" 0	Cancels immediate print mode
〈ESC〉 "i" 1	Sets immediate print mode
〈ESC〉 "j" *n*	Sends a one-time reverse feed of *n*/216 inch
〈ESC〉 "k" *n*	Selects a character set
〈ESC〉 "l" *n*	Sets the left margin
〈ESC〉 "p" 0	Cancels proportional print
〈ESC〉 "p" 1	Sets the printer to proportional print
〈ESC〉 "r" *n*	Sets the top margin
〈ESC〉 "s" 0	Cancels half-speed printing
〈ESC〉 "s" 1	Sets half-speed printing

〈ESC〉 "x" 0	Cancels LQ characters
〈ESC〉 "x" 1	Selects LQ characters
〈ESC〉 "~" 0	Prints "normal zero"
〈ESC〉 "~" 1	Prints "slash zero"
〈FS〉 "2"	Sets line spacing to 1/6 inch
〈FS〉 "A" *n*	Sets line spacing to *n*/72 inch
"((0))"	Cancels auto feed mode
"((1))"	Supplies paper from first bin
"((2))"	Supplies paper from second bin
"((4))"	Selects auto feed mode
"((R))"	Ejects paper

■ IBM-P mode

The following functions take effect under the IBM-P mode, which emulates the IBM Proprinter.

Control code	**Function**
CHR$(7)	Sounds the printer bell
CHR$(8)	Moves the print head back one print position (backspace)
CHR$(9)	Moves the print head to the next horizontal tab position
CHR$(10)	Advances the paper one line (line feed)
CHR$(11)	Advances paper to the next vertical tab position
CHR$(12)	Advances the paper to the top of the next page (form feed)
CHR$(13)	Returns print head to the left margin (carriage return)
CHR$(14)	Sets the printer to expanded print for the remainder of the current line
CHR$(15)	Sets the printer to condensed print
CHR$(17)	Sets printer on line
CHR$(18)	Cancels condensed print
CHR$(20)	Cancels one line expanded print
CHR$(24)	Cancels a line
CHR$(27)	Escape (indicated as 〈ESC〉 below)
CHR$(127)	Deletes the last character sent

〈ESC〉 CHR$(10)	Reverses the paper one line
〈ESC〉 CHR$(12)	Reverses the paper to the top of the current page
〈ESC〉 CHR$(14)	Sets the printer to expanded print for the remainder of the current line
〈ESC〉 CHR$(15)	Sets the printer to condensed print
〈ESC〉 CHR$(25) CHR$(0)	Cancels auto feed mode
〈ESC〉 CHR$(25) CHR$(1)	Supplies paper from first bin
〈ESC〉 CHR$(25) CHR$(2)	Supplies paper from second bin
〈ESC〉 CHR$(25) CHR$(4)	Selects auto feed mode
〈ESC〉 CHR$(25) "R"	Ejects paper
〈ESC〉 "!" *n*	Sets the master print mode
〈ESC〉 "$" *n1 n2*	Moves the print head to an absolute horizontal position
〈ESC〉 "%" 0	Cancels download character set
〈ESC〉 "%" 1	Selects download character set
〈ESC〉 "*" *n0 n1 n2 m1 m2*···	Selects graphics modes
〈ESC〉 "−" 0	Cancels underlining
〈ESC〉 "−" 1	Selects underlining
〈ESC〉 "/" *n0*	Selects vertical channels
〈ESC〉 "0"	Sets line spacing to 1/8 inch
〈ESC〉 "1"	Sets line spacing to 7/72 inch
〈ESC〉 "2"	Uses 〈ESC〉 "A" definition
〈ESC〉 "3" *n*	Sets line spacing to *n*/216 inch
〈ESC〉 "4"	Sets the top of form to the current position
〈ESC〉 "5" 0	Sets carriage return function without a line feed
〈ESC〉 "5" 1	Sets carriage return function with a line feed
〈ESC〉 "6"	Selects character set #2
〈ESC〉 "7"	Selects character set #1
〈ESC〉 "8"	Disables paper-out detector
〈ESC〉 "9"	Enables paper-out detector

⟨ESC⟩ ":"	Sets the print pitch to elite
⟨ESC⟩ "⟨"	Selects one-line uni-directional printing
⟨ESC⟩ "=" CHR$(0) *n1 n2 m0 m1 m2 d1 d2 ... dx*	Defines download characters into RAM
⟨ESC⟩ "?" *n0 n1*	Redefines the graphics mode
⟨ESC⟩ "@"	Resets the printer
⟨ESC⟩ "A" *n*	Defines line spacing to *n*/72 inch
⟨ESC⟩ "B" *n1 n2 n3 ...* CHR$(0)	Sets vertical tab positions
⟨ESC⟩ "C" CHR$(0) *n*	Sets page length to *n* inches
⟨ESC⟩ "C" *n*	Sets page length to *n* lines
⟨ESC⟩ "D" *n1 n2 n3 ...* CHR$(0)	Sets horizontal tab positions
⟨ESC⟩ "E"	Selects emphasized printing
⟨ESC⟩ "F"	Cancels emphasized printing
⟨ESC⟩ "G"	Selects boldface printing
⟨ESC⟩ "H"	Cancels boldface printing
⟨ESC⟩ "I" 0	Selects draft characters
⟨ESC⟩ "I" 2	Selects LQ characters
⟨ESC⟩ "I" 4	Selects draft download character set
⟨ESC⟩ "I" 6	Selects LQ download character set
⟨ESC⟩ "J" *n*	Sends a one-time paper feed of *n*/216 inch
⟨ESC⟩ "K" *n1 n2 m1 m2 ...*	Prints 8-dot normal-density graphics
⟨ESC⟩ "L" *n1 n2 m1 m2 ...*	Prints 8-dot double-density graphics
⟨ESC⟩ "M"	Sets the print pitch to elite
⟨ESC⟩ "N" *n*	Sets the bottom margin
⟨ESC⟩ "O"	Cancels top and bottom margins
⟨ESC⟩ "P"	Sets the print pitch to pica
⟨ESC⟩ "Q" CHR$(3)	Sets printer off line
⟨ESC⟩ "R"	Cancels tabs to the default values
⟨ESC⟩ "S" 0	Selects superscripts
⟨ESC⟩ "S" 1	Selects subscripts
⟨ESC⟩ "T"	Cancels a superscript or subscript
⟨ESC⟩ "U" 0	Cancels uni-directional printing

〈ESC〉 "U" 1	Selects uni-directional printing
〈ESC〉 "W" 0	Cancels expanded print
〈ESC〉 "W" 1	Sets the printer to expanded print
〈ESC〉 "X" *n1 n2*	Sets the left and right margins
〈ESC〉 "Y" *n1 n2 m1 m2* ...	Prints 8-dot double-density graphics at double-speed
〈ESC〉 "Z" *n1 n2 m1 m2* ...	Prints 8-dot quadruple-density graphics
〈ESC〉 "\" *n1 n2*	Prints characters from all character sets
〈ESC〉 "^" *n*	Prints a character from all character sets
〈ESC〉 "_" 0	Cancels overlining
〈ESC〉 "_" 1	Selects overlining
〈ESC〉 "a" *n*	Sets alignment or centering
〈ESC〉 "b" *n0 n1 n2 n3* ... CHR$(0)	Sets vertical tab positions in a channel
〈ESC〉 "e" 0 *n*	Sets horizontal tab positions every *n* characters
〈ESC〉 "e" 1 *n*	Sets vertical tab positions every *n* lines
〈ESC〉 "f" 0 *n*	Sets the print position to *n* characters
〈ESC〉 "f" 1 *n*	Sets print position to *n* lines
〈ESC〉 "h" *n*	Enlarges characters in whole or cancels same
〈ESC〉 "i" 0	Cancels immediate print mode
〈ESC〉 "i" 1	Sets immediate print mode
〈ESC〉 "j" *n*	Sends a one-time reverse feed of *n*/216 inch
〈ESC〉 "k" *n*	Selects a character set
〈ESC〉 "l" *n*	Sets the left margin
〈ESC〉 "p" 0	Cancels proportional print
〈ESC〉 "p" 1	Sets the printer to proportional print
〈ESC〉 "r" *n*	Sets the top margin
〈ESC〉 "s" 0	Cancels half-speed printing
〈ESC〉 "s" 1	Sets half-speed printing

〈ESC〉 "x" 0	Cancels LQ characters
〈ESC〉 "x" 1	Selects LQ characters
〈ESC〉 "~" 0	Prints "normal zero"
〈ESC〉 "~" 1	Prints "slash zero"
〈FS〉 "2"	Sets line spacing to 1/6 inch
〈FS〉 "4"	Selects italic characters
〈FS〉 "5"	Cancels italic characters
〈FS〉 ":" CHR$(0) CHR$(0) CHR$(0)	Copies standard ROM font into RAM
〈FS〉 "A" *n*	Sets line spacing to *n*/72 inch
〈FS〉 "Q" *n*	Sets the right margin
〈FS〉 "R" *n*	Selects an international character set
〈FS〉 "\" *n1 n2*	Moves the print head to a specified horizontal position
"((0))"	Cancels auto feed mode
"((1))"	Supplies paper from first bin
"((2))"	Supplies paper from second bin
"((4))"	Selects auto feed mode
"((R))"	Ejects paper

MEMO

APPENDIX F
TECHNICAL SPECIFICATIONS

Printing

Printing method	Serial impact dot matrix
Printing speed	216 characters per second (in Draft elite) 72 characters per second (in LQ mode)
Print buffer	8 KB (5KB for 15-inch type)
Paper feed	2.2 inches/second (for form feeding) Tractor and Friction feed
Printing direction	Bi-directional, logic seeking Uni-directional in dot graphics modes
Character set	
Draft characters	96 standard ASCII characters 156 international characters [13 sets] 183 super and subscripts 87 IBM special characters 50 IBM block graphics characters
LQ characters	96 standard ASCII characters 156 international characters [13 sets] 233 super and subscripts 87 IBM special characters 50 IBM block graphics characters
Other characters	35 downloadable characters
Character matrix	
LQ characters	
Normal	24 dot × 31 dot
Super/subscripts	16 dot × 23 dot
Block graphics	30 dot × 35 dot
Draft characters	
Normal	24 dot × 9 dot
Super/subscripts	16 dot × 7 dot

Block graphics	30 dot × 11 dot
Dot graphics	8 dot × 60 dots/inch
	8 dot × 80 dots/inch
	8 dot × 90 dots/inch
	8 dot × 120 dots/inch
	8 dot × 240 dots/inch
	24 dot × 60 dots/inch
	24 dot × 90 dots/inch
	24 dot × 120 dots/inch
	24 dot × 180 dots/inch
	24 dot × 360 dots/inch
Line spacing	1/6 inch or 1/8 inch standard
	n/60 or *n*/180 inch programmable (Standard mode)
	n/72 or *n*/216 inch programmable (IBM modes)

Column width	10-inch type	15-inch type
Normal pica	80	136
Normal elite	96	163
Semi-condensed	120	204
Condensed pica	137	233
Condensed elite	160	272
Expanded pica	40	68
Expanded elite	48	81
Expanded semi-condensed	60	102
Expanded condensed pica	68	116
Expanded condensed elite	80	136
Proportional spacing	Variable	Variable

Special features
- Automatic single sheet insertion
- Prestige Letter Quality printing
- Short form tear-off
- Easy access format switches
- Self-test and hex dump
- Downloadable characters
- 7 or 8 bit selectable interface
- Ultra hi-resolution bit image graphics
- Vertical and horizontal tabs
- Skip over perforation

15.5″ carriage (15-inch type only)
Automatic sheet feeder (option)
Various LQ character cartridges (option)
RAM cartridge (option)

Paper

	10-inch type	15-inch type
Single sheets		
Width	5.5 – 8.5 inches	6 –14.5 inches
Thickness	0.07 – 0.10 mm	0.07 – 0.10 mm
Sprocket-feed paper		
Width	4 – 10 inches	4 – 15.5 inches
Thickness	0.07 – 0.10 mm, one-part form, Max 0.28 mm, 3-part form	

Printer

Dimensions	10-inch type	10-inch type
Height	108mm (4.3 inches)	121mm (4.7 inches)
Width	400mm (15.7 inches)	580mm (22.8 inches)
Depth	355 mm (14.0 inches)	383 mm (15.1 inches)
Weight	12.8 kg (28.2 pounds)	14.8 kg (32.6 pounds)

Power	120 VAC ± 10%, 60Hz. 220 VAC ± 10%, 50/60Hz. 240 VAC ± 10%, 50/60Hz.
Environment	Temperature: 5 to 40℃ (40 to 104°F) Humidity: 10 to 80%, non condensing
Ribbon	Black cloth ribbon in special cartridge Ribbon life: 4.5 million draft characters
Print head life	200 million strokes per wire

Parallel interface

Interface	Centronics-compatible, 7 or 8 bit
Synchronization	By external supplied Strobe pulses
Handshaking	By ACK or BUSY signals
Logic level	TTL
Connector	57-30360 Amphenol

Serial interface (option)

Interface	Asynchronous RS-232C/20mA current loop
Bit rate	150, 300, 600, 1200, 2400, 4800, 9600, 19200 baud
Word length	1 start bit 7 or 8 data bits Odd, even or no parity 1 or 2 stop bits
Handshaking	Serial BUSY, 1 byte mode Serial BUSY, 1 block mode ACK mode XON/XOFF mode

APPENDIX G
THE PARALLEL INTERFACE

This printer has a parallel interface to communicate with the computer. The operating specifications of the parallel interface are as follows:

Data transfer rate:	1,000 to 6,000 characters per second
Synchronization:	Via externally supplied $\overline{\text{STROBE}}$ pulses
Handshaking:	$\overline{\text{ACK}}$ and BUSY signals
Logic level:	Compatible with TTL level

The parallel interface connects to the computer by a 36 pin connector on the back of the printer. This connector mates with an Amphenol 57-30360 connector. The functions of the various pins are summarized in Table G-1.

■ Functions of the Connector Signals

Communications between the computer and the printer use many of the pins of the connector. To understand how the system of communications works, let's look at the functions of the various signals carried by the pins of the interface connector.

Pin 1 carries the $\overline{\text{STROBE}}$ pulse signal from the computer to the printer. This signal is normally held high by the computer. When the computer has data ready for the printer it sets this signal to a low value for at least 0.5 microseconds. When the printer sees this pulse on the strobe pin, it reads the data that the computer supplies on pins 2 through 9. Each of these lines carries one bit of information. A logical "1" is represented by a high signal level, and a logical "0" is represented by a low signal level. The computer must maintain these signals for a period

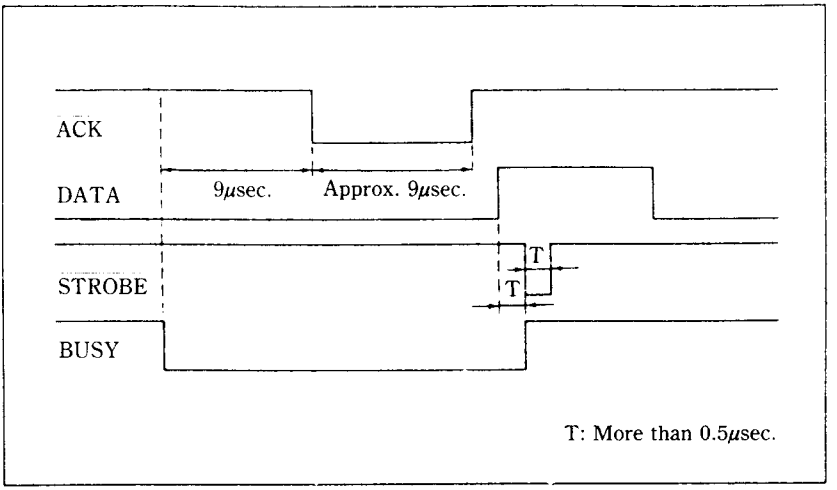


Figure G-1. The interface timing diagram.

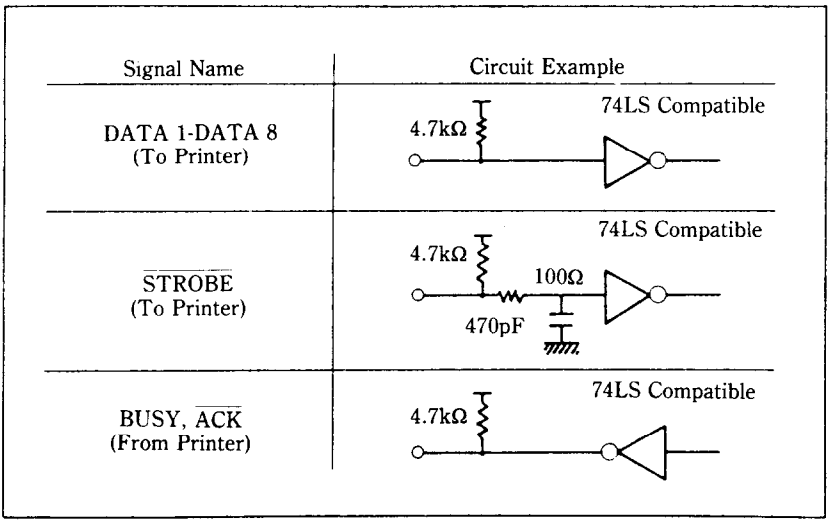


Figure G-2. Typical interface circuit.

beginning at least 0.5 microseconds before the strobe pulse starts and continuing for at least 0.5 microseconds after the strobe pulse ends.

When the printer has successfully received the byte of data from the computer it sets pin 10 low for approximately 9

Table G-1
Parallel interface pin functions

Pin No.	Signal Name	Direction	Function
1	$\overline{\text{STROBE}}$	IN	Signals when data is ready to be read. Signal goes from HIGH to LOW (for at least 0.5 microseconds) when data is available.
2	DATA1	IN	These signals provide the information of the first to eighth bits of parallel data. Each signal is at HIGH level for a logical 1 and at a LOW level for a logical 0.
3	DATA2	IN	
4	DATA3	IN	
5	DATA4	IN	
6	DATA5	IN	
7	DATA6	IN	
8	DATA7	IN	
9	DATA8	IN	
10	$\overline{\text{ACK}}$	OUT	A LOW pulse acknowledges receipt of data.
11	BUSY	OUT	When this signal goes LOW the printer is ready to accept data.
12	PAPER OUT	OUT	This signal is normally LOW. It will go HIGH if the printer runs out of paper. This signal can be held LOW permanently by turning DIP switch 2-4 off.
13	SELECTED	OUT	This signal is HIGH when the printer is on-line.
14-15	N/C		Unused
16	SIGNAL GND		Signal ground.
17	CHASSIS GND		Printer's chassis ground, isolated from logic ground.
18	+ 5VDC	OUT	External supply of + 5VDC.
19-30	GND		Twisted pair return signal ground level.
31	$\overline{\text{RESET}}$	IN	When this signal goes LOW the printer is reset to its power-on condition.
32	$\overline{\text{ERROR}}$	OUT	This signal is normally HIGH. This signal goes LOW to signal that the printer cannot print due to an error condition.
33	EXT GND		External ground.
34, 35	N/C		Unused.
36	$\overline{\text{SELECT IN}}$	OUT	Data entry to the printer is possible only when this level is LOW.

microseconds. This signal acknowledges the receipt of the data and so is called the ACK (for "acknowledge") signal.

Pin 11 reports when the printer is not able to receive data. The signal is called BUSY. When this signal is high, the printer cannot receive data. This signal will be high during data transfer, when the printer is off-line and when an error condition exists.

The printer will report that it has run out of paper by making the PAPER OUT signal on pin 12 high. This pin can be held low by turning DIP switch 2-4 off. When the printer is in the on-line state, pin 13 is held high. This signal (SELECTED) tells the computer that the printer is ready to receive data.

Pins 14, 15, 34 and 35 are not used, while pins 16, 17, 19-30 and 33 are grounded. Pin 18 is connected to the + 5VDC supply in the printer.

Pin 31 can be used to reset the printer. If this siganl (RESET) goes low the printer will reinitialize. Pin 32 is used to report error conditions in the printer. This signal (ERROR) is high during normal operation and goes low to report that the printer cannot print due to an error condition.

APPENDIX H
SERIAL INTERFACE SPECIFICATIONS

This printer provides a very flexible RS232C serial interface as an option. If can communicate at rates from 150 to 19,200 baud (bits per second) and supports four different kinds of *handshaking*. This interface can also function as a 20mA current loop interface. The operating specifications of the interface are as follows:

Data transfer rate:	150-19200
Word length:	1 start bit
	7 or 8 data bits
	Odd, even or no parity
	1 or 2 stop bits
Signal levels:	Mark or logical 1, −3 to −15 volts or current ON
	Space or logical 0, +3 to +15 volts or current OFF
Handshaking:	Serial BUSY, 1 byte mode
	Serial BUSY, 1 block mode
	ACK mode
	XON/XOFF mode

NOTE: 19200 baud can be used only with an RS232C interface; it cannot be used with a 20mA current loop interface.

The optional board has a DB-25 female connector to connect to a computer. The functions of the pins are summarized in Table H-1.

Table H-1
Serial interface pin functions

Pin No.	Signal Name	Direction	Function
1	GND	–	Printer's chassis ground.
2	TXD	OUT	This pin carries data from the printer.
3	RXD	IN	This pin carries data to the printer.
4	RTS	OUT	This is ON when the printer is ready to receive data.
5	CTS	IN	This pin is ON when the computer is ready to send data.
6	DSR	IN	This pin is ON when the computer is ready to send data. This printer does not check this pin.
7	GND	–	Signal ground.
8	DCD	IN	This pin is ON when the computer is ready to send data. This printer does not check this pin.
9	TTY TXDR	–	This pin is the return path for data transmitted from the printer on the 20mA current loop.
10	TTY TXD	OUT	This pin carries data from the printer on the 20mA current loop.
11	RCH	OUT	This is the signal line for the serial busy protocols. This pin goes OFF when printer's buffer fills, and ON when the printer is ready to receive data. In the busy protocols this line carries the same signal as pin 20.
12	N/C		Unused.
13	GND	–	Signal ground.
14-16	N/C		Unused.
17	TTY TXDR	–	This pin is the return path for data transmitted from the printer on the 20mA current loop.
18	TTY RXDR	–	This pin is the return path for data transmitted to the printer on the 20mA current loop.
19	TTY RXD	IN	This pin carries data to the printer on the 20mA current loop.
20	DTR	OUT	The printer turns this pin ON when it is ready to receive data.
21-22	N/C		Unused.
23	TTY RXDR	–	This pin is the return path for data transmitted to the printer on the 20mA current loop.

Pin No.	Signal Name	Direction	Function
24	TTY TXD	OUT	This pin carries data from the printer on the 20mA current loop.
25	TTY RXD	IN	This pin carries data to the printer on the 20mA current loop.

CONFIGURING THE SERIAL INTERFACE

DIP switch on the serial interface board controls the configuration of the serial interface. Table H-2 describes the functions of the individual switches in DIP switch.

Table H-2
DIP switch on serial board

Switch	ON	OFF
1	7 data bits	8 data bits
2	Parity checked	No parity
3	Handshaking protocols – see Table H-3	
4		
5	Odd parity	Even parity
6	Data transfer rate – see Table H-4	
7		
8		

Table H-3
Handshaking protocols

Protocol	Switch 3	Switch 4
Serial busy, 1 byte mode	OFF	OFF
Serial busy, 1 block mode	ON	OFF
ACK mode	OFF	ON
XON/XOFF mode	ON	ON

Table H-4
Data transfer rates

Baud rate	Switch 6	Switch 7	Switch 8
150	OFF	OFF	OFF
300	OFF	OFF	ON
600	OFF	ON	OFF
1200	OFF	ON	ON
2400	ON	OFF	OFF
4800	ON	OFF	ON
9600	ON	ON	OFF
19200	ON	ON	ON

THE SERIAL PROTOCOLS

This printer has four serial protocols selected by DIP switches 3 and 4. Figure H-1 shows a typical byte of serial data and Figure H-2 shows timing charts for the 4 protocols.

■ Serial busy protocols

In the serial busy protocols, this printer uses DTR (pin 20) and RCH (pin 11) to signal to the computer when it is able to accept data. These two pins go ON when the printer is ready to accept data. In the 1 byte mode they go OFF after each character is received. In the 1 block mode they only go OFF when the printer's buffer approaches capacity. In both cases they will stay OFF if the buffer is too full to accept more data.

■ XON/XOFF protocol

The XON/XOFF protocol uses the ASCII characters 〈DC1〉 and 〈DC3〉 (sometimes called XON and XOFF, respectively) to communicate with the computer. When the printer's buffer approaches capacity this printer will send a DC3 (ASCII 19) on TXD (pin 2) to tell the computer that it must stop sending data. When the printer is able to receive more data it sends a DC1 (ASCII 17) on TXD. The computer can then send more data until the printer sends another DC3.

■ ACK protocol

In the ACK protocol, this printer sends an ACK (ASCII 6) on TXD (pin 2) each time that it is prepared to receive a byte of data.

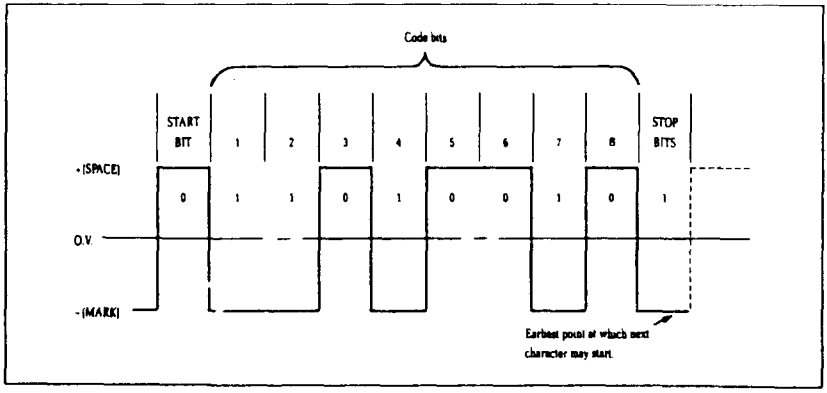


Figure H-1. Typical data byte on the serial interface.

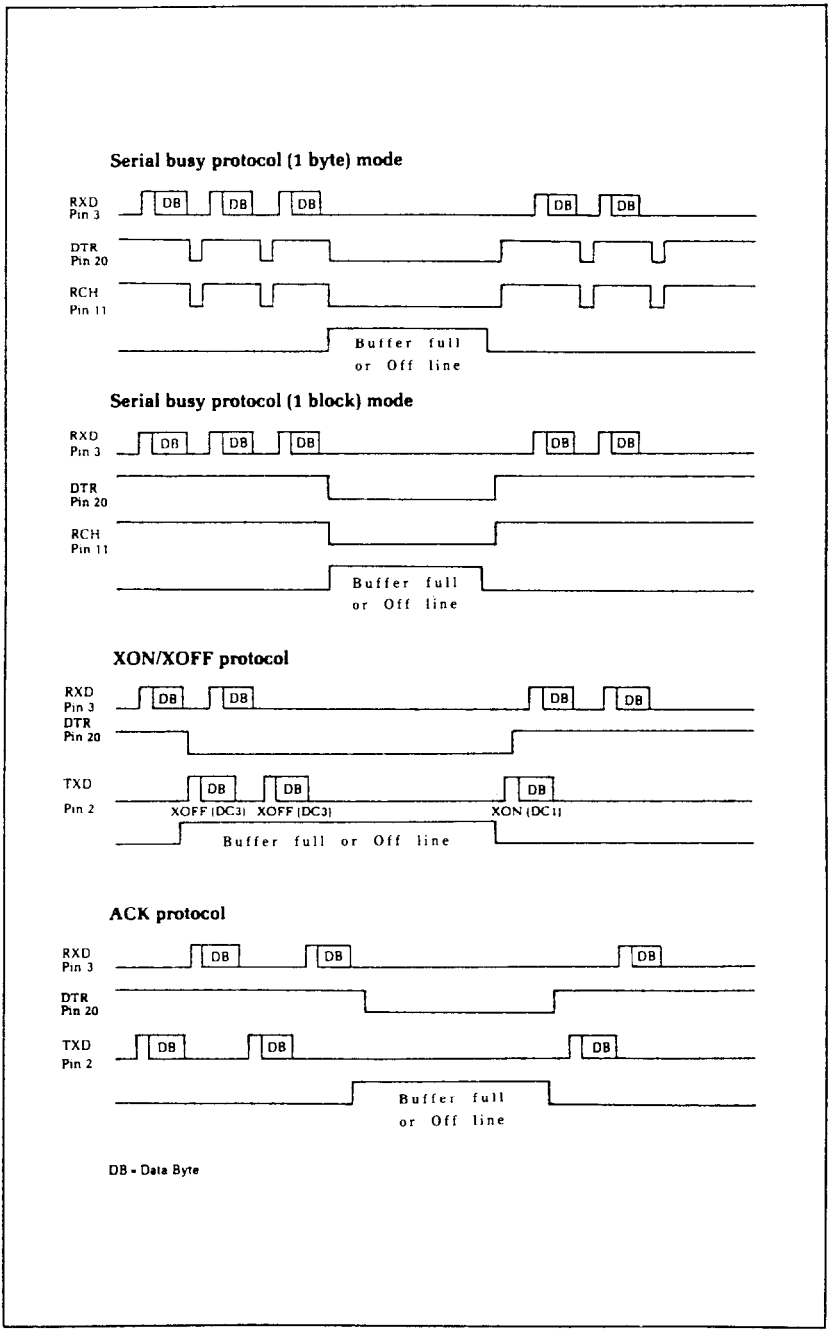


Figure. H-2. Serial protocol timing charts.

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